

POWER CONFERENCE

On Energy Research and Policy

ABSTRACT

"Decompositions and Policy Consequences of an Extraordinary Decline in Air Pollution from Electricity Generation"

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We find that annual damages from air pollution produced by U.S. power plants fell from \$245 billion in 2010 to \$133 billion in 2017, a 46 percent. Most of the decline in damages is due to reduced sulfur dioxide emissions, decreased generation from coal-fired power plants, and changes in power plants in the East. Per person, damages declined by about \$1,000 for residents in West Virginia, Pennsylvania, and Ohio. The reductions in pollution damages between 2010 and 2017 were greater in poorer areas. We estimate that average damages decreased from about \$600 to \$200 per capita for individuals in the lowest-income decile, and from about \$450 to \$150 for those in the highest decile. The study highlights four avenues through which the net \$112 billion reduction in damages occurred. Reduction in emissions per power plant, mostly due to the installation of emissions control technologies, accounted for \$63 billion of the total decline. Shifting power generation from dirtier (coal) plants to cleaner (natural gas) plants explained \$60 billion of the decline. For example, shifts away from fossil-fuel-based generation towards renewable generation reduced damages by \$25 billion. In opposition to these declines, the damage costs per unit of emissions increased damages by \$35 billion. This increase was due to a combination of population growth and demographic changes, atmospheric changes, and a rising social cost of carbon. We use their findings to quantify the potential implications for policy. We estimate that over this seven-year period, marginal damages decreased from 8.6¢ per kilowatt hour (kWh) to 6.0¢ per kWh in the East. However, marginal damages in the West and Texas increased slightly. These numbers are then used to calculate the benefits of electric cars and household solar panel adoption. We find that, in 2010, the average electric car had a higher annual pollution cost, by about \$81, than a gasoline-fueled car. By 2017, the average electric car was cleaner by \$72. Household solar panels, meanwhile, had an annual environmental benefit of \$356 in 2017, down slightly from \$418 in 2010. The averages, however, mask substantial geographic variation.