Exhibit 2

Andover Technology Partners 978-683-9599
Consulting to the Air Pollution Control Industry

Review and Analysis of the Actual Costs of Complying With MATS in Comparison to Predicted in EPA's Regulatory Impact Analysis

At this point we are in a position to make a post-hoc assessment of what the cost has been to comply with US EPA's Mercury and Air Toxics Standards (MATS) for power plants. In its Regulatory Impact Analysis (RIA) for the final rule.[1] EPA estimated a cost for the rule of $9.6 billion (2007 dollars) versus quantified benefits of between $33 billion to $81 billion, depending upon discount rate (plus other unquantified benefits). The $9.6 billion annual cost is primarily the cost to control coal-fired units, at an estimated $9.4 billion. This $9.4 billion includes the following components:

- Amortized capital
- Costs associated with change in fuel
- Variable operating and maintenance (VOM)
- Fixed operating and maintenance (FOM)

These costs are estimated using the Integrated Planning Model (IPM), which is described later. The fuel costs are associated with the costs of switching to natural gas or to lower chlorine coal.

Experience with technologies deployed for MATS compliance has shown them to be less expensive and more effective than originally assumed in EPA's analysis. Technological improvements and a lower price of natural gas than originally projected have further reduced costs. As a result, the true cost of complying with the MATS rule is approximately $7 billion per year per year less than estimated by EPA, making the true cost of the rule approximately $2 billion, or less than one-quarter of what EPA originally estimated the Rule to cost.

Except for the fuel charge, EPA's forecast of the cost impact of the MATS rule is determined in large part by the forecast of installed air pollution control equipment, which is shown in Figure 1. This figure shows the forecast installations (expressed as GW of installed capacity) in the Base Case and forecast installations in the case of the MATS rule. As shown, EPA forecast a reduction in wet FGD systems (fewer FGD retrofits in the policy case than in the Base Case) and increases in dry FGD systems, FGD upgrades, increase in Dry Sorbent Injection (DSI), an increase in Activated Carbon Injection (ACI), and increases in Fabric Filters (FF) and ESP upgrades. These forecasts are determined using ICF International's Integrated Planning Model (IPM), which is described briefly in the insert on the following

[1] Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, EPA-452/R-11-011, December 2011

page, and the methodology and assumptions for IPM are described in detail in the documentation found on EPA's web site.

Methods to comply with the regulation may include addition of control technology, changing fuels, or even retirement. For every technology considered EPA makes assumptions about the capital and operating cost of the technology and the performance of the technology with regard to emissions control performance. Costs for fuels are considered as well, and this is particularly important when an option is to change to different fuels. IPM selects the approach that provides the lowest cost to comply, or, alternatively, the highest future value for operation of the facility. IPM estimates the future dispatch of the facility based upon the economics of that facility relative to other facilities in the region. In cases where the facility is determined to be uneconomical to operate in the future, IPM will determine that the facility will be retired and electricity supplied from other sources.

According to the RIA issued with the final rule: *"This analysis projects that by 2015, the final rule will drive the installation of an additional 20 GW of dry FGD (dry scrubbers), 44 GW of DSI, 99 GW of additional ACI, 102 GW of additional fabric filters, 63 GW of scrubber upgrades, and 34 GW of ESP upgrades. . . .With respect to the increase in operating ACI, some of this increase represents existing ACI capacity on units built before 2008. EPA's modeling does not reflect the presence of state mercury rules, and EPA assumes that ACI controls on units built before 2008 do not operate in the absence of these rules. In the policy case, these controls are projected to operate and the projected compliance cost thus reflects the operating cost of these controls. Since these controls are in existence, EPA does not count their capacity toward new retrofit construction, nor does EPA's compliance costs projection reflect the capital cost of these controls (new retrofit capacity is reported in the previous paragraph)."*

EPA uses the Integrated Planning Model (IPM) to analyze the projected impact of environmental policies on the electric power sector in the 48 contiguous states and the District of Columbia. Developed by ICF Consulting, Inc. and used to support public and private sector clients, IPM is a multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector. It provides forecasts of least-cost capacity expansion, electricity dispatch, and emission control strategies for meeting energy demand and environmental, transmission, dispatch, and reliability constraints. IPM can be used to evaluate the cost and emissions impacts of proposed policies to limit emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon dioxide (CO_2), and mercury (Hg) from the electric power sector. The IPM was a key analytical tool in developing the Clean Air Interstate Rule (CAIR).

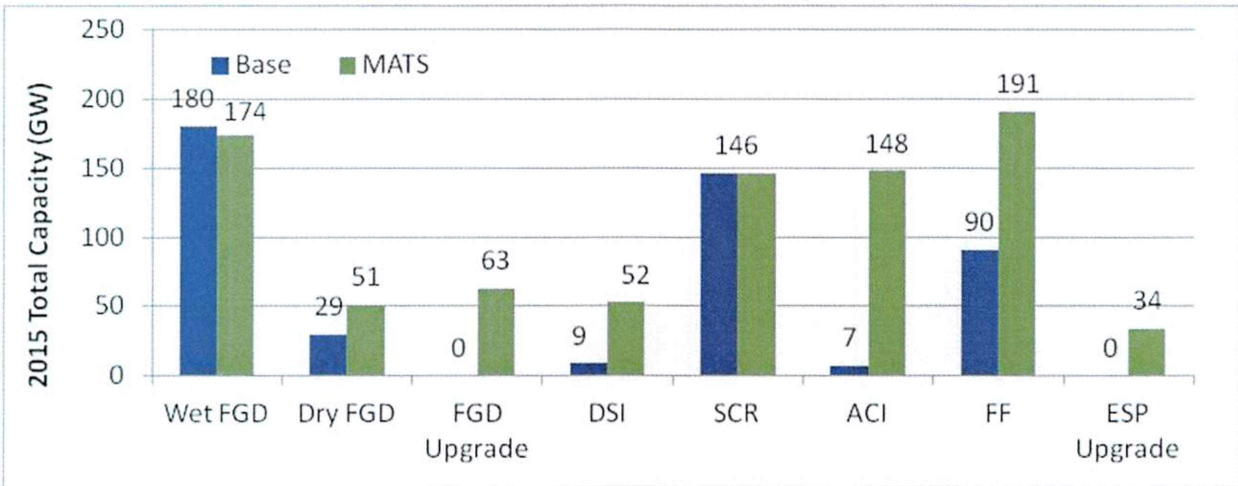
Among the factors that make IPM particularly well suited to model multi-emissions control programs are (1) its ability to capture complex interactions among the electric power, fuel, and environmental markets; (2) its detail-rich representation of emission control options encompassing a broad array of retrofit technologies along with emission reductions through fuel switching, changes in capacity mix and electricity dispatch strategies; and (3) its capability to model a variety of environmental market mechanisms, such as emissions caps, allowances, trading, and banking. IPM's ability to capture the dynamics of the allowance market and its provision of a wide range of emissions reduction options are particularly important for assessing the impact of multi-emissions environmental policies like CAIR.

http://www.epa.gov/airmarkets/progsregs/epa-ipm/

Now that we know what companies have done to comply with the MATS rule, we are in a position to determine how accurate this forecast was. There are a few things that stand out about the methods that were projected by EPA for industry to comply with the rule:

- The very high level of projected fabric filter systems
- The level of projected dry FGD systems
- The level of scrubber upgrades
- The high cost of dry sorbent injection ("DSI") and activated carbon injection ("ACI") systems that did not take account of technological advances reducing those costs
- The limited amount of fuel switching compared to actual levels driven by low shale gas prices

Figure 1. Operating Pollution Control Capacity on Coal-fired Capacity (by Technology) under the Base Case and with MATS, 2015 (GW)[2]



Fabric Filter - EPA's Air Markets Program Data shows only about 82 GW of Electric Utility or Small Power Producer Generation equipped with baghouses for particulate matter control at the end of second quarter 2015. Another 8.7 GW of fabric filter projects – not part of dry FGD projects - are underway with extensions for a total of perhaps 91 GW.[3] In other words, IPM overestimated the baghouse installations by about 100 GW (191 GW of total FF projected to be installed versus 91 GW) as shown in Figure 2. This is related to assumptions about DSI, dry FGD and the need for PM upgrades.

Dry FGD - IPM forecast 51 GW of dry FGD to be installed in the MATS policy case versus 29 GW in the Base Case when, in fact, AMPD data shows that at the end of second quarter 2015 there were only about 33 GW of dry FGD installed – or an overestimate of 18 GW as shown in Figure 2. Although there are an estimated 22 GW of dry FGD projects underway to be completed in the coming years and MATS extensions have been permitted associated with these projects,[3] these

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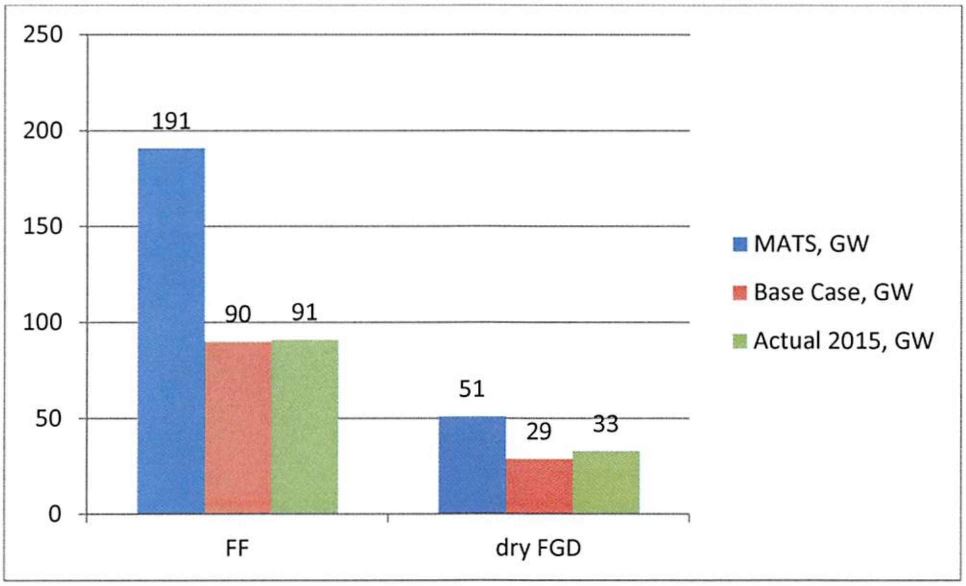
2 Note: The difference between controlled capacity in the base case and under the MATS may not necessarily equal new retrofit construction, since controlled capacity above reflects incremental operation of dispatchable controls in 2015. Additionally, existing ACI installed on those units online before 2008 are not included in the base case to reflect removal of state mercury rules from IPM modeling. For these reasons, and due to rounding, numbers in the text below may not reflect the increments displayed in this figure. See IPM Documentation for more information on dispatchable controls.

3 Michael J. Bradley and Associates, "MATS Compliance Extension Status Update", MJB&A Issue Brief, June 24, 2015. Examination of the underlying data showed that of the 17 GW of FF with extensions, 8.3 GW were associated with FGD systems, leaving 8.7 GW of FF not associated with FGD.

dry FGD systems are primarily part of plans for compliance with the Regional Haze Rule or other SO_2 control requirements.

Scrubber upgrades – EPA's forecast of 63 GW in wet FGD upgrades is higher than actual. In 2015 there was about 170 GW of wet FGD installed on coal fired electric utility units or small power plants. On the other hand, a review of the Information Collection Request (ICR) data shows only about 7,600 MW of the roughly 52,000 MW of capacity with wet FGD installed that reported HCl emissions to the ICR, or about 15%, had HCl emissions in excess of the MATS limit. This would suggest only about 30 GW of FGD upgrades to be expected. About 16 GW of scrubber upgrades have been identified in applications for MATS extensions.[3] While there is no official data showing the level of wet FGD upgrades, it is reasonable to assume that at least 16 GW and no more than 30 GW of scrubber upgrades were performed. To that point, most of the FGD system upgrades were justified on the basis of improved SO_2 control for CAIR or CSAPR rather than MATS.

Figure 2. MATS and Base Case projections, and 2015 actual or planned installations of FF and dry FGD, expected to be directly a result of MATS, GW



The projected fixed and variable operating costs are also impacted by the type of equipment projected to be used and the assumed reagent usage rates for this equipment. Of particular concern with regard to variable operating cost are reagent usage assumptions relating to dry sorbent injection (DSI).
This Report will review each of the following as they relate to EPA's projection of cost to the MATS rule.

- Capital and operating cost projections relating to EPA forecasts for DSI
- Capital and operating cost projections relating to EPA forecasts for dry FGD
- Forecasts for PM control retrofits to fabric filters
- Forecasts for ACI variable operating and maintenance costs

- Fuel cost projections

Projections for the capital and operating costs for Dry Sorbent Injection (DSI)

In practice, DSI may be deployed for control of SO_3, HCl or SO_2. For SO_3 control the DSI system may be deployed in combination with an ACI system to enhance the Hg capture of the ACI system. On the other hand, IPM only forecasts DSI systems for MATS compliance as a means for controlling HCl. Therefore, many of the DSI systems installed to enhance Hg control in response to the MATS rule were not installed to control the pollutant EPA targeted DSI for. By and large, DSI systems for SO_3 control, however, are quite inexpensive to own and operate compared to those used for SO_2 or HCl control as a result of the comparatively very low reagent demand necessary to control SO_3. Therefore, the costs of the DSI systems associated with SO_3 capture can be ignored when compared against these other costs.

DSI capital cost

EPA's assumptions regarding use of a fabric filter in combination with DSI and EPA's assumptions about DSI treatment rates for controlling HCl introduce a number of issues. As described in Section 5.5.3 of the IPM documentation, EPA assumes that facilities that select DSI for reduction of HCl emissions always install a fabric filter. Treatment rate is assumed by EPA to be at a Normalized Stoichiometric Ratio of 1.55 using milled Trona per Appendix 5-4 of the IPM v4.10 documentation.[4] Experience has shown that lower treatment rates are possible without the need to retrofit a fabric filter.

Sodium based sorbents, such as Trona actually improve ESP capture efficiency due to the beneficial impact on fly ash resistivity making a fabric filter retrofit unnecessary. In fact, very few DSI systems that have been installed in response to the MATS rule entailed installation of a fabric filter. EPA's overestimation of fabric filters is due in part to the assumption that use of DSI for HCl control requires a baghouse. Assuming that the 9 GW of DSI forecast in the Base Case does not have FF, this means that IPM forecast at least an additional 43 GW of DSI that was equipped with FF (52 GW projected in the policy case versus 9 GW in the Base Case). Fabric filters increase the installed cost of a DSI system by a substantial amount – costing on the order of \$150-\$250/kW, depending upon the size of the facility and other factors.

Although EPA assumed that a fabric filter would be necessary for control of HCl, it is also worth examining the capital costs EPA uses for use of DSI upstream of an ESP, because this is by far the most common application of DSI. Appendix 5-4 of the IPM documentation describes the cost estimating approach developed by Sargent & Lundy for use in the IPM.[4] This methodology predicts capital costs of \$40/kW for a 500 MW plant and costs well in excess of \$100/kW for plants of about 100 MW in size. Discussions of these costs with both utilities and technology providers indicates pretty clearly that these capital cost estimates are well above what has been experienced in practice. This may be the result of the overestimation of Trona demand – that would necessitate more equipment than in fact is necessary.

[4] Sargent & Lundy, "IPM Model – Updates to Cost and Performance for APC Technologies Dry Sorbent Injection for SO2 Control Cost Development Methodology Final", August 2010 Project 12301-007

DSI operating costs

DSI operating costs are also lower than estimated. EPA assumed that DSI would provide 90% HCl removal and would require a normalized stoichiometric ratio (NSR) of 1.55 when using DSI in combination with a baghouse for capturing HCl. Studies by Solvay[5] showed DSI achieving over 98% HCl removal at much lower treatment rates. They examined several sorbents at different milling levels.

- Trona (S200) - d50 : 30 µm
- Milled Trona (S250) - d50 : 15 µm, d90 : 60 µm
- Milled Sodium Bicarbonate (S350) - d50 : 12 µm, d90 : 40 µm
- Finely Milled Sodium Bicarbonate (S450) - d50 : 7 µm ,d90 : 17 µm
- Hydrated Lime - d90 : 45 µm, purity: 96.8%

Figures 3a and 3b show the results of pilot tests performed with injection upstream of an ESP and Figures 4a and 4b show the results of pilot tests performed with injection upstream of a baghouse. As demonstrated by Figure 3a, 90% HCl capture was achieved with milled Trona (D250) with an NSR or roughly 0.3 and 99% capture was achieved with an NSR of roughly 0.6. This compares to an assumed forecast of 1.55 for 90% capture. EPA's assumed treatment rate at 90% removal was therefore almost five times what is shown in this data. As demonstrated in Figure 3a, with an ESP milled trona produced 90% capture at an NSR of about 0.35 and 99% capture with an NSR of about 0.70. However, in this case much better performance was provided by the more reactive sodium bicarbonate (S350 and S450). While any given facility may experience slightly different results than shown in these pilot tests, it is clear that whether using trona or sodium bicarbonate it is possible to achieve well in excess of 90% without a fabric filter at treatment rates well below those assumed by EPA.

SO_2 capture is normally well below that of HCl because SO_2 is slower to react, and Figures 3b and 4b confirm that. At treatment rates where milled trona is expected to achieve 90% HCl capture, roughly 20% SO_2 capture is expected, and at treatment rates where 99% HCl capture is achieved, roughly 40% SO_2 capture is expected. These significant levels of SO_2 capture are nonetheless lower than the 70% assumed by EPA.

Another aspect of operating costs is waste disposal. EPA assumes that the by-product must be disposed of at a much higher cost than normally used for landfill of coal combustion products. This is an unnecessary cost because sodium by product can be blended or neutralized and disposed of as a non-hazardous waste at a much lower cost. Moreover, if this were a sufficiently large concern, the facility owner could use calcium-based reagent, such as hydrated lime, which produces a highly stable product.

Other factors that caused the IPM forecast of fabric filters to be too high was the result of overestimation of dry FGD, overestimation of waste disposal costs associated with ACI, and underestimation of the ability of existing ESPs to achieve the MATS PM emission standard with simple upgrades.

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5. Yougen Kong, Mike Wood, Solvay Chemicals Inc.," HCl Removal in the Presence of SO2 Using Dry Sodium Sorbent Injection", Houston, Texas, available at www.solvay.com

Figure 3a. HCl removal with injection upstream of an ESP

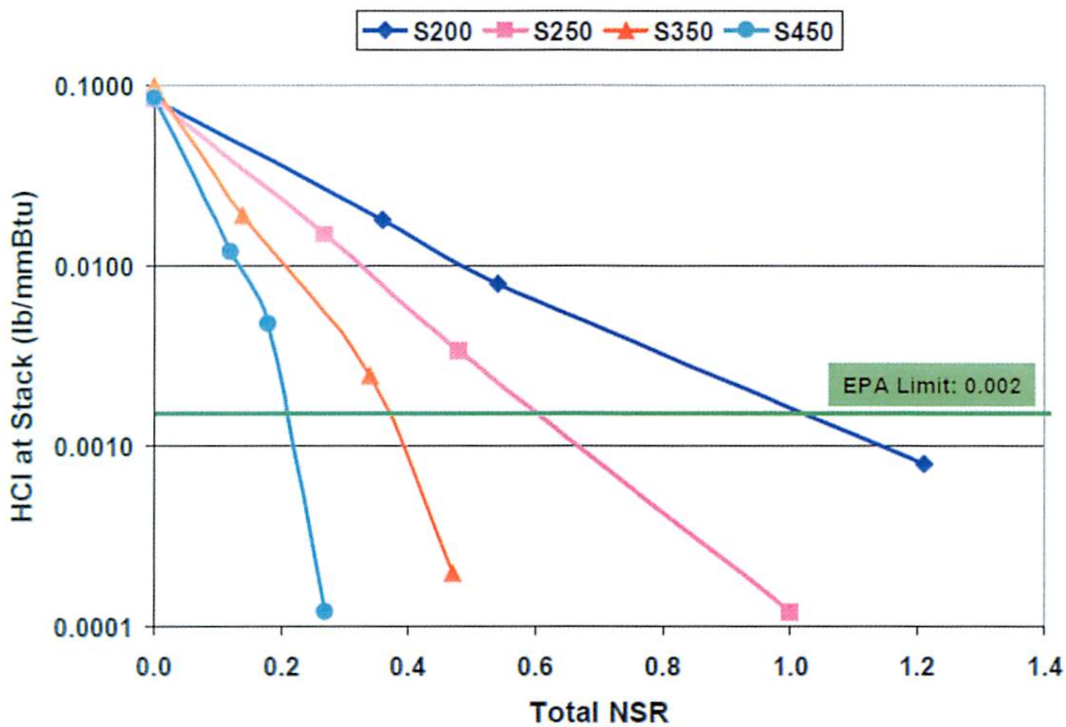


Figure 3b. SO_2 reduction with injection upstream of an ESP

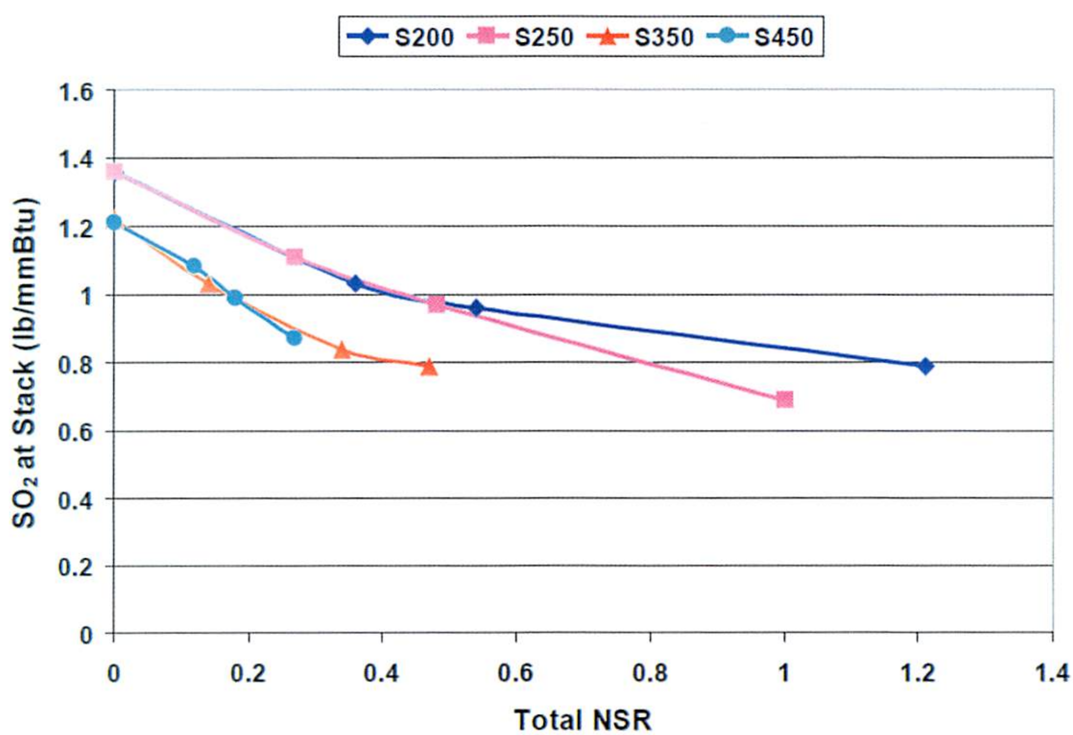


Figure 4a. HCl removal with injection upstream of baghouse

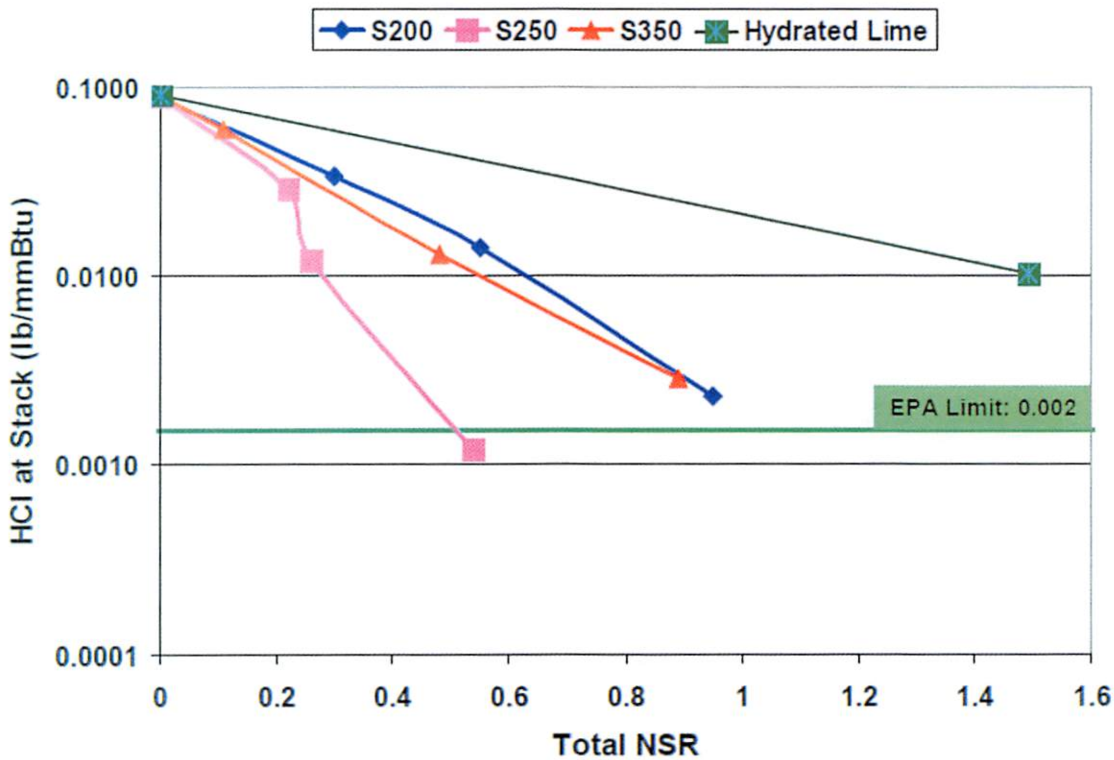
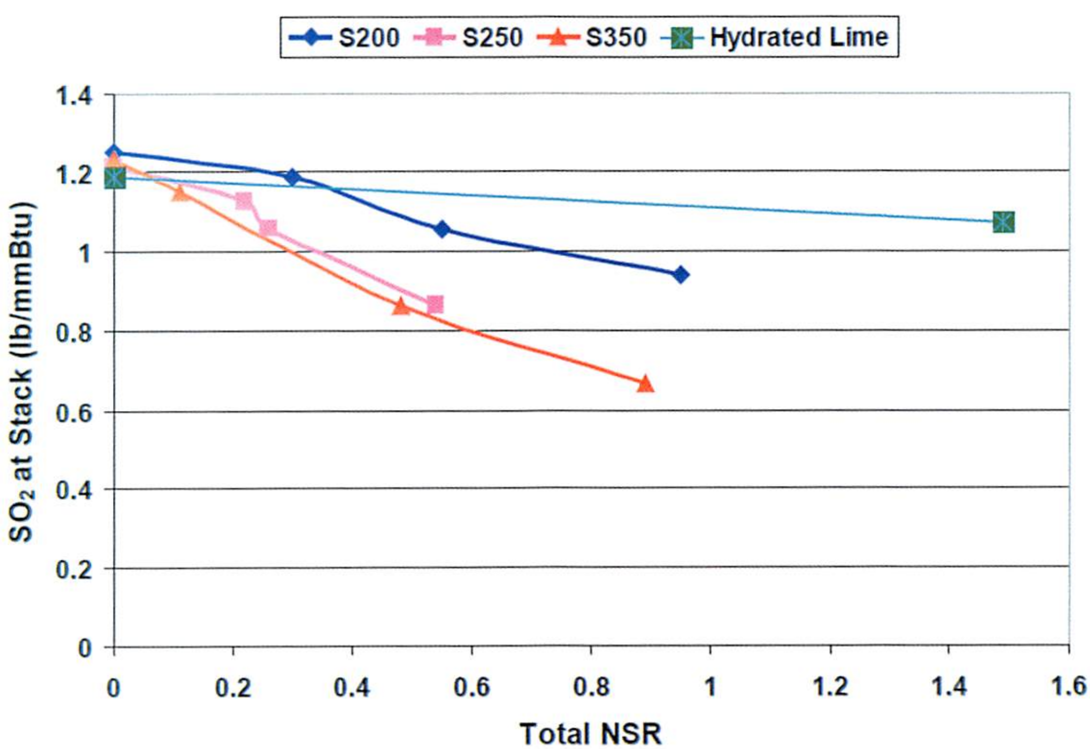


Figure 4b. SO_2 reduction with injection upstream of a baghouse



Projections for dry FGD

Dry FGD systems are commonly installed with fabric filters. As a result, an overestimation of dry FGD installations will result in an overestimation of fabric filter installations. The reason for the high forecast for dry FGD is likely the result of forecasts for DSI costs with a fabric filter (that may have made the incremental cost for dry FGD more acceptable) or the assumption by EPA that DSI is limited to only 90% HCl capture (that would force dry FGD to be selected by the IPM if greater than 90% HCl reduction was necessary). These assumptions would cause IPM to project that companies would select dry FGD for acid gas control rather than DSI in situations where DSI is, in fact, capable of providing adequate acid gas control. But, the effects of DSI and dry FGD can explain about 65 GW[6] of the roughly 100 GW of FF that were forecast but are not actually installed.

Projections for PM control

EPA's assumptions regarding DSI and dry FGD do not adequately explain the overestimation of fabric filters in their MATS cost estimate. EPA also made assumptions about the need to retrofit fabric filters for PM control to meet the MATS PM standard or for use in ACI systems. The assumptions for PM were used in a spreadsheet to identify facilities projected to need upgrade of their ESP or retrofit of a fabric filter. The projection developed with the spreadsheet was exogenously input to the IPM model to determine if improvement in PM collection efficiency was needed and, if so, what kind of improvement would be performed and what it would cost. In this manner that spreadsheet determined if a PM retrofit with a baghouse was necessary or if ESP upgrade was adequate. The approach used apparently underestimated the ability of the existing ESP to achieve the MATS PM emission standard. In fact, most ESPs were capable of achieving the emission standard without any modifications or with relatively modest changes – at most changes to the transformer rectifier sets and perhaps electrodes. In many cases rebalancing of flows was adequate at minimal cost.

The result is that EPA projected more fabric filter retrofits than were, in fact, built. EPA's modeling attributes 101 GW of FF to MATS versus the Base Case, some of which are attributed to dry scrubbers. Moreover, EPA also likely overestimated the cost of modifying existing ESPs to comply with the regulation. ATP's estimate of the market size for ESP upgrades in 2014 was only in the range of about $50 million based upon interviews with discussions with suppliers of these services and equipment.

ACI variable operating and maintenance costs

According to Appendix 5-3 to Chapter 5 of the IPM documentation,[7] EPA assumes that when activated carbon and fly ash are collected in the same PM control device that the cost of disposal for all solids – fly ash and activated carbon – are increased. The effect is that the projected cost of waste disposal exceeds that of the carbon sorbent – more than doubling the VOM. This is based upon the presumption that addition of activated carbon renders beneficial reuse of fly ash impossible. In practice, this does not

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6 22 GW of additional dry FGD for MATS versus the Base Case plus 43 GW of additional FF on DSI for MATS versus the Base Case

7 Sargent & Lundy, "IPM Model – Revisions to Cost and Performance for APC Technologies Mercury Control Cost Development Methodology, Final", March 2011, Project 12301-009

happen. First, despite the desirability of beneficially reusing fly ash as a concrete additive, in practice most fly ash is not used for this purpose because of local market conditions or other reasons. Furthermore, activated carbon suppliers have developed "cement friendly" carbons that do not have the adverse impact of conventional carbons. The assumption that waste disposal costs increase so much may also partially account for the overestimate of fabric filters, as installation of an additional fabric filter would facilitate segregation of fly ash from activated carbon.

EPA also overestimated the ACI that is attributable to MATS – 148 GW of ACI forecast for MATS versus 7 GW in the Base Case. According to ATP's estimates, *at least* 20 GW of ACI was in operation in 2014, clearly well over the 7 GW attributed by EPA to the Base Case. Furthermore, EPA's estimate of 148 GW of ACI exceeds somewhat ATP's estimates of total ACI systems, which is about 120 GW once MATS is fully implemented. ATP estimates that with the rule fully implemented, about 100 GW of ACI is attributable to MATS.

Fuel Costs

Facility owners will convert to natural gas or switch to higher cost coal if in their estimation this is a less costly approach to complying with the MATS rule. EPA's forecast Policy Case projected a cost of natural gas in 2015 of $5.66/MMBtu versus $5.40/MMBtu in its Base Case. Data from the Energy Information Administration indicates that in 2015 natural gas to utility customers has ranged from a high of $4.99/thousand cubic feet down to $3.24/thousand cubic feet, or about $4.99/MMBtu to about $3.24/MMBtu because a cubic foot of gas has very close to 1,000 Btu's of energy. Therefore, much lower natural gas prices than forecast by EPA have made gas a much more attractive fuel and has resulted in the cost of compliance with the rule to be much lower.

Impact on cost

A rough estimate of the impact on cost of the various assumptions addressed in this memo is shown in Table 1. This shows the estimated excess costs associated with:

- the fabric filter overestimate that is not associated with dry FGD,
- the overestimate of dry FGD
- the overestimate of reagent consumption associated with DSI
- the overestimate of capital cost associated with wet FGD upgrades,
- the overestimate associated with waste disposal assumptions for ACI,
- an adjustment to account for the underestimate of carbon use if the facilities that are assumed to install TOXECON systems do not,
- the overestimate of the ACI systems attributable to the MATS rule

Section 8 of the IPM documentation states that a capital charge rate of 11.3% is used for environmental retrofits, which is what is used to determine amortized capital charges. the assumed capacity factor is 65%. Cost estimates are developed using capital costs ($/kW), VOM ($/MWh) and FOM ($/kW-yr) rates taken from the IPM v4.10 documentation used to develop the MATS rule. The fabric filter overestimate is clearly the most significant, followed by the overestimate of dry FGD and the overestimate associated with DSI.

The overestimate of FF that is not explained by dry FGD is 82 GW. 43 GW of this is explained by DSI attributed to MATS, leaving 40 GW unexplained by DSI or dry FGD. This results in an additional 40 GW that can be ACI systems in TOXECON arrangements. As a result, there are roughly 101 GW (141 GW – 40 GW) that are ACI systems without TOXECON that where waste-disposal costs are overestimated. This is offset in part by the underestimate of sorbent costs if the 40 GW of forecast TOXECON systems are made to be conventional ACI systems upstream of an ESP.

Table 1. Approximate overestimate of costs

	FF [1]	dry FGD [2]	DSI [3]	wet FGD upgrade [4]	Wet FGD [5]	ACI Waste [6]	ACI carbon [7]	ACI excess [8]	Total
million $	$16,072	$8,838	$0	$4,700	$992	$0	$0	$414	$31,016
Annualized, capital, million $	$1,816	$999	$0	$531	$112	$0	$0	$47	$3,505
Operating costs, million $	$102	$391	$1,400	$0	$37	$1,196	-$207	$798	$3,718
Million $	$1,918	$1,390	$1,400	$531	$149	$1,196	-$207	$845	$7,223

Notes:

1. *The overestimate of FF is the amount over actual installations that is not explained by dry FGD*
2. *Dry FGD estimate for excess dry FGD over actual installed*
3. *DSI estimate assumes that actual reagent is roughly one third of EPA assumption.*
4. *Wet FGD upgrade assumes 30 GW of actual upgrade versus 63 GW predicted. No formal data is available.*
5. *The actual reduction in wet FGD versus the Base Case was greater than forecast by EPA*
6. *Accounts for EPA assumption about fly ash waste for facilities where fly ash is collected with carbon*
7. *Accounts for higher carbon demand from units with ESP versus TOXECON. EPA assumed more TOXECON installations, which include new baghouses.*
8. *Accounts for overestimate of ACI installations after rule is fully implemented. Only includes carbon for VOM as waste already addressed.*

Conclusion

Experience with technologies deployed for MATS compliance has shown them to be less expensive and more effective than originally assumed in EPA's analysis. As a result, the true cost of complying with the MATS rule is more than $7 billion per year less than estimated by EPA, making the true cost of the rule about one quarter of what EPA originally estimated the rule to cost.