The Economic Impact of a Coal-Fired Power Plant in Wise County, Virginia, Compared to Investments in Energy Efficiency

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Overview

- Overall Objectives
  - Assess economic impact of Dominion Virginia Power's (DVP) 585 MW coal-fired power plant in Wise County (the *Plant*)
  - Assess economic impact of alternative energy efficiency-based approach to offset the electricity needs otherwise met by the Plant (*Energy Efficiency Alternative*)
  - Account for impact of likely federal carbon emissions regulation
- Overall Findings
  - Energy Efficiency Alternative is less costly to ratepayers than the Plant, and substantially more beneficial to Virginia economy.
  - Advantage of the Energy Efficiency Alternative is particularly strong when we account for a carbon emissions regulation.

Highlights of Analysis

- Impacts on *Virginia* Gross State Product, employment, and employee income of:
  - Expenditures for Plant and Energy Efficiency Alternative
  - Electricity rate effects – *residential and business customers* – of Plant and Energy Efficiency Alternative
- Three analysis years: 2012, 2018, 2025
- Plant cost and rate effects based primarily on DVP presentations to SCC
- Energy Efficiency Alternative based on ACEEE analysis of energy efficiency opportunities in Virginia – *low* and *medium* cost cases

Highlights of Analysis

- Carbon Emissions Regulation analysis from studies of Lieberman-Warner Climate Security bill – low and mid permit price cases; no regulation case.
- Account for displacement of purchased power from PJM Interconnection
- Analyses rely on an input-output framework of the Virginia economy, which assesses the economy-wide effects of these changes in outlays and sector-specific economic activity levels

Modeling Plant Construction & Operation

- Analysis relies on the Job and Economic Development Impact (JEDI) framework developed by NREL for analysis of coal-fired generating facilities
- Key inputs to the JEDI modeling framework gathered from the Company's testimony to the SCC include:
  - Construction cost, capacity factor, heat rate, cost of fuel, etc.
  - Fixed O&M (labor, materials, services)
  - Local share of expenditures
- The total cost of the Plant is $1.8 billion dollars, over 4 years
- Economic effects arising from construction are temporary, those from operations are essentially permanent

Modeling Rate Effects Due to the Plant

- Impact of rate changes necessarily begins from an estimate of the rate effect from construction and operation of the Plant.
- The recovery of, and return on, the capital investment in the Plant
  - Assigned full $1.8 billion into rate base in 2012; recovered on straight-line basis over 30 years
- The cost of energy and other expenses for O&M
- The avoided cost of purchased power presumed to be displaced by generation from the Plant
  - Yields a *net* cost to Virginia ratepayers from of approximately $30 per MWh in the Plant's first year of operation

Modeling Rate Effects Due to the Plant

- Carbon Emissions Policy Case - electricity generated by the Plant, and the displaced electricity purchases, are assigned an additional cost due to a likely carbon emissions regulation.
  - A “low” cost case of $23 per ton of CO_2-equivalent emissions in 2012 (nominal annual growth rate 8.8%)
  - A “mid” cost case of $39 per ton
  - 5.4 million tons of CO_2 per year; assume 50% coverage
- Residential – effect of rate changes based on changes in consumers’ expenditures in response to change in spending for electricity
- Businesses – effect of rate changes based on the pass-through of changes in electricity costs and resulting changes in demand due to elasticity effect

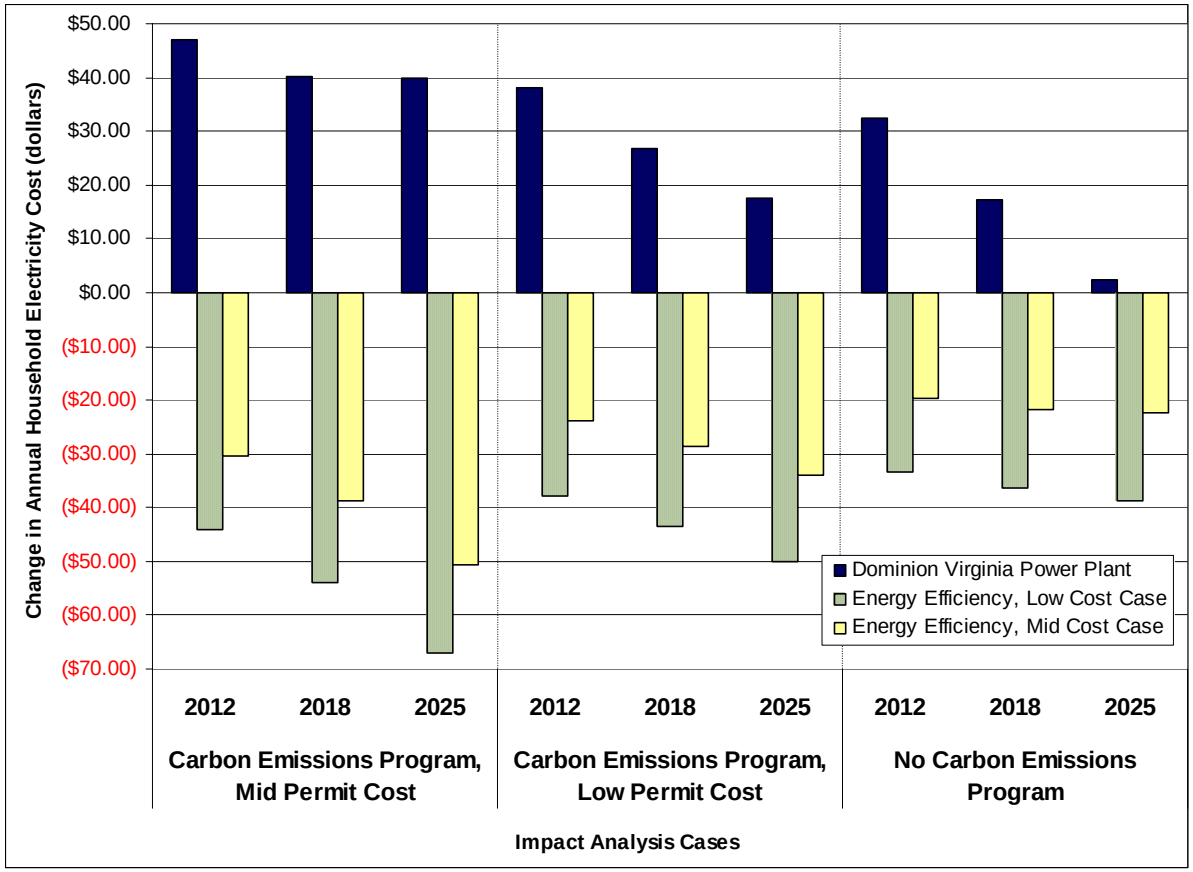
Modeling the EE Alternative

- Conceptually similar to the Plant - assess impact on the Virginia economy from EE outlays and electricity rate changes
- Recent ACEEE found that substantial, cost-effective energy efficiency opportunities exist in Virginia (annual potential for over 37,000 GWh based on current electricity prices and existing technologies)
- "Low" EE cost case based on the weighted average levelized cost of the ten least cost efficiency opportunities in the non-residential sector, which is $0.01/kWh (or $10.10/MWh) in constant 2006 dollars
- "Mid" EE cost case based on all opportunities ($26.54/MWh)
- *Administrative and Marketing* add-on to implement and administer an energy efficiency program(s) bring costs to $31 and $49/MWh in 2012

Modeling the EE Alternative

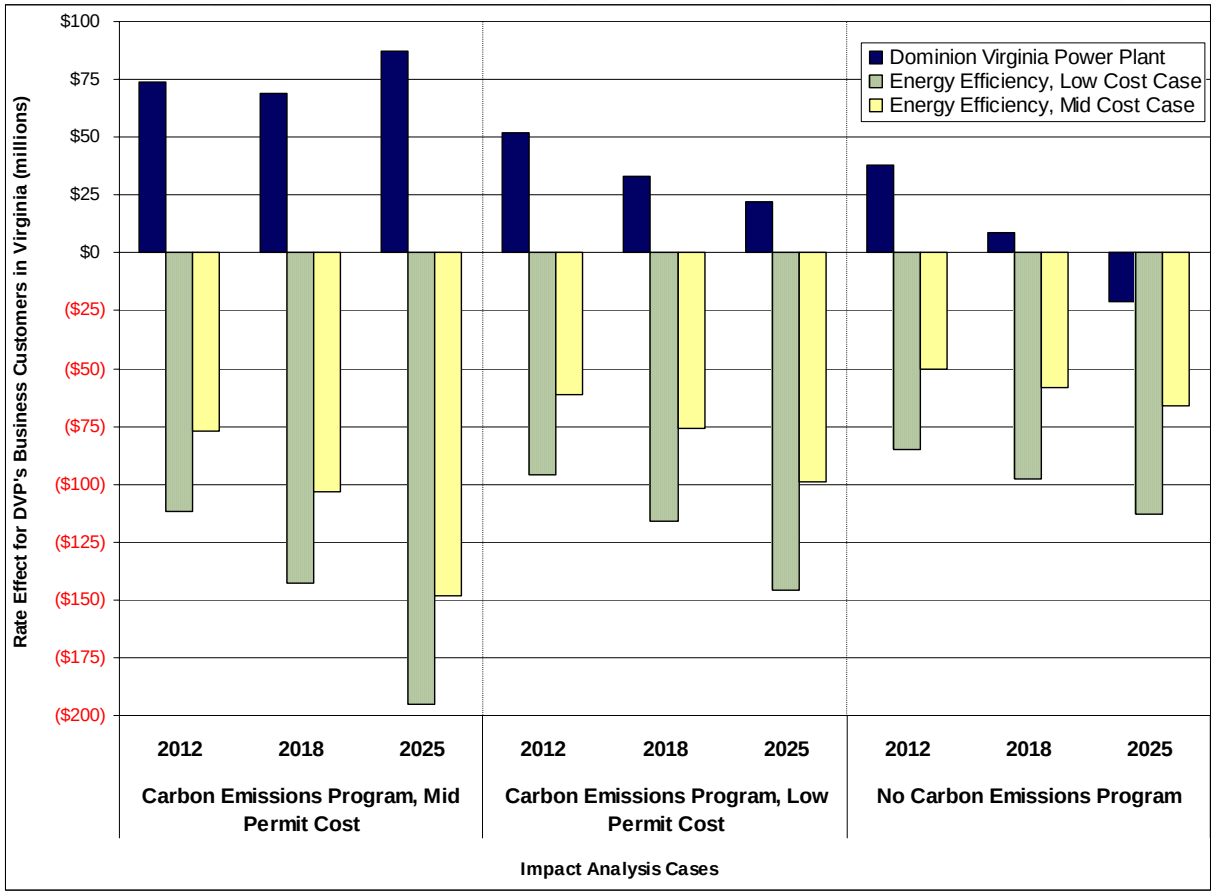
- Estimate of EE rate effect to DVP's customers assumes that the Company would directly undertake investments in energy efficiency instead of building the Plant
- Assumes these investments occur as constant annual outlays rather than a lump-sum initial outlay that declines in rate base over time
- Assumes, as in Plant analysis, that the reductions in electricity consumption displace purchased power from the PJM control area
- Allocated the total rate effect for Virginia ratepayers between residential and business consumers, and within the business consumers, over the affected economic sectors
- Allocated the outlays to sectors of the Virginia economy that were judged to likely engage in the manufacture, installation, and service of energy efficiency services (manufacturing, electrical equipment, and miscellaneous services).

Residential Customer rates decline with Energy Efficiency Alternative, increase with Plant



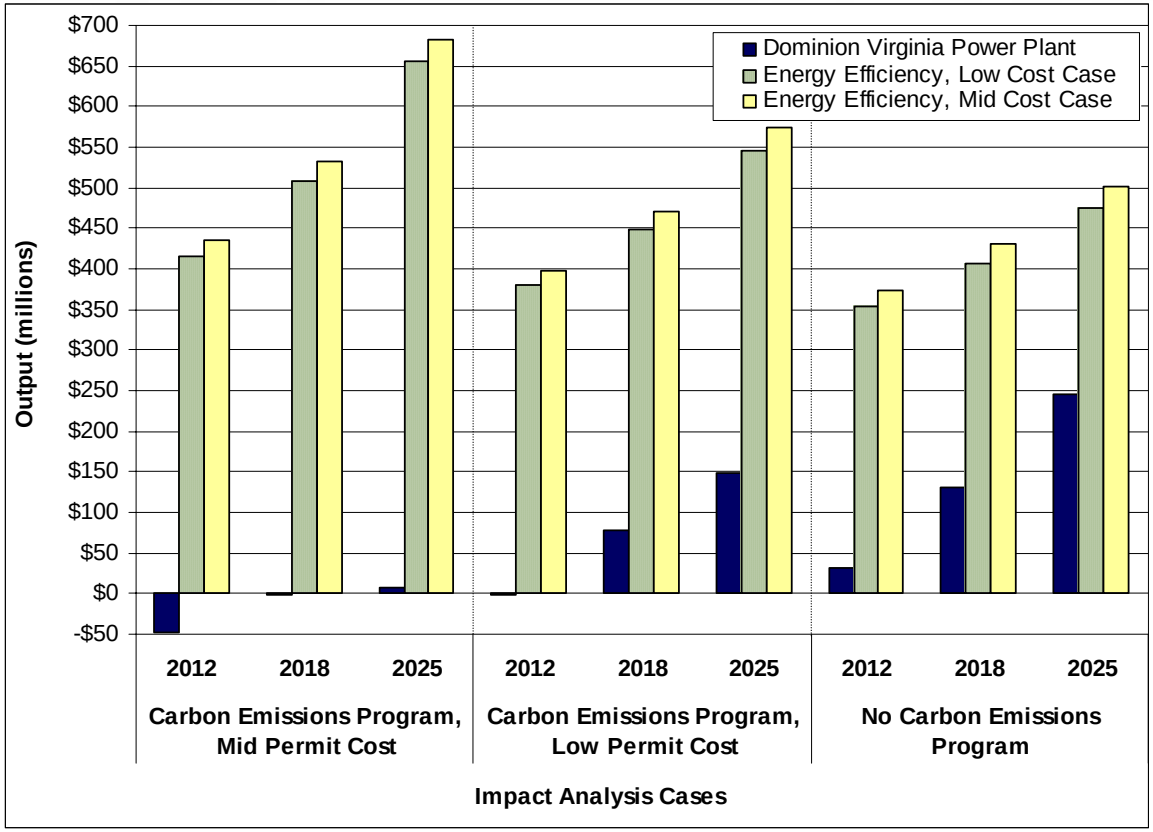
- For average Virginia household (1,200 kWh/month), *mid permit cost* case:
  - Plant yields a*dditional cost* of $47 per year in 2012; $40 increase in other years
  - Energy Efficiency Alternative yields s*avings* of $30 - $45 in 2012; savings increase over time

Business customer rate burden declines with Energy Efficiency Alternative, increases with Plant



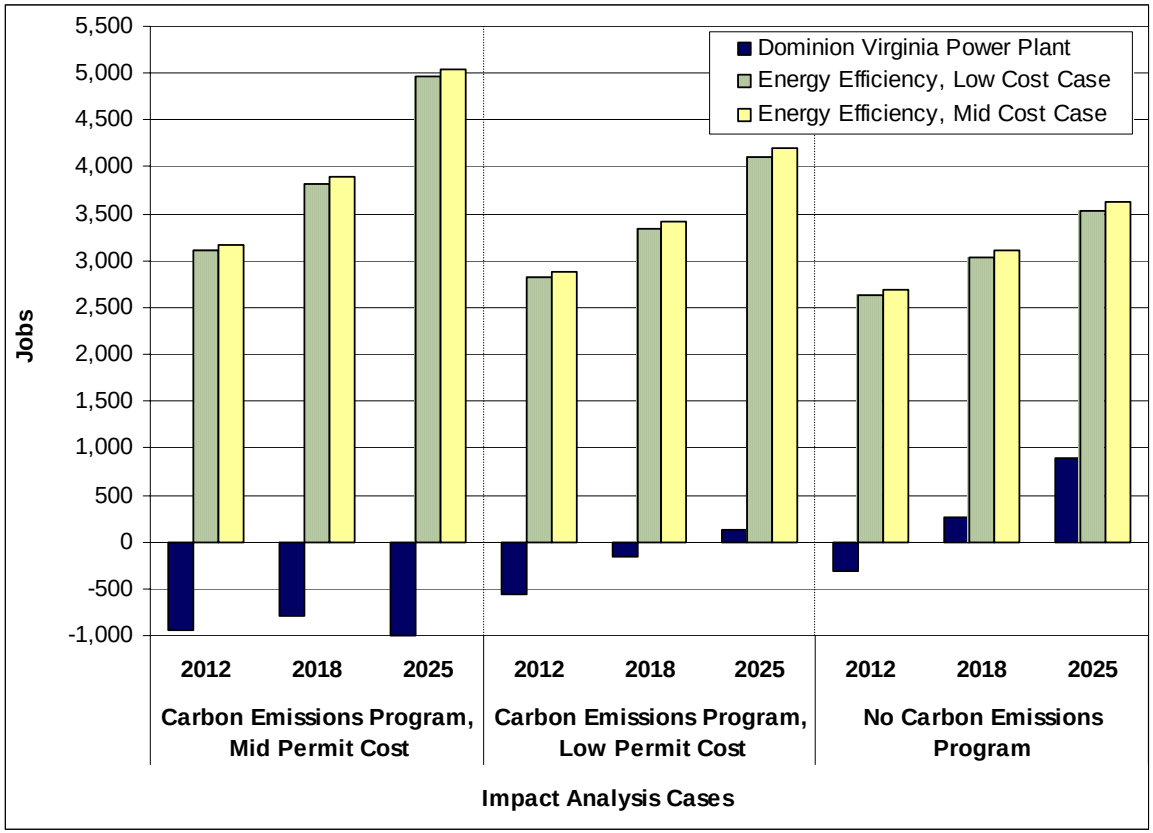
- Energy Efficiency Alternative: Substantial rate *reductions* for businesses, totaling tens of millions of dollars annually and increasing over time.
- Plant: Substantial rate *increases* under the carbon emissions regulation cases; less increase and eventually reduction without carbon regulation

GSP increases with Energy Efficiency Alternative; negative or much lower GSP effects with Plant



- Mid Permit Cost Carbon Regulation: Efficiency Alternative *increases* GSP by $420 million in 2012; Plant reduces GSP by about $50 million.
- Energy Efficiency Alternative benefits increase over time and as the cost of carbon emissions regulation increases

Energy Efficiency Alternative also yields superior job and employee income benefits



- Mid Permit Cost Carbon Regulation: Energy Efficiency Alternative yields *increase* of about 3,100 jobs and $130 million in employee income in 2012. Plant yields *loss* of 950 jobs and $23 million in employee income in 2012.

Overall, Energy Efficiency Alternative offers more beneficial approach to meeting Virginia's energy needs

- Energy Efficiency Alternative achieves superior economic benefits for Virginia compared to the Plant.
- Federal carbon emissions regulation poses substantial liability for Plant. Energy Efficiency Alternative does not face this risk.
- Too late for this Plant – but interest in using analyses to make the case to VA General Assembly for mandatory efficiency measures; EE is best way to tackle challenging budget, energy, and climate issues.
- Analysis does not assess which specific energy efficiency programs are better options for Virginia, but demonstrates that energy efficiency can contribute a substantial economic gain compared with traditional approaches to meeting electricity demand.

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