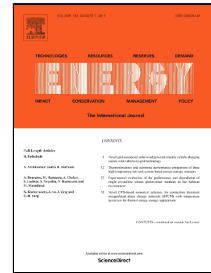


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Davood Manzoor, Vahid Aryanpur



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Power Sector Development in Iran: A Retrospective Optimization Approach

Davood Manzoor ¹

Vahid Aryanpur ^{2*}

Abstract: This paper provides an overview of the power sector development in Iran for the period 1984-2014. A retrospective optimization approach is applied to assess economic and environmental benefits that would have been achieved through appropriate long-term planning. MESSAGE, a systems engineering optimization model, is used for this analysis. Two alternative scenarios are defined to explore the impact of supply- and demand-side strategies on the power generation mix, fuel consumption and CO₂ emissions. The focus on the past choice of energy scenarios provides some insights for future scenario design. The results of the cost-optimal scenarios with international fuel prices are compared with the actual historical development. The findings indicate that the demand-side strategies are key drivers in achieving a low-carbon generation mix. Least-cost scenarios would favor much more combined cycle, renewable technologies and distributed electricity generation units, and less gas turbine than the actual transition pathway. Long-term energy planning would have reduced the cumulative total power system costs by \$21-\$90 billion.

Keywords: Iranian Power Sector; Retrospective Analysis; Energy System Planning; Cost-optimal Scenario; MESSAGE Model

¹ Associate Professor of Economics at Imam Sadiq University, Tehran, Iran. E-mail: manzoor@isu.ac.ir

² Energy and Power Planning Office, Department of Energy, Tehran, Iran. E-mail: aryanpur@alum.sharif.edu

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