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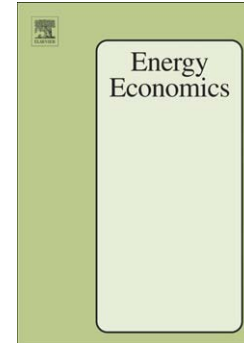
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Considering Uncertainty in Electricity Demand and Public Acceptance

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Strategic Real Option and Flexibility Analysis for Nuclear Power Plants Considering Uncertainty in Electricity Demand and Public Acceptance

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Abstract

Nuclear power is an important energy source especially in consideration of CO₂ emissions and global warming. Deploying nuclear power plants, however, may be challenging when uncertainty in long-term electricity demand and more importantly public acceptance are considered. This is true especially for emerging economies (e.g., India, China) concerned with reducing their carbon footprint in the context of growing economic development, while accommodating a growing population and significantly changing demographics, as well as recent events that may affect the public's perception of nuclear technology. In the aftermath of the Fukushima Daiichi disaster, public acceptance has come to play a central role in continued operations and deployment of new nuclear power systems worldwide. In countries seeing important long-term demographic changes, it may be difficult to determine the future capacity needed, when and where to deploy it over time, and in the most economic manner. Existing studies on capacity deployment typically do not consider such uncertainty drivers in long-term capacity deployment analyses (e.g., 40+ years). To address these issues, this paper introduces a novel approach to nuclear power systems design and capacity deployment under uncertainty that exploits the idea of strategic flexibility and managerial decision rules. The approach enables dealing more pro-actively with uncertainty and helps identify the most economic deployment paths for new nuclear capacity deployment over multiple sites. One novelty of the study lies in the explicit recognition of public acceptance as an important uncertainty driver affecting economic

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