Emissions from Coal-Fired Power Plant Retirements [*]

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Abstract

The coal-fired power plant industry is a major polluting source of various emissions, including greenhouse gas (CO2), sulfur dioxide (SO2) and nitrogen oxides (NOx). Beginning in around 2012, many coal-fired power plants in the U.S. started to retire, which creates a chance for evaluating their end-of-business-cycle polluting behavior. This paper examined the coal-fired power plants' emission patterns when they approach retirement. A better understanding of such emission patterns can guide the government in designing environmental regulations that reduce emissions efficiently. Using data from the Continuous Emission Monitoring System, which includes all the coal power plants regulated by the Acid Rain Program in the U.S., we apply a fixed effects model to evaluate the emission rates for the last 10 years of operation. I found a significantly higher CO2 emission rate in their last three years of operation and a constantly increasing trend for NOx and SO2 emission rates in their last five years of operation. As a result, in their last year of operation, each generating unit on average emits 78.6 million lbs CO2 (1.5%), 0.9 million lbs NOx (14%) and 6.3 million lbs SO2 (47.6%) more than the baseline level in 2012. The increase in CO2 emission rate is mainly due to the lower efficiency of the generating units. Controlling for the monthly lagged startup and shutdown frequency can explain about 17% of the efficiency decrease in their last year of operation. I use a single agent model to study the power plants' exit decision and predict the retirement decision in each year. Plants with higher exit probability do not show a significantly different emission rate trend suggesting that intentionally reducing maintenance may not be the main driving force. Regulated coal power plants exhibit a higher SO2 emission rate trajectory than their privatized counterpart, which implies capital-intensive abatement techniques may play an important role.

1   Introduction

Coming Soon.