

Optimization model for design and analysis of an integrated energy system for residential sector

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In this study, we develop a new optimization-based framework for design and analysis of renewable energy system for the residential sector. In achieving this goal, we first generate different scenarios for integrated energy system which includes different types of renewable resource and various new technologies along with the existing technologies in the current energy system. We then develop a new network optimization model to feature the underlying system, which includes minimizing the energy cost as an object function with different constraints. Finally, we apply the model to the design problem of the energy supply system for the residence in Jeju Island, Korea. As a result, we identify the optimal configuration of the systems and comparatively analyze the economic performance of the optimal and alternative energy systems. We also analyze the sensitivity of main cost-drivers for the total required cost.