

Addressing the factors causing inefficiency of fossil fuel power generation in Saudi Arabia

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Abstract:

Efficiency of fossil fuel generation has improved significantly over the last decade and has a potential for further improvement. Fuel types and technologies have played a crucial role in this trend. However, several factors can affect efficiency with different impacts, such as equipment aging, operation, maintenance and fuel subsidies etc.

Saudi Arabia is among the countries with the lowest generation efficiency. On the other hand, the energy demand is growing above the global average. This has increased the consumption of fossil fuel since it is the sole source of electricity in the kingdom. The increasing consumption can affect the share of oil export, and it also contributes to the high level of emission, which has made Saudi Arabia one of the highest emitters of CO₂ in the globe. Recent researches have suggested increasing the share of combined cycle gas turbines (CCGT) since it has the highest generation efficiency. Furthermore, the increased share of natural gas also contributes to higher efficiency. Nevertheless, the doubling of the CCGT capacity between 2011 and 2013 from 6% to 12 % has led to only 1% increase in generation efficiency, with natural gas accounts for 50% of total electricity production. Fuel type and technology have not increased generation efficiency significantly in Saudi Arabia.

This paper aims to identify the main factors causing the current relatively low efficiency in fossil fuel power plants in Saudi Arabia. First, the factors influencing efficiency were investigated. Second, factors with the higher impacts were identified. Third, real data were collected and carefully analyzed. The results have shown strong evidence to link these factors to low generation efficiency in Saudi Arabia.

In conclusion, we found that operation and fuel subsidies are the most influencing factors leading to low generation efficiency in the kingdom. Low cost of fuel paid by power providers has generated distorted price signals. As a result, the merit order of operating power plants is affected negatively. In addition, the absence of competition and lack of incentives are the secondary factors causing inefficiency in electricity generations.

Keywords: Efficiency, Electricity, Generation, Fossil Fuel.