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ANALYSIS OF THE ECONOMIC IMPACT ANALYSIS SUPPORTING EPA'S PROPOSED RULE FOR NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS FROM FERROALLOYS PRODUCTION (40 CFR Part 63)

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EXECUTIVE SUMMARY

On November 23, 2011, the U.S. Environmental Protection Agency (EPA) published a proposed rule in the Federal Register to amend the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for hazardous air pollutants (HAPs) from ferroalloys production facilities (76 FR 72508, hereafter called the "2011 Proposed Rule"). On October 6, 2014, the EPA published a supplement to the 2011 Proposed Rule (79 FR 60238, hereafter called the "2014 Proposed Rule"). The 2014 Proposed Rule is accompanied by an Economic Impact Analysis (EIA) with EPA's estimates of benefits, costs and economic impacts of the Proposed Rule (EPA, 2014a). Together, the 2011 Proposed Rule and the 2014 Proposed Rule comprise the "Ferroalloys NESHAP Rulemaking." My comments focus on the EIA's assessment of the economic impacts of the Ferroalloys NESHAP Rulemaking in light of the 2014 Proposed Rule. I conclude that the EIA is deficient in its assessment of economic impacts.

Key Findings on the Economic Impact Analysis

- EPA's correctly concludes that a loss in output of almost 16% associated with increased annual operating costs of $8.7 million from having to add both enhanced fugitive capture and activated carbon injection (ACI) would result in "substantial economic impacts" and "potential closure."

- EPA's failure to comment on the "substantial economic impacts" and "potential closure" associated with a loss in output of almost 10% associated with increased annual operating costs of $5.3 million from having to add enhanced fugitive capture highlights the limitations of EPA's EIA.

- The EIA correctly concludes that Eramet Marietta Incorporated (EMI) could not increase its prices and maintain its level of output but then fails to correctly assess the business implications of that fact. When new compliance costs must be absorbed without price increases, affected businesses will experience reduced profits, which may even turn negative and result in plant closure. Even if profits have a chance of remaining positive, the affected businesses may not be able to obtain the financing necessary to add capital for compliance equipment and would thereby also be forced to close.

    - Data on EMI's net margins indicate that EMI would likely be in just such a position with respect to its ability to absorb the additional capital and operating costs imposed by the 2014 Proposed Rule and remain in business.

- The potential loss of U.S. ferroalloy manufacturing should be viewed as a national security risk, but the EIA fails to mention this.

While the intent of this report is to provide a stand-alone economic analysis of the 2014 Proposed Rule, my previous analysis and that of my colleague Anne Smith (included in the

docket at EPA-HQ-OAR-2010-0895-0106) remains relevant and is incorporated in this analysis by reference.[1]

My full CV is provided in Appendix A. Appendix B provides business-confidential financial statements for EMI's manganese ferroalloys business on which this report relies.

[1] Smith AE, Bloomberg SJ. 2012. "Technical Comments on the Regulatory Impact Analysis Supporting EPA's Proposed Rule for National Emissions Standards for Hazardous Air Pollutants from Ferroalloys Production (76 FR 72508)." Prepared for and submitted to EPA Docket by Eramet Marietta, Incorporated. January 31.

I. OVERVIEW OF THE 2014 PROPOSED RULE

The 2014 Proposed Rule "presents a revised technology review for the Ferroalloys Production source category and proposed revisions to the standards based on those reviews."[2]

The Ferroalloys NESHAP Rulemaking covers four primary categories of standards:

1. MACT floor limits for Mercury, Polycyclic Aromatic Hydrocarbons (PAH), Hydrochloric Acid (HCl), and Formaldehyde;

2. Beyond the Floor (BTF) Limits for Mercury and PAH;

3. Technology-based Particular Matter (PM) limits; and

4. Risk-based controls on process fugitive emissions.

A. MACT floor limits

The proposed MACT floor limits for Mercury and PAH have subcategories for ferromanganese (FeMn) and silicomanganese (SiMn). These limits for existing sources are denominated in micrograms per dry standard cubic meter, or μg/dscm, and are summarized in Figure 1.

Figure 1: MACT Floor Limits for Existing Sources

	FeMn Production	SiMn Production
Mercury	170 μg/dscm	12 μg/dscm
PAH	1,400 μg/dscm	120 μg/dscm
HCl	1,100 μg/dscm	1,100 μg/dscm
Formaldehyde	201 μg/dscm	201 μg/dscm

EPA wrote, "We anticipate that both of the existing sources would be able to meet these product-specific MACT floor limits for existing sources without installing additional controls."[3] Therefore, costs associated with the proposed MACT floor limits are assumed to be zero for purposes of this analysis.

B. BTF limits for Mercury and PAH

The BTF limits for Mercury, proposed in the 2011 Proposed Rule, also have subcategories for FeMn and SiMn. EPA considered a 50% reduction for FeMn and a 60 pound per year reduction for SiMn. Each reduction would be achieved by installing activated carbon injection (ACI) technology with brominated carbon. Regarding the BTF limit for Mercury from FeMn

[2] 79 Fed Reg 60238.

[3] 79 Fed Reg 60261.

production, EPA wrote in the 2014 Proposed Rule, "… we believe that Eramet Marietta would not be able to sustain the costs of BTF mercury controls (in addition to the fugitive control costs required …). This would likely result in substantial economic impacts in the short-term and potential closure of the facility in the longer-term."[4] Given this consideration, EPA decided not to propose a BTF limit for Mercury from FeMn production in the 2014 Proposed Rule. EPA also determined that a BTF limit for Mercury from SiMn production would not be cost-effective and they did not propose a BTF limit for Mercury from SiMn production either.

The BTF limits proposed in 2011 for PAH were also based on the addition of ACI, which is assumed to result in BTF limits of 340 μg/dscm for FeMn production furnaces and 28 μg/dscm for SiMn production furnaces. Since the BTF limits were also based on the addition of ACI, the potential costs are the same as for the BTF limits for Mercury. Regarding the BTF limits for PAH, the EPA wrote, "Given the uncertainties regarding the percent of PAH reductions that can be achieved with ACI and since the cost-effectiveness is relatively high for this HAP, we are not proposing BTF limits for PAHs." [5]

C. PM limits

EPA is proposing revised technology-based PM limits for existing sources to limit stack emissions to 25 mg/dscm (milligrams per dry standard cubic meter). EPA wrote that existing facilities should be able to meet this standard without any additional controls, so costs associated with meeting PM limits are assumed to be zero for this analysis.

D. Risk-based controls on process fugitive emissions

In its 2011 Proposed Rule, EPA had a risk-based requirement for full building enclosure. Commenters, including EMI, pointed out that such a requirement would be quite costly, and possibly not feasible. In the 2014 Proposed Rule, EPA agreed, concluding "… the full-building enclosure option with negative pressure may not be feasible and would have significant economic impacts on the facilities (including potential closure for one or more facilities)."[6]

For the 2014 Proposed Rule, EPA proposed alternative, less costly, risk-based controls to reduce process fugitive emissions. EPA determined that the installation of additional PM capture and control devices to address emissions from tapping, casting, and slag raking processes would allow ferroalloy producers to capture 95% of such process fugitive emissions. EPA proposed the enhanced fugitive capture option as part of the 2014 Proposed Rule, in lieu of full building enclosure.

[4] 79 Fed Reg 60262-60263.

[5] 79 Fed Reg 60264.

[6] 79 Fed Reg 60273.

II. ECONOMIC IMPACTS TO EMI

My analysis of the economic impacts to EMI begins with a high-level review of my initial analysis of the 2011 Proposed Rule. From there, I present an overview of the Ferroalloys production industry. Next, I provide a critique of EPA's economic analysis associated with the 2014 Proposed Rule. Finally, I conclude with an assessment of EMI's projected compliance costs and compare them to EMI's ability to absorb such costs and continue to operate.

A. EMI would have been unlikely to undertake the investments required to comply with the 2011 Proposed Rule

In the 2011 Proposed Rule, EPA proposed to require activated carbon injection (ACI) controls as a "beyond the MACT floor" standard and proposed to require full-building fugitive emissions control as an "ample margin of safety" standard.[7]

EPA made unsubstantiated economic claims in both the Regulatory Impact Analysis (RIA)[8] and in the preamble to the Proposed Rule. In the Executive Summary of the RIA, EPA wrote, "The economic impacts for the firms affected by this proposed rule range are annual compliance costs of less than 0.01 percent of sales. Thus, consumers will also experience minimal changes in the price of ferroalloy output."[9] Similarly, in the Federal Register preamble the EPA wrote, "The impacts to affected firms will be low because the annual compliance costs are quite small when compared to the annual revenues for the two affected parent firms (much less than 1 percent for each)."[10]

The Economic Impact Analysis section of the RIA did not include <u>any</u> analysis that would support the conclusion in the document's Executive Summary. In fact, the only support for characterizing the economic impacts on the affected firms as "low" was the concluding statement that the costs would be very small relative to the parent firms' revenues. This statement, however, merely connected two financially-unrelated concepts and reflected a fundamental lack of understanding of how companies make investment decisions.

In my technical report on the 2011 Proposed Rule, I concluded that with annual compliance costs associated with total building ventilation and activated carbon injection (ACI) of approximately $17 million and EMI's net margin losses over the 2009 through 2011 time period (the three most recent years of available data at the time), that EMI would be unlikely to undertake the investments required to comply with the 2011 Proposed Rule, and instead would close the plant, resulting in the loss of jobs for more than 200 employees. That conclusion is unchanged.

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[7] 76 Fed Reg. 72524-25, 72533.

[8] *Regulatory Impact Analysis (RIA) for the Proposed Manganese Ferroalloys RTR.* U.S. EPA, November 2011.

[9] RIA, p. 1-1.

[10] 76 Fed Reg 72540.

B. Ferroalloys are a commodity product and higher costs from U.S. producers cannot be passed along as higher prices

Ferroalloys are a commodity product. The production processes of domestic producers and importers differ little.[11] Buyers of ferroalloys do not view products sold by producers in the United States or producers outside of the United States as different products, and therefore, will not choose their supplier based on product differentiation. With nothing to differentiate these products, buyers will choose their suppliers primarily based on price.[12]

In the United States, imports are a large portion of the ferroalloys market. According to EMI, imports account for about 80% of the ferroalloys purchased in the United States. The largest importing countries to the United States are India, South Korea, and South Africa (and countries in Eastern Europe). There are only two domestic producers, EMI and Felman Production, LLC (Felman), and no new entrants are expected from the domestic market. EMI produces ferroalloys at a facility in Marietta, Ohio, while Felman operates a plant in West Virginia. EMI employs just under 200 people, while Felman employs 256 employees (when operating at full production).[13]

Given a competitive market, such as the ferroalloys market, prices are primarily determined based on the cost structure of producers. In general, the ferroalloys production process is a mature process and this limits differences in the cost of production across suppliers to differences in raw materials costs (including energy costs), labor costs, transportation costs, and other local costs (*e.g.*, compliance costs with regulations). Raw materials costs, including the costs of manganese ore, silica, coke, and electricity, are the largest costs, with manganese ore being the largest share of costs. Electricity costs are also quite significant. For example, they accounted for more than 20% of Felman's total production costs.[14] Electricity prices in the United States are also expected to increase as a result of new and proposed EPA regulations such as the Mercury and Air Toxics Standard (MATS) and Carbon Pollution Guidelines for Existing Power Plants (also known as the Clean Power Plan), and these costs have not been factored into EPA's

[11] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 3-6.

[12] U.S. International Trade Commission, Investigation Nos. 731-TA-929-931 (Second Review), September 2013, p. 13, "… we find that silicomanganese is a commodity product. All domestic producers reported silicomanganese from all sources to be *** interchangeable. The majority of importers and U.S. purchasers found products to be frequently or always interchangeable in all country comparisons." A possible exception to this would be for purchases made by the Defense Logistics Agency, part of the U.S. Department of Defense, as discussed later in this report.

[13] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 3-4.

[14] "Initial Joint Staff Memorandum Re: Case No. 13-1325-E-PC Felman Production LLC," Public Service Commission of West Virginia, October 2, 2013, Available at: http://www.psc.state.wv.us/scripts/WebDocket/ViewDocument.cfm?CaseActivityID=380001&NotType='WebDocket'.

economic analysis.[15] Compliance costs associated with environmental regulations that are not required of all global producers are an example of local costs that would be borne by U.S. producers but not by importers.

Thus, given the structure of the U.S. ferroalloys market, the 2014 Proposed Rule would subject the two remaining domestic ferroalloys producers to higher environmental compliance costs. The cost structure for all of the importers, accounting for approximately 80% of the U.S. market, would be completely unchanged by the 2014 Proposed Rule. Regardless of what the compliance costs are, the two domestic ferroalloys producers would need to either increase their prices to recover both their higher operating costs and their capital outlays, or maintain their prices and absorb such costs and hope that they could still be recovered through their (lower) profits. The ferroalloys importers would have no need to increase their prices, and would only do so if it would increase their profits.

Importers have not historically shown any signs that they would increase prices up to the levels that U.S. producers would need to increase them to remain profitable. In fact, on several occasions the U.S. International Trade Commission (ITC) has found ferroalloys importers to be illegally "dumping" their product in the U.S. market at below-market prices.[16] Although the actions of the ITC prevent some competitors from "dumping" their product in U.S. markets, if the 2014 Proposed Rule were to be implemented, then ferroalloys importers would not need to lower their prices to achieve a competitive advantage since U.S. producers would need to somehow cover their higher costs to comply with the 2014 Proposed Rule (or else shutdown). Thus, the net impact of the 2014 Proposed Rule is no different than if the ITC were to allow importers to "dump" their ferroalloys in the U.S. market.

The ITC has in the past noted the difficulties for the U.S. ferroalloys producers to recover their costs given the competitive role of the importers:

> "*Finally, the Commission noted that the domestic industry had not been fully able to recoup costs through sales revenue, despite a rebound in apparent U.S. consumption and generally**** during the period examined. Accordingly, the Commission found that the increasing volume of subject imports, sold at low and declining prices, played a significant role in preventing price increases. The*

[15] For example, EPA has separately projected that in 2020, prices in the RFCW region, which includes Ohio and West Virginia, would be higher by more than 6% as a result of the Clean Power Plan. Source: *Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants*, U.S. EPA, June 2014, Table 3-21.

[16] See for example, ITC Investigation Nos. 731-TA-929-931 (Second Review) and 731-TA-671-673 (Third Review), covering imports from India, Kazakhstan, Venezuela, Brazil, China and Ukraine. The U.S. International Trade Commission (ITC) determined that the antidumping duty order on silicomanganese from India, Kazakhstan, Venezuela, China, and Ukraine should not be revoked. The antidumping duty order for Brazil was revoked, however.

Commission concluded that subject imports had suppressed and depressed prices to a significant degree and had an adverse effect on U.S. prices."[17]

Given that prices offered by importers to the U.S. would not be expected to change as a result of the 2014 Proposed Rule's added cost to U.S. producers, the question arises as to whether the U.S. producers could raise their prices and find buyers willing to pay those higher prices. As noted in the ITC's September 2013 review, ferroalloy pricing data is publicly-available from sources such as *Metals Week* and *Ryan's Notes*. These published prices are used by both producers and purchasers to help determine prices.[18] The published prices would be heavily weighted toward the lower-priced import products and thus, these lower prices would set purchasers' willingness to pay. It would become extremely difficult, if not impossible, for U.S. producers like EMI to sell the same commodity at a higher price.

The only way in which the U.S. producers could expect to sell the same product at a higher price (and thereby cover their increased costs) would be if there were insufficient supplies available to meet global demand. However, in the ITC's September 2013 investigation, they noted that there was "ample excess capacity."[19] The existence of such excess global ferroalloys capacity would make U.S. producers' efforts to raise prices to cover their increased costs an unsustainable strategy. Further, even if a shortage of ferroalloys capacity were to arise in the future, this would likely motivate the addition of new capacity globally. It is not expected that any new capacity would be located in the United States[20] because production costs would be higher than in other countries not subject to the higher environmental costs associated with the 2014 Proposed Rule (as well as other existing regulatory and labor market disadvantages).

As noted in the EPA's EIA, the Felman facility has recently struggled financially. Felman ceased operations for an extended period in 2013-2014 and also requested a special electric power rate from the West Virginia Public Services Commission to "remain competitive with other ferroalloy producers worldwide."[21] It is my understanding that EMI is in a similar situation to Felman and is in the process of requesting a special electric power rate from the Public Utilities Commission of Ohio. As I discussed above, electricity rates are only expected to increase further as a result of other EPA regulations like MATS and the Clean Power Plan (and these cost increases are not yet reflected in any analyses).

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[17] ITC Nov. 2007, pp. 16-17. ("***" denotes confidential information that has been redacted from the publicly-available document.)

[18] ITC Sept. 2013, p. 21.

[19] ITC Sept. 2013, p. 14.

[20] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 2-2.

[21] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 3-10.

In summary, U.S. production of ferroalloys is highly substitutable with imports of ferroalloys. The excess global ferroalloys capacity could be used to displace U.S. production if U.S. production is faced with increased costs that will not be borne by importers. Finally, U.S. producers could not easily increase their prices and maintain their production output, so higher costs incurred to comply with EPA regulations would have to come out of profit margins.

C. EPA's economic conclusions are inconsistent

In the EIA's Executive Summary, EPA concludes, "The economic impacts for the firms affected by this proposed rule include annual compliance costs of approximately 1.8 percent of sales, and a potential 9.5 percent reduction in output."[22]

EPA demonstrates a basic misunderstanding of economic impacts when it compares increased annual costs to sales revenues. Revenues are not an indicator of a company's ability to pay for increased costs – profits and/or free cash flow are. (In fact, it should be a combination of profit and free cash flow over the period of the investment and then discounted back to a net present value.) Take a simple example of a company with $100 million in annual revenues and a regulation that mandates incremental production costs of only $1 million. These costs may be small relative to sales (only 1%), but if the company also has existing costs of $99.5 million then it would not have sufficient profits with which to pay for the additional costs, and if it were to incur them it would then become unprofitable if it could not raise its prices.

In the EIA, EPA used elasticity information developed by the U.S. ITC in 2013 to evaluate the economic impacts of the 2014 Proposed Rule. EPA began by comparing the annual operating costs to estimated sales and calculated that the annual operating costs associated with the enhanced fugitive capture would be 1.76% of sales. EPA correctly wrote that it would be difficult for EMI to increase its prices by 1.76% to recover these costs, acknowledging that EMI is a price taker.[23]

EPA next looked at how higher costs for EMI could lead to decreased EMI production (increased imports). First, using both the price elasticity of demand and the price elasticity of supply, EPA determined that a 1% increase in price would result in a 0.92% decline in demand. Multiplying this rate by the presumed price increase of 1.76% results in a loss of output for EMI of 1.62%. Then, using an elasticity of substitution of 4.5 and an increase in price of 1.76%, EPA estimated

[22] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 1-1. Note that the compliance costs are for both EMI and Felman, but are only for the enhanced fugitive capture.

[23] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 5-5.

a further 7.9% increase in demand for imports (decrease in output for EMI), for a total loss in output for EMI of 9.52%.[24, 25]

EPA further evaluated the potential loss in output for EMI if EMI were required to install ACI to comply with BTF limits as proposed in the Ferroalloys NESHAP Rulemaking. According to EPA, installing ACI would add approximately $3.4 million in annual operating costs and EPA estimated that this would increase the loss in output from 9.52% to 15.83%, or an additional 6.21%.[26]

The EPA concludes its economic impacts analysis by stating EMI, "… would not be able to sustain the costs of the beyond-the-floor mercury controls (in addition to the fugitive control costs). This would likely result in substantial economic impacts to the facility in the short-term and potential closure in the longer-term."[27]

EPA's conclusion that a loss in output of almost 16% associated with increased annual operating costs of $8.7 million would result in "substantial economic impacts" and "potential closure" makes economic sense, particularly given EMI's financial situation (see Table 1). What does not make sense is that EPA does not consider the impact of adding enhanced fugitive capture without ACI, which EPA estimates would still result in an almost 10% reduction in output associated with $5.3 million in annual operating costs. As I show in the following paragraphs, it does not appear as if EMI could incur the additional compliance costs associated with any of the proposals that have been advanced by EPA in this rulemaking without it having "substantial economic impacts."

D. Economic Impacts of the 2014 Proposed Rule on EMI

1. Compliance costs for different EPA options

As part of my analysis of the economic impacts of the 2014 Proposed Rule on EMI, I am going to focus on the following control options:

1. Option 1 for control of fugitive HAP emissions via enhanced fugitive capture;

2. Option 2 for control of fugitive HAP emissions via full building enclosure; and

[24] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, pp. 5-5, 5-6.

[25] EPA noted that EMI also imports SiMn and implies that this mitigates the substitution effect. This is an irrelevant argument since it has no impact on the viability of EMI's U.S. operations.

[26] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 5-7.

[27] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, p. 5-7.

3. Addition of activated carbon injection (ACI) controls to Option 1 (enhanced fugitive capture) for BTF limits.

For Option 1 (control of fugitive HAP emissions via enhanced fugitive capture), EPA's EIA estimated total capital costs for EMI of $25 million, with annual costs of $5.3 million (with the capital annualized assuming a 7% interest rate and a 20-year equipment life) for enhanced fugitive capture.[28]

For Option 2 (control of fugitive HAP emissions via building ventilation), EPA's EIA estimated total capital costs for EMI of $33 million, with annual costs of $14 million, for building ventilation to comply with the proposed metal HAP emissions requirements from process fugitives.[29]

EPA estimated the capital costs of ACI for EMI to be $30 million, with annual costs of $3.4 million.[30] Combined with the costs of enhanced fugitive capture this would be capital costs of $55 million and annual operating costs of $8.7 million.

2. General implications of increased compliance costs

EMI would likely not be able to pass along to customers these higher costs associated with complying with the 2014 Proposed Rule because importers, who would not be faced with these costs and who have excess capacity, could ramp up production and take away market share from EMI. Therefore, to comply with the 2014 Proposed Rule, EMI could either divert sufficient funds to make the necessary investments or shutter its plant. The question that the EIA should have addressed is whether the compliance investments will be financially-sound investments from the business perspective of the facility owners. The decision to close a plant is a difficult one as it affects the lives of all of the plant's employees. At the same time, EMI must make a profit on its investments, and if it cannot do that, then the inevitable business decision will be to close the plant.

For companies, decisions about whether or not to make an investment are usually evaluated based on a net present value (NPV) analysis. After discounting the costs (capital spending and ongoing operating costs) and revenues using the company's cost of capital as a discount rate, if the NPV is positive then an investment is considered "in-the-money," and may be pursued (provided non-financial factors do not make the investment appear unfavorable). If not, the

[28] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, Table 4-1. These cost estimates exclude costs associated with downtime, which are significant.

[29] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, Table 4-1. These cost estimates exclude costs associated with downtime, which are significant.

[30] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, Table 4-4.

project is deemed to be unprofitable and business logic dictates that the investment not be made. In addition, a company must have the financial resources to finance the investment, otherwise it cannot move forward.

In deciding whether to invest in the required control technologies to comply with the 2014 Proposed Rule, such an NPV analysis would factor in the up-front capital costs associated with the installation of the new emissions control equipment required by the Proposed Rule and increased operating costs that would be borne in the future. These costs would be evaluated along with projections of other operating costs and anticipated revenues. Both the costs and revenues would be discounted to a present value to accurately consider the time value of money. While some costs are relatively straightforward to project, other costs and revenues are quite difficult and uncertain to project. For example, EMI would need to project sales prices and commodity input costs (or at least the difference between these two) for the life of the capital investments required by the 2014 Proposed Rule, which would be 20 years (per EPA). Projecting commodity markets, which is what the cost inputs and sales prices are, is incredibly difficult and wildly uncertain. This uncertainty is typically reflected by either a higher discount rate, or multiple analyses that have different assumptions.

3. Cost implications for EMI

My review of EMI's financial condition brings into serious question whether investments at any of the levels described above would be a reasonable and sustainable business decision. Further, as explained below, the increased annual operating costs would only add to the losses that EMI has incurred over the last five years (see Table 1).

Table 1 includes relevant financial information for 2011 through 2013 for EMI's manganese business.[31] I have focused on the most recent three years (similar to my prior analysis) because EMI has undertaken some capital upgrades that are only reflected in those years' results and thus are most indicative of EMI's cost structure going forward.[32]

[31] See Appendix B for source information. All years based on international accounting standards, IFRS, as this was the only form available for all five years.

[32] In my prior analysis, I included the years 2009 through 2011. In this analysis, I have excluded both 2009 and 2010 because I have been informed that these years are not reflective of operations going forward. If I had included those years the average for 2009 through 2013 would have been as follows: [redacted]

Table 1: Selected Financial Information for EMI's Manganese Business [CONFIDENTIAL]

	2011	2012	2013	2011-2013 Average
Units Sold (metric tons)	[redacted]			
Net Margin (k$)[33]				
Net Margin / Units Sold				

These financials are useful for estimating EMI's ability to pay for the environmental costs required to comply with the Ferroalloys NESHAP Rulemaking for each of the options described above. The annual compliance costs would range from $5.3 million (enhanced fugitive capture) to $14 million (full building enclosure) per year. This additional cost would eliminate some of EMI's margins in a year like [redacted] and would lead to even larger losses in the [redacted] To place these annual costs on a cost per unit basis, $5.3 million per year would translate to additional costs o[redacted] metric ton of product sold (based on the average output levels from 2011 through 2013), while annual costs of nearly $14 million would translate to more than [redacted] metric ton of product sold.[34] This compares to an average net margin over that same time period of approximately [redacted] metric ton. Thus, the additional costs would have resulted in EMI earning an average net margin of between [redacted] that they sold if the Ferroalloys NESHAP Rulemaking's compliance costs had been in effect over the last three years. These recent ferroalloy-specific data suggest that EMI would be unlikely to undertake the investments required to comply with the Ferroalloys NESHAP Rulemaking, and instead would be forced by economic reality to close their plant, resulting in the loss of jobs for just under 200 employees.

This calculation does not suggest that EMI would necessarily have an ability to pay [redacted] in annual compliance costs going forward. There are other considerations such as potential increases in other unrelated operating costs and the initial capital outlay. EMI would need to be able to finance capital costs of between $25 million and $33 million. My review of EMI's recent financials suggests that EMI [redacted] (Again, EMI management has advised me that EMI's parent does not subsidize EMI, although it could provide EMI with a loan if it could demonstrate that the project would have a positive return on investment. This loan would need to be paid back in full, with interest.) In evaluating whether or not to extend credit to EMI to finance the investment required by the 2014 Proposed Rule, a lender would evaluate EMI's expected ability to earn a return on the capital. The lender would understand, as my own analysis shows, that it is unlikely EMI could increase its prices. Further, the capital projects do not allow EMI to increase production levels (which could result in lower fixed costs per unit going forward). In fact, if EMI tried to

[33] Net Margin is calculated as sales less costs. See Appendix B for all of the detailed costs that were netted from sales to calculate Net Margin.

[34] My analysis assumes that EMI could not pass along higher costs, which is consistent with EPA's assessment of the ferroalloys market. I do note that EPA instead assumed that EMI would increase its prices to cover its costs, resulting in lost sales. Left unsaid by EPA is that lost sales combined with higher costs would likely lead to lower profits.

increase its prices, then EPA estimated that its output could drop by between 10% and 16%. Given these factors, a typical lender would reasonably be quite hesitant to provide EMI with the funds necessary to pay for the capital. Even if a lender were to decide to extend the funds to EMI, it would likely only do so at an interest rate higher than the 7% cost of capital assumed by EPA,[35] which would be more reflective of the lender's risk that EMI would not be able to repay the loan. Of course, the higher interest rate would result in even higher annual costs to EMI because of higher interest payments.

Further complicating EMI's ability to pay for the increased environmental costs required to comply with the 2014 Proposed Rule are the nature of the annualized costs and the nature of the ferroalloys market. Many of the required costs are fixed costs (approximately $2.2 million per year in annualized capital recovery costs out of the $5.3 million per year).[36] Higher fixed costs put more pressure on a company to maintain or increase capacity utilization. If output increases then the fixed costs on a per unit basis will decline; if, however, output decreases then the fixed costs per unit will increase. (This is a relevant consideration now, while EMI is considering if it can undertake the investments. If they were to make the investment, then these costs would become sunk costs and would no longer be a major consideration in future strategic decisions such as pricing). While the fixed costs comprise $2.2 million per year of the estimated total annual costs, the remaining $3.1 million per year is in the form of higher operating costs. Companies are generally not able to set prices at less than their per unit operating costs, otherwise they would be losing money on every unit they sell. The higher variable costs that EMI would incur (if they did not close the plant), however, will likely not be translated into higher prices, thus they will be eroding EMI's margins. It is quite possible that there would be certain sales throughout a year that EMI would no longer make (*e.g.*, when prices fall below their variable costs). Each instance in which this were to happen would lower EMI's output, resulting in a larger fixed cost burden on each unit sold. If EMI were to expect even a few instances of this each year it could lead to a downward spiral of financial results from which it would be very difficult to emerge profitably in the long term. This would present a further reason why undertaking the environmental investments required to comply with the 2014 Proposed Rule would not be in the financial interests of EMI.

EPA failed to consider the national-scale concerns of making U.S. ferroalloys producers unprofitable

EPA's failure to include any sort of economic analysis of the impacts to the companies subject to the Ferroalloys NESHAP Rulemaking led EPA to simply state in 2011 that EPA "…assumes that

[35] *Economic Impact Analysis (EIA) for the Manganese Ferroalloys RTR Supplemental Proposal*, U.S. EPA Office of Air Quality Planning and Standards, Air Quality Assessment Division, September 2014, Table 4-1, footnote 1.

[36] "Memorandum Re: Cost Impacts of Control Options Considered for the Ferroalloys Production NESHAP to Address Fugitive HAP Emissions." Memo from Jeff Harris, Brad Nelson EC/R to Phil Mulrine U.S. EPA, OAQPDS/SPPD/MICG. EPA-HQ-OAR-2010-0895-0177. August 13, 2014, Attachment 1.

the regulated entities will comply with the regulation and continue to operate."[37] As described above, this is an unsupported assumption and one that is very difficult to accept given the dynamics of competition in the ferroalloys industry.

If the producers decided that the required capital investment and ongoing operating costs associated with complying with the 2014 Proposed Rule would not be financially justified, then they would be forced to shutter their plants and lay off their workers. Further, this would make U.S. steel producers, the largest purchasers of ferroalloys, 100% reliant on imports of ferroalloys. A U.S. steel industry that is 100% dependent on raw materials from India, South Korea, South Africa and the other foreign ferroalloys producers would have several detrimental consequences. One such consequence would be the absence of a domestic supply of steel for the U.S. military, which as noted in EPA's RIA is a consumer for "weapons systems and munitions,"[38] and other industries that are critical to U.S. national security and economic interests. EMI has also described past purchases of product by the Defense Logistics Agency, part of the U.S. Department of Defense, of vital raw materials deemed necessary for national security, including some ferroalloys from EMI. While this has not been significant in recent years, world events could change this.

As discussed above, the economics and the history of the global ferroalloys industry suggests that increasing prices to pay for the incremental compliance costs of the 2014 Proposed Rule is highly unlikely. This fact alone increases the likelihood that closure of the U.S. plants is a real possibility under the 2014 Proposed Rule that EPA should have considered. The potential loss of just under 200 jobs at just the EMI plant in Marietta, Ohio, indicates that EPA's EIA has fallen far short of its obligations by simply assuming that these plants will continue to operate.

[37] RIA, p. 5-10.

[38] RIA, November 2011, p. 3-2.

III. REFERENCES

EPA. 2011. *Regulatory Impact Analysis (RIA) for the Proposed Manganese Ferroalloys RTR.* Final Report. November.

EPA. 2014a. *Economic Impact Analysis (EIA) for the Managanese Ferroalloys RTR Supplemental Proposal*. Office of Air Quality Planning and Standards, Air Quality Assessment Division, Research Triangle Park, NC. September.

EPA. 2014b. "Memorandum Re: Cost Impacts of Control Options Considered for the Ferroalloys Production NESHAP to Address Fugitive HAP Emissions." Memo from Jeff Harris, Brad Nelson EC/R to Phil Mulrine U.S. EPA, OAQPDS/SPPD/MICG. EPA-HQ-OAR-2010-0895-0177. August 13.

EPA. 2014c. *Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants.* June.

Federal Register, Vol. 76, No. 226, November 23, 2011, Environmental Protection Agency, 40 CFR Part 63, "National Emission Standards for Hazardous Air Pollutants: Ferroalloys Production; Proposed Rule."

Federal Register, Vol. 79, No. 193, October 6, 2014, Environmental Protection Agency, 40 CFR Part 63, "National Emission Standards for Hazardous Air Pollutants: Ferroalloys Production; Proposed Rule."

Public Service Commission of West Virginia. 2013. "Initial Joint Staff Memorandum Re: Case No. 13-1325-E-PC Felman Production LLC." October 2. Available at: http://www.psc.state.wv.us/scripts/WebDocket/ViewDocument.cfm?CaseActivityID=380001&NotType='WebDocket'.

Smith AE, Bloomberg SJ. 2012. "Technical Comments on the Regulatory Impact Analysis Supporting EPA's Proposed Rule for National Emissions Standards for Hazardous Air Pollutants from Ferroalloys Production (76 FR 72508)." Prepared for and submitted to EPA Docket by Eramet Marietta, Incorporated. January 31. Available at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2010-0895-0106.

U.S. International Trade Commission. 2007. "Silicomanganese From India, Kazakhstan, and Venezuela," Investigation Nos. 731-TA-929-931 (Review). November.

U.S. International Trade Commission. 2012. "Silicomanganese From Brazil, China, and Ukraine," Investigation Nos. 731-TA-671-673 (Third Review). October.

U.S. International Trade Commission. 2007. "Silicomanganese From India, Kazakhstan, and Venezuela," Investigation Nos. 731-TA-929-931 (Second Review). September.

APPENDIX A. CV OF MR. SCOTT J. BLOOMBERG

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SCOTT J. BLOOMBERG
Vice President

Mr. Bloomberg focuses on economic and strategic issues facing the energy and large energy-consuming sectors. His areas of specialization include assessing national and regional effects of proposed environmental regulations and restructuring of energy markets. He has served important roles in litigation support, assisting experts with all forms of economic and large dataset analyses, serving as the lead on quality control, and working with legal teams to shape strategies informed by the analyses. He has also led projects for several clients that have focused on long-term resource planning, either as part of regulated integrated resource plan filings or as corporate strategic initiatives. Mr. Bloomberg has helped clients understand the inter-relationships among fuel markets (particularly natural gas and coal), environmental regulation/policy, and technological progress that are a vital part of any business planning process. Recent projects have focused on evaluations of different investment options given uncertain commodity markets, detailed analyses of proposed federal and regional environmental regulations, analyses of electric sector costs, and business impacts resulting from multi-pollutant legislation and regulation.

Education

University of Chicago
MBA (Honors), Finance and Strategic Management, 2002

Northwestern University
BA (Honors), Mathematical Methods in the Social Sciences, Economics, and Sociology, 1996

Professional Experience

NERA Economic Consulting
2011-present Vice President

Charles River Associates
2008-2011 Principal, Climate & Sustainability Group

2005-2008 Associate Principal, Energy & Environment Practice

2002-2005 Senior Associate, Energy & Environment Practice

Selected Experience

Environmental/Energy Policy

Filed technical comments on EPA's Regulatory Impact Analysis (RIA) for National Emissions Standards for Hazardous Air Pollutants (NESHAP) from ferroalloys production. Comments focused on a review of EPA's economic impact analysis and identified flaws in that analysis.

Led evaluation of a potential carbon dioxide standard for existing power plants. Study considered impacts of flexibility in the form of inter-state trading of credits and credits associated with energy efficiency.

Co-author of study to evaluate the potential impacts on the U.S. economy from possible future carbon taxes whose revenues would be devoted to a combination of debt and tax rate reduction. The analysis utilized the N_{ew}ERA model to estimate the effects of a carbon tax on the U.S. economy as well as on emissions and energy markets.

Co-author of study on likely and potential future U.S. energy policy over the remaining years of the Obama Administration (2013-2017), and its implications for the oil and natural gas sectors.

Co-author of analysis that reviewed seven major recent and anticipated EPA regulations affecting the electricity and energy sectors. The analysis used the N_{ew}ERA model to estimate electricity and other energy market impacts and broader economic impacts.

Performed analysis to support comments filed by the American Coalition for Clean Coal Electricity (ACCCE) regarding EPA's proposed new source performance standard (NSPS) for CO_2 emissions from new fossil-fired electric generating units. Analysis focused on limitations of EPA's conclusions regarding the NSPS and the importance of evaluating uncertainties.

Performed a detailed analysis of EPA's Mercury and Air Toxics Standards (MATS) Rule using the N_{ew}ERA model. Analysis focused on costs and associated economic impacts associated with compliance with the Rule, and also a comparison to EPA's own modeling results.

For a large generator owner, conducted a detailed review of EPA's modeling analysis of the final Cross State Air Pollution Rule (CSAPR), with a particular focus on identifying incorrect modeling assumptions and inconsistencies between the Rule and the analysis used to support it.

Conducted detailed, long-term assessment of the value of the existing nuclear generating fleet and potential value for additional nuclear generating capacity through up-rates and new nuclear builds.

Analyzed several different forms of renewable energy standards/clean energy standards, with a particular emphasis on understanding the potential implications on demand and pricing of natural gas.

Worked with a team of industry and functional experts to evaluate the potential consequences of proposed carbon policies on the airline industry and to develop strategies to mitigate negative outcomes.

Led engagement evaluating Midwest Governors' proposed cap-and-trade policy and the economic consequences that could result from its implementation on key industries in Minnesota.

Evaluated the potential outcomes in the electric sector that could results from a moratorium on new coal-fired power plants.

Conducted analysis to evaluate the factors that could drive prices in the Regional Greenhouse Gas Initiative (RGGI) market.

Extensive analysis of national, state, regional, and utility-specific cost impacts of several proposed environmental legislations/rules related to the electric utility sector. Federal CO_2 policies evaluated include: Lieberman-Warner-Boxer, Bingaman-Specter, McCain-Lieberman, Sanders-Boxer, and Carper. State and regional CO_2 polices evaluated included: RGGI, Florida, Illinois, and Midwest Governors.

Led a review and analysis of various allowance allocations and their consequences on retail electricity prices and bills across the United States.

Review of state and national-level renewable portfolio standards (RPS) with a focus on renewable energy credit (REC) prices, CO_2 emission reductions, and economic efficiency of proposals.

Conducted analysis of the consequences on the electric sector that could result from a widespread adoption of plug-in hybrid electric vehicles (PHEVs) as part of a larger study by the Electric Power Research Institute (EPRI) on the air quality impacts associated with PHEVs.

Allowance price forecasting for SO_2, NO_X, Hg, and carbon under assorted environmental scenarios, fuel cost scenarios, and capital cost assumptions.

Conducted detailed impact analysis resulting from a state's proposal to opt out of EPA's Clean Air Mercury Rule (CAMR) and instead impose a MACT. Impacts include total costs, wholesale electricity prices, emissions levels, coal unit profitability, and tax revenues.

Conducted analyses and co-authored comments on EPA's proposed Mercury Rule, filed on behalf of EPRI.

Financial modeling of the costs and benefits of implementing RTO and SMD policies within the Eastern Interconnection on behalf of regulatory utility commissions.

Strategic financial assessment of the costs and benefits of joining an RTO for a large eastern utility.

Strategic Investment Decisions

Valuation of existing nuclear power plant for sale-leaseback transaction. Analysis included several sensitivities with respect to environmental policy, natural gas prices, and electricity demand growth.

Lead author of study evaluating whether or not nuclear small modular reactors should be considered as a baseload generating option in Iowa. Study filed with Iowa State Utilities Board as part of MidAmerican Energy Company's testimony. Docket No. RPU-2013-0005. Analysis evaluates the options given a range of key uncertainties, including sensitivities on several independent variables.

Led diverse teams in developing long-term fuel forecast scenarios (natural gas, coal, and oil) used by a large vertically integrated utility in all of their long-term planning and strategic decision-making analyses, including those presented to respective state utility commissions.

Led scenario analysis exercise for integrated utility. Scenario analysis used to inform utility's senior management of strategic opportunities and risks over the next 20 years.

Assisted AmerenUE with its integrated resource plan (IRP) by providing a consistent set of integrated inputs across a range of policy and commodity price scenarios. This analysis also included a probabilistic analysis and formal risk assessment.

Led an IRP for a state governmental agency. Work included educating the client on IRP processes and best practices, and an evaluation of preferred resource plans given uncertainties in commodity markets and future load growth.

Assisted a G&T cooperative in evaluating the relative costs, benefits, and risks associated with different potential new capacity additions, accounting for uncertainties with respect to carbon policy and natural gas prices.

Analyzed the value of new combined cycle generation capacity in different regions of the US and Canada to assist a project developer in targeting preferred markets.

Conducted a broad evaluation of environmental planning processes used by a utility to evaluate its future power plant and retrofit investments.

Estimated the capital and operating costs related to the potential installation of pollution control equipment at selected power plants in response to proposed environmental policies. Estimated costs were used in the valuation of power plants under consideration as acquisitions by client.

Estimated the residual lease value for several coal-fired power plants leased to a hedge fund to assist the hedge fund in future lease negotiations.

Evaluated the prudence and timing of proposed capital investments in pollution control equipment for a Midwestern electric cooperative.

Determined the market potential of an early-stage clean coal technology. Assessed strategic pricing options and optimal customer targets.

Testimony Support in Regulatory and Judicial Proceedings

Led support for expert witness in the matters of Sierra Club v. Energy Future Holdings Corp. et al, Case No. 5:10-cv-156 (E.D.Tex) and Case No. 6:12-cv-108 (W.D.Tex) on behalf of Energy Future Holdings, regarding alleged opacity violations at the Martin Lake Power Plant and the Big Brown Power Plant, respectively. Support included review, synthesis and merging of large public and private datasets; detailed economic analysis including statistical analysis of robustness of results; quality control of data and analyses; management of other team members; coordination with legal team and expert witness; and testimony support.

Led support for expert witness in proceedings before the State of New Mexico Environment Improvement Board, EIB 11-16(R), in the matter of Proposed Repeal of Regulation 20.2.100 NMAC – "Greenhouse Gas Reduction Program." Support included analysis, quality control, coordination with legal team, and testimony support.

Led support for expert witness in proceedings before the State of New Mexico Environment Improvement Board, EIB 11-15(R), in the matter of Proposed Repeal of Regulation 20.2.350 NMAC – "Greenhouse Gas Cap and Trade Provisions." Support included analysis, quality control, coordination with legal team, and testimony support.

Managed a team of five people supporting the expert testimony of two expert witnesses, including analysis, quality control, testimony preparations, and witness preparation. Also, evaluated generating unit-level and system-level economic impacts resulting from several scenarios of compliance with Colorado's Clean Air Clean Jobs Act. Expert testimony and rebuttal testimonies were focused on relative costs, relative risks, and key assumptions such as fuel prices and environmental policy.

Analyzed expected dispatch and profitability of natural gas-fired combined cycle units as part of arbitration hearing on damages incurred through breach of contract.

Conducted detailed modeling of operation of pumped storage hydroelectric facility in the northeast, including forecasts of energy and ancillary services revenues as part of a broader facility valuation.

In support of expert testimony in an international arbitration hearing, performed detailed analysis of physical and financial transactions for liquefied natural gas (LNG) to be delivered from North Africa. Assessment included evaluations of physical storage levels, shipping capability, risk mitigation, and netback pricing.

Analyzed key issues in support of expert testimony regarding California energy crisis of 2000-2001, with a primary focus on natural gas transportation, storage, and consumption.

Conducted analyses relating to cost of capital appropriate for independent power projects in support of expert testimony as part of arbitration hearing.

Estimated damages incurred through a breach of contract dispute related to the termination of a tolling agreement. Damages estimate was presented as part of binding arbitration.

Publications

"Economic Outcomes of a US Carbon Tax," with A. Smith, D. Harrison, W.D. Montgomery, P. Bernstein, S. Tuladhar, M. Yuan, W. Gans, N. Kaufman, and S. Mankowski, prepared on behalf of the National Association of Manufacturers, February 2013. (available at http://www.nera.com/nera-files/PUB_Smith_NAM_FinalReport_0213.pdf)

"Impacts of Renewable Energy Subsidies on Achieving Renewables Goals," with M. King, J. Heidell, P. Bernstein and S. Tuladhar, NERA Economic Consulting, January 2013. (available at http://www.nera.com/nera-files/PUB_Renewable_Energy_Subsidies_Incentives_1212.pdf)

"Economic Implications of Recent and Anticipated EPA Regulations Affecting the Electricity Sector," with D. Harrison, A. Smith, A. Foss, A. Locke, S. Mankowski, M. McPhail, R. Patel and S. Tuladhar, prepared for American Coalition for Clean Coal Electricity, October 2012. (available at: http://www.nera.com/nera-files/PUB_ACCCE_1012.pdf)

"Analyzing the Changing US Carbon Policy Landscape," with S. Tuladhar and S. Mankowski, NERA Economic Consulting, March 2012.

"An Economic Impact Analysis of EPA's Mercury and Air Toxics Standards Rule," with A. Smith, P. Bernstein, S. Mankowski and S. Tuladhar, March 1, 2012.

"Gas Shales—A Game-Changer for Natural Gas Producers and Consumers," in CRA *Insights: Oil & Gas* (June 2010).

"The Price of Carbon," in *Electric Light & Power Magazine*, Volume 87 (August 2009).

"The Merits of Combining a Renewable Electricity Standard with a Greenhouse Gas Cap-and-Trade Policy: An Analysis of the American Clean Energy and Security Act of 2009 (H.R.2454)," with M. Neimeyer and K. Ditzel, Dialogue, in Dialogue, United States Association for Energy Economics (August 2009).

"Macroeconomic Analysis of American Clean Energy and Security Act of 2009," with R. Baron, P. Bernstein, K. Ditzel, J. Lamy, L. Lane, D. Montgomery, A. Smith, S. Tuladhar, and M. Yuan, in *Dialogue*, United States Association for Energy Economic, (August 2009).

"An Assessment of H.R. 2454 Cost Estimates by EPA and CBO," white paper, with W. D. Montgomery and P. Bernstein. (June 2009).

"Impact on the Economy of the American Clean Energy & Security Act of 2009," prepared on behalf of National Black Chamber of Commerce (May 2009).

"Economic Analysis of the Lieberman-Warner Climate Security Act of 2007 Using CRA's MRN-NEEM Model," with P. Bernstein, R. Baron, B. Gibbs, W. D. Montgomery, J. Plewes, A. Smith, S. Tuladhar, and M. Yuan. April 8, 2008.

Speeches and Presentations

"A Carbon Dioxide Standard for Existing Power Plants: Impacts of the NRDC Proposal," prepared on behalf of the American Coalition for Clean Coal Electricity, March 2014 (available at: http://www.americaspower.org/sites/default/files/NERA%20NRDC%20March%202014.pdf).

"Approaches to Combining Policy and Technology to Achieve Greenhouse Gas Emission Reductions," with S. Tuladhar, P. Bernstein, and S. Mankowski, Sixth Annual Conference and Meeting of the Society for Benefit-Cost Analysis, Washington, DC, March 2014.

"Findings from an Assessment of Baseload Generation Options in Iowa," NEI Small Reactor Forum, Washington, DC, February 2014.

"Electricity Generation in the Era of $4.00 Natural Gas," Shale Insight 2013 Conference, Philadelphia, PA, September 2013.

"EPA Regulation of Greenhouse Gases, a Carbon Tax, or All of the Above? Understanding the Relative Economic Impacts," with M. Yuan, S. Mankowski, and A. Smith, Air & Waste Management Association Climate Change: Impacts, Policy and Regulation Conference, Herndon, VA, September 2013.

"Impacts of Renewable Energy Subsidies on Achieving Renewables Goals," with M. King, J. Heidell, P. Bernstein and S. Tuladhar, 25th Annual Western Conference, Center for Research in Regulated Industries, Monterey, CA, June 2012.

"Analyzing the Changing Climate Policy Landscape," EUEC Conference, Phoenix, AZ, February 2012.

"The Importance of Long-Term Fuel Forecasts for Scenario Planning," EUCI, White Plains, NY, October 2011.

"The Importance of Long-Term Fuel Forecasts for Scenario Planning," for the Southeastern Electric Exchange, March 2011.

"Uncertain Emissions Regulations Create Challenges for Retrofit and New Build Decisions," Energy & Environment Conference & Expo, Phoenix, AZ, February 2009.

"Climate Change Policy Risks and Opportunities," Goldman Sachs Conference, New York, NY, April 2008.

"Economics of Climate Change Policy Options – Analyses of Lieberman-Warner Bill," Business Roundtable Climate RESOLVE Workshop, November 2007.

"Policy Modeling Results: Implications for Compliance Strategies," Electric Utilities Environmental Conference: Clean Air, Mercury, Global Warming & Renewable Energy, Tucson, AZ, January 2006.

"Economic Impacts of Regulatory Developments for Mercury," Infocast - Power Plant Emissions Reduction Technologies & Strategies: Coal Sustainability Under New Environmental Regulations, Washington, DC, October 2005.

APPENDIX B. CONFIDENTIAL FINANCIAL STATEMENTS FOR EMI'S MANGANESE BUSINESS (2011-2013)

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