Optimal Solar Systems for Industrial Heat and Power

INDHEAP

Introduction:

INDHEAP project will demonstrate at TRL7 that it is worth considering solar thermal (ST) and photovoltaic (PV) energies in combination to address the heat and power needs of mid temperature industrial processes, up to 250°C. As for it, INDHEAP will highlight the synergy between the different technologies with the development and integration of a core flexible Thermal Energy Storage, boosted by electric heaters (named e-TES) that is the key for a rational use of thermal and electrical solar renewable energy.

Project description:

The project will rely on the development of specific methodology and tools, tested on different case studies from industrial project's partners, as to:

1) Reduce heat and power peak demands with an optimization of the current energy efficiency for the industrial process, (best use of waste heat and analyse of demand's elasticity)

2) Define the best share between ST and PV based on technical-eco-environmental criteria

3) Define the ST-PV hybrid system's architecture, the presizing of components, and the global control maximizing the use of solar heat and power.

4) Develop the specific components for the best integration and use of ST and PV plants in synergy, e.g. the flexible e-TES, but also PV panels integration enablers, low cost / mid temperature solar collectors and a smart hybrid controller for heat and power joined management.

A prototype (ST up to 300 kWth, PV up to 20 kWp, e-TES up to 1 MWh) will be installed on an industrial process of lubricants blending, owned by Total Energies in Spain, to validate the concept at TRL7 with a one-year test campaign.

Project facts:

Start date: 01/01/2024
End date: 31/12/2027

Duration in months: 48

Project EU funding: € 6.99M

Research & Innovation Action

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Renewable energy sources - general – industrial solar heat and power, PV plant, ST plant, thermal buffer, hybrid ST and PV power plant.

Finally, from results gained, a global upscaling and replication potential across the South Europe and MENA areas will be achieved to assess the societal and economic benefits of the concept to meet the Net Zero by 2050 ambitions. INDHEAP will support the EU in reducing dependency to natural gas, while reaching climate targets.

Expected impact:

The INDHEAP project stands at the forefront of sustainable energy innovation, poised to revolutionize industrial processes with its pioneering approach to solar thermal (ST) and photovoltaic (PV) energies. At its core, the project aims to demonstrate the viability and efficacy of integrating these renewable energy sources to meet the heat and power demands of mid-temperature industrial processes, reaching up to 250°C.

Through meticulous research and development, the project will showcase the synergistic potential of ST and PV technologies, supported by the implementation of a groundbreaking Thermal Energy Storage system (e-TES). This innovative approach not only optimizes the utilization of solar energy but also contributes to reducing heat and power peak demands, enhancing energy efficiency, and minimizing environmental impact.

By addressing key challenges such as technology optimization, system architecture, and control mechanisms, INDHEAP seeks to pave the way for widespread adoption of solar energy solutions in industrial settings. A prototype installation, slated for validation at Total Energies' lubricants blending facility in Spain, marks a significant milestone in the project's journey towards achieving Technology Readiness Level 7 (TRL7).

Beyond the confines of this demonstration, the project holds the promise of scalability and replicability across South Europe and the MENA region, with potential societal and economic benefits that align with global sustainability goals. By reducing dependency on natural gas and advancing towards Net Zero targets, INDHEAP aims to catalyze a paradigm shift in the industrial energy landscape, driving towards a more sustainable and resilient future.

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