World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:17, No:03, 2023

Optimization of the Energy Management for a Solar System of an Agricultural Greenhouse

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Abstract : To improve the climatic conditions and increase production in the greenhouse during the winter season under the Mediterranean climate, this thesis project proposes a design of an integrated and autonomous solar system for heating, cooling, and conservation of production in an agricultural greenhouse. To study the effectiveness of this system, experiments are conducted in two similar agricultural greenhouses oriented north-south. The first greenhouse is equipped with an active solar system integrated into the double glazing of the greenhouse's roof, while the second greenhouse has no system, it serves as a controlled greenhouse for comparing thermal and agronomic performance The solar system allowed for an average increase in the indoor temperature of the experimental greenhouse of 6°C compared to the outdoor environment and 4°C compared to the control greenhouse. This improvement in temperature has a favorable effect on the plants' climate and subsequently positively affects their development, quality, and production.

Keywords : solar system, agricultural greenhouse, heating, cooling, storage, drying
Conference Title : ICSET 2023 : International Conference on Solar Energy Technology
Conference Location : Barcelona, Spain
Conference Dates : March 06-07, 2023