

Quantifying air pollution and health co-benefits from climate policy

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We evaluate the influence of potential US climate policies on regional ozone and particulate matter concentrations and air pollution-related health and economic impacts. To assess future air quality, we couple output from a regional computable general equilibrium economic model (the US Regional Energy Policy [USREP] model), with a regional air quality model (the Community Multiscale Air Quality [CMAQ] model). USREP projects the future economy (through the projection of economic variables such as GDP, energy use, sectoral output, consumption, etc.), as well as emissions of greenhouse gases. Here, it is extended to project urban and regional pollutants (CO, VOC, NO_x, SO₂, NH₃, black carbon, and organic carbon). USREP is used to determine how potential future U.S. climate policy would change emissions from ten emissions-heavy sectors of the economy (electricity, coal, gas, crude oil, refined oil, energy intensive industry, other industry, service, agriculture, and transportation [light duty and heavy duty]). For this study, we will use USREP to evaluate how pollutant emissions would change under two climate policy scenarios: a market-based cap-and-trade policy (or equivalently a carbon tax) covering all sectors of the economy, versus regulatory policies such as renewable electricity standards that are targeted towards specific sectors. Future scenarios of pollutants are then modeled using CMAQ for the eastern U.S. to determine the impact on ground level pollution and the potential for human exposure in major urban areas in the US. We then use an extension of the USREP model to quantify mortalities and morbidities associated with ozone and particulate matter, and quantify the economic impact of these damages. Estimations of the damages of both scenarios will be compared with the cost of implementation.