

Solar Polygeneration Collector for Combined Heat, Power, Hydrogen Fuel and Wastewater Treatment



MS6 - Design Key Performance Indicators established

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Public Executive Summary

The **SPECTRUM** project is developing solar polygeneration technologies to simultaneously generate heat, electricity, hydrogen fuel, and treat industrial wastewater.

This report (Milestone MS6) presents the structured definition of Key Performance Indicators (KPIs) that will guide the design, integration, and performance evaluation of the SPECTRUM polygenerating solar collectors. These collectors are being developed to simultaneously produce heat, electricity, and hydrogen, and enable wastewater treatment through a novel integration of subsystems, including a solar concentrator, spectral splitter, thermal absorber, photovoltaic (PV) modules, and a photocatalytic reactor.

The KPI framework has been developed in close collaboration with technology partners across Work Package (WP) 2, *Polygenerating collector design and optimization*, ensuring its relevance to both the individual subcomponent functionalities and the overall performance targets of the two collector configurations.

The performance indicators were systematically categorized into sub-component and collector-level KPIs to establish a more precise design framework. The former are defined as technical parameters whilst the latter are KPIs. This framework accounts for the complex nature of the development process, which necessitates the collaboration of various technologies and developers. Ultimately, this multidisciplinary approach aims to deliver two poly-generating collectors. The KPIs presented here serve as design targets and benchmarking metrics for upcoming work in WP2 (simulation and optimization), WP3 (prototyping), WP4 (validation), and WP5 (impact and techno-economic assessment).

This report establishes a robust basis for performance-driven collector development across the remaining phases of the SPECTRUM project.