ENERGETICS

MUR DM 117/GI - Integration of solar-water purification technologies and electrochemical technologies for sustainable fuels and water purification

Funded By	GREEN INDEPENDENCE SRL [P.iva/CF:02631640741] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	The research activity focuses on the integration of solar-water purification and electrochemical technologies for the decentralized production of green hydrogen and water. In detail, a system-scale optimisation analysis is planned to explore the various synergies between the envisioned technologies. Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23001950004
Objectives	The scope of the PhD research activity is to explore and optimize the synergistic integration of solar-driven water purification and electrochemical technologies with a focus on sustainable water and green hydrogen production. The activity involves numerical analyses. The research activity is related to an industrial collaboration with Green Independence srl. The objectives of the research are as follows: - Performance Evaluation: Conduct extensive numerical analyses to estimate, at the system-scale, the performance of the integrated system under various operating conditions. - Integration strategies: Explore methods to integrate the solar-driven water purification and electrochemical technologies to maximize energy efficiency and resource utilization. - System Design and Engineering: Develop a comprehensive design and engineering framework for the integrated system, considering factors like scalability, modularity, and safety.

	- Economic Viability: Assess the economic feasibility of the proposed integrated technology, considering potential cost savings, payback periods, and return on investment for industrial-scale applications.

Skills and competencies for the development of the activity	A deep knowledge of mass and heat transport phenomena and thus of thermo-fluidynamics is required. Strong knowledge of mathematical modeling, simulation tools (e.g., simulink, system modeler), and optimization techniques for system-level analyses is required. Excellent skills in managing and analyzing large datasets (related to energy consumption, production, and demand).