

Multi-Criteria Evaluation of Integrated Renewable Energy Systems for Community-Scale Applications

Authors : Kuanrong Qiu, Sebnem Madrali, Evgueniy Entchev

Abstract : To achieve the satisfactory objectives in deploying integrated renewable energy systems, it is crucial to consider all the related parameters affecting the design and decision-making. The multi-criteria evaluation method is a reliable and efficient tool for achieving the most appropriate solution. The approach considers the influential factors and their relative importance in prioritizing the alternatives. In this paper, a multi-criteria decision framework, based on the criteria including technical, economic, environmental and reliability, is developed to evaluate and prioritize renewable energy technologies and configurations of their integrated systems for community applications, identify their viability, and thus support the adoption of the clean energy technologies and the decision-making regarding energy transitions and transition patterns. Case studies for communities in Canada show that resource availability and the configurations of the integrated systems significantly impact the economic performance and environmental performance.

Keywords : multi-criteria, renewables, integrated energy systems, decision-making, model

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