

EPOS WP 3 – EPOS tool development

Lead: EPFL

Technical methodology for cross-sectorial IS (1)

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Summary

This research provides a framework, called Osmose, for optimising complex industrial integration inside unit operations to the level of processes and entire plants and finally to considering industrial symbiosis opportunities, interactions between plants. This framework provides the calculation engine for the EPOS toolbox, one major innovation to be completed within the context of the EPOS project.

The framework is constructed in the domain of mixed-integer linear programming (MILP) which exhibits rapid convergence and a global optimum with well-defined solution methods. The model is built upon previous efforts in process integration and includes material and energy integration with thermodynamic constraints imposed by formulating the heat cascade within the MILP. The full model and method which forms the fundamental aspects of a process integration problem is presented, considering exchange restrictions and the problem formulation across multiple time-scales to provide flexibility in solving complex design, planning and operational problems. A case study is included to demonstrate the capabilities and results on a simple, fictional example though the potential applications for the method are broadly applicable across scale, time and plant complexity. The methodology can be applied in a variety of cases and the multi-scale superstructure optimisation framework will be extended to improve its applicability and accuracy.