



Harvard Kennedy School Energy Policy Seminar Series, Spring 2015

PJM's Economic Analysis of the EPA Clean Power Plan

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Discussion of the EPA's Clean Power Plan proposal continued in the March 9, 2015, energy policy seminar, with a presentation by Dr. Paul Sotkiewicz, Chief Economist, Markets, for PJM Interconnection, on the results of extensive computer modeling by PJM of how the EPA's proposed carbon emission reduction standards for existing sources might play out in PJM's electricity markets.

Through detailed simulations that together consumed more than three months of computer processing time and included transmission constraints and detailed information about existing generation, PJM simulated the economic dispatch results of a range of scenarios that included higher and lower energy efficiency rates, variations in natural gas prices, and greater and lesser amounts of renewable generation.

The PJM simulation worked by running dispatch scenarios with increasing implied carbon prices incorporated until it reached a dispatch whose emissions complied with the proposed EPA rule. Dr. Sotkiewicz noted that the particular assumptions made in the different scenarios were either requested by the Organization of PJM States, or designed to provide bounds on possible outcomes. Given the uncertainty as to what set of assumptions would be realized by 2020, the point of the exercise is not any precise set of results, but rather certain patterns in the results that seem to hold even as assumptions are changed.



Some patterns in the simulation were exactly what would be expected. For example, PJM ran the simulations both for a regional compliance approach (in which the twelve states entirely or partially in the PJM region cooperated in meeting EPA targets) and a state-by-state approach. As would be expected, costs for the regional approach are lower overall.

Other patterns that emerged were more surprising. In scenarios with higher amounts of renewables and/or energy efficiency, for example, these resources displaced more natural gas generation than coal generation, because under economic dispatch, coal remained relatively cheap, even when PJM incorporated an implied carbon price. Another surprising finding was that the results of the simulations were very different depending on whether PJM approached the standard from a "rate-based" (no more than a certain amount of emissions per kwh generated) or a "mass-based" (keeping emissions below a certain cap) perspective. (The two approaches are intended to be equivalent alternatives for each other). PJM's models showed a rate-based approach resulting in lower electricity prices than a mass-based approach, while implied carbon prices were actually higher.

PJM's analysis assumed that the rule only applied to sources in existence or under construction as of January 2014. Sources built after this time were presumed to be regulated under section 111(b), which governs "new sources" of emissions.

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