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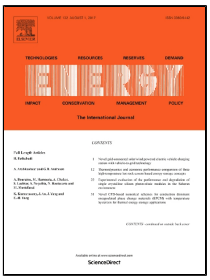

The implementation of inter-plant heat integration among multiple plants. Part II: The mathematical model

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The implementation of inter-plant heat integration among multiple plants. Part II: The mathematical model

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ABSTRACT

It is a challenging task to solve a large-scale Inter-Plant Heat Integration (IPHI) problem, especially for simultaneous optimization for intra- and inter-plant heat integration. In the companion paper (Part I), a novel screening algorithm named Nearest and Largest Q_{rec} -based Screening Algorithm (NLQSA) was proposed. It can be used to divide a large-scale IPHI problem into several small ones, each of which includes two or three plants, while keeping the theoretical maximum inter-plant heat recovery potential Q_{rec}^{max} almost unchanged. NLQSA provides a prior solution before determination of inter-plant Heat Exchanger Network (HEN) configuration for each achieved small IPHI scheme. In this paper, a modified MINLP model with an objective of minimum Total Annual Cost (TAC) is proposed to determine the final inter-plant HEN configurations of achieved segregated IPHI schemes. With the addition of stream data extraction method and NLQSA which were proposed in Part I of this paper series, a complete three-step strategy is established in order to solve the large-scale IPHI problem. Theoretically, a large-scale IPHI problem can be solved no matter how many plants involved. A case study with seven plants is introduced to illustrate the feasibility and effectiveness of the proposed method.

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