

## Renewable Portfolio Standards May Reduce Green Energy used in Electricity Production

Rising energy prices, dependence on foreign oil supplies, and consequences of climate change have prompted governments worldwide to initiate policies to shift from fossil fuels to renewables for electricity generation. One of the most commonly used policy instruments is the Renewable Portfolio Standard (RPS), which requires electricity providers to procure green energy (e.g., wind, solar, biomass) for a portion of their electricity supplies. To date, RPS has been a state-mandated program in the United States. As of February 2017, 29 states, Washington DC, and 3 territories have adopted RPS policies.

### *CAFIO-PRG Research*

The objective of a recently published paper (Bhattacharya, Giannakas, and Schoengold, 2017) is to determine the system-wide market and welfare effects of the introduction of RPS (or increase in mandated renewable share) in electricity markets. Our analysis takes into account the supply and demand effects of RPS which include increased costs (i.e., *cost effect*) and a higher consumer valuation (i.e., *utility effect*) for regular power. It recognizes the coexistence of mandate-driven *compliance* markets (where regular power containing a portion of renewables is sold to the end users) with *voluntary* markets (where consumers purchase green power from their electric suppliers on a voluntary basis), and incorporates the possibility that green energy for RPS may be more expensive than voluntary markets due to additional restrictions. It allows for increased congestion in green energy production with RPS, which increases the cost of voluntary green power.

### *CAFIO-PRG Findings*

- The introduction of RPS can reduce the total quantity of green power used in electricity production. This adverse policy impact will occur when a relatively small share of renewables in the regular power mix (mandated by RPS) generates a significant consumer shift from voluntary green power and/or a small increase in the costs of regular power.
- The most likely outcome depends on whether an area has congestion in green energy supply. The cost effect of RPS requirements may be lower in a non-RPS state with plentiful wind energy (e.g., Nebraska) than in one with limited sources of wind energy (e.g., West Virginia). Differences depend on whether there is underutilized wind energy capacity.
  - *Areas with no congestion with green energy supply:* The most likely scenario is an increase in the quantity of green power and an increase in the price of regular power. There is an increase (decrease) in welfare for green (regular) consumers. Firm profits in both markets decrease, a result that is consistent with a lack of industry support for RPS. Thus, under plausible scenarios, RPS policies can be successful in increasing the use of renewable energy sources, but are unlikely to be politically popular.
  - *Areas with congestion with green energy supply:* Areas with congestion in renewable energy supply are more likely to have an increase in consumer welfare and in regular firm profit. Thus, it is likely that RPS policies will have considerable political support in these cases. However, results show that the effect may actually be a net decrease in renewable energy, which is contrary to the primary goal of RPS. In such cases, there may be real economic benefits of RPS but little (if any) environmental benefits.
- Results are based on the status quo with no taxes or tradable permits for fossil fuels. Such policies will make renewable energy relatively more attractive and cost-effective under all scenarios.

Karina Schoengold, Associate Professor, UNL; Konstantinos Giannakas, Professor, UNL; & Suparna Bhattacharya, Public Utility Commission of Oregon