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Economic Evaluation of Varying Scenarios to Fulfill the Regional Electricity Demand in Pakistan

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Abstract : Poor planning and governance in the power sector of Pakistan have generated several issues ranging from gradual reliance on thermal-based expensive energy mix, supply shortages, unrestricted demand, subsidization, inefficiencies at different levels of the value chain and resultantly, the circular debt. This situation in the power sector has also hampered the growth of allied economic sectors. This study uses the Long-range Energy Alternative Planning (LEAP) system for electricity modelling of Pakistan from the period of 2016 to 2040. The study has first time in Pakistan forecasted the electricity demand at the provincial level. At the supply side, five scenarios Business as Usual Scenario (BAUS), Coal Scenario (CS), Gas Scenario (GS), Nuclear Scenario (NS) and Renewable Scenario (RS) have been analyzed based on the techno-economic and environmental parameters. The study has also included environmental externality costs for evaluating the actual costs and benefits of different scenarios. Contrary to the expectations, RS has a lower output than even BAUS. The study has concluded that the generation from RS has five times lesser costs than BAUS, CS, and GS. NS can also be an alternative for the sustainable future of Pakistan. Generation from imported coal is not a good option, however, indigenous coal with clean coal technologies should be promoted. This paper proposes energy planners of the country to devise incentives for the utilization of indigenous energy resources including renewables on priority and then clean coal to reduce the energy crises of Pakistan.

Keywords : economic evaluation, externality cost, penetration of renewable energy, regional electricity supply-demand planning
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