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November 3, 2010

Dear Senator Carper:

Thank you for your letter of October 6, 2010 requesting the Institute of Clean Air Companies' (ICAC) insights and perspective regarding the questions of labor availability and the capacity of the electric power industry to install air pollution control systems on a timely schedule and the types of jobs these installations create. As you recognize in your letter, this is not a new concern. In fact, industry stakeholders raised this exact concern when EPA proposed the NO<sub>x</sub> SIP Call rule in 1998 and, again, when EPA proposed the Clean Air Interstate Rule (CAIR) in 2005. Notably however, these were concerns raised primarily in advance of the finalization of rules, and in both cases proved unfounded as the stationary source air pollution control and measurement (APC) industry satisfied demand for labor and other resources placed upon us and related industries. These concerns and doubts are being raised again; however, based on a history of successes, we are now even more resolute that labor availability will in no way constrain the industry's ability to fully and timely comply with the proposed interstate Transport Rule and upcoming utility MACT rules. Contrary to any concerns or rhetoric pointing to labor shortages, we would hope that efforts that clean the air also put Americans back to work. We appreciate your efforts to more fully understand this issue and we offer the following responses to the specific questions you raise:

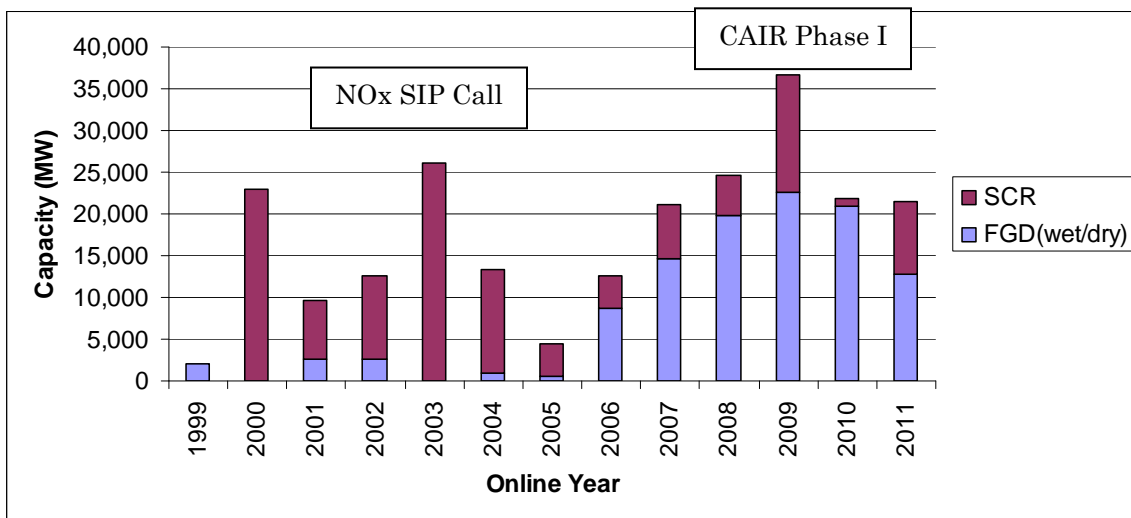
- The APC Industry is able to meet future demands for emission control technology due to our overwhelming experience in meeting requirements for selective catalytic reduction (SCRs) and flue gas desulfurization (FGDs) under the NO<sub>x</sub> SIP Call and CAIR.
- Less resource and time-intensive technologies are available to be quickly deployed offering the electric generating industry the needed flexibility to comply with the proposed Clean Air Transport Rule and the upcoming utility MACT. For example direct sorbent injection (DSI) and dry scrubbing technology installation times are approximately 12 and 24 months, respectively.
- The design and construction of NO<sub>x</sub>, SO<sub>2</sub> and HAPs control technologies require engineers, skilled craft labor such as boilermakers and creates upstream and downstream employment and economic benefits.
- We estimate that over the past seven years, the implementation of CAIR Phase 1 resulted in 200,000 jobs in the APC industry.

***Is labor availability likely to constrain the industry as it seeks to comply with the interstate transport and utility MACT rule?***

The simple answer is that labor availability has never jeopardized overall industry compliance requirements, nor is there any reason to assume that it would prevent the power generation industry from effectively complying in a timely way with requirements. As an industry, we respond to whatever demand for products and services is placed upon us by affected industries complying with requirements. The corollary to this response is that the APC industry has proven, particularly in recent years, the dynamic nature of ours and related industries in meeting demand from the electric power generating industry. This has been demonstrated by repeatedly satisfying rapid and substantial increases in demand for services and products, working effectively with end-users to efficiently deploy resources to meet compliance deadlines, innovating then bringing those innovations quickly to market, and relying on inherent competitiveness within the industry to bring an ever broader range of economically reasonable solutions to our customers. The variable nature of our industry, including supporting and related industries, now finds us at a point where demand for products and services is low, so we are well-positioned to meet any new demand.

We are extremely confident in the ability of our industry to deliver and satisfy, as we have so successfully in the past, the labor, materials and resources needed to meet the demand. Labor availability did not constrain the electric power industry’s ability to comply with CAIR and the NOx SIP Call. We based this observation on (1) recent and past decade of industry installation experience, and (2) the extent of controls already installed at existing coal-fired power plants. In addition, there are less capital intensive control technology options available to the industry that can be implemented in a shorter period of time. In these current market conditions the APC industry is in a period of underutilization as compared to the NOx SIP Call and CAIR Phase I years.

**Figure 1. Cumulative SCR and FGD Installations by Year**



Source: US EPA NEEDs database 4.10 v

Many of the technologies that will be needed to be installed to comply with the requirements of the proposed interstate Transport Rule and the as yet-to-be-proposed utility MACT rule are likely to be the same technologies installed in recent years for other successful and more labor-intensive programs. In fact, over the past decade (as illustrated in Figure 1) our industry has already successfully met the challenge of installing what were substantially new technologies on a significant portion of the electric power industry. These technologies have been refined and are readily available, as are the resources needed to complete their installation. Today more than one-half of the coal-fired electric generation fleet currently operates reliably on some combination of these technologies.

The trend in recent years has been to install the largest and most effective control systems such as FGD and SCR systems, which are also some of the most labor-intensive and time-consuming technologies available. The design and construction of a large ‘wet’ scrubber system may take 36 months to complete. Wet scrubbers reduce SO<sub>2</sub> emissions by more than 98 percent, and their construction and installation employ several hundred workers. Currently, more than one-half of the coal-fired electric generation capacity of the U.S. operates with FGD systems, with most having been installed over the past decade. We anticipate that FGD control installations from implementing the proposed Transport Rule will be radically less than our recent installation experience under CAIR Phase I. EPA projects that about 14 gigawatts (GW) of coal-fired generating capacity will be retrofitted with scrubbers and less than 1 GW with SCR controls by 2014 to comply with the recently proposed interstate Transport Rule. This is substantially less than what was accomplished under CAIR.

Going forward, ICAC expects a wide range of technologies will be available to provide flexibility for utility compliance strategies. In particular, we expect greater use of both DSI and dry scrubbing technologies, such as circulating dry scrubbers (CDS) and spray dryer absorber (SDA) technology, due to future backend water and disposal requirements. The added advantages of using these technologies are fewer resources required and shorter installation times – 12 months for DSI and 24 months for a dry scrubber. Moreover, the next round of EGU control installations will likely be on smaller coal-fired units, and DSI and dry scrubbing are well-suited to smaller footprints and high-sulfur bituminous coal applications. However, exact technology controls are chosen by electric power generating companies based on final requirements and in a context of multiple market variables.

### **Recent Industry Experience**

The electric power sector has a demonstrated ability to install a large number of complex pollution control systems in a relatively short period of time, while coordinating outage schedules to maintain electric system reliability. Specifically, the industry’s recent experience with the CAIR and the NO<sub>x</sub> SIP Call clearly demonstrates that the industry has more than sufficient capacity to comply with the proposed interstate Transport Rule and upcoming utility MACT rules.

The majority of coal plants have already installed NO<sub>x</sub> and SO<sub>2</sub> controls. Of the 310 GW of coal capacity in the United States, 170 GW have installed FGD systems and another 55 GW have FGD controls planned. As a result, roughly two-thirds of the existing coal fleet will soon be

retrofit with FGD controls. Additionally, about one-half of U.S. coal capacity has installed or soon will be retrofit with advanced NO<sub>x</sub> controls. Many companies have also installed or optimized existing control systems for mercury reductions in response to state regulations, giving them a jump start on a future utility MACT rule. In the absence of a federal standard, almost 20 states have adopted mercury regulations for coal-fired power plants over the past several years.

**Clean Air Interstate Rule.** The Clean Air Interstate Rule (CAIR), limiting NO<sub>x</sub> and SO<sub>2</sub> emissions in the Eastern U.S., created substantial demand for SCR and FGD systems. Between 2008 and 2010, coal-fired power plants added approximately 60 GW of FGD controls and almost 20 GW of SCR controls with a total of 80 GW of FGD controls installed under CAIR Phase 1. CAIR created unprecedented high demand for scrubber components and, lead times on key components, including large recycle pumps, motors, fans, chimney components and construction. Utilities managing large, multiple-scrubber programs, also used the compliance flexibility in the rule to stage and optimize use of personnel and other resources over longer periods than would have been needed were there just one scrubber. It is notable to point out that in a recently presented paper (*Implementation Strategies for Southern Company FGD Projects*; Wall, Healy & Huggins; Power Plant Pollutant Control “Mega” Symposium, September 2010), the Southern Company authors noted that company-wide planning for FGD installations started in 2003, while the CAIR rule was not final until 2005.

Labor limitations are normally cited by the utility industry as the chief limiting factor in undertaking clean air retrofits, and boilermakers, in particular, are cited as the major source of concern because of their specialized skills. Other craft labor, such as iron and steel workers and carpenters, can be drawn from the broader construction industry.

Prior to the implementation of CAIR, EPA and industry stakeholders, such as the Utility Air Regulatory Group, assumed that skilled labor would limit the industry’s ability to install air pollution control equipment. However, based on a retrospective review of actual experience by James Staudt, Ph.D., CFA, it was determined that EPA and industry dramatically underestimated the ability of the air pollution control industry to support the utility industry in responding to CAIR<sup>1</sup>. According to Staudt:

“The assumptions regarding the availability of labor were demonstrated in this White Paper to be too limiting and, by imposing a “hard cap” on labor availability, did not take into account the dynamic nature of U.S. labor markets, which US EPA had acknowledged in the past. Also, assumptions by US EPA and the representatives of the utility industry regarding the timing of orders relative to the finalization of the CAIR proved to be incorrect. As a result, both US EPA and representatives of the utility industry underestimated the ability of the [air pollution control] industry to support the utility industry in its response to the CAIR.”

Staudt offers several reasons for why EPA and industry underestimated the capabilities of the labor market: (1) boilermakers will work overtime during periods of high demand; (2)

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<sup>1</sup> “Availability of Resources for Clean Air Projects”, James Staudt PH.D., CFA, Andover Technology Partners, October 2010

boilermakers frequently travel to different locations for work, supplementing local available labor; (3) boilermakers work in fields other than power, such as refining/petrochemical, shipbuilding, metals industries and other construction trades, and workers can shift industry sectors with appropriate training; and (4) new workers will enter the field between 1999 and 2001 - for example, in advance of the NO<sub>x</sub> SIP Call, boilermakers increased their ranks by 35 percent mostly by adding new members.

**NO<sub>x</sub> SIP Call.** Between 2001 and 2005, the electric industry successfully installed more than 96 GW of SCR systems in response to the NO<sub>x</sub> SIP call thus adding NO<sub>x</sub> controls to roughly one-third of the U.S. coal fleet. During this same time period, the industry was simultaneously adding a record amount of new generating capacity. Between 2001 and 2004, the electric industry built more than 180 GW of new generating capacity, including natural gas combined cycle power plants, coal-fired power plants, and renewable energy facilities.

### **Alternative Control Options**

Much of our discussion has focused on scrubbers and SCR systems that may be used for compliance with the proposed interstate Transport Rule and upcoming utility MACT rule. These technologies may require longer installation times, however, there are other less resource and labor-intensive alternatives that will also be used for compliance. For example, DSI is a technology that reduces SO<sub>2</sub> through injection of trona, sodium bicarbonate or hydrated lime upstream of a particulate control device. DSI does not generally provide the high rates of SO<sub>2</sub> control achieved with a scrubber, but the technology can achieve significant levels of control and can be implemented very quickly—typically within one year. DSI and other dry scrubbing systems also are effective in reducing some hazardous air pollutants that would be controlled under MACT, such as hydrochloric acid (HCl). These systems are likely to preferentially reduce HCl in the flue gas. With regard to NO<sub>x</sub> control, selective non-catalytic reduction (SNCR) is a widely used technology that can also be implemented in under a year. The levels of NO<sub>x</sub> control are less than what can be achieved with SCR, but the technology can be installed quickly with fewer labor resources. Again, industry choices prevail in complying with requirements, and there are now approximately 18 GW of generation with SNCR NO<sub>x</sub> controls.

Even if the upcoming utility MACT were to require the level of control achieved by wet scrubbers, it is unlikely that this technology would then be applied to all of the remaining unscrubbed fleet. We can see that the already installed pollution control systems, along with potential coal plant retirements, will change the future demand for equipment orders. When anticipating outcomes of the yet to be proposed utility MACT, it is important to recognize that wet scrubbers are placed into service to substantially eliminate SO<sub>2</sub> emissions, while the hazardous air pollutants may rely on a different set of less labor intensive technologies. One observation, is that the demand for large equipment orders on the scale of wet scrubbers, may diminish significantly for the near future when driven by the transport rule and utility MACT; and be largely supplanted by alternative technologies that demand less labor and shorter installation time. Historically, affected industry will comply with requirements by utilizing a suite of reasonably economic technology solutions.

It may also be possible to improve the scrubber performance of many older scrubbers that were installed in the 1970's and 1980's. For example, limestone forced oxidation wet scrubber system upgrades at the Vectren Culley Station Units 2 & 3, E.On's Trimble County Unit 1, and Michigan South Central Power's Endicott Station resulted in increased removal efficiencies in the range of 98 percent. Upgrades such as these can also be implemented quickly and at lower cost versus the installation of a new scrubber.

Preserving these compliance alternatives will require that EPA allow a degree of compliance flexibility in its regulatory design. For example, EPA has proposed a hybrid cap-and-trade approach under the proposed interstate Transport Rule that would allow companies to take advantage of these alternative control strategies. In addition, the Clean Air Act MACT program allows a state-granted one year compliance extension, if needed, to complete installation of controls.

***What types of engineering and construction skills are required to design and construct NOx, SO2, and HAPs controls?***

This is an extremely relevant question, such that dollars spent on air pollution control not only result in avoided health costs including avoided premature mortality, but these same dollars are plowed back into the U.S. economy as good and green jobs. Adding pollution control equipment to existing power plants requires engineers to design the systems and specialized construction labor, particularly boilermakers, to build and install the equipment. When operational, these control systems rely on a continuous supply of manufactured and processed reagents resulting in jobs in related industries. FGD and SCR systems require: (1) construction materials, such as steel plate, alloy steel, fabricated steel components, structural steel, and concrete; (2) engineered equipment and specialty materials, such as slurry pumps, fans, motors and catalyst; and (3) reagents, especially limestone and ammonia. These requirements are examples of direct and indirect employment opportunities resulting from the environmental drives for new and retrofitted air pollution control systems.

Looking back over the past seven years as industry installed SCR and FGD controls in readiness for the CAIR Phase I requirements, we estimate that this work required approximately 200,000 person-year jobs in direct and indirect labor. Specifically, a typical turnkey installation of a 500 MW scrubber is estimated to employ approximately 200 people, with about 80 percent dedicated to construction and 20 percent for engineering and project management<sup>2</sup>. The installation of SCR controls creates a similar number of jobs over a shorter time period and employs a greater number of boilermakers. As we near the end of installing this latest phase of beneficial control projects, these workers are readily available and trained to continue this level of activity.

Boilermakers are an important trade in terms of the installation of pollution control equipment. It is a specialized trade, serving the electric power, refining/petrochemical, shipbuilding, and metals industries, and boilermaker supply, represented by both union and non-union labor, is

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<sup>2</sup>*Engineering and Economic Factors Affecting Installation of Control Technologies for Multipollutant Strategies*; U.S. EPA; October 2002

dynamic in responding to demand. Other crafts can be and have been drawn from the broader construction labor market.

We are not aware that engineering labor has ever been raised as an issue that might limit the industry's ability to install air pollution control equipment. There are numerous suppliers of air pollution control equipment. If one supplier becomes busy, there are several other options. Also, companies that are building multiple scrubbers will often adopt standardized equipment designs, reducing the need for engineering support, as supported by Southern Company's experience referenced above.

In addition to the amplified employment demands of major clean air initiatives such as CAIR and the NOx SIP Call, our industry provides a continuous and enduring stream of good and green jobs related to the manufacturing, installation and servicing of air pollution control and measurement technologies.

***If labor is in short supply among any of these trades are there actions that we should be taking today in order to ensure that we have the skilled labor needed to comply with the Clean Air Act?***

We are extremely confident in the ability of the industry to deliver and satisfy, as we have so successfully in the past, the labor, materials and resources needed to meet the demand. While we do not believe that skilled labor will be in short supply, proactive steps to provide more clarity sooner to industry on the full suite of requirements for air, water, and waste regulations that they are facing, will in turn provide the needed investments and assist our industry in meeting demand. EPA's efforts to move forward expeditiously with the proposed interstate Transport Rule and the upcoming utility MACT rules will be helpful in this regard. We believe early and continuous installations are needed to promote job security in ours and other industries, as well as ensure more efficient application of resources to meet longer term challenges. As discussed throughout our response, labor availability has not and is not an impediment to industry compliance, and we are already at a high level of industry readiness. In closing, ICAC shares your enthusiasm that now is the time "to put American workers back on the job of modernizing our electric generating fleet" and give America the clean healthy air they deserve.

Sincerely Yours,

A handwritten signature in blue ink, appearing to read "David C. Foerter".

David C. Foerter, ICAC Executive Director

# United States Senate

WASHINGTON, DC 20510-0803  
October 6, 2010

David C. Foerter  
Executive Director  
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Dear Mr. Foerter,

As you know, the U.S. Environmental Protection Agency (EPA) has proposed regulations to limit electric sector nitrogen oxide (NOx) and sulfur dioxide (SO2) emissions in the Eastern U.S. and will soon be proposing regulations to limit hazardous air pollutant (HAP) emissions from coal- and oil-fired power plants. These regulations are vital for protecting public health and the environment. The proposed transport rule alone is projected to yield \$120 to \$290 billion in annual health and welfare benefits in 2014.

The Subcommittee on Clean Air and Nuclear Safety held an oversight hearing on EPA's proposed interstate transport rule on July 22, 2010. As part of that hearing, American Electric Power (AEP) introduced written testimony suggesting that labor availability would constrain the industry's ability to install SO2 scrubbers. Similar claims were made when EPA proposed the NOx SIP call rule in 1998 and the Clean Air Interstate Rule (CAIR) in 2005.

In light of the important contributions that your members have made in terms of installing advanced pollution control systems in recent years, I wanted to seek your input and opinion on the issue of labor availability in the pollution control industry. Based on the recent experience of your members, installing scrubbers and other pollution control systems, is labor availability likely to constrain the industry as it seeks to comply with the interstate transport and utility MACT rules? What types of engineering and construction skills are required to design and construct NOx, SO2, and HAPs controls? If labor is in short supply among any of these trades are there actions that we should be taking today in order to ensure that we have the skilled labor needed to comply with the Clean Air Act?

I appreciate your input on this issue. These environmental standards are vital for protecting human health and the environment. They also offer an opportunity to put American workers back on the job modernizing our electric generating fleet. Understanding the ability of labor to provide timely solutions and the capacity of the industry to install the necessary controls will be critical for developing an appropriate regulatory response. With best personal regards, I am

Sincerely yours,



Tom Carper  
U.S. Senator