

## **Executive Summary**

### **Oil Subsidies and Renewable Energy in Saudi Arabia: A General Equilibrium Approach**

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Saudi Arabia is embarking on a long-term economic strategy to reform its energy system, including the decarbonization of its electricity mix. In particular, the Kingdom has outlined in the Vision 2030 strategic document plans for the deployment of 9.5 GW of renewable energy. The impact of renewables in the economy is often analyzed via cost-benefit analysis, where the cost to renewable technologies is compared to the cost of fossil fuel technologies using a partial equilibrium approach. However, for Saudi Arabia, a different approach is needed for analyzing the implications of renewable technologies.

Saudi Arabia consumes oil to produce electricity at utility scale, something atypical to many developed economies. In addition, given the abundance of cheap fossil fuel resources, the domestic price of oil is lower than the international price. This implies that if Saudi Arabia were to shift from oil toward renewables for producing electricity it would open up the opportunity to export more oil; thus, increasing oil revenues for the country. All these elements are considered in the research for this paper, using a general equilibrium modeling environment.

The results of the analysis suggest that a relative small quantity of renewable technology (consistent with the country's Vision 2030 plans), would have a positive impact on long-run GDP and households' welfare. For a large deployment of renewable energy, the integration costs of this technology into the electricity system is critical. The results suggest that households' welfare would be maximized at around 30-40 percent renewables penetration. An unpleasant corollary of this is that Saudi Arabia's economy becomes more dependent on oil for revenue as the penetration of renewables increases.

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In this context, this paper also explores the potential effects of increasing the administered price of oil in the domestic market, based on the principle that an economy not distorted by policies and regulations would perform better and have higher households' welfare. The results show that this strategy has a positive impact on welfare. However, welfare gains are non-linear and it is shown that the gains would peak when the domestic price reaches about \$44 per barrel at 2010 prices (approximately \$54 at current prices).

The paper also discusses an important potential risk for Saudi Arabia, if it were to follow such a strategy. The analysis shows that exporting significantly more oil onto the international market could have a negative impact on international oil prices (given Saudi Arabia's position in the market), and thus could potentially offset the potential gains from the suggested renewable energy policy.