University of Cyprus
Department of Electrical and Computer Engineering

Seminar Series: Fall 2022

Green Hydrogen and its prospects in the energy transition

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Room: XOD02-112

Abstract: The presentation will provide key information on hydrogen technologies, including fuel cells, electrolysis, and hydrogen storage. The fundamental principles of fuel cell and electrolyzer technologies will be demonstrated. The various key processes in designing and integrating these components in a total hydrogen subsystem will be provided, including generation of hydrogen from water electrolyser stacks, storage of hydrogen in hydrogen storage units, utilization of hydrogen in fuel cell stacks to re-generate electrical energy. The key available technologies for fuel cell, electrolyzer, and hydrogen storage will be briefly mentioned. Then some key system options focusing on the integration of a hydrogen subsystem to RES-based technologies, such as solar photovoltaic (PV) technology will be discussed and analysed in terms of operation, integration, application, and advantages. It will be illustrated how a PV-battery-green hydrogen microgrid system operates, along with the benefits that arise in terms of onsite power generation, self-consumption, maximization of RES capacity and share, that can help in the effort of reaching monthly Net-Zero Energy Buildings (Net-ZEB) targets and reduce our carbon footprint. Finally, some European programmes related to green hydrogen technologies will be briefly presented to show the ongoing interest on this area.

Biography: Alexandros Arsalis is a Special Scientist (Research) at the FOSS Research Centre for Sustainable Energy of the University of Cyprus. He holds a PhD degree in Mechanical and Manufacturing Engineering from Aalborg University, Denmark (2012), an MS degree in Mechanical Engineering from Virginia Tech, Blacksburg, Virginia, USA (2007), a BS degree in Mechanical Engineering from Old Dominion University, Norfolk, Virginia, USA (2004). His PhD study was supported with a fully funded PhD fellowship from Aalborg University and the Danish Hydrogen and Fuel Cell Academy and was completed in collaboration with the industry (Danfoss & Dantherm Power). After his studies, he worked as a Postdoctoral RA at Aalborg University, Denmark. His research Interests include the application of advanced methodological approaches (e.g., thermoeconomic modelling, genetic algorithm optimization) for the design, modelling and optimization of novel energy systems based on fuel cell technology, hydrogen-generation-storage-and-utilization, heat and refrigeration cycles, photovoltaics, etc. He has authored more than 40 peer-reviewed papers in scientific Journals and Conference Proceedings and participated in several funded research projects. He is currently the guest editor of the Energies journal for the special issue 'Design, Modelling, and Optimization of Novel Fuel Cell Systems'.

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