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Title:	Professor Mechanical Engineering Department, Technological Education Institute of Sterea Ellada Psachna 34400, Evia	
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Presentation title:	**Energy Analysis on Cascade Refrigeration CO2 Systems with Thermal Compression in Super Markets**	

The objective of this study is to present and examine a novel solar assisted mechanical compression refrigeration system. Flat plate collectors are used in order to partially thermally compress the refrigerant, after the mechanical compressor. This design aims to reduce the electricity consumption using a renewable energy source, creating a sustainable system. The thermal compression technology is a consenting technology due to the ability to use volatile fluids that have the ability to evaporate at ambient temperatures and of course to work as gas and not as vapours. The suggested design is analyzed parametrically in order to investigate its energetic behaviour in various operating conditions and it is examined with EES (Engineering Equator Solver) in steady state conditions. The examined parameters are the temperature levels -like those prevailing in super markets in the evaporator and the maximum one in the condenser- as well as the thermal compression fraction expressed with the pressure ratio parameter. The final results proved that the optimum values of the pressure after the mechanical compressor is the 75% of the maximum pressure and for this case, energy savings from 25% to 30% can be achieved. Moreover, the specific collecting area is found to be relatively low, close to 2m2/kW for the optimum cases. The final results proved that the new design leads to energy savings in all the examined cases and especially in cases with higher evaporating temperature levels, a fact that makes it ideal for space cooling applications.

CV:

Michalis Gr. Vrachopoulos is Professor of Mechanical Engineering Department, Technological Education Institute of Sterea Ellada. He has a PhD and long experience in Mechanical Engineering projects specialized in buildings' thermal behavior and the design of energy installations including solar and geothermal. He is director of Energy and Environmental Research Laboratory. He has published many papers in international journals and conferences with a large number of citations (based on Scopus and Google scholar sources) and he is author of four books in heating, cooling, air conditioning and renewable energy issues. He is a member of the Technical Chamber of Greece, American Society of Mechanical Engineers (ASME), and other scientific and professional bodies. It is worthwhile mentioning his experience in the organization, management and implementation of research projects, since he had main research role or he was Scientific responsible in research projects funded by General Secretariat for Research and Technology (GSRT) and European Commission as well. Among them is project TESSe2b: Thermal Energy Storage Systems for Energy Efficient Buildings. An integrated solution for residential building energy storage by solar and geothermal resources, Horizon 2020 project, GA 680555.