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**THE ECONOMIC IMPACTS OF CONSTRUCTING A  
SCRUBBER AT MERRIMACK STATION**

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Prepared By  
Dr. Lisa Shapiro, Ph.D., Chief Economist  
Heidi Kroll, Market and Policy Analyst  
Gallagher, Callahan and Gartrell, P.C.  
214 North Main Street  
Concord, NH 03301  
[www.gcglaw.com](http://www.gcglaw.com)  
(800) 528-1181

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## EXECUTIVE SUMMARY

Merrimack Station is a coal fired power station in Bow, New Hampshire that is undergoing a major construction project to dramatically reduce mercury and sulfur dioxide emissions pursuant to a New Hampshire law passed in 2006. The \$457 million project is halfway completed.

Starting in the summer of 2008, a number of interested parties have called for "pausing" the project in order to revisit the overall public interest of the construction project. A bill has been introduced in the New Hampshire Senate, SB 152, which requires the New Hampshire Public Utilities Commission to consider whether or not the project is in the public interest, and take action accordingly.

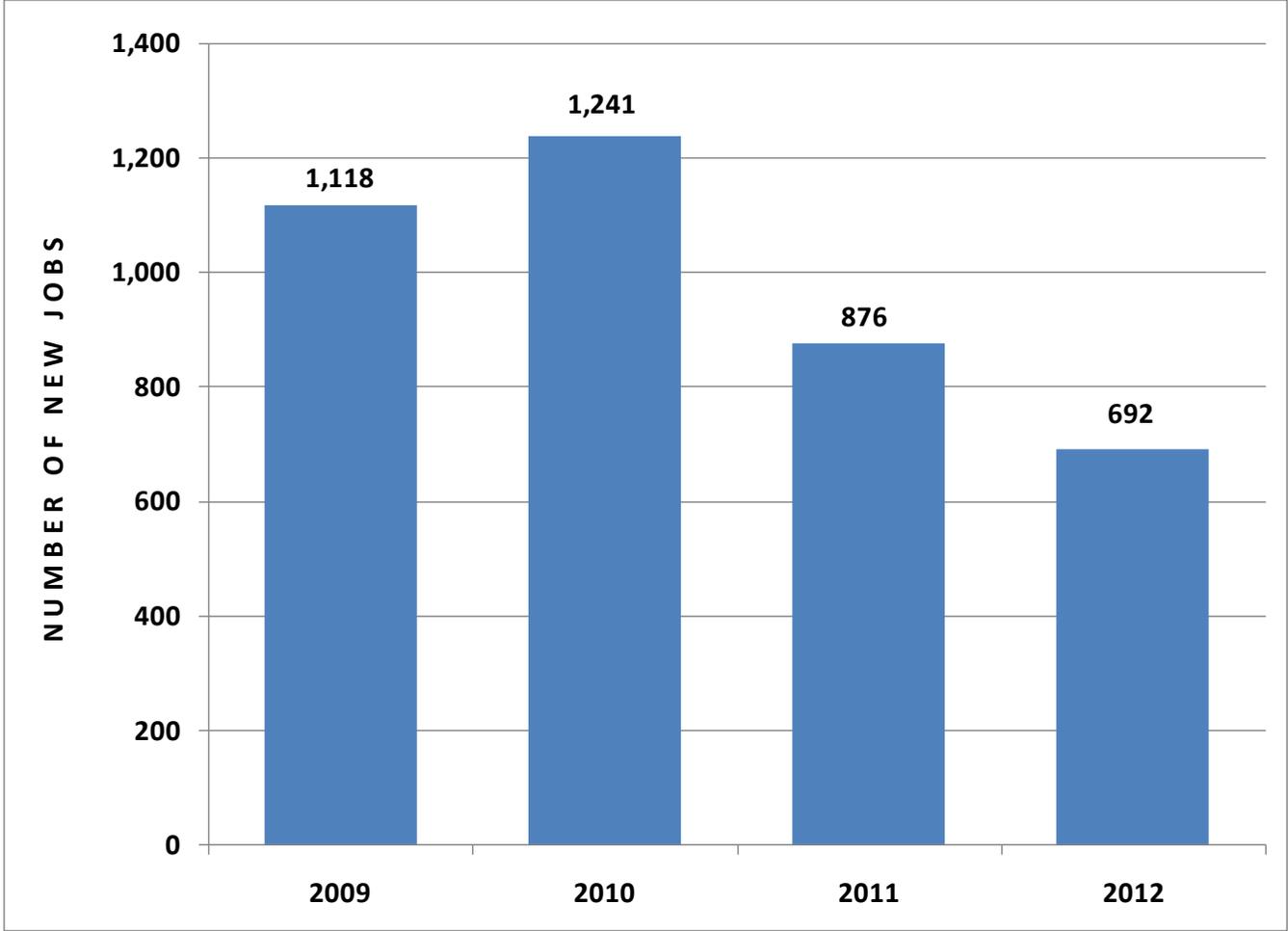
The purpose of this study is to provide an estimate of the economic benefits to New Hampshire – jobs, gross state product, and personal income – from the construction of a wet flue gas desulphurization system, commonly called a scrubber, at Merrimack Station. This report is intended to provide additional information for the legislature on the potential consequences from passing SB 152.

The methodology uses a model of the New Hampshire economy developed by the Regional Economic Model, Inc. (REMI). The REMI model is founded on econometrics – the application of mathematics, statistics, and economic theory to provide an empirical model and quantitative framework to explain and forecast economic impacts. This analysis uses a 23-sector single-region REMI model, widely used by government and private forecasters to simulate the effect on the economy of various private and public initiatives and policy proposals. In New Hampshire, the REMI model was used, for example, by the University of New Hampshire to estimate the economic benefits of enacting legislation to join the Regional Greenhouse Gas Initiative (RGGI), and by New Hampshire Economic and Labor Market Information Bureau (ELMI) to estimate the economic impacts from large mill closures in the North Country.

### *Summary of Economic Impacts*

- There is immediate and significant job creation from the investment in the scrubber project as a result of direct, indirect, and induced economic effects.
- Beginning in 2009 and continuing through 2012, about 1,000 jobs per year will be created (or saved) in New Hampshire from the scrubber construction project.<sup>1</sup>
- The new (or saved) jobs are primarily in construction, retail, and services.
  - A median estimate of 1,118 new (or saved) jobs in 2009.
  - A median estimate of 1,241 new (or saved) jobs in 2010.
  - A median estimate of 876 new (or saved) jobs in 2011.
  - A median estimate of 692 new (or saved) jobs in 2012.

**Chart ES-1: Estimates of New Jobs from the Scrubber Project  
(Median Estimates)**



- The state's Gross State Product (GSP) is estimated at \$224 million higher on a cumulative basis during 2009-2012, and economic output at \$396 million higher on a cumulative basis over the 4 year forecast period of the scrubber project construction.
- Disposable personal income is projected to increase during the 2009-2012 period by an average of about \$35 million per year.

## **BACKGROUND**

In 2002, New Hampshire passed a first-in-the-nation four-pollutant reduction law, the Clean Power Act, RSA Chapter 125-O. It was the product of a lengthy collaborative effort in which Public Service Company of New Hampshire (“PSNH”), the Governor’s Office, the Office of Energy and Planning, the Department of Environmental Services, and a number of legislators and environmental groups all participated. In 2006, following near-unanimous passage in the House and Senate of House Bill 1673, the Act was amended to reflect updated reduction requirements for mercury emissions.

The Clean Power Act expressly states that “It is in the public interest to achieve significant reductions in mercury emissions at the coal-burning electric power plants in the state as soon as possible” and requires a minimum of an 80% reduction in such emissions. “To accomplish this objective, the best known commercially available technology shall be installed at Merrimack Station no later than July 1, 2013... The department of environmental services has determined that the best known commercially available technology is a wet flue gas desulphurization system, hereafter ‘scrubber technology’.”

Merrimack Station is a 433 MW base-load plant that generates approximately 3.1 billion kilowatt-hours (kWh) per year. This level of operation is expected to continue after the scrubber is installed. In addition, the Station will have the added benefit of being among the cleanest coal-burning plants in the nation. As recognized in the Clean Power Act, the “[s]crubber technology achieves significant emissions reduction benefits, including but not limited to, cost effective reductions in sulfur dioxide, sulfur trioxide, small particulate matter, and improved visibility (regional haze).” For example, the scrubber will enhance current reductions in SO<sub>2</sub> emissions by an additional 30,000 tons of reductions each year. Such reductions will avoid the cost of emission allowances, and provide public health and environmental benefits.

## **SCRUBBER PROJECT TIMELINE – KEY MILESTONES**

The installation of the scrubber is a large and complex project that has been underway since 2006 and will be completed on or before July 1, 2013 if there are no delays. PSNH has already completed a number of critical milestones on the scrubber project, including but not limited to the following:

- The program manager has been hired.
- Engineering design work is nearly complete.
- Rigorous competitive bidding processes took place for the seven major pieces of work: the program manager, the site preparation, foundations, scrubber, new chimney, waste-water treatment facility, and material handling.
- Fixed price contracts have been negotiated with winning bidders for these seven key areas.

- Union labor agreements have been signed.
- Contractors have received notices to proceed for procurement of materials, design and engineering.
- All Phase 1 permits have been issued.
- Phase 1 construction is underway.
- Final Temporary Permit for the installation and operation of the scrubber has been issued.
- Phase 2 construction is slated to begin.
- Over \$230 million has been spent or contractually committed.

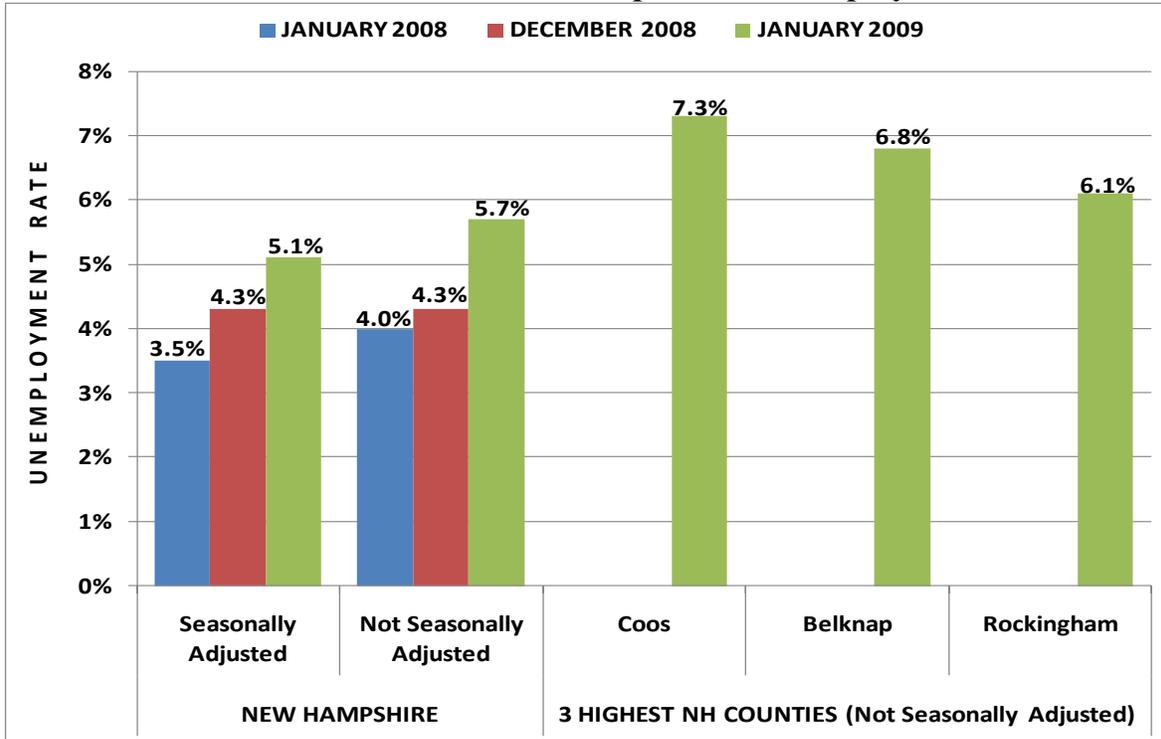
### **ESTIMATED ECONOMIC BENEFITS**

According to filings submitted to the Public Utilities Commission in September 2008 by Public Service Company of New Hampshire, the scrubber project is estimated to cost \$457 million and produce a nominal benefit to customers of \$583 million (a \$132 million benefit on a net present value basis) over the depreciable life of the scrubber.<sup>2</sup> The cost estimate includes the project costs, project management costs, AFUDC,<sup>3</sup> indirect costs, and project contingencies. Phase 1 construction began in 2008, Phase 2 construction is slated to begin imminently, and construction activities will continue through 2012.

As discussed below, this multi-year investment is estimated to have significant economic benefits for New Hampshire during a time when the State is in a recession and facing many economic uncertainties. Households are struggling. A survey released last week by the Mortgage Bankers Association found that 7% of all mortgage loans in New Hampshire were at least 30 days past due in the last quarter of 2008.<sup>4</sup> Furthermore, NH bankruptcy filings are up 32% and the jump is largely attributable to personal, rather than business, filings.<sup>5</sup>

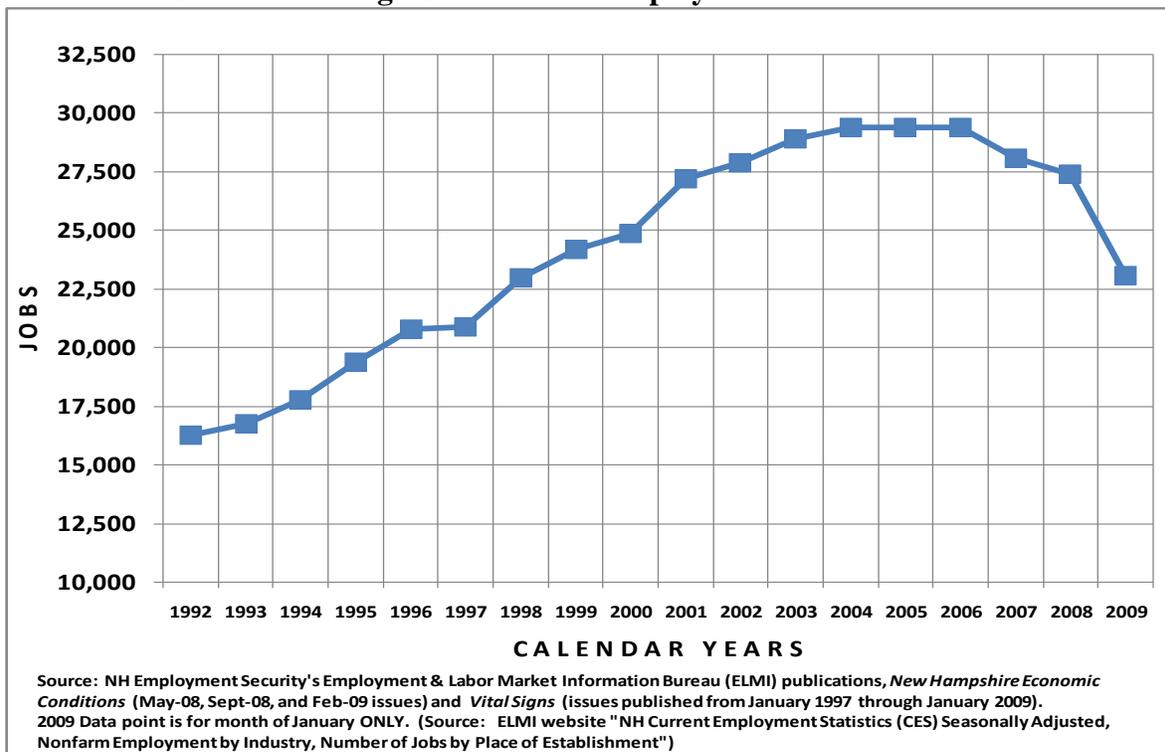
Many businesses are struggling, reducing their spending and cutting jobs. New Hampshire's unemployment rate currently stands at 5.1%, a 15-year high – the number of unemployed residents grew by 6,620 between December 2008 and January 2009, to reach 38,060.<sup>6</sup> In January 2009, 11,890 more New Hampshire residents were unemployed than in January 2008.<sup>7</sup> Before this latest economic news was released, it was forecast that the State would lose at least 16,000 jobs, or 2.5% of employment, with the greatest job losses occurring in the Trade, Finance, and Construction sectors.<sup>8</sup>

**Chart 1: Growth in New Hampshire's Unemployment**



The construction industry is among the hardest hit in New Hampshire. Employment in the construction industry has already declined by as many as 3,700 jobs between January 2008 and January 2009.<sup>9</sup> As discussed below, the scrubber project would put a significant number of construction and other skilled laborers back to work.

**Chart 2: Average Construction Employment in NH 1992-2009**



## ***Methodology***

This analysis used primary and secondary approaches to estimate the economic impacts of the scrubber project during its construction. Together these approaches provide the basis for the estimated median impacts on jobs, business activity, and personal income in New Hampshire.

The primary methodology used a model of the New Hampshire economy developed by the Regional Economic Model, Inc. (REMI). The REMI model is founded on econometrics – the application of mathematics, statistics, and economic theory to provide an empirical model and quantitative framework to explain and forecast economic impacts. This analysis used a 23-sector single-region REMI model, widely used by government and private forecasters to simulate the effect on the economy of various private and public initiatives and policy proposals.

In this instance, the model was used to simulate the near-term economic effects of spending \$457 million during 2008 through 2012 (Phase 1 and Phase 2 construction activities) on the scrubber project compared to a control forecast where no such investments are made. Several different variables for modeling expenditures on industrial equipment and construction were used to reflect greater or lesser amounts of the expenditures being retained in-state. Sensitivities were also run to reflect the possibility that the project may come in under \$457 million and to reflect the fact that AFUDC and indirect corporate costs are not expected to have the same impact on the New Hampshire economy as other expenditures. The lowest case scenario simulates a 15% reduction in investment to reflect a conservative outlook, namely higher levels of leakage and lower levels of investment. The results from these various REMI scenarios were compared against estimates made using New Hampshire-specific multipliers from the federal government’s Regional Input-Output Modeling System, or RIMS II.<sup>10</sup> RIMS II multipliers are used to estimate static, present-day economic impacts resulting from a given amount of final demand in an industry or a given number of new jobs specific to a project. These multipliers reflect the federal government’s analyses of inter-industry relationships.

## ***Summary of Economic Impacts***

Based on the results from the REMI modeling, the economic impacts in New Hampshire of investing in the scrubber project are forecasted to be positive. The estimated impacts are summarized in Table 1 and described in more detail below.

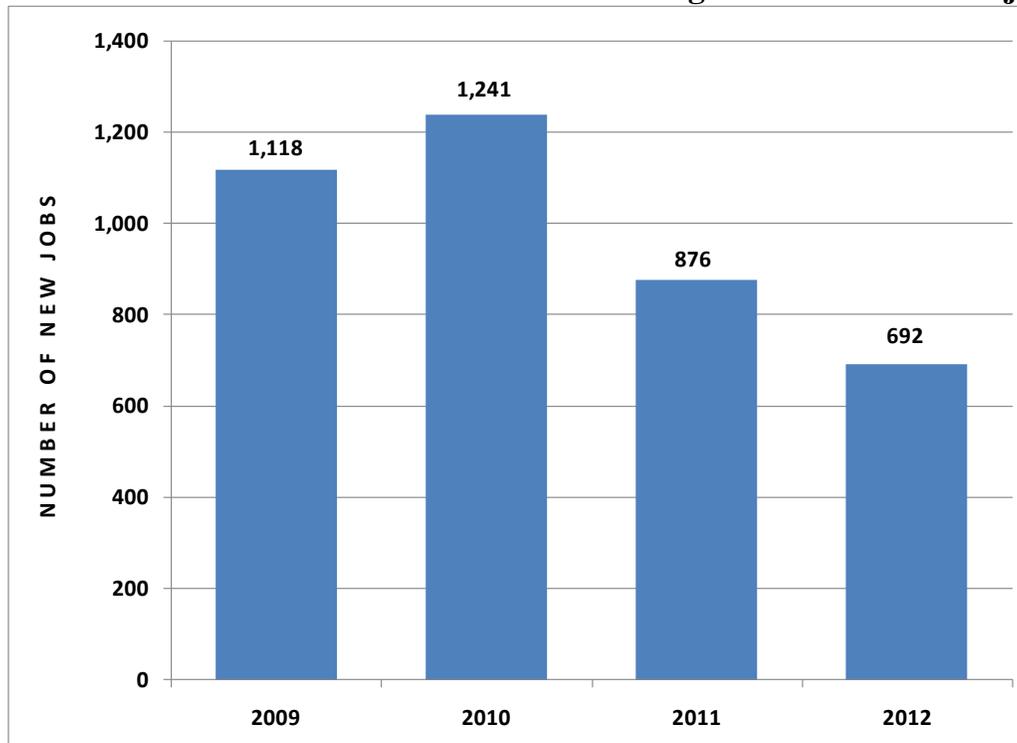
**Table 1: Median Estimates of Annual Economic Impacts of Investing in the Scrubber Project  
Increase in Jobs, Gross State Product, Sales and Personal Income  
2009-2012**

<b>Economic Indicator</b>	<b>Average Per Year</b>
Employment	982 Jobs
Gross State Product (2009\$)	\$56 Million
Economic Output / Sales (2009\$)	\$99 Million
Disposable Personal Income (2009\$)	\$35 Million

## *Employment*

There is immediate and significant job creation from the investment in the scrubber project. The median estimate for new jobs is 982 on average during the period 2009 through 2012.<sup>11</sup> The estimated number of new jobs will peak in 2010, at a median estimate of 1,241 jobs, when activity on the project is expected to crest. The majority of these jobs are expected to occur in three sectors: construction, services, and retail trade.

**Chart 3 Median Estimates of Jobs from Investing in the Scrubber Project**



The estimated job creation is a result of three economic effects: direct, indirect, and induced economic impacts. Direct jobs refers to those jobs that are directly related to work on the scrubber project. PSNH estimates conservatively that there would be more than 300 skilled workers on site for the project during the peak period in 2010. The New Hampshire Building Trades Council estimates the number to be closer to 500 jobs because certain trades such as sheet metal workers, insulators, and painters are not included in PSNH’s 300 estimate, and experience has shown that projects of this magnitude tend to require around 500 workers.<sup>12</sup> PSNH has reached a written agreement to use union labor to ensure the availability of critical skilled workers and prioritize safety on the job. In addition to these skilled laborers, the project will also support many engineering and management related positions. For example, in the fall of 2008, the program manager for the scrubber project, URS Washington Division (“URS”), had approximately 30 engineers working on the project in areas such as electrical, civil, and structural engineering; controls; fire protection; and draftsmen.

Beyond the direct jobs described above that are associated with the project, indirect jobs will also be created as a result of meeting the project’s demand for materials, supplies, and indirect services, and induced jobs will be created when direct and indirect workers spend their

income on local goods and services. The RIMS II multiplier for construction jobs is approximately 2, which suggests that the job estimates produced by the REMI model are reasonable.

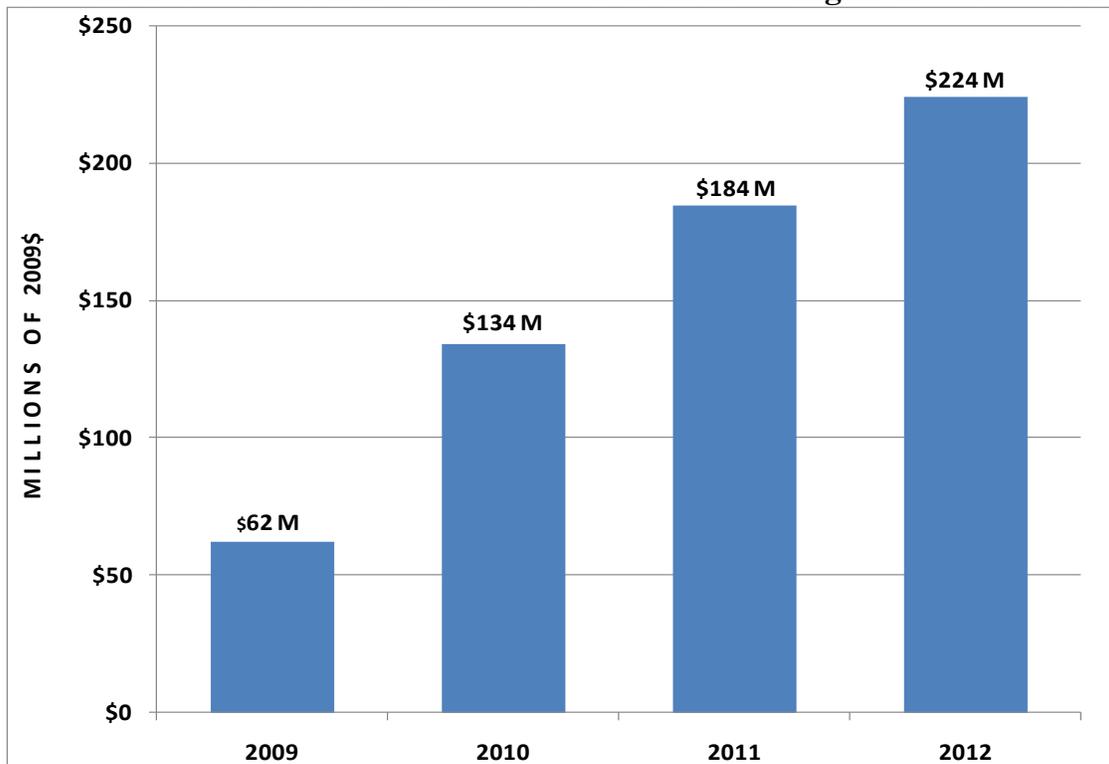
The median estimates for new jobs shown in Chart 3 are based on the scenarios described earlier. Several different variables for modeling expenditures on industrial equipment and construction were used to reflect greater or lesser amounts of the expenditures being retained in-state. Sensitivities were run to reflect the possibility that the project may come in under \$457 million, and to reflect lower in-state impacts from AFUDC and corporate cost. The ranges of job creation reflecting these scenarios for each year are as follows:

- Between 826 and 1,411 jobs created in 2009
- Between 936 and 1,546 jobs created in 2010
- Between 647 and 1,106 jobs created in 2011
- Between 496 and 888 jobs created in 2012

### ***Gross State Product***

Gross State Product (GSP) is the value added to the economy through the net output of goods and services. The median estimate for the increase in New Hampshire’s annual GSP between 2009 and 2012 is \$56 million. Based on the median estimated increases in GSP each year during this period, the state’s GSP is estimated to be \$224 million higher on a cumulative basis than it would be in the absence of the scrubber project.

**Chart 4: Cumulative Median Estimates of GSP from Investing in the Scrubber Project**



The median estimates for GSP underlying the data in Chart 4 are based on a range of scenarios and estimates. Several different variables for modeling expenditures were used to reflect greater or lesser amounts of the expenditures being retained in-state, and sensitivities were run to reflect costs coming in under \$457 million and higher leakage rates. The ranges for each year are as follows:

- Between \$51 million and \$74 million more in GSP in 2009
- Between \$61 million and \$83 million more in GSP in 2010
- Between \$43 million and \$58 million more in GSP in 2011
- Between \$34 million and \$46 million more in GSP in 2012

### ***Economic Output / Sales***

Economic output, or sales, captures all of the intermediate goods purchased as well as all of the final goods and services that are captured in GSP. Based on the modeling for this analysis, New Hampshire's annual sales are estimated to increase on average by \$99 million. Based on REMI's estimated increases in economic output each year during the period 2009-2012, the state's output could be an estimated \$396 million higher on a cumulative basis than they would be in the absence of investment in the scrubber project.

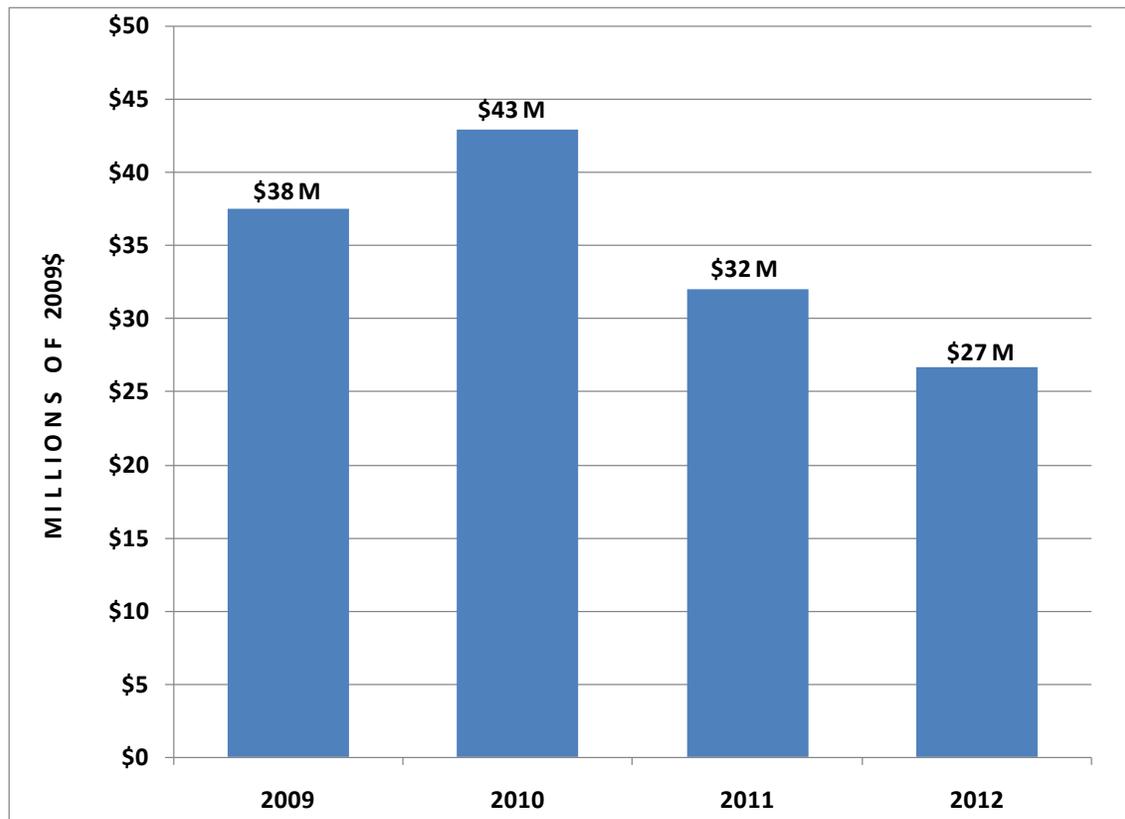
The median estimates for economic output are based on the range of scenarios described earlier in this report. The ranges for each year are as follows:

- Between \$89 million and \$135 million more in economic output in 2009
- Between \$106 million and \$151 million more in economic output in 2010
- Between \$73 million and \$103 million more in economic output in 2011
- Between \$58 million and \$79 million more in economic output in 2012

### ***Disposable Personal Income***

Disposable personal income is projected to increase during the 2009-2012 period by an average of about \$35 million per year, and during the peak year of activity, disposable personal income could increase by a median estimate of \$43 million. Disposable personal income in the REMI model reflects the income received by New Hampshire residents from wages and salaries (and supplements thereto), proprietors' income, rental income, interest and dividends, and transfer receipts (e.g., retirement and disability insurance benefits, Medicare, etc.), less taxes and contributions for government social insurance.

**Chart 5:  
Median Estimates of Disposable Personal Income from Investing in the Scrubber Project**



The median estimates for personal disposable income shown in Chart 5 are based on the range of scenarios described earlier in this report. The ranges for each year are as follows:

- Between \$26 million and \$49 million more in personal disposable income in 2009
- Between \$31 million and \$55 million more in personal disposable income in 2010
- Between \$23 million and \$41 million more in personal disposable income in 2011
- Between \$19 million and \$35 million more in personal disposable income in 2012

<sup>1</sup> Jobs include full-time and part-time jobs.

<sup>2</sup> PSNH's September 2, 2008 filing to the Public Utilities Commission responding to a Request for Information on the Merrimack Station Scrubber Project, Docket No. 08-103.

<sup>3</sup> AFUDC stands for Allowance for Funds Used During Construction and is an imputed interest rate on the funds used to construct large utility plant and equipment.

<sup>4</sup> "Foreclosed Homes Snatched Up In NH Auction," Associated Press, March 8, 2009. Available at: [www.Seacoastonline.com](http://www.Seacoastonline.com)

<sup>5</sup> "NH Bankruptcy Filings Up 32 Percent," Associated Press, January 11, 2009. Available at: [www.Seacoastonline.com](http://www.Seacoastonline.com)

<sup>6</sup> "Unemployment News Release," New Hampshire Economic and Labor Market Information Bureau, February 26, 2009.

<sup>7</sup> "Unemployment News Release," New Hampshire Economic and Labor Market Information Bureau, February 26, 2009.

<sup>8</sup> Gittel, Ross, "New Hampshire and New England Economic Outlook," New England Economic Partnership, February 2009.

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<sup>9</sup> “NH Current Employment Statistics (CES) Seasonally Adjusted, Nonfarm Employment by Industry, Number of Jobs by Place of Establishment,” New Hampshire Economic and Labor Market Information Bureau, <http://www.nh.gov/nhes/elmi/nonfarmcessa.htm>.

<sup>10</sup> Additional information about the US Department of Commerce’s Bureau of Economic Analysis’ RIMS II multipliers can be found at <http://www.bea.gov/regional/rims/index.cfm>.

<sup>11</sup> Jobs include full-time and part-time jobs.

<sup>12</sup> Testimony of the New Hampshire Building Trades Council before the House Science, Technology & Energy Committee on HB 496, March 5, 2009.