ENERGETICS

MUR DM 117/GI - Enhancing the energy efficiency of solar-water purification technology for green hydrogen production

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 investigating and improving the performance and efficiency of a wastewater purification system based on thermal membrane distillation processes, for green hydrogen production. Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23001950004
Objectives	The scope of the PhD research activity is to investigate and optimize the efficiency of solar-driven water purification technology with a specific focus on producing green hydrogen, in order to fulfill the growing demand for sustainable and environmentally friendly hydrogen production methods. The activity involves both experimental and numerical analyses. The research activity is related to an industrial collaboration with Green Independence srl. The objectives of the research are as follows: - Efficiency Enhancement: Investigate and identify key factors that affect the efficiency of solar-driven water purification technology for hydrogen production. This may include studying various solar collectors, heat recovery devices, geometry and configurations of the modules for thermal membrane distillation processes. - Green Hydrogen Generation: Develop and optimize the solar-driven water purification process to maximize the production of green hydrogen. The emphasis will be on evaluating the composition and quality of the produced water in input to the hydrogen production technology. - Performance Evaluation: Conduct extensive experimental testing and data analysis under various operating conditions to assess the reliability and

	scalability of the wastewater purification technology. - Cost-effectiveness: Evaluate the economic feasibility of the lab-scale technology and preliminarily propose cost-effective solutions for larger scale implementation in realistic settings. Overall, the PhD research activity aims to advance the field of solar-powered water purification for green hydrogen production by providing valuable insights and solutions that have practical applications in industry.

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 mechanical design and thus CAD software (e.g., solidworks) is required. Strong knowledge regarding the acquisition of experimental measurements and then data analysis is required. Strong knowledge of rapid prototyping processes is required.