

Key Points About NERA's Analysis of Four EPA Regulations

- National Economic Research Associates (NERA) analyzed the combined energy and economic impacts of four EPA rules: (1) the final Cross-State Air Pollution Rule and the proposed rules for (2) utility MACT, (3) coal combustion residuals, and (4) 316(b) (cooling water intake structures).
- NERA used three models to conduct its analysis and relied on cost and other data from EPA and EIA for most of the modeling assumptions. The results of the analysis show substantial economic impacts.
- Costs for the electric sector to comply with the four rules are projected to be **\$21 billion** per year, which includes **\$104 billion** (present value) in capital spending. Together, these are the most expensive rules EPA has ever written for coal-fueled power plants.
- Retail electricity prices in regions of the U.S. covering all or portions of 30 states plus DC are projected to increase by **double digits** in the peak years, with some regions experiencing increases as high as **19 percent**.
- Nationwide *net* employment losses total **1.65 million job-years** by 2020, with an average of **183,000 jobs** lost per year. Net takes into account both job gains and losses.
- Natural gas use for electric power generation increases, causing natural gas prices to rise. As a result, residential, commercial, and industrial consumers will spend **\$8 billion** more per year for natural gas, a total of **\$52 billion** (present value) by 2020.
- The average U.S. family loses **\$270 per year** in disposable income.
- Over **39,000 MW** of coal-fueled electric generating capacity become uneconomic and retire prematurely. This represents 12 percent of the U.S. coal fleet.
- Further details are available in NERA's 74-page report, "Potential Impacts of EPA Air, Coal Combustion Residuals, and Cooling Water Regulations." For the full report, please visit: http://www.americaspower.org/NERA_CATR_MACT_29.pdf.

Impact of EPA Regulations on Coal-Fueled Power Plants

October 2011

Recently, National Economic Research Associates (NERA)¹ modeled the economic impacts of four major EPA regulations that affect coal-fueled power plants: (1) the final Cross-State Air Pollution Rule and proposed regulations for (2) Utility MACT, (3) cooling water intake structures, and (4) coal combustion residuals. The modeling was conducted to help understand the combined impacts of these four regulations on the electric power sector and the U.S. economy.

How did NERA model these regulations? NERA used three models: the National Energy Modeling System (NEMS) developed by the Energy Information Administration (EIA); the PI+ model developed by Regional Economic Models, Inc. (REMI); and a model developed by NERA to project coal unit retirements.

NEMS is a comprehensive model of the U.S. energy-economy developed by the Energy Information Administration (EIA), which uses NEMS to project the impacts of alternative energy policies. REMI's PI+ is a macroeconomic model that projects changes in employment, GDP, disposable personal income, and other macroeconomic parameters caused by changes in supply, demand, prices, and other inputs. The PI+ model provides a comprehensive, economy-wide assessment of employment effects in 70 sectors of the economy.

NERA's coal-unit retirement model is designed to simulate decisions by power plant owners whether to retrofit or retire coal units. The model uses a Monte Carlo simulation that considers ranges of values for key variables, including control technology costs and fuel prices, to develop a range of possible outcomes, along with the probability of each outcome. Monte Carlo analyses are a comprehensive way to take uncertainty into consideration.

What are some of the impacts? NERA projects these four EPA regulations will:

- Cost \$21 billion per year between 2012 and 2020, a total cost of \$127 billion over the period;
- Cause a net loss of jobs averaging 183,000 jobs per year, a total of 1.65 million job-years lost by 2020;
- Increase electricity prices by double digits in many regions of the country, with peak-year increases in some regions as high as 19 percent;

- Increase the cost of natural gas for consumers and businesses by \$8 billion per year, a total cost of \$52 billion by 2020;
- Cause a loss of \$270 per year in the average family's household income; and
- Cause 39,100 MW of existing coal-fueled power plants to retire (about 12 percent of the existing U.S. coal fleet).

Other impacts are described in NERA's 74-page report, "Potential Impacts of EPA Air, Coal Combustion Residuals, and Cooling Water Regulations."

What major assumptions did NERA use to make these projections? The approach used in the modeling was designed to provide credible and transparent results. Therefore, NERA's input assumptions were taken from either EPA or EIA. The energy forecasts are from EIA's Annual Energy Outlook 2011. For capital and operating costs of emission control technologies, NERA used assumptions from EPA's IPM base case v.4.10.

The regulatory assumptions also were similar or identical to those used by EPA. For CSAPR, NERA modeled the flexibility in the final version of the rule promulgated by EPA in August. For MACT, NEMS projects mercury control strategies. For hydrogen chloride and particulate matter, NERA assumed control technologies similar to EPA's technology assumptions. Compliance with MACT was assumed to be required by 2015.

To model EPA's cooling water intake proposal, NERA used EPA's costs for its "Option 1" impingement proposal.² To comply with EPA's proposal to reduce entrainment, NERA assumed, like EPA, that 46 fossil-fuel-fired facilities would install cooling towers. For coal combustion residuals, NERA used EPA's site-specific cost estimates for Subtitle D (non-hazardous) regulation.³

Could the impacts of EPA's regulations be greater than NERA projects? NERA's modeling is designed to project impacts with as much credibility as possible. At the same time, many of the assumptions are subject to uncertainty typical of any modeling. In addition, NERA's modeling was not designed to analyze certain impacts. Therefore, it is possible the analysis could understate the costs and other impacts of the EPA regulations. For example:

- The modeling assumes that all emission controls and replacement capacity can be installed by 2015 without any price increases that are likely to result from the unprecedented number of emission control and replacement capacity projects that would have to be completed during such a short period of time.
- The modeling does not include costs for replacement power if emission controls cannot be installed in time and coal units must be taken off line temporarily.

- The modeling uses EPA's cost estimates for both 316(b) and coal combustion residuals; other analyses have projected higher costs.⁴
- The modeling does not analyze the potential for electric reliability problems that may be caused by the large number of premature coal unit retirements and by the potential unavailability of coal units that cannot install emission controls in time to meet EPA's compliance deadlines.
- Finally, other EPA regulations are not included in the analysis. Therefore, the modeling does not reflect the impact of EPA's entire regulatory agenda for coal-fueled power plants.

¹ NERA is a global firm that provides economic and financial analysis to government authorities and the private sector.

² EPA's "Option 1" proposal allows the use of "state of the art" traveling screens with fish return systems to reduce impingement, rather than requiring cooling towers at all facilities.

³ EPA provided plant-specific cost information for compliance with Subtitle D regulation in a 2009 analysis. NERA used these site-specific costs that include "engineering controls and ancillary costs" (such as groundwater monitoring, and liners and leachate collection for new units), with the "land disposal treatment" option (moisture treatment and compaction).

⁴ See, for example, "Comments of the Utility Water Act Group on EPA'S Proposed § 316(b) Rule for Cooling Water Intake Structures at Existing Facilities and New Units, EPA-HQ-OW-2008-0667, FRL-9289-2, RIN 2040-AE95 76 Fed. Reg. 22,174 (April 20, 2011)," August 18, 2011, and EOP Group, Inc., "Cost Estimates for the Mandatory Closure of Surface Impoundments Used for the Management of Coal Combustion Byproducts at Coal-Fired Electric Utilities," November 11, 2010.

NERA Analysis of Four EPA Rules: Cross-State Air Pollution Rule, Utility MACT, 316(b) and Coal Combustion Residuals

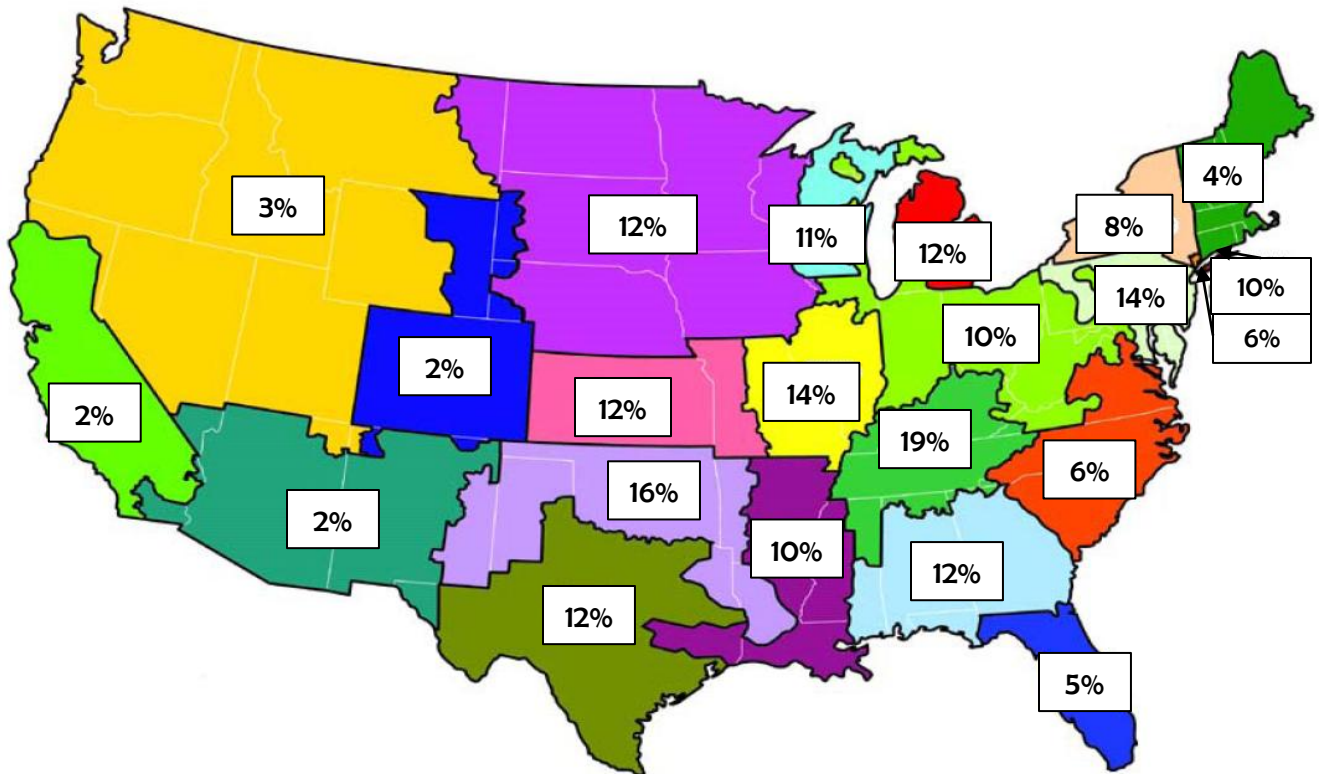
(September 21, 2011)

COST	<ul style="list-style-type: none"> ▪ Annualized cost of \$21 billion ▪ Total cost of \$127 billion (present value) by 2020 ▪ \$104 billion of total represents capital costs for emission controls and replacement capacity
U.S. EMPLOYMENT	<ul style="list-style-type: none"> ▪ Employment losses <u>total</u> 2.15 million job-years by 2020. Counting job gains, <i>net</i> employment losses total 1.65 million job-years. ▪ <u>Annual</u> employment losses average 239,000 jobs. Counting job gains, <i>net</i> employment losses average 183,000 jobs per year.
ELECTRICITY PRICES	<ul style="list-style-type: none"> ▪ Regions covering all or part of 30 states plus D.C. have peak-year increases exceeding 10 percent and as high as 19 percent
NATURAL GAS PRICES	<ul style="list-style-type: none"> ▪ 14 percent increase in 2013 ▪ \$8 billion per year in higher natural gas costs for residential, commercial and industrial consumers ▪ Higher gas prices total \$52 billion (present value) by 2020
GROSS DOMESTIC PRODUCT	<ul style="list-style-type: none"> ▪ Cumulative GDP loss of \$190 billion by 2020
DISPOSABLE PERSONAL INCOME	<ul style="list-style-type: none"> ▪ Cumulative DPI loss of \$222 billion by 2020 ▪ Average U.S. family loses \$270 per year in disposable income, a total of \$1,750 (present value) by 2020
COAL RETIREMENTS AND COAL DEMAND	<ul style="list-style-type: none"> ▪ 39.1 GW of coal retires by 2015. This is in addition to 3.1 GW already projected by the model to retire. ▪ 11 percent reduction in coal demand (108 million tons) in 2012

NOTES

- As in prior modeling, NERA relied on three models to conduct its analysis: NEMS, REMI and NERA's Retirement Model. The economic and cost assumptions are taken directly from EPA and EIA data.
- Previous NERA modeling reported present value totals over a longer time period (2011-2030). The new NERA analysis uses a shorter period (2012-2020) in order to better evaluate the near-term effects of the EPA rules.
- All dollars are reported in 2010\$.
- EPA costs were used by NERA to model the effects of regulating coal combustion residuals and cooling water intake.
- Net employment losses take into account the net effect of jobs that are lost (e.g., due to higher energy prices) and jobs that are created (e.g., construction of pollution controls) by these regulations.
- Disposable personal income (DPI) is the total amount of money available for an individual (or family) to spend or save after taxes have been paid.
- This modeling only includes four of the so-called "train wreck" regulations that will affect coal-fueled electricity generation. It does not include such policies as EPA's planned greenhouse gas regulations, regional haze requirements, further changes to ambient air quality standards, and requirements for water discharges.
- The modeling assumes that emission controls can be installed by the dates EPA has proposed, for example, 2015 for utility MACT. The results do not include potential cost increases that may occur due to the large number of emission control and replacement capacity projects during the next 3 years.
- The modeling is not intended to address electric reliability problems that may be caused by coal unit retirements.

Retail Electricity Price Increases Due to New EPA Rules



Peak year price increases above are for each of 22 regions represented in EIA's NEMS model. These projected price increases are caused by EPA's Cross-State Air Pollution Rule and proposed rules for Utility MACT, coal combustion residuals, and cooling water intake structures. Other impacts of these four rules include, but are not limited to, the following:

- \$21 billion annual cost, making these four rules the most expensive EPA has ever written for the electric power sector.
- \$127 billion in total cost through 2020. This includes \$104 billion in capital costs for environmental controls and replacement capacity.
- 183,000 net jobs lost per year. Net jobs represent the difference between job losses due to higher energy prices and potential job gains (so-called "green jobs"). Job losses outweigh gains by more than three to one.
- 1.65 million net job-years lost by 2020.
- \$52 billion increase in the cost of natural gas for consumers through 2020.

Source: "Potential Impacts of EPA Air, Coal Combustion Residuals, and Cooling Water Regulations," National Economic Research Associates for the American Coalition for Clean Coal Electricity, September 2011.