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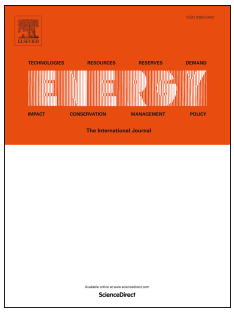

Robust design and optimization of solar photovoltaic supply chain in an uncertain environment

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Robust design and optimization of solar photovoltaic supply chain in an uncertain environment

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Abstract

The rising concern about environmental impacts of fossil fuels has forced supply chains to focus more on environmentally sustainable energy sources. Solar is one of the most promising alternative sources of energy that is widely available and environment friendly. In this respect, this paper develops a two-phase approach based on data envelopment analysis and robust optimization models to design and plan a solar photovoltaic supply chain in an uncertain environment. Applying the data envelopment analysis model, the first phase identifies the most suitable candidate locations for solar plants according to a set of technical, geographical and social criteria. The selected locations are utilized later in the optimization model. This phase is capable of reducing the computational complexity of the optimization model by removing inappropriate sites. In the second phase, the robust optimization model determines both strategic and tactical decisions of photovoltaic supply chain, while ensuring that supply chain network is stable under almost all possible realizations of uncertain parameters. The performance of the proposed approach is examined by a real case study in Iran through which important managerial and practical insights are derived.

Keywords: Photovoltaic supply chain, Solar energy, Supply chain network design, Robust optimization, Data envelopment analysis, Uncertainty.

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