The chemical sector blueprints give a comprehensive representation of some typical chemical processes in terms of their main energy and material flows. Given the complexity of the chemical industry, blueprints are built for three major chemical processes: a refinery, a polymerisation unit and a typical synthesis reaction. Figure 1 depicts the blueprints’ life-cycle. It is constituted of two phases: (1) the construction phase during which the blueprints are created by experts and integrated into the EPOS toolbox; (2) the utilisation phase when the user screens for Industrial Symbiosis (IS) potential.

INTRODUCTION

A systematic methodology is applied in order to produce the chemical blueprints [1]. Three profiles are generated and summarise the material, thermal and electrical inputs and outputs of the chemical process under consideration (see Figure 2). They can be visualised thanks to Sankey diagrams. For the energy profiles an additional display is available giving access to a deeper level of detail with respect to the process energy consumption. Various anonymisation techniques have been applied (Pareto approach, data aggregation, use of anonymisation factors) in order to ensure data confidentiality while keeping the realistic nature of the blueprint. The blueprints are customisable mixed integer linear programming (MILP) models for identifying and optimising the best IS connections between process sectors and are made available through the EPOS toolbox [2].
In this section, the first level of the blueprints' visualisation is illustrated using the blueprint of the synthesis reaction process. This unit is constituted of the three typical steps: pre-treatment, reaction and separation. The first level of the material and energy profiles are displayed in Figure 3 and Figure 4. The material profile indicates that a large part of the raw material inputs are recycled back to the process. The energy profiles show that heat, under the form of steam, is mainly used during the pre-treatment and the separation stages while electricity is used to power the cooling pumps and compressors.
The use of blueprints is a powerful tool for overcoming the burden of industrial data confidentiality. They provide an easy and clear solution for industries to share data and learnings that can lead to better practices, operation optimisation and even new businesses.

REFERENCES


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