Technical Support Document
for the
Rulemaking on Section 126 Petition from North Carolina to Reduce Interstate Transport of Fine Particulate Matter and Ozone;
Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone; Revisions to the Clean Air Interstate Rule; Revisions to the Acid Rain Program
(70 FR 49708; August 24, 2005)

CAIR CSP Allowance Calculations for Early Emission Reductions

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Introduction

This technical support document (TSD) presents analysis the United States Environmental Protection Agency (EPA) performed to support its response to comment on Clean Air Interstate Rule Federal Implementation Plan rule (CAIR FIP) on the grounds that EPA's use of a .25lbs/mmBtu criterion for calculating CSP allowances for early reductions is unwarranted.

This document presents analysis the (EPA) performed to derive a .25 lb/mmBtu NOx emission rate as a cut-off point qualifying an early reduction unit for CAIR FIP CSP allowances. In order for early emission reductions to qualify for allowances from the CSP, sources must demonstrate that they had an annual NOx emission rate below .25lb/mmBtu. If a unit's emission rate falls below this cut-off point, it will receive allowances from the CSP equal to the difference between .25 lbs/mmBtu and its actual emission rate multiplied by the heat input. The analysis supports our response to comments that suggested the CAIR FIP CSP should not include the criterion that units can only request and receive early reduction credit equal to the difference between .25lb/mmBtu and the unit's actual emission rate multiplied by the unit's actual heat input. This analysis demonstrates that the .25 emission rate criterion selected is reasonable and provides assurance that early reductions will be awarded CAIR FIP CSP allowances, but not in a quantity that leads to windfall profits.

The FIP NPR proposed a CAIR FIP NOx annual cap-and-trade program that included a Compliance Supplement Pool (CSP) to provide an incentive for early, annual NOx emission reductions. The CSP will provide, for each affected state, a pool of CAIR NOx annual allowances from which EPA could distribute allowances for early, surplus NOx emissions reductions occurring in 2007 and 2008. The CSP provides an additional 200,000 annual NOx allowances apportioned to each state based on heat input and fuel factors.

Allowances from the CSP may be distributed to units through 2 methods:

1. Implementing NOx control measures that result in early emission reductions in 2007 or 2008
2. A demonstration of need for an extension of the 2009 deadline for implementing emission controls

Sources requesting CSP allowances based on early reductions must demonstrate that their NOx emission rate is below .25 lbs/mmBtu. Many units making these early reductions already have the control equipment installed. In many cases, the SCR is only used for ozone season NOx emission. The possibility of CSP allowances creates incentives for sources to make early reductions by activating these controls year round. The costs of running controls an additional 7 months are minimal, and the .25 lbs/mmBtu criterion helps deflate the total value of allowances awarded for these reductions to an amount proportionate to the cost. This methodology for calculating the allowance provides units with SCRs already on-line the incentive to run their control year round, but simultaneously accounts for the circumstances at such units by making sure the profits earned through their reductions are not excessive.

Analysis

The .25 NOx emission rate is used as a criterion to prevent units from accumulating windfall allowances, and consequently weakening the effect of CAIR. Many units have a SCR installed for summer time NOx emissions, and will simply run this already installed control for non ozone season operation hours. There is no additional fixed capital cost or overhead associated with turning on this SCR year round. Variable cost will be the only resulting increase in expenses.

In general, the market value of an allowance is equal to a dollar amount that exceeds the total cost of installing and running the control. Thus, there is an economic incentive for a company to *install* and *run* a control once the phase I and II caps begin.

$ of allowance > fixed cost + variable cost

The CSP encourages early reductions by offering allowances to those units who reduce their emissions below cap levels prior to the phase I and II deadlines. However, the units doing this already have the SCRs installed and operating for ozone season NOx, and they will simply run the control year round instead of just during the ozone season (May – September). The SCR is already installed, therefore there is no fixed cost associated with running the SCR in the non ozone season. . The only additional cost is variable cost resulting from operating the control more often. Equipment deterioration cost associated with running the SCR 12 months instead of 5 months (such as catalyst replacements) are incorporated into the variable cost. Therefore, the market value of the allowances received for these reductions must exceed the associated increase in variable cost.

$ of allowance > variable cost

For units that simply turn on summertime controls for the entire year, the value of allowances received should be greater than the associated variable cost, but should not cover fixed cost when no fixed cost were accrued. Because typical allowance value covers fixed cost and variable cost, the EPA had to include a mechanism that would deflate this total value of allowances for early reductions to a level consummate with variable cost. The EPA uses the .25 lbs/mmBtu emission rate criterion for early reductions allowances awarded from the CSP to keep the economic benefit of the allowances on par with the associated cost. A source would receive an early reduction credit equal to the difference between .25 lb/mmBtu and the unit's actual emission rate multiplied by the unit heat input. The value of the allowances received will still be greater then the cost of running the SCR an additional 7 months.

The following tables illustrate how the .25 lb/mmBtu criterion affects the total value of allowances awarded for early reduction under CSP. They also present how the associated variable cost for running a SCR year round is calculated, and how this cost relates to the value of allowances earned with and without the .25 lb/mmBtu criterion.

EPA used average NOx emission rate with and without SCR for coal units in 2010 to identify the expected change in emission rate when a SCR is activated.

Table 1

	Emission rate
SCR	0.07
w/o SCR	0.33

EPA modeling estimates there will be 293 coal units before 2010 that have SCRs installed, and could possibly apply for early reduction allowances from the CSP. These units have an average capacity of 438 MW, average heat input of 33 tBtu, and an average capacity factor of .83. There allowance would be calculated as:

Table 2

	Starting emission rate lbs/mmBtu	Ending emission rate lbs/mmBtu	Reduction used to calculate allowance	Heat input (tBtu)	Allowance
0.25	0.33	0.07	.18 (.25-.07)	33	2,970
no criterion	0.33	0.07	.26 (.33 - .07)	33	4,290

The value of a NOx allowance will be $1,251 in 2010. Therefore the average value of total allowances received for these units is:

Table 3

	Allowance	**Total value ($)**
0.25	2970	3,715,470
no criterion	4290	5,366,790

In both cases, the CSP early reduction allowance provides economic incentive for the unit to make early reductions. In both cases, the unit receives allowances valued more then the cost of turning on these SCRs. The cost of turning on these controls year round is very little, so the EPA uses the .25 lb/mmBtu criterion to avoid windfall allowances far greater then the additional cost. For 2010, the .25 lb/mmBtu base point reduces the allowances awarded for early reduction by 30%.

The variable cost associated with running the SCR an additional 7 months is calculated in the following manner:

$$7/12 * (242/\text{unit capacity})^{.11} * .6 = X \text{ mills/Kwh}$$

$$\text{Total variable cost} = (X * \text{unit capacity (KW)}/1000) * 8760 \text{ days/year} * \text{capacity factor}$$

When this formula is applied to the 2010 data for coal units, the average additional variable cost for these units to run SCR is:

$$7/12 * (242/438)^{.11} * .6 = .33$$

$$\text{Total variable cost} = (.33 * 438{,}000)/1000 * 8760 * .83$$

Total Variable cost = $1,050,000

When the change in emission rate is coupled with average heat input of 33 tBtu you get a NOx allowance worth more then the $1,050,000 cost calculated above. The total value of allowances and net profit with and without .25 lbs/mmBtu criterion is shown below.

Table 4

	Starting emission rate lbs/mmBtu	Ending emission rate lbs/mmBtu	Reduction used to calculate allowance	Heat input (tBtu)	Allowance	Total value of allowance	Total Cost	Profit
0.25	0.33	0.07	.18 (.25-.07)	33	2,970	3,715,470	1,050,000	2,665,470
no criterion	0.33	0.07	.26 (.33-.07)	33	4,290	5,366,790	1,050,000	4,316,790

At the aggregate level for 2010, the average total value of allowances exceeds the average total cost by a ratio of nearly 4:1 with the .25 criterion. Using the .25 factor has the desired affect of reducing windfall allowances. However, it is also set at a level that still creates economic incentive for 271 of the 294 coal units in 2010 to make early reductions. The 25 lbs/mmBtu could be lowered further to .13 lbs/mmBtu and still generate average total allowances with a value greater than average total cost. However, this would result in a smaller number of allowances for many units at the lower bound, and the value of allowances would only exceed the associated cost for 154 units. This would result in fewer early reductions. The EPA set the .25 lbs/mmBtu criterion high to encourage maximum early compliance, even if it still allows large profits for some units.

The .25lbs/mmBtu criterion provides a high return to those units who opt to run their SCR in the winter time months, as well as summer time. At the same time, it reduces the profit margin for these early reductions by nearly 40% helping to prevent windfall allowances. The criterion serves its intended role well; it adjusts NOx allowances awarded for early reductions at units with existing controls to a level that is appropriate to the circumstances and cost these units face.