

The Cost of Solar-Centric Renewable Portfolio

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Abstract : This paper develops an econometric forecasting system of energy demand coupled with engineering-economic models of energy supply. The framework is used to quantify the impact of state-level renewable portfolio standards (RPSs) achieved predominately with solar generation on electricity rates, electricity consumption, and environmental quality. We perform the analysis using Arizona's RPS as a case study. We forecast energy demand in Arizona out to 2035, and find by this time the state will require an additional 35 million MWh of electricity generation. If Arizona implements its RPS when supplying this electricity demand, we find there will be a substantial increase in electricity rates (relative to a business-as-usual scenario of reliance on gas-fired generation). Extending the current regime of tax credits can greatly reduce this increase, at the taxpayers' expense. We find that by 2025 Arizona's RPS will implicitly abate carbon dioxide emissions at a cost between \$101 and \$135 per metric ton, and by 2035 abatement costs are between \$64 and \$112 per metric ton (depending on the future evolution of nature gas prices).

Keywords : electricity demand, renewable portfolio standard, solar, carbon dioxide

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