DETC2016-59965

ENERGY SYMBIOSES IN ECO-INDUSTRIAL PARKS: MODELS AND PERSPECTIVES

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ABSTRACT

Design and implementation of Eco-Industrial Parks (EIPs) is a practical and scientific solution to achieve sustainable industries. Specifically, energy exchange networks can significantly contribute to the pollution reduction by recovering and sharing wasted heat generated in industrial processes. Despite this perceived fact, the existing research seems mainly looking for one to one relation and lacks in methods for modeling and optimizing multi-synergy symbioses which is essential for EIPs. This paper reviews main concepts in designing industrial symbioses and proposes an optimization model to exchange residual energy between individual industries in an EIP. Using mathematical programming, the model decides the best set of connections between energy suppliers and users to minimize the total cost and maximize energy symbioses. The presented models analyze perspectives to potential symbioses for individual industries and EIP managers. A detail discussion clarifies how these perspectives can affect the optimized symbioses. The model is validated using anonymized data of a real case. The result shows that various perspectives to the model provide different energy network topographies.