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Optimizing Process Gas Utilization through AI: A Sustainable Energy Solution

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The transition toward a low-carbon, sustainable industrial ecosystem requires innovative solutions that maximize resource efficiency and minimize environmental impact. This study presents EnVisA, a research project funded by Vinnova, Sweden, focused on optimizing the utilization of process gases from steel production through advanced AI-driven tools. Despite the high calorific value of these gases, a significant portion remains underutilized or flared, leaving a great opportunity for improving energy recovery. EnVisA addresses this challenge by developing predictive models to forecast surplus gas availability and integrating real-time visualization systems to enhance operational decision-making. To realize this target, the project focused on enhancing the cooperation between different sectors from steelmaking to local energy system in the framework of Industrial Symbiosis. As a result, the outcoming real-time prediction and visualization system has been launched in the industrial trial to facilitate the integration of process gases into local energy systems and promote energy efficiency.

EnVisA's work aligns with the framework of the ongoing EU RFCS project SymbioSteel, which focuses on Industrial Symbiosis. It aims to transform the steel sector by promoting collaboration with other all stakeholders and reducing environmental impact and accelerate the adoption of Industrial Symbiosis in the steel industry, supporting decarbonization and resource efficiency. SymbioSteel provides a robust platform to evaluate project's performance on industrial symbiosis development, emission reduction, resuource efficiency, etc.

After EnVisA project was completed, it was evaluated with idea and methodologies from SymbioSteel, resulting in deeper insights into the potential of EnVisA for energy saving, environment protection and sustainable development. This will enable us to refine EnVisA's strategies and set plans for future development.

Keywords: Process gas; Energy recovery; AI prediction; Industrial Symbiosis; Steelmaking.

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