

Optimal planning of energy management system under demand uncertainty

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With ever-growing global demand for energy, reducing dependency on fossil fuels is a major challenge for most economically advanced countries. This necessitates investments in R&D infrastructure as well as resource allocation strategies for alternative energy resources. This study addresses the problem of modeling energy resource allocation and deriving an optimal policy for long-term investments in novel energy technologies. A probabilistic model based on Markov chain that balances the demand and supply is first constructed. The objective is to determine how we invest in each energy resource by considering the uncertainty as well as the future value of each energy resource including sustainability, economic feasibility, and shipping cost over future time window. For this, we propose an algorithmic strategy based on the framework of approximate dynamic programming and demonstrate the methodology using the available data in the literature reflecting the current situation of Korea.