Industrial energetic optimization methodology combining BAT Analysis and Process Simulation

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Authors agree that a sustainable industry requires innovative approaches [1] with an increased emphasis on decisions over process selection [2]. This paper proposes an innovative approach for sustainable process design based on two known tools: BAT (Best Available Techniques) Analysis, meant to be the support for decision making during process selection and design, and process simulation, which works as an evaluation tool to compare alternatives. BAT Analysis [3] involves a deep knowledge of the process considered to develop an inventory of candidate techniques, proving a technical sheet with related information for each of them. Based on this information, techniques for the specific situation can be selected for implementation. On the other hand, process simulation is a useful tool to predict process behaviour in response to changes in one or more variables [4].

This paper proposes a new methodology to improve the sustainability of industrial processes combining these tools. The first one, BAT Analysis, is used to analyse the considered plant and to select the candidate techniques for implementation. Then the selected alternatives are evaluated using simulation, which would determine the configuration that best improves the sustainability of the process. The combination of both tools in an integrated methodology will help decision makers to select the most sustainable configuration for a given process. The methodology has been validated in a hydrogen production plant. Results show, after the analysis of several scenarios representing the implementation of different candidate techniques, that the energy efficiency of the process is highly improved when the appropriate combination of BAT is applied.

Keywords: BAT Analysis, process simulation, energy efficiency.

References