Corrected Technical Support Document
for the
Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone
(Clean Air Interstate Rule):
Notice of Final Action on Reconsideration

Corrected CAIR SO2 Allocation Approach Analysis

This is a corrected version of the document at docket number OAR-2003-0053-2360 ("CAIR SO2 Allocation Approach Analysis" TSD in the Docket on the Clean Air Interstate Rule). The errors made in referencing tables in the original document have been corrected in this document.

EPA Docket number: OAR-2003-0053
March 15, 2006
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U.S. Environmental Protection Agency
Office of Air and Radiation

The following corrections have been made to this Technical Support Document (TSD) since the date of signature of the final rule. These changes correct improper references and grammatical errors.

Page numbers refer to the pagination of the original TSD, Docket Number OAR-2003-0053-2360.

1. On Page 7, replace "EPA's analysis of SO2 coverage ratios (the ratio of allowances to projected emissions, discussed to some degree in this section and presented in the "CAIR SO2 Allocation Approach Analysis" Technical Support Document, available in the docket), is not suggestive of this trend." with "EPA's analysis of SO2 coverage ratios (the ratio of allowances to projected emissions, discussed below), is not suggestive of this trend."
2. On Page 17, change the reference, "Tables 4-5," to "Appendix A, Table E," in the sentence, 'The State budget and emissions data behind the tables in Appendix A are available in Tables 4-5, as well as in the docket, "SO2 Allocations Analysis Data."'
3. On Page 17, replace "EPA believes that a further understanding of the overall relative impacts of the various allocation approaches, EPA believes that it is useful to apply the statistical concepts of (1) bias and (2) consistency." with "For a further understanding of the overall relative impacts of the various allocation approaches, EPA believes that it is useful to apply the statistical concepts of (1) bias and (2) consistency."
4. Add the table heading, "Table E. State SO2 Budgets by Allocation Approach for 2010 and 2015," on page 3 of Appendix A.

Introduction

This technical support document (TSD) presents analysis the United States Environmental Protection Agency (EPA) performed to support its Notice of Final Action on Reconsideration of the Clean Air Interstate Rule (CAIR) (70 FR 25162) specific to the sulfur dioxide (SO_2) allocation methodology.

EPA received one petition for reconsideration that asked EPA to reconsider the SO2 allocation approach to be used by States participating in the EPA-administered CAIR SO2 trading program. As described in the Notice of Final Action on Reconsideration, this petitioner argued that the SO2 allowance allocation approach is unreasonable and inequitable. The petitioner argued that the approach is unreasonable because other approaches would be more appropriate. According to the petitioner, the approach is inequitable because it results in owners of units that have historically lower emission rates being forced to buy allowances from historically higher emitting units that install new emission controls. The petitioner asked EPA to establish a different approach.

As described in the Notice of Reconsideration, EPA does not agree with petitioner's conclusions about this issue. EPA continues to believe that the approach selected is reasonable for the reasons explained in the CAIR final rule and further discussed below. Furthermore, numerous opportunities for public comment on this issue were provided, and a full discussion of the allowance allocation options occurred during the rule development process. Nonetheless, given the intense public interest in this issue, EPA decided to grant the petition for reconsideration insofar as it raised issues regarding alleged inequities resulting from the application of EPA's SO2 allowance allocation approach.

In the Notice of Reconsideration, EPA announced its decision to reconsider this issue and solicited additional public input. EPA also solicited comment on additional analyses it conducted in response to the petition for reconsideration concerning the impact of the SO2 allowance allocation approach adopted in the CAIR model trading rule. This additional analysis compared the SO2 allocation approach in CAIR to various alternatives EPA also considered during the rulemaking process. In response to comment on the Notice of Reconsideration, EPA has further refined some of its analyses and carefully considered the arguments of the petitioner.

EPA continues to believe that these analyses show that EPA's selected approach to SO2 allowance allocations is appropriate, given the objectives of CAIR and other relevant considerations. Moreover, EPA believes that the Agency's approach produces a reasonable result in terms of equity. Therefore, in this Notice of Final Action on Reconsideration, EPA is not altering the approach taken in CAIR for SO2 allowance allocation. EPA's response to public comments on the analyses presented in the Notice of Reconsideration and further discussion of the petitioner's concerns are provided below.

The underlying data, including data for both 2010 and 2015, are available in the docket (OAR-2003-0053), as "SO_2 Allowance Allocation Data."

Considerations Relevant to Choosing an Allocation Approach

While EPA did not explicitly define a distinct set of principles that should be used in developing State budgets under a region-wide cap and trade program, EPA has made it clear throughout this process that it has relied upon several consistent, important factors in developing both the SO2 and NOx budgets.

The first is the impact of allowance allocations on the specific environmental objectives and overall cost of the rule, as well as any potential adverse effects. In general, while the chosen allocation or State budget calculation approach can affect the distribution of compliance costs under a cap-and-trade program, it will have little effect on overall compliance costs or environmental outcome. This is because the incentives provided by cap-and-trade encourage economically efficient compliance over the entire region. However, this may not always hold where there are interactions with existing environmental policies. In the case of NOx, EPA did not find this consideration to be restrictive because there was not an existing annual NOx trading program and the SIP Call ozone season trading program could be easily integrated into the CAIR ozone season trading program. As a result, a number of budget methodologies were compatible. For SO2, this consideration played a larger role because depending upon how the program was integrated within the existing Title IV structure, it could impact emissions before the program went into affect as well as emissions in regions not affected by the program.

Another important consideration is that an allocation methodology must be consistent with the existing regulatory and legislative structure. Once again for NOx, this consideration could be satisfied with a wide range of budget methodologies. However, for SO2, reductions for EGUs using Title IV allowances is necessary in order to ensure the preservation of a viable Title IV program (70 FR 72272). Linking the two programs maintains the trust and confidence that has developed in the functioning market for title IV allowances. The EPA recognizes this familiarity and confidence (especially in a market-based approach) as a key source of the program's success.

A third factor is equity. In the absence of other considerations, EPA believes that it is in the public interest that the distribution of allowances under a cap and trade program be as equitable as possible. For NOx, since the other considerations could be satisfied with a number of different methodologies, this factor was the primary one. For SO2, where the other considerations were more limiting, this factor was not as central to our decisions, especially since the Title IV allocation structure was erected by Congress for the long term.

SO2 Allocation Options Discussed in CAIR

EPA considered and analyzed a variety of SO2 allowance allocation methodologies during the CAIR rulemaking process. After careful analysis, EPA decided to use the allocation approach chosen by Congress in title IV of the Clean Air Act. EPA also considered the following alternative approaches, which are explained in the final CAIR "Corrected Response to Significant Public Comments on the Proposed Clean Air Interstate Rule," Corrected April 2005 (Docket Number OAR-2003-0053):

- Allocations based on historic tons of actual emissions from more recent years;
- Allocations based on heat input (with alternatives based on heat input from all fossil generation, and heat input from coal- and oil-fired generation only); and
- Allocations based on electricity output (with alternatives based on all generation and all fossil-fired generation).

In addition to these alternatives, EPA has analyzed other heat input-based allocation approaches in the reconsideration process, explained below. Each allocation approach suggested by the petitioner and other commenters during the CAIR rulemaking and reconsideration process has advantages and disadvantages for different companies and States. However, as explained in the final CAIR, EPA believes that the approach used in the final CAIR is the most appropriate among the alternatives for several reasons.

First, EPA believes – based on strong policy and air quality concerns – that it is necessary to use the existing title IV allowances in order to preserve the viability and emissions reductions of the highly successful title IV program. The disruption of the title IV SO2 trading program would also potentially result in increased emissions outside of the CAIR region starting in 2010 because, with title IV allowances having little or no value, the title IV program would no longer constrain SO2 emissions in those States. Further, if title IV allowances are not used for compliance in the CAIR SO2 trading program, the likely result will be: a significant surplus of title IV allowances; a collapse of the price of title IV allowances; and a title IV SO2 trading program that, contrary to Congressional intent, no longer provides incentives to minimize emission control costs and encourage pollution prevention and innovation.

If EPA adopts an approach that does not preserve the structure of the title IV allowance market and the value of those allowances, the confidence in the cap-and-trade policy instrument and allowance markets in general, and in the CAIR cap-and-trade programs in particular, would likely decline. Such an outcome could result in a reduced willingness of the owners of sources in cap-and-trade programs to invest in control technologies that would generate excess allowances for sale, or to purchase allowances for compliance, for fear that the rules might change. If owners were to ignore the incentives provided by cap-and-trade in such a manner, efficiency and cost-savings provided by these programs would be lost. The preservation of title IV allowances for use in CAIR, then, is integral to the viability and effectiveness of both title IV and the CAIR trading programs. See discussion in preamble to the final CAIR in section IX (70 FR 25293-25295).

Second, EPA relied on the permanent allocation methodology established by Congress in title IV for purposes of reducing SO2 emissions. Congress chose a policy of not revisiting and revising these allocations and, apparently, believed that its allocation methodology for title IV allowances would be appropriate for future time periods. Third, title IV allowance allocations provide a logical and well understood starting point from which additional electric generation unit (EGU) SO2 emission reductions can be achieved for Acid Rain units, which account for over 90 percent of the SO2 emissions from CAIR EGUs.

Finally, in response to comments on the proposed CAIR, EPA performed an analysis comparing the title IV methodology to other methodologies. At the outset, EPA notes that the objective of CAIR is not to ensure that each State receives the maximum amount of SO2 allowances possible under any approach. The goal of CAIR is to reduce SO2 emissions that significantly contribute to non-attainment. As EPA has noted, selecting the most appropriate SO2 allowance allocation approach for CAIR has required addressing a number of different considerations. The policy and air quality concerns specific to the CAIR SO2 trading program and noted by EPA above necessitate that EPA implement the CAIR SO2 program using the existing structure of title IV. Nevertheless, EPA has analyzed the impact of using title IV allocations on States relative to other possible allocation approaches.

EPA's analysis indicates that the use of title IV allowances in the CAIR SO2 trading program has a reasonable result (See CAIR Corrected Response to Comments, section X.A.26, Docket #: EPA-HQ-OAR-2003-0053-2172). This analysis compares State budgets (as a percent of the total CAIR regional budget) calculated based on title IV allowances with State budgets calculated using the other suggested SO2 allocation approaches. In more than two-thirds of CAIR States (accounting for about 80 percent of the total heat input in the CAIR region from 1999-2002), the use of title IV allowances results in each State having neither the highest nor the lowest percentage of the region-wide SO2 budget, but instead, a percentage that is well within the range of percentages that the States would receive under all of the alternative options considered.

For example, Ohio's trading budget for 2010 under EPA's method is 333,520 tons, which is about 9 percent of the CAIR region trading budget of 3,619,196 tons.[1] If Ohio's budget were calculated based on historic tons of emissions, it would receive approximately 12 percent of the total CAIR budget. If Ohio's budget were calculated based on output, it would receive approximately 5 percent of the total CAIR budget. The allocation approach based on title IV, thus, provides Ohio with a budget in the middle of the range of the options analyzed.

EPA recognizes, of course, that the relative impact of allocations based on title IV allowances as compared to alternative approaches will vary among States and individual companies. However, each alternative allocation approach would disadvantage some States or companies relative to another alternative allowance allocation approach. EPA must, nevertheless, select a method for SO2 allowance allocation and must be sensitive to competing considerations.

In summary, EPA's use of title IV allowances in the CAIR SO2 trading program is supported by: (1) EPA's determination that this approach is necessary to maintain the efficacy of the title IV program and to prevent erosion of confidence in cap-and-trade programs in general; and (2) EPA's analysis showing that the allocations resulting from this approach are reasonable. Nevertheless, as a part of this reconsideration, EPA performed additional analyses, explained below, to evaluate the SO2 allocation approach in the final CAIR in light of the petitioner's concerns.

[1] EPA's methodology to calculate the Regional and State budgets is described in the TSD in the docket http://www.epa.gov/cair/pdfs/finaltech06.pdf,

Response to Comments on the Equitability of CAIR SO2 Allocation Approach

One commenter argued that EPA should evaluate SO2 allowance allocation approaches using the same metrics and methods that it used for NOx allocations. The commenter suggests that the metrics by which EPA assessed NOx allocations included (1) whether the EPA method avoids penalizing coal-fired generation units that already have installed emissions controls and (2) whether, relative to the alternative allocation approaches, the EPA method better minimizes for each State the disparity between allowances provided and projected emissions, and argued that EPA cites these rationales in justifying its chosen NOx allocation approach. This commenter also suggests that EPA's use of title IV allowances penalizes new units and independent power producers (IPPs) and results in large wealth transfers from low-emitting to high-emitting States.

While EPA agrees that the Agency considered these factors (among several others) in choosing its allocation approach under the CAIR NOx trading programs, EPA does not fully agree with the commenter's characterization of EPA's considerations. EPA believes that the commenter has omitted some of the significant context and caveats that were included in the discussion of NOx allocations and the use of fuel adjustment factors in the reconsideration notice, as well as a number of other factors that EPA must consider, particularly in the context of SO2 allocations. First, EPA noted in the June 10, 2004 Supplemental Notice of Proposed Rulemaking and in the Notice of Reconsideration that, "in contrast to *allocations based on historic emissions*, the factor would also not penalize coal-fired plants that have already installed pollution controls" (69 FR 32869, 70 FR 72276, emphasis added). This language explains that allocations using historic heat input adjusted for fuel type, while providing additional allowances to coal-fired units that will likely install controls under CAIR, would not simultaneously penalize coal-fired units that had already made investments in emissions controls.

An approach based on historic emissions, on the other hand, would also provide additional allowances to units that would likely have to install controls, but would simultaneously penalize units that had already done so. While EPA makes this argument in support of its chosen approach for NOx allocations, the Agency does not raise this point to establish a criterion for evaluating allowance allocation approaches. Rather, it simply notes that its chosen approach for NOx allocations can provide an advantage to one set of coal-fired units without disadvantaging another set of coal-fired units.

Second, while the commenter is correct in noting that EPA stated in its discussion of NOx allocations in the Notice of Reconsideration that it is in the public interest to attempt to minimize the disparity between individual State budgets and projected emissions for each State, EPA did not set this goal as one of only two primary criteria for adoption of a given allocation strategy, as the commenter suggests. Rather, EPA notes that "*In the absence of other considerations*, EPA believes that it is in the public interest to reduce the disparity between the number of allowances in a State budget and total projected State EGU emissions" (70 FR 72276, emphasis added). As EPA has noted, equity is one of many considerations faced by EPA in choosing an SO2 allowance allocation approach. In particular, unlike in the case of NOx, EPA had to consider an existing, nationwide trading program implemented by statute in the case of SO2.

Third, as EPA discussed in the CAIR Response to Comments, while commenters express concern about the availability of allowances for non-Acid Rain units, it should be noted that not all sources covered under the Acid Rain program received allowances. By the design of the title IV program (as outlined by Congress), because of the permanent allocation of allowances, new units beginning commercial operation after 1995 or beginning construction after 1990 did not receive title IV allowances. Thus, Congress recognized that, over time, new units would be built and covered under the program, but felt it reasonable that such units would obtain title IV allowances either through the auction or from the market. Under the auction, 250,000 title IV allowances will be auctioned annually for the years 2012 and beyond, and these allowances can be used for compliance with CAIR. The availability of these allowances ensures that all sources, including new units and non-title IV sources, will have access to a pool of allowances, protecting them from potential exercise of market power by market participants holding allowances. Finally, IPPs have the option of opting in to title IV until their exemption expires in order to obtain title IV allowances. EPA addresses other issues specific to IPPs in section VI.E of today's CAIR FIP preamble.

Fourth, while the commenter asserts that EPA's use of title IV allowances in the CAIR SO2 trading program will result in significant wealth transfers from low-emitting to high-emitting States, EPA's analysis of SO2 coverage ratios (the ratio of allowances to projected emissions, discussed below), is not suggestive of this trend. In fact, looking at the differences in States' projected emissions and coverage ratios between the base case and CAIR, it becomes evident that both lower- and higher-emitting States are projected to make investments in emissions reductions under CAIR, reducing their demand for allowances, or freeing up allowances for sale, in the process. States that might be categorized as high-emitting are not always projected to be net sellers of allowances, and States that might be categorized as low-emitting are not always projected to be net purchasers of allowances.

Another commenter argues that smaller units would be forced to purchase SO2 allowances from the market in order to comply with CAIR. This commenter argues that the SO2 allowance market is not efficient and subjects forced participants to bear an undue amount of financial burden and/or risk. EPA believes that the commenter's claims about the state of the SO2 allowance market are unfounded. As is discussed in the Acid Rain Program Report (EPA 43-R-05-012, October 2005), about 20,000 allowance transactions, affecting about 15.3 million allowances, were recorded in the EPA Allowance Tracking System in 2004. This large volume of transactions is evidence of a viable and well-functioning market. In addition, title IV compliance costs have been much lower than projected and allowance prices in the SO2 allowance market have generally reflected this. Finally, as discussed earlier in this section, sources have the option of purchasing allowances directly from the annual auction.

Further, in raising equity concerns, a couple of commenters argue for conflicting measures of equity within their own comments. These commenters argue that an equitable emissions allocation approach will result in an equivalent effective emissions rate across States. These commenters then point to EPA's chosen CAIR NOx emissions allocation approach as an exemplary allocation approach because it limits the disparity between individual State budgets and projected emissions. However, the commenters fail to realize that, that approach does not

actually result in an equivalent emissions rate across States. Such a result underscores the notion that improving equity along one metric can actually reduce it along another.

Finally, some commenters argued that the use of title IV allowance allocations penalizes sources who have already installed scrubbers prior to the start of the Acid Rain Program. This is because, in general, allowances under title IV were allocated to units that had not installed controls at a higher rate relative to units that had installed controls. The title IV approach, in that sense, is somewhat similar to the approach taken for NOx under CAIR, in that it provides additional allowances for units expected to install controls under the rule.

EPA believes that the commenters' arguments that the continued use of title IV allowances penalizes sources that installed controls prior to the Acid Rain Program are unfounded. First, these controls were installed over 20 years ago and are, at this point, a sunk cost. Second, these control installations were completed within a regulated electricity sector, such that in most cases the cost of installing these controls should have been recovered through an electricity price rate increase. Third, these controls were installed in response to requirements separate from both CAIR and the Acid Rain Program. Fourth, Congress was clearly aware of the issues raised by commenters when designing the SO2 trading program in 1990, and consciously used a formula for future allocations for the length of time it believed was reasonable. In general, the Acid Rain Program has enjoyed 10 years of operation without substantial concern over this issue and with industry at-large appreciating the program's merits in providing a cost-effective, flexible, and fair way to provide environmental protection. Finally, analysis by one of these two commenters, which estimates the windfall of allowances that a hypothetical unscrubbed coal-fired unit would attain by installing a scrubber and reducing emissions, neglects the fact that this unit would have to endure the costs of installing controls. Thus, the ostensible windfall would be significantly smaller than was suggested by the commenter.

Analysis of SO2 Allocation Options Presented in the Notice of Reconsideration

In the Notice of Reconsideration, EPA compared three alternative SO2 allowance allocation methodologies to the approach in the final CAIR. In these analyses, EPA examined how allowances would be distributed to individual companies instead of examining how they would be distributed to States. According to the petitioner, the allowance distribution will result in the petitioner's relatively low-emitting units being forced to buy allowances from other companies' relatively high-emitting units. They thus argue the allocation approach used in CAIR is per se inequitable and unreasonable. To evaluate this concern, EPA compared projected allocations not just to individual units, but to individual companies who own these units under various methodologies relative to projected SO2 emissions of all the units owned by those companies. The logic behind this is described in detail in the Notice of Reconsideration and associated TSD (docket, EPA-HQ-OAR-2003-0053-2229).

The three alternative allowance allocation methodologies EPA analyzed were suggested by various commenters during the rulemaking process and this reconsideration process. These methodologies are:

1. Allocating allowances based on more recent heat input data;
2. Allocating allowances based on more recent heat input data adjusted for fuel type (e.g., coal, oil and gas); and
3. Allocating allowances based on more recent heat input data adjusted both for fuel type and for coal type (e.g., bituminous, sub-bituminous and lignite).

In comparing the CAIR SO2 allocation approach and the three alternative methodologies, EPA took into account certain factors that are applicable to the CAIR final allocation approach but not to the three alternative methodologies. For all four methodologies, EPA analyzed the resulting total allowance allocations, and the total projected emissions, for companies' sources located in the States subject to CAIR. In addition, for all the methodologies, EPA analyzed the relationship between allowances and emissions in two ways. First, EPA calculated the ratio of allowances to total projected emissions before CAIR controls (base case emissions). This provides a reasonable estimate of the extent to which each company's future emissions could have exceeded its allowances and, thus, indicates how much effort a company must expend for compliance either by purchasing allowances or installing controls. Second, EPA calculated the ratio of allowances to total projected emissions after the installation of CAIR controls (control case emissions). This provides a reasonable estimate of the number of allowances a company would need to purchase or would be able to sell after any controls are installed. Some companies with existing low-emitting units may have excess allowances to sell even if no controls are installed.

In its analysis of the CAIR approach, EPA also considered both the allowance allocations and the emissions for companies' units both within the CAIR region and outside the CAIR region. EPA believes that this is appropriate because, under the CAIR approach, if a company's units outside the CAIR region have more title IV allowances than needed to cover their emissions under the Acid Rain Program, the company might be able to transfer, at little or no net cost, excess allowances to the company's units in the CAIR region for use to cover emissions under the CAIR trading program. Under the three alternative methodologies, all of which would require creating new CAIR SO2 allowances independent of the existing title IV allocations, CAIR sources could not use title IV allowances held for sources outside (or inside) the CAIR region for compliance with the CAIR SO2 allowance holding requirement.

Further, in the analysis of the CAIR approach, EPA considered the allocation of title IV allowances to CAIR units that are not currently in the Acid Rain Program but that could opt into the Acid Rain Program and receive title IV allowances (see 42 U.S.C. 7651i and 18 CFR part 74; and the discussion below concerning the ability of units to opt in). This analysis assumed that companies owning non-Acid Rain units subject to CAIR would elect to opt into the Acid Rain Program because they would receive title IV allowances to cover a portion of the units' emissions under CAIR. EPA believes this assumption is reasonable because any of these units has the option of becoming an Acid Rain Program opt-in unit and thereby providing the company additional allowances, at little or no additional cost, and the value of title IV allowances could be substantial. In contrast, the analysis of the three alternative methodologies did not consider the impact of Acid Rain Program opt-ins because these approaches do not use title IV allowances for CAIR compliance.

EPA's analysis indicated that while allocations vary from company to company under the four methodologies, overall the distributions of allowances that companies received relative to their projected emissions for the CAIR control case are very similar. EPA came to similar conclusions when looking at the base case.[2] See Appendix B for the results.

Changes in Data Representation

In the Notice of Reconsideration, we displayed data in figures as the cumulative number of companies obtaining a specific ratio (or a lower ratio). The ratios were calculated as the projected base case SO2 allowance allocations divided by emissions. By displaying data in this manner we found that the distributions of allowances relative to emissions are similar across the four approaches.

Another way to display such data is by showing the percentage of companies or States that have a specific ratio (or a lower ratio). This method of graphing places the primary variable of interest, such as coverage ratio, on the x-axis, and shows the cumulative percentage of companies on the y-axis. Because of the ease of interpreting this format, we have chosen to display all relevant charts, thus. For example, see Appendix B, Figure 1. In addition, the statistical analysis discussed in the Appendix B, provides another way to assess system-wide trends in the data, which indicate whether an allocation approach is biased or inconsistent in its distribution of allowances across all States, as compared to other alternatives. The conclusion of that statistical analysis is that EPA's method is not biased or inconsistent compared to other methods.

There are two sets of analyses files associated with the Reconsideration process in the CAIR docket (EPA-HQ-OAR-2003-0053), "SO2 Allocations Analysis Data," from this Notice of Final Action on Reconsideration, March 15, 2006, and another set from the December 2005 Notice of Reconsideration (OAR-2003-0053-2261). EPA used the following labels in its data files in the docket for the corresponding allocation approaches analyzed:

2b = EPA's CAIR method
3b = Pure heat input
4b = Heat input with fuel factors
5b = Heat input with fuel factors and coal type

Slight changes in calculations for the method 5b were made to reflect another interpretation of how such a heat input allocation approach could be handled. In addition, a few duplicative entries were found and removed in this set of data files. Detailed explanation of the methodology for the revised data analysis can be found in (Source: Memos from David Sellers, Perrin Quarles Associates, March 2006, "CAIR SO2 Allocation Analysis Data," and "SO2

[2] Note: For NOx, EPA calculated a separate region-wide budget for New Jersey and Delaware using the same approach that was used to calculate the larger CAIR region-wide budget. This region-wide budget was then apportioned to individual State budgets using the same approach used in CAIR. Because New Jersey and Delaware were treated separately in the context of NOx allocations, EPA has not included them in this SO2 analysis. EPA believes their inclusion would have made little difference in the overall results given the relative smallness of the States' fossil generation capacity and coal-fired capacity in particular.

Allocation Data Spreadsheets" (Docket: EPA-HQ-OAR-2003-0053). Previous calculation methods can be found in Appendix A of Notice of Reconsideration TSD, "Sulfur Dioxide Allowance Allocation Methodology Comparative Analysis" (Docket: EPA-HQ-OAR-2003-0053-2229).[3]

Company-by-Company Analyses

EPA analyzed company-by-company data for owner/operating companies, as well as parent/holding companies. EPA analyses at the operating company level take into account that companies may incur some cost to shift allowances across State lines, e.g. if the States involved regulate retail electricity sales. Believing that taking this into account would not have a major effect on the outcome of these analyses, EPA performed this portion of the analyses to test this assumption.

One commenter criticized EPA's company-by-company analysis on the grounds that EPA determined allowance allocations under the various allocation alternatives using title IV-based CAIR State budgets rather than using State budgets that were calculated using corresponding heat input allocation approach. EPA agrees with the commenter that determination of company allocations under a given alternative allocation approach should be based on State budgets calculated using the same approach. EPA has reanalyzed company level allocations using this methodology, and the revised analyses are included in this document (also see "SO2 State Budget Analysis Data" spreadsheet in the CAIR docket, and March 2006 memos from David Sellers for underlying data).

EPA's revised analyses for both base and CAIR control cases in 2010 and 2015 for owner/operating companies and parent/holding companies all show mostly similar results to those described in the Notice of Reconsideration SO2 Analysis TSD with one exception. As in the prior analyses, EPA's SO2 allowance allocation approach is shown to be reasonable compared to the alternatives. This is true for 2010 and 2015 and when using emissions from both the base and CAIR control cases. However, because of the recalculation of the heat input with fuel factors approach for this final action analysis, the pure heat input approach is less far off from the heat input with fuel and coal factors approach under all cases and years. (See Appendix B for more details related to company-level analyses.)

This is further seen in the results for the owner/operating company analyses, which were slightly different than the parent/holding company analyses and what was described in the Notice of Reconsideration. EPA's method provides a distribution of ratios (allocations to emissions) similar to the heat input with fuel factors alternative, but not as close to the other two alternatives (see Appendix B, Figures 1, 2, 7 and 8). One reason for this difference is the owner/operator analyses indicate that the distributions of ratios are sensitive to the number or sources with zero allocations (and therefore a ratio of zero allowances to emissions). Companies may have zero allocations because the units they operate commenced operations after 1990. This is true for both 2010 and 2015 and with base case and control case emissions (see docket: EPA-HQ-OAR-

3 The District of Columbia is excluded from analyses that require emissions data because DC is projected to have no emissions in 2010 or 2015.

2003-0053, "SO_2 State Budget Analysis"). The vast majority of these companies have primarily gas generation, which has little or no emissions. For example about 94% of the 64 companies with a ratio of zero allowances to emissions were gas-fired for 2010 CAIR control case. This is true for at least 90% of companies for other years and cases, as well. Since these units have negligible SO_2 emissions, receiving no allowances will not significantly impact the operating companies (see docket, OAR-2003-0053, "SO_2 Allocations Analysis Data," for related data). When the figures are redrawn with those zero values removed for all methods, EPA's approach, again, appears to be very similar to the others analyzed (Appendix B, Figures 5, 6, 11 and 12).

Among the three remaining methods that incorporate a fuel-adjustment factor, neither heat input methodology stands out as providing a more reasonable method of allocation across all companies when examining allowance needs under either the base case or CAIR control case. In addition, the CAIR method for allocating SO_2 allowances is supported by EPA's over-riding policy decision to preserve operation of the title IV SO_2 cap and trade program as the CAIR method.

State-by-State Budget Analysis

As described in the CAIR Notice of Final Action on Reconsideration, in response to comment on the Notice of Reconsideration, EPA performed a set of State-level SO2 budget analyses. This section includes additional tables with data that support EPA's conclusions given in the Notice of Final Action on Reconsideration.

EPA received several comments on various aspects of the SO2 allocation analyses presented in the Notice of Reconsideration. A few commenters claimed that EPA should have focused its analyses on State budgets rather than on projected allocations to companies because, with an alternative allocation approach, States would have the responsibility for allocating allowances to their respective affected sources and could meet control requirements differently than assumed in EPA's analyses. Further, these commenters claimed a State-by-State analysis is more consistent with the analysis of NOx allocation methodologies in the Notice of Reconsideration and the final CAIR itself. Finally, one commenter noted that company-specific analysis can obscure state-by-state variation and may not be reliable given continual shifts in ownership structure.

EPA agrees with the commenters that one method of evaluating the reasonableness of SO2 allocation approaches is (in addition to company-by-company analyses) to compare State budgets calculated according to various methodologies. EPA performed the company-by-company analyses described above in response to a specific petitioner's claims that the SO2 allowance allocation approach created inequities at the company-level. Despite one commenter's assertion that such an analysis is made unreliable by constantly changing corporate structures, EPA believes that such an analysis remains instructive. A State-level analysis provides additional perspective on the impact of various allocation approaches, though it will, of course, obscure some of the potential company-level variability among allowance approaches. For this reason, EPA does not repeat the "Select High-emitting Companies" analysis in this document.

EPA presented such a State-by-State analysis in the final CAIR RTC (final CAIR "Corrected Response to Significant Public Comments on the Proposed Clean Air Interstate Rule," Corrected April 2005 (Docket Number OAR-2003-0053)). EPA recognizes that the analysis prepared for the CAIR RTC did not consider two of the alternative allocation approaches discussed above. For today's notice, EPA has analyzed State budgets calculated under eight different approaches (title IV and seven alternatives). These eight approaches are described in Table 1, below.

Table 1. Description of Allocation Approaches Included in EPA Analysis

Approach Name	Description of Approach
EPA Title IV	Title IV allocations adjusted for the 2 to 1 allowance retirement ratio in 2010-2014 and the 2.86 to 1 allowance retirement ratio in 2015 and thereafter. EPA's chosen approach.
Average 1999 -2002 (Pure) Heat Input	For each State, calculates the average heat input over the years 1999-2002. Apportions the region-wide SO2 cap to individual States based on each State's share of the total region-wide average for those years.
1999 -2002 Heat Input w/ Fuel Factors	For each State, calculates the average adjusted heat input over the years 1999-2002. Adjusts heat input using factors of 1.0 for coal, 0.009 for natural gas, and 0.3 for oil. Apportions the region-wide SO2 cap to individual States based on each State's share of the total region-wide average adjusted heat input for those years.
1999 -2002 Heat Input w/ Fuel Factors & Coal Type	For each State, calculates the average adjusted heat input over the years 1999-2002. Adjusts heat input using factors of 2.6 for bituminous coal, 1.0 for subbituminous and lignite coals, 0.2 for natural gas, and 0.7 for oil. Apportions the region-wide SO2 cap to individual States based on each State's share of the total region-wide average adjusted heat input for those years.
Average 1999 -2002 Heat Input Coal + Oil	For each State, calculates the average heat input from coal- and oil-fired units over the years 1999-2002. Apportions the region-wide SO2 cap to individual States based on each State's share of the total region-wide average heat input from these units for those years.
Average 1999 -2002 SO2 Emissions	For each State, calculates the average emissions over the years 1999-2002. Apportions the region-wide SO2 cap to individual States based on each State's share of the total region-wide average emissions for those years.
Average 1999 -2002 Generation Output (all sources fossil and non-fossil)	For each State, calculates the average output over the years 1999-2002. Apportions the region-wide SO2 cap to individual States based on each State's share of the total region-wide average output for those years.
1999 -2002 Generation Output (Fossil-fuel-fired units only)	For each State, calculates the average output from fossil fuel-fired units over the years 1999-2002. Apportions the region-wide SO2 cap to individual States based on each State's share of the total region-wide average output from these units for those years.

As is shown in Table 2, the first component of EPA's State-level analysis compared the individual State shares of total region-wide SO2 allocations under the various approaches. The revised analysis reaffirms EPA's original conclusion, which was that calculating State budgets using the title IV allowances results in about 80 percent of the States receiving a percentage of total SO2 allocations that is within the range of the percentages that resulted for these States under other suggested SO2 allocation approaches ("Sulfur Dioxide Allowance Allocation Methodology Comparative Analysis" Technical Support Document (Docket ID: EPA-HQ-OAR-2003-0053)). In other words, 80 percent of States get neither the most nor the least allowances relative to what they receive under the other allocation approaches, under the title IV approach. Furthermore, when compared specifically to the methods supported by commenters (pure heat input, heat input with fuel factors, heat input with fuel factors and coal type, coal and oil heat input and average output all), distribution of State budgets using title IV allocations results in an individual State receiving its smallest or greatest share of total SO2 allocations relative to what the individual State receives under the alternative approaches the same number of times as the pure heat input methodology and fewer times than the other methodologies supported by commenters (see the last three rows of Table 2). Such results suggest that this approach performs as well as three of the other allocation approaches suggested by commenters, indicating that EPA's argument that its chosen allocation approach is reasonable. While the coal and oil heat input approach appears to perform best in this analysis, this approach received more limited commenter support.

In examining the results of this analysis for the States where commenters that submitted adverse comments on the use of title IV own generating units (FL, IN, MD MN,NY NC, PA, SC, TX), it becomes apparent that each allocation approach makes some States better off and others worse off. For example, North Carolina receives 3.8 percent of the total region-wide SO2 budget under the title IV approach, and Florida receives 7.0 percent. Under a heat input with fuel factors approach, North Carolina receives 4.5 percent of the total budget, while Florida receives its lowest share of the total budget (5.6 percent) of all eight allocation approaches. Similarly, while Florida and Texas receive their largest share of allowances under a fossil output-based approach or pure heat input approach, Maryland actually receives its lowest share of allowances under that approach. Florida, Maryland, Pennsylvania, and New York all receive more allowances under the title IV approach than they would under the heat input with fuel factors approach.[4] Further, while using a heat input with fuel factors approach would provide an advantage to many of the States that provided adverse comments on title IV, shifting to this approach would disadvantage 10 of the 23 States (DC is not counted) relative to the title IV approach.

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4 Also, it is worth noting that the five most significant commenters from FL, IN, MN, NC, and SC are all in cost-of-service States, where they should be able to pass through costs. In other words, sources in these States are likely to recover their cost of compliance, and the rate impact in these States, spread over all generation, transmission, and distribution is likely to be minimal. EPA's Regulatory Impact Analysis for CAIR forecasts an increase of only about 2.0 percent and 2.7 percent in average electricity prices in the CAIR region in 2010 and 2015, respectively. Florida is projected to experience an increase in retail electricity prices of 0.8 percent in 2010 and 1.4 percent in 2015. Also, the region containing North Carolina and South Carolina is forecast to have retail electricity price increases lower than the regional average increases under CAIR in 2010 and 2015.

Notably, EPA found that commenters that did not like EPA's approach to SO2 allocations owned less than 10 percent of the coal-fire capacity in the CAIR region (see Appendix C).

Table 2. State Percentage of Regionwide Budget

State	EPA Title IV	Average 1999 -2002 (Pure) Heat Input	1999 -2002 Heat Input w/ Fuel Factors	1999 -2002 Heat Input w/ Fuel Factors & Coal Type	Average 1999 -2002 Heat Input Coal + Oil	Average 1999 - 2002 Emissions	Average1 999 -2002 Output All	Average 1999 - 2002 Output Fossil
AL	4.4%	4.3%	4.9%	5.2%	4.7%	5.0%	4.7%	4.2%
DC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
FL	7.0%	7.7%	5.6%	6.7%	7.3%	6.0%	7.2%	7.7%
GA	5.9%	4.1%	4.7%	5.3%	4.5%	5.2%	4.5%	4.2%
IA	1.8%	1.9%	2.4%	1.2%	2.3%	1.4%	1.5%	1.8%
IL	5.3%	4.7%	5.4%	4.4%	5.2%	4.7%	6.6%	4.4%
IN	7.0%	6.5%	7.9%	7.9%	7.5%	8.6%	4.6%	6.2%
KY	5.2%	4.9%	6.0%	7.3%	5.8%	5.8%	3.5%	4.5%
LA	1.7%	3.3%	1.6%	1.0%	1.5%	1.1%	3.4%	3.6%
MD	2.0%	1.8%	1.9%	2.3%	2.0%	2.7%	1.9%	1.7%
MI	4.9%	4.2%	4.4%	3.7%	4.3%	3.7%	4.1%	4.2%
MN	1.4%	1.9%	2.3%	1.1%	2.2%	1.0%	1.9%	1.7%
MO	3.8%	3.6%	4.3%	2.3%	4.1%	2.4%	2.9%	3.4%
MS	0.9%	1.4%	1.0%	1.0%	1.1%	1.2%	1.6%	1.6%
NC	3.8%	3.7%	4.5%	5.5%	4.3%	4.7%	4.5%	3.8%
NY	3.7%	4.0%	2.2%	2.7%	3.4%	2.7%	5.3%	3.9%
OH	9.2%	6.4%	7.9%	9.6%	7.5%	12.2%	5.4%	6.5%
PA	7.6%	6.0%	7.1%	8.4%	6.9%	9.5%	7.4%	6.1%
SC	1.6%	2.0%	2.3%	2.9%	2.2%	2.1%	3.4%	2.0%
TN	3.8%	3.0%	3.7%	4.4%	3.5%	4.0%	3.5%	3.0%
TX	8.9%	15.3%	9.4%	5.5%	9.0%	6.0%	13.9%	16.6%
VA	1.8%	2.3%	2.5%	3.1%	2.5%	2.3%	2.8%	2.3%
WI	2.4%	2.5%	2.9%	1.8%	2.8%	2.0%	2.2%	2.2%
WV	6.0%	4.4%	5.4%	6.7%	5.2%	5.8%	3.4%	4.5%
	100%	100%	100%	100%	100%	100%	100%	100%
# of times method provides least allowances	3	4	2	7	0	2	4	4
# of times method provides most allowances	2	1	4	6	0	4	4	4
Total (most + least)	5	5	6	13	0	6	8	8

Two commenters performed alternative analyses of State budgets, modeled after the calculations done for the CAIR Reconsideration related to NOx budgets (CAIR Statewide NOx Budget Calculations, EPA Docket Number OAR-2003-0053, December 2005). The commenters claim that their analysis proves that EPA's SO2 allowance allocation approach is inferior to a fuel-adjusted heat input method, such as the allocation approach used in the CAIR NOx model

trading rule. They assert that EPA's analysis of NOx allocation methodologies is also the appropriate way to compare the reasonableness of the SO2 allocation alternatives.

As EPA explained in the NOx TSD, to quantitatively evaluate whether the fuel factor approach is providing States with annual NOx budgets that more closely reflected their projected emissions, EPA calculated the arithmetic mean of the (absolute) difference between the ratio of each State's allowance allocation under each approach to its projected emissions under CAIR (coverage ratio), and 1.0 (i.e., the value representing a State's projected emissions matching the State's CAIR NOx budget). In other words, EPA calculated how far off the State's coverage ratio was from 1.0, and then determined the average value of this difference for each approach.

One commenter performed a similar analysis of State budgets, comparing each State's projected emissions to its projected allowances under each allocation approach. The commenter analyzed the results in relation to a coverage ratio of 1.0 (as EPA did in its NOx analysis) and averaged the values for each approach. Another commenter performed a similar analysis but presented the results as the cumulative value (sum) of absolute differences between the coverage ratios and 1.0.

EPA disagrees with the commenter's assertion that the methodology that the Agency used to evaluate State NOx allocations should be the primary means by which to evaluate the reasonableness of the SO2 allocation methodology. As explained in the CAIR preamble, in the case of SO2, EPA needs to balance various considerations, including the need to allocate SO2 allowances in a way that is less disruptive to the title IV program. In light of these considerations, minimizing the disparity between a State's allocation and projected emissions cannot be the primary objective. For SO2, there is a pre-existing national trading program (the Acid Rain SO2 trading program) that Congress intended to continue as a viable program into the future and under which allowances have been allocated in perpetuity. For NOx, there is no pre-existing national trading program where efficiency and effectiveness would be jeopardized by creating new CAIR NOx allowances. There is, of course, a pre-existing regional NOx ozone-season program covering a portion of the CAIR region (the NOx Budget Trading Program, established by regulation, rather than directly by Congress). Under the existing NOx ozone-season program, no State has allocated allowances past 2009 (and only a handful of States have allocated allowances past 2008). Therefore, in contrast with EPA's determination concerning SO2 allocations, evaluation of potential approaches to NOx allocations did not involve concerns about Congressional intent to preserve an existing trading program and about preserving the value of allowances already allocated in perpetuity. For NOx, EPA does not need to consider other important policy concerns that are important for SO2 (as explained above and in the CAIR final rule).

While the methodology used by EPA to evaluate NOx allocation methodologies for CAIR can be applied to analysis of SO2 allocations, EPA believes that the commenters performed their State-by-State analyses incorrectly, overlooking a fundamental difference between the CAIR NOx and SO2 trading programs, which is the existence of a significant bank of pre-2010 allowances that will be eligible for use for compliance with CAIR. Because of the existence of a SO2 allowance bank, EPA believes that the commenter's comparison of allocation approaches using a coverage ratio of 1.0, which would assume that in a given year total SO2 emissions in the region are equal

to the total region-wide SO2 budget, is not appropriate for evaluating the SO2 State budgets resulting from the various SO2 allocation methodologies. A State that had a coverage ratio of 1.0 would have enough allowances to cover its emissions, and, while this ratio would be a meaningful target in the context of the CAIR NOx trading program, it is not for SO2, because 2010 and 2015 emissions will be higher than the region-wide cap due to the use of banked allowances. For SO2, the region-wide ratios of allowances to projected emissions are 0.70 for 2010 and 0.60 for 2015. On average, one would expect States to have coverage ratios similar to the region-wide average.

While in both the NOx annual and NOx ozone season trading programs some allowances beyond the State Budgets (i.e., compliance supplement pool allowances in the annual program and banked allowances from the NOx Budget Trading Program in the ozone-season program) will be available to sources, the amount of these extra allowances will be too small to affect the State-by-State NOx analysis. Consequently, EPA believes that a more appropriate way to evaluate SO2 allocation methods is to use the 0.70 (for 2010) and 0.60 (for 2015) coverage ratios, rather than a ratio of 1.0. Further, because each allocation approach results in allocation that are advantageous for different companies and States, EPA believes that the reasonableness of a given allocation approach should be judged by its overall impact on companies and States, not its specific impact on any single company or State or on a few companies or States.

EPA has redone the commenters' analysis, using the methodology used by EPA in its analysis of NOx allocations and corrected coverage ratios described above. This analysis is presented in Appendix A, tables A to D. The State budget and emissions data behind the tables in Appendix A are available in Appendix A, Table E, as well as in the docket, "SO2 Allocations Analysis Data."

While the title IV SO2 allocation approach does not perform the best of the allocation approaches considered using this metric, the differences observed among the approaches are of a lower magnitude than those suggested by the commenters. The commenters did not provide any benchmark in their analysis for assessing whether or not a given allocation approach was reasonable. Further, although the commenters discuss some of the implications of the differences observed between an allocation approach based on fuel factors and the allocation approach based on title IV, they do not conclude their analyses with any meaningful arguments that EPA's approach is not reasonable.

As EPA noted earlier in this section, there are a number of ways by which to assess the equitability of a given allowance allocation approach. For a further understanding of the overall relative impacts of the various allocation approaches, EPA believes that it is useful to apply the statistical concepts of (1) bias and (2) consistency. EPA determined that an appropriate statistic for examining the bias of a given allocation approach is the average difference between a State's coverage ratio and the coverage ratio for the entire region (*e.g.*, 0.70 for 2010 or 0.60 for 2015). The degree of bias inherent in a given allocation approach cannot be discerned from the absolute value statistic, because it ignores the degree to which positive and negative differences cancel each other out. A perfectly unbiased distribution under a given allocation approach would be one that resulted in an average difference of zero, meaning that on average a State-by-State coverage ratio higher than the regional coverage ratio is balanced out by a ratio below. Another

useful statistic is the percent of instances in which the allocation approach yields a State coverage ratio that is high (or low) relative to the regional coverage ratio. Lack of bias would be indicated if 50 percent of the State coverage ratios are higher than the regional coverage ratio and 50 percent are lower.

EPA evaluated the four allocation approaches considered during the CAIR rulemaking (title IV, pure heat input, heat input with fuel-factors, and heat input with fuel factors and coal type factors) along these metrics. From EPA's calculations (Table 3), all the approaches are biased high for 2010 and all but one is biased high for 2015 (with CAIR controls). The average differences for EPA's approach, 0.06 (range across approaches: 0.05 to 0.11) in 2010 and 0.17 (range across approaches: -0.17 to 0.18) in 2015, are among the closest to zero compared to the alternatives examined. The one approach (heat input with fuel and coal adjustment factors) that exhibits less bias than the title IV approach in 2010 exhibits bias of the same magnitude (but opposite direction) as the title IV approach in 2015. In addition, the percent of positive differences for EPA's approach for 2010 and 2015 are near 50 percent and do not greatly vary from the alternative methods analyzed. This demonstrates that EPA's approach provides a reasonable result. (Summary tables of all metrics analyzed, including bias and consistency, are available in Tables 6 and 7 below.

Table 3. Evaluation of Bias and Consistency of Four Different SO2 Allocation Approaches, 2010 and 2015

	2010				2015			
	EPA Title IV	Average 1999 - 2002 (Pure) Heat Input	1999 - 2002 Heat Input w/ Fuel Factors	1999 - 2002 Heat Input w/ Fuel Factors & Coal Type	EPA Title IV	Average 1999 - 2002 (Pure) Heat Input	1999 - 2002 Heat Input w/ Fuel Factors	1999 - 2002 Heat Input w/ Fuel Factors & Coal Type
Average Difference	0.06	0.11	0.06	0.05	0.17	0.18	0.14	-0.17
Percent Positive	43%	39%	52%	48%	43%	43%	43%	52%

Source: EPA 2006

One commenter, who disagreed with EPA's focus on how States fare under different methodologies, suggested using an "effective emission rate comparison." However, the commenter proceeded to perform this comparison using of the ratio of the adjusted state SO2 budgets to recent adjusted heat input in each affected state. The commenter failed to realize that using the adjusted state SO2 budget in the numerator and adjusted heat input (i.e., the heat input values adjusted with fuel factors, which were used to calculate the State budgets) in the denominator results in a constant ratio across States. Based on the commenter's arguments, it appears it should have used the adjusted State budget divided by the actual projected heat input. This approach, however, would not result in the constant effective emission rates, which the commenter insinuates is most desirable. The commenter's argument, therefore, is based on fatally flawed analysis.

Several commenters have raised concerns about the cost of purchasing allowances to meet projected emissions under EPA's approach, relative to another alternative. To provide some perspective of the significance of these purchases, EPA calculated the projected cost of purchasing allowances as a percentage of revenue from electricity sales in 2004 for select States in CAIR for SO2 (Tables 4 and 5). The CAIR region-wide cost as a percentage of revenue is a fraction of one percent for either 2010 or 2015. These States are projected to spend less than 2% of their revenue on purchasing allowances in either 2010 or 2015. Most States from which commenting companies operate are projected to spend even less than 1 percent or less of revenues on allowances, and Florida is projected to be a net seller of allowances (signified by the negative sign for both 2010 and 2015).5 In fact, the States that are projected to spend the most on purchasing allowances as a percentage of revenue (Kentucky in 2010 and Michigan in 2015) do not have companies commenting on this Reconsideration process.

Table 4: 2010 State Budgets, Projected Emissions and Allowance Costs for States with Commenters Opposing EPA Approach

State	2010 CAIR SO2 Emissions (Tons)	2010 Base Case SO2 Emissions (Tons)	Final CAIR 2010 State SO2 Budget	Heat Input Method 2010 State Budget	Heat Input w/ Fuel Factors 2010 State Budget	Heat Input w/ Fuel Factors & Coal Type 2010 State Budget	2010 Projected Allowance Cost (2004$)	2004 State Electric Power Revenue (2004$)	2010 Projected Allowance Cost as Percent of Current Revenue
FL	217,697	220,670	253,450	279,084	203,650	244,120	-24,526,627	17,834,520,000	-0.1%
IL	239,867	401,522	192,671	168,592	195,590	158,976	32,376,250	9,464,950,000	0.3%
MD	61,815	309,968	70,697	63,847	68,691	83,869	-6,092,778	4,785,324,000	-0.1%
MN	68,734	83,110	49,987	68,420	81,572	40,045	12,860,442	3,950,079,000	0.3%
NC	252,132	261,352	137,342	134,643	161,807	199,711	78,745,940	8,756,173,000	0.9%
PA	234,757	907,768	275,990	217,369	255,227	302,565	-28,285,975	11,485,558,000	-0.2%
SC	141,276	196,065	57,271	71,616	84,298	104,757	57,627,704	4,971,537,000	1.2%
TX	398,088	417,397	320,946	555,455	339,975	199,493	52,919,275	25,482,302,000	0.2%

Note: Projected allowance costs are estimated at $686 per ton using IPM modeling run CAIR_CAMR_CAVR available at www.epa.gov/airmarkets/mp adjusted to 2004$. Electric power revenues are based on U.S. Department of Energy, Energy Information Administration, "Electric Power Annual 2004," available at www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html

5 Based on EPA calculations of Acid Rain Program emissions data from 2003 to 2004 compared to SO2 allocations over the same time period, EPA sees that Minnesota Power and Florida Power and Light have had more allowances than they needed to cover their emissions in recent years. As net "sellers" of allowances, companies in these States have been able to either build up an allowance bank for future use or sell their excess allowances.

Table 5: 2015 State Budgets, Projected Emissions and Allowance Costs for States with Commenters Opposing EPA Approach

State	2015 CAIR SO2 Emissions (Tons)	2015 Base Case SO2 Emissions (Tons)	Final CAIR 2015 State SO2 Budget	Heat Input Method 2015 State Budget	Heat Input w/ Fuel Factors 2015 State Budget	Heat Input w/ Fuel Factors & Coal Type 2015 State Budget	2015 Projected Allowance Cost (2004$)	2004 State Electric Power Revenue (2004$)	2015 Projected Allowance Cost as Percent of Current Revenue
FL	167,154	220,670	177,415	195,359	142,555	170,884	-10,199,335	17,834,520,000	-0.1%
IL	239,660	446,728	134,869	118,015	136,913	111,283	104,162,453	9,464,950,000	1.1%
MD	23,813	312,974	49,488	44,693	48,084	58,708	-25,520,851	4,785,324,000	-0.5%
MN	71,988	82,046	34,991	47,894	57,100	28,031	36,774,521	3,950,079,000	0.9%
NC	137,886	142,109	96,139	94,250	113,264	139,798	41,496,518	8,756,173,000	0.5%
PA	132,469	851,260	193,193	152,158	178,659	211,795	-60,359,557	11,485,558,000	-0.5%
SC	104,436	170,353	40,089	50,131	59,008	73,330	63,960,421	4,971,537,000	1.3%
TX	352,064	417,558	224,662	388,818	237,982	139,645	126,637,389	25,482,302,000	0.5%

Note: Projected allowance costs are estimated at $994 per ton using IPM modeling run CAIR_CAMR_CAVR available at www.epa.gov/airmarkets/mp adjusted to 2004$. Electric power revenues are based on U.S. Department of Energy, Energy Information Administration, "Electric Power Annual 2004," available at www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html

EPA's approach provides values within the range of alternatives considered for all of the metrics examined in the SO2 analyses as presented in the following tables (6-7). Furthermore, when examining metrics using base case emissions, EPA's approach performs better than the heat input with fuel factors approach. By these measures, EPA's approach better distributes allowances across the system before control decisions are made to meet CAIR emission reduction goals.

Table 6. Summary -- CAIR Control Case Difference of State-by-State SO2 Coverage Ratios (Budget: Emission) from Region-wide Percent Reduction

	2010				2015			
	Final CAIR SO2	Heat Input (3b)	Heat Input w/ Fuel Factors (4b)	Heat Input w/ Fuel Factors & Coal Type (5b)	Final CAIR SO2	Heat Input (3b)	Heat Input w/ Fuel Factors (4b)	Heat Input w/ Fuel Factors & Coal Type (5b)
Average Coverage Ratio	0.76	0.81	0.76	0.75	0.77	0.78	0.74	0.77
Average Difference	0.06	0.11	0.06	0.05	0.17	0.18	0.14	-0.17
Percent Positive	43%	39%	52%	48%	43%	43%	43%	52%
Cumulative Absolute Difference	6.13	7.29	4.37	5.94	8.06	8.36	5.97	9.03
Average Absolute Difference	0.27	0.32	0.19	0.26	0.35	0.36	0.26	0.39

Source: EPA, 2006

Table 7. Base Case Difference of State-by-State SO2 Coverage Ratios (Budget: Emission) from Regionwide Percent Reduction

	2010				2015			
	Final CAIR SO2	Heat Input (3b)	Heat Input w/ Fuel Factors (4b)	Heat Input w/ Fuel Factors & Coal Type (5b)	Final CAIR SO2	Heat Input (3b)	Heat Input w/ Fuel Factors (4b)	Heat Input w/ Fuel Factors & Coal Type (5b)
Average Coverage Ratio	0.48	0.54	0.50	0.46	0.35	0.39	0.36	0.34
Average Difference	0.06	0.12	0.08	0.04	0.05	0.14	0.08	0.04
Percent Positive	43%	43%	61%	52%	39%	43%	52%	57%
Cumulative Absolute Difference	3.60	5.86	3.82	2.71	2.35	4.00	2.62	2.08
Average Absolute Difference	0.16	0.25	0.17	0.12	0.20	0.33	0.22	0.17

Source: EPA, 2006

Further examination of the analyses shows that each approach advantages and disadvantages electric generating units using fossil fuels some in States. A few States receive coverage ratios that are consistently on one end of the spectrum or the other regardless of which approach is taken, according to EPA projections. Michigan and Georgia have coverage ratios in the bottom 5 of all CAIR States analyzed (low category). New York and Maryland receive among the 5 highest coverage ratios in 2010 under the CAIR control case (high category). Meanwhile, some States are particularly advantaged or disadvantaged by one or a few of the approaches and not others (see Tables 8 to 11). For example, choosing the pure heat input method would put Tennessee into the low category, while bringing Texas and Louisiana into the high category. On the other hand, choosing any of the fuel adjusted methods, including EPA's method, would guarantee that Ohio, Pennsylvania, Maryland and New York are in the high category, while Georgia, Mississippi, and Michigan would be in the low category. Minnesota has among the highest relative rank with heat input with fuel factors, but Iowa joins the low category in that case. South Carolina is in the low category in 2010 CAIR control case for all approaches except heat input with fuel factors and coal type.

These tables further demonstrate that each allocation approach results in a somewhat different mix of States who, in general, will be net sellers or buyers of allowances. This alone is not enough to assess the fairness of a particular method, as some commenters have alleged. However, after evaluating multiple approaches compared to EPA's approach with several analytical and statistical methods seen throughout this TSD and its appendices, EPA has determined that its SO2 allowance allocation methodology is a rational choice among the options to support the objectives stated above.

Table 8. 2010 State-by-State CAIR Control Case Coverage Ratios in Descending Order

State	CAIR SO2	State	Heat Input	State	Heat Input with Fuel Factors	State	Heat Input with Fuel Factors and Coal Type
NY	2.04	NY	2.20	MN	1.19	NY	1.45
PA	1.18	LA	1.94	NY	1.17	MD	1.36
FL	1.16	TX	1.40	MD	1.11	PA	1.29
MD	1.14	FL	1.28	PA	1.09	OH	1.17
OH	1.12	MD	1.03	OH	0.95	FL	1.12
LA	0.97	MN	1.00	FL	0.94	WV	0.97
WV	0.86	PA	0.93	LA	0.93	VA	0.82
TX	0.81	OH	0.78	TX	0.85	NC	0.79
IL	0.80	IL	0.70	IL	0.82	KY	0.77
MN	0.73	WI	0.65	WV	0.78	TN	0.75
TN	0.65	WV	0.63	WI	0.77	SC	0.74
WI	0.64	VA	0.61	IA	0.72	IN	0.67
IN	0.59	MS	0.59	IN	0.66	IL	0.66
MO	0.57	IA	0.59	VA	0.66	AL	0.59
KY	0.55	IN	0.55	NC	0.64	LA	0.58
NC	0.54	MO	0.54	MO	0.64	MN	0.58
IA	0.54	NC	0.53	KY	0.64	TX	0.50
AL	0.49	KY	0.52	TN	0.63	WI	0.47
GA	0.48	TN	0.52	SC	0.60	MS	0.44
MI	0.47	SC	0.51	AL	0.55	GA	0.43
VA	0.47	AL	0.48	MS	0.42	IA	0.37
SC	0.41	MI	0.40	MI	0.42	MI	0.35
MS	0.39	GA	0.33	GA	0.38	MO	0.34

Source: EPA, 2006

Table 9. 2010 State-by-State Base Case Coverage Ratios in Descending Order

State	CAIR SO2	State	Heat Input	State	Heat Input with Fuel Factors	State	Heat Input with Fuel Factors and Coal Type
FL	1.15	TX	1.33	MN	0.98	FL	1.11
NY	1.03	FL	1.26	MO	0.98	NY	0.74
TX	0.77	LA	1.21	FL	0.92	KY	0.59
LA	0.60	NY	1.12	TX	0.81	VA	0.58
MN	0.60	MN	0.82	NC	0.63	WI	0.58
MO	0.60	MO	0.82	NY	0.60	SC	0.53
NC	0.55	MS	0.59	LA	0.58	MN	0.48
IL	0.48	NC	0.53	KY	0.49	MO	0.48
MI	0.46	VA	0.44	IL	0.49	TX	0.48
KY	0.42	WI	0.44	VA	0.47	TN	0.45
MS	0.39	IL	0.42	WI	0.47	IN	0.44
IN	0.39	KY	0.40	IN	0.44	MS	0.44
TN	0.39	MI	0.40	SC	0.43	WV	0.42
WV	0.37	SC	0.37	MS	0.42	IL	0.40
GA	0.36	IN	0.36	MI	0.41	AL	0.39
IA	0.36	AL	0.32	TN	0.38	LA	0.36
VA	0.33	TN	0.31	AL	0.37	MI	0.35
WI	0.33	WV	0.27	WV	0.33	PA	0.33
AL	0.33	GA	0.25	GA	0.29	NC	0.33
PA	0.30	IA	0.25	IA	0.29	GA	0.33
SC	0.29	PA	0.24	PA	0.28	IA	0.33
OH	0.24	MD	0.21	MD	0.22	MD	0.27
MD	0.23	OH	0.17	OH	0.21	OH	0.25

Source: EPA, 2006

Table 10. 2015 State-by-State CAIR Control Case Coverage Ratios in Descending Order

State	CAIR SO2	State	Heat Input	State	Heat Input with Fuel Factors	State	Heat Input with Fuel Factors and Coal Type
NY	2.32	NY	2.51	MD	2.02	MD	2.47
MD	2.08	MD	1.88	PA	1.35	NY	1.65
PA	1.46	LA	1.36	NY	1.34	PA	1.60
WV	1.28	FL	1.17	WV	1.15	WV	1.44
OH	1.12	PA	1.15	OH	0.96	OH	1.17
FL	1.06	TX	1.10	FL	0.85	FL	1.02
NC	0.70	WV	0.94	NC	0.82	NC	1.01
LA	0.68	OH	0.79	MN	0.79	SC	0.70
TX	0.64	NC	0.68	TX	0.68	TN	0.69
TN	0.60	MN	0.67	LA	0.65	KY	0.68
GA	0.60	VA	0.50	TN	0.58	VA	0.67
IL	0.56	IL	0.49	IL	0.57	IN	0.57
IN	0.51	SC	0.48	SC	0.57	GA	0.54
KY	0.49	TN	0.48	KY	0.56	AL	0.52
MN	0.49	WI	0.48	IN	0.56	IL	0.46
WI	0.46	IN	0.47	WI	0.56	LA	0.41
AL	0.43	KY	0.46	VA	0.54	TX	0.40
MO	0.39	MS	0.44	AL	0.48	MN	0.39
SC	0.38	AL	0.42	IA	0.48	WI	0.34
VA	0.38	GA	0.41	GA	0.48	MS	0.33
IA	0.36	IA	0.39	MO	0.44	IA	0.25
MI	0.32	MO	0.37	MS	0.31	MI	0.24
MS	0.29	MI	0.28	MI	0.29	MO	0.23

Source: EPA, 2006

Table 11. 2015 State-by-State Base Case Coverage Ratios in Descending Order

State	CAIR SO2	State	Heat Input	State	Heat Input with Fuel Factors	State	Heat Input with Fuel Factors and Coal Type
FL	0.80	TX	0.93	MN	0.70	FL	0.77
NY	0.72	FL	0.89	MO	0.70	NY	0.51
TX	0.54	LA	0.85	FL	0.65	KY	0.44
MN	0.43	NY	0.77	TX	0.57	VA	0.43
MO	0.43	MN	0.58	NC	0.43	WI	0.43
LA	0.42	MO	0.58	NY	0.41	SC	0.43
NC	0.38	MS	0.42	LA	0.41	IN	0.38
IN	0.34	NC	0.36	IN	0.37	TN	0.35
KY	0.32	VA	0.32	KY	0.37	WV	0.34
MI	0.31	WI	0.32	VA	0.35	MN	0.34
WV	0.31	IN	0.31	WI	0.35	MO	0.34
TN	0.30	KY	0.30	SC	0.35	TX	0.33
IL	0.30	SC	0.29	IL	0.31	AL	0.33
MS	0.28	MI	0.27	AL	0.30	MS	0.31
AL	0.27	AL	0.27	TN	0.30	LA	0.26
GA	0.25	IL	0.26	MS	0.30	IL	0.25
IA	0.25	TN	0.24	MI	0.28	PA	0.25
VA	0.25	WV	0.22	WV	0.28	MI	0.24
WI	0.25	PA	0.18	PA	0.21	GA	0.23
SC	0.24	GA	0.17	GA	0.20	IA	0.23
PA	0.23	IA	0.17	IA	0.20	OH	0.23
OH	0.22	OH	0.15	OH	0.19	NC	0.23
MD	0.16	MD	0.14	MD	0.15	MD	0.19

Source: EPA, 2006

Appendix A – EPA Difference Tables

Table A. 2010 State-by-State CAIR Control Case Coverage Ratios, CAIR & Alternatives

	CAIR SO2			Heat Input			Heat Input w/ Fuel Factors			Heat Input w/ Fuel Factors & Coal Type		
State	Coverage Ratio: Budget to Emission	Difference (from 0.70)	Absolute Difference (from 0.70)	Coverage Ratio: Budget to Emission	Difference (from 0.70)	Absolute Difference (from 0.70)	Coverage Ratio: Budget to Emission	Difference (from 0.70)	Absolute Difference (from 0.70)	Coverage Ratio: Budget to Emission	Difference (from 0.70)	Absolute Difference (from 0.70)
AL	0.49	-0.21	0.21	0.48	-0.22	0.22	0.55	-0.15	0.15	0.59	-0.11	0.11
FL	1.16	0.46	0.46	1.28	0.58	0.58	0.94	0.24	0.24	1.12	0.42	0.42
GA	0.48	-0.23	0.23	0.33	-0.37	0.37	0.38	-0.32	0.32	0.43	-0.27	0.27
IA	0.54	-0.16	0.16	0.59	-0.11	0.11	0.72	0.02	0.02	0.37	-0.33	0.33
IL	0.80	0.10	0.10	0.70	0.00	0.00	0.82	0.12	0.12	0.66	-0.04	0.04
IN	0.59	-0.11	0.11	0.55	-0.15	0.15	0.66	-0.04	0.04	0.67	-0.03	0.03
KY	0.55	-0.15	0.15	0.52	-0.18	0.18	0.64	-0.06	0.06	0.77	0.07	0.07
LA	0.97	0.26	0.26	1.94	1.24	1.24	0.93	0.23	0.23	0.58	-0.12	0.12
MD	1.14	0.44	0.44	1.03	0.33	0.33	1.11	0.41	0.41	1.36	0.66	0.66
MI	0.47	-0.24	0.24	0.40	-0.30	0.30	0.42	-0.28	0.28	0.35	-0.35	0.35
MN	0.73	0.02	0.02	1.00	0.30	0.30	1.19	0.49	0.49	0.58	-0.12	0.12
MO	0.57	-0.14	0.14	0.54	-0.16	0.16	0.64	-0.06	0.06	0.34	-0.36	0.36
MS	0.39	-0.31	0.31	0.59	-0.11	0.11	0.42	-0.28	0.28	0.44	-0.26	0.26
NC	0.54	-0.16	0.16	0.53	-0.17	0.17	0.64	-0.06	0.06	0.79	0.09	0.09
NY	2.04	1.33	1.33	2.20	1.50	1.50	1.17	0.47	0.47	1.45	0.75	0.75
OH	1.12	0.41	0.41	0.78	0.08	0.08	0.95	0.25	0.25	1.17	0.47	0.47
PA	1.18	0.47	0.47	0.93	0.23	0.23	1.09	0.39	0.39	1.29	0.59	0.59
SC	0.41	-0.30	0.30	0.51	-0.19	0.19	0.60	-0.10	0.10	0.74	0.04	0.04
TN	0.65	-0.05	0.05	0.52	-0.18	0.18	0.63	-0.07	0.07	0.75	0.05	0.05
TX	0.81	0.10	0.10	1.40	0.70	0.70	0.85	0.15	0.15	0.50	-0.20	0.20
VA	0.47	-0.24	0.24	0.61	-0.09	0.09	0.66	-0.04	0.04	0.82	0.12	0.12
WI	0.64	-0.07	0.07	0.65	-0.05	0.05	0.77	0.07	0.07	0.47	-0.23	0.23
WV	0.86	0.16	0.16	0.63	-0.07	0.07	0.78	0.08	0.08	0.97	0.27	0.27
Total		1.40	6.13		2.62	7.29		1.46	4.37		1.11	5.94
Average	0.76	0.06	0.27	0.81	0.11	0.32	0.76	0.06	0.19	0.75	0.05	0.26
Percent Positive		43%			39%			52%			48%	

Source: EPA, 2006

Table B. **2015 State-by-State CAIR Control Coverage Ratios, CAIR & Alternatives**

	CAIR SO2			Heat Input			Heat Input w/ Fuel Factors			Heat Input w/ Fuel Factors & Coal Type		
State	Coverage Ratio: Budget to Emission	Difference (from 0.60)	Absolute Difference (from 0.60)	Coverage Ratio: Budget to Emission	Difference (from 0.60)	Absolute Difference (from 0.60)	Coverage Ratio: Budget to Emission	Difference (from 0.60)	Absolute Difference (from 0.60)	Coverage Ratio: Budget to Emission	Difference (from 0.60)	Absolute Difference (from 0.60)
AL	0.43	-0.17	0.17	0.42	-0.18	0.18	0.48	-0.12	0.12	0.52	0.08	0.08
FL	1.06	0.46	0.46	1.17	0.57	0.57	0.85	0.25	0.25	1.02	-0.42	0.42
GA	0.60	0.00	0.00	0.41	-0.19	0.19	0.48	-0.12	0.12	0.54	0.06	0.06
IL	0.56	-0.04	0.04	0.49	-0.11	0.11	0.57	-0.03	0.03	0.46	0.14	0.14
IN	0.51	-0.09	0.09	0.47	-0.13	0.13	0.56	-0.04	0.04	0.57	0.03	0.03
IA	0.36	-0.24	0.24	0.39	-0.21	0.21	0.48	-0.12	0.12	0.25	0.35	0.35
KY	0.49	-0.11	0.11	0.46	-0.14	0.14	0.56	-0.04	0.04	0.68	-0.08	0.08
LA	0.68	0.08	0.08	1.36	0.76	0.76	0.65	0.05	0.05	0.41	0.19	0.19
MD	2.08	1.48	1.48	1.88	1.28	1.28	2.02	1.42	1.42	2.47	-1.87	1.87
MI	0.32	-0.28	0.28	0.28	-0.32	0.32	0.29	-0.31	0.31	0.24	0.36	0.36
MN	0.49	-0.11	0.11	0.67	0.07	0.07	0.79	0.19	0.19	0.39	0.21	0.21
MS	0.29	-0.31	0.31	0.44	-0.16	0.16	0.31	-0.29	0.29	0.33	0.27	0.27
MO	0.39	-0.21	0.21	0.37	-0.23	0.23	0.44	-0.16	0.16	0.23	0.37	0.37
NY	2.32	1.72	1.72	2.51	1.91	1.91	1.34	0.74	0.74	1.65	-1.05	1.05
NC	0.70	0.10	0.10	0.68	0.08	0.08	0.82	0.22	0.22	1.01	-0.41	0.41
OH	1.12	0.52	0.52	0.79	0.19	0.19	0.96	0.36	0.36	1.17	-0.57	0.57
PA	1.46	0.86	0.86	1.15	0.55	0.55	1.35	0.75	0.75	1.60	-1.00	1.00
SC	0.38	-0.22	0.22	0.48	-0.12	0.12	0.57	-0.03	0.03	0.70	-0.10	0.10
TN	0.60	0.00	0.00	0.48	-0.12	0.12	0.58	-0.02	0.02	0.69	-0.09	0.09
TX	0.64	0.04	0.04	1.10	0.50	0.50	0.68	0.08	0.08	0.40	0.20	0.20
VA	0.38	-0.22	0.22	0.50	-0.10	0.10	0.54	-0.06	0.06	0.67	-0.07	0.07
WV	1.28	0.68	0.68	0.94	0.34	0.34	1.15	0.55	0.55	1.44	-0.84	0.84
WI	0.46	-0.14	0.14	0.48	-0.12	0.12	0.56	-0.04	0.04	0.34	0.26	0.26
Total		3.81	8.06		4.11	8.36		3.25	5.97		-3.99	9.03
Average	0.77	0.17	0.35	0.78	0.18	0.36	0.74	0.14	0.26	0.77	-0.17	0.39
Percent Positive		43%			43%			43%			52%	

Source: EPA, 2006

Table E. State SO2 Budgets by Allocation Approach for 2010 and 2015

ST ABBR	Final CAIR 2010 State SO2 Budget	Final CAIR 2015 State SO2 Budget	Method 3b 2010 State Budget	Method 3b 2015 State Budget	Method 4b 2010 State Budget	Method 4b 2015 State Budget	Method 5b 2010 State Budget	Method 5b 2015 State Budget
AL	157,582	110,307	154,288	108,001	175,798	123,058	188,339	131,837
DC	708	495	513	359	189	133	212	148
FL	253,450	177,415	279,084	195,359	203,650	142,555	244,120	170,884
GA	213,057	149,140	146,955	102,868	169,928	118,950	192,536	134,775
IA	64,095	44,866	70,019	49,013	85,715	60,001	43,853	30,697
IL	192,671	134,869	168,592	118,015	195,590	136,913	158,976	111,283
IN	254,599	178,219	235,113	164,579	284,195	198,936	287,174	201,022
KY	188,773	132,141	178,489	124,942	217,936	152,555	262,395	183,676
LA	59,948	41,963	120,325	84,228	57,551	40,286	36,197	25,338
MD	70,697	49,488	63,847	44,693	68,691	48,084	83,869	58,708
MI	178,605	125,024	153,030	107,121	160,502	112,351	134,708	94,295
MN	49,987	34,991	68,420	47,894	81,572	57,100	40,045	28,031
MO	137,214	96,050	130,563	91,394	155,103	108,572	81,931	57,351
MS	33,763	23,634	50,870	35,609	36,089	25,263	37,669	26,369
NC	137,342	96,139	134,643	94,250	161,807	113,264	199,711	139,798
NY	135,139	94,597	146,004	102,203	77,937	54,556	96,342	67,439
OH	333,520	233,464	233,407	163,385	284,404	199,082	348,166	243,716
PA	275,990	193,193	217,369	152,158	255,227	178,659	302,565	211,795
SC	57,271	40,089	71,616	50,131	84,298	59,008	104,757	73,330
TN	137,216	96,051	109,435	76,604	133,420	93,394	157,948	110,563
TX	320,946	224,662	555,455	388,818	339,975	237,982	199,493	139,645
VA	63,478	44,435	82,995	58,097	89,665	62,765	110,935	77,654
WI	87,264	61,085	89,598	62,719	105,025	73,518	64,197	44,938
WV	215,881	151,117	158,567	110,997	194,929	136,450	243,059	170,141
	3,619,196	**2,533,434**	**3,619,196**	**2,533,434**	**3,619,196**	**2,533,434**	**3,619,197**	**2,533,433**

Source: EPA, 2006

Table C. **2010 State-by-State Coverage Ratios using Projected Emissions from Base Case, CAIR & Alternatives**

	CAIR SO2			Heat Input (3b)			Heat Input w/ Fuel Factors (4b)			Heat Input w/ Fuel Factors & Coal Type (5b)		
State	Coverage Ratio: Budget to Emission	Difference (from 0.42)	Absloute Difference (from 0.42)	Coverage Ratio: Budget to Emission	Difference (from 0.41)	Absloute Difference (from 0.42)	Coverage Ratio: Budget to Emission	Difference (from 0.41)	Absloute Difference (from 0.42)	Coverage Ratio: Budget to Emission	Difference (from 0.41)	Absloute Difference (from 0.42)
AL	0.33	-0.09	0.09	0.32	-0.10	0.10	0.37	-0.05	0.05	0.39	-0.03	0.03
FL	1.15	0.73	0.73	1.26	0.84	0.84	0.92	0.50	0.50	1.11	0.69	0.69
GA	0.36	-0.06	0.06	0.25	-0.17	0.17	0.29	-0.13	0.13	0.33	-0.09	0.09
IL	0.48	0.06	0.06	0.42	0.00	0.00	0.49	0.07	0.07	0.40	-0.02	0.02
IN	0.39	-0.03	0.03	0.36	-0.06	0.06	0.44	0.02	0.02	0.44	0.02	0.02
IA	0.36	-0.06	0.06	0.25	-0.17	0.17	0.29	-0.13	0.13	0.33	-0.09	0.09
KY	0.42	0.00	0.00	0.40	-0.02	0.02	0.49	0.07	0.07	0.59	0.17	0.17
LA	0.60	0.18	0.18	1.21	0.79	0.79	0.58	0.16	0.16	0.36	-0.06	0.06
MD	0.23	-0.19	0.19	0.21	-0.21	0.21	0.22	-0.20	0.20	0.27	-0.15	0.15
MI	0.46	0.04	0.04	0.40	-0.02	0.02	0.41	-0.01	0.01	0.35	-0.07	0.07
MN	0.60	0.18	0.18	0.82	0.40	0.40	0.98	0.56	0.56	0.48	0.06	0.06
MS	0.39	-0.03	0.03	0.59	0.17	0.17	0.42	0.00	0.00	0.44	0.02	0.02
MO	0.60	0.18	0.18	0.82	0.40	0.40	0.98	0.56	0.56	0.48	0.06	0.06
NY	1.03	0.61	0.61	1.12	0.70	0.70	0.60	0.18	0.18	0.74	0.32	0.32
NC	0.55	0.13	0.13	0.53	0.11	0.11	0.63	0.21	0.21	0.33	-0.09	0.09
OH	0.24	-0.18	0.18	0.17	-0.25	0.25	0.21	-0.21	0.21	0.25	-0.17	0.17
PA	0.30	-0.12	0.12	0.24	-0.18	0.18	0.28	-0.14	0.14	0.33	-0.09	0.09
SC	0.29	-0.13	0.13	0.37	-0.05	0.05	0.43	0.01	0.01	0.53	0.11	0.11
TN	0.39	-0.03	0.03	0.31	-0.11	0.11	0.38	-0.04	0.04	0.45	0.03	0.03
TX	0.77	0.35	0.35	1.33	0.91	0.91	0.81	0.39	0.39	0.48	0.06	0.06
VA	0.33	-0.09	0.09	0.44	0.02	0.02	0.47	0.05	0.05	0.58	0.16	0.16
WV	0.37	-0.05	0.05	0.27	-0.15	0.15	0.33	-0.09	0.09	0.42	0.00	0.00
WI	0.33	-0.09	0.09	0.44	0.02	0.02	0.47	0.05	0.05	0.58	0.16	0.16
Total		1.35	3.60		2.87	5.86		1.83	3.82		1.01	2.71
Average	0.48	0.06	0.16	0.54	0.12	0.25	0.50	0.08	0.17	0.46	0.04	0.12
Percent Positive		43%			43%			61%			52%	

Source: EPA, 2006

Table D. 2015 State-by-State Coverage Ratios using Projected Emissions from Base Case, CAIR & Alternatives

	CAIR SO2			Heat Input (3b)			Heat Input w/ Fuel Factors (4b)			Heat Input w/ Fuel Factors & Coal Type (5b)		
State	Coverage Ratio: Budget to Emission	Difference (from 0.32)	Absloute Difference (from 0.32)	Coverage Ratio: Budget to Emission	Difference (from 0.32)	Absloute Difference (from 0.32)	Coverage Ratio: Budget to Emission	Difference (from 0.32)	Absloute Difference (from 0.32)	Coverage Ratio: Budget to Emission	Difference (from 0.32)	Absloute Difference (from 0.32)
AL	0.27	-0.05	0.05	0.27	-0.05	0.05	0.30	-0.02	0.02	0.33	0.01	0.01
FL	0.80	0.48	0.48	0.89	0.57	0.57	0.65	0.33	0.33	0.77	0.45	0.45
GA	0.25	-0.07	0.07	0.17	-0.15	0.15	0.20	-0.12	0.12	0.23	-0.09	0.09
IL	0.30	-0.02	0.02	0.26	-0.06	0.06	0.31	-0.01	0.01	0.25	-0.07	0.07
IN	0.34	0.02	0.02	0.31	-0.01	0.01	0.37	0.05	0.05	0.38	0.06	0.06
IA	0.25	-0.07	0.07	0.17	-0.15	0.15	0.20	-0.12	0.12	0.23	-0.09	0.09
KY	0.32	0.00	0.00	0.30	-0.02	0.02	0.37	0.05	0.05	0.44	0.12	0.12
LA	0.42	0.10	0.10	0.85	0.53	0.53	0.41	0.09	0.09	0.26	-0.06	0.06
MD	0.16	-0.16	0.16	0.14	-0.18	0.18	0.15	-0.17	0.17	0.19	-0.13	0.13
MI	0.31	-0.01	0.01	0.27	-0.05	0.05	0.28	-0.04	0.04	0.24	-0.08	0.08
MN	0.43	0.11	0.11	0.58	0.26	0.26	0.70	0.38	0.38	0.34	0.02	0.02
MS	0.28	-0.04	0.04	0.42	0.10	0.10	0.30	-0.02	0.02	0.31	-0.01	0.01
MO	0.43	0.11	0.11	0.58	0.26	0.26	0.70	0.38	0.38	0.34	0.02	0.02
NY	0.72	0.40	0.40	0.77	0.45	0.45	0.41	0.09	0.09	0.51	0.19	0.19
NC	0.38	0.06	0.06	0.36	0.04	0.04	0.43	0.11	0.11	0.23	-0.09	0.09
OH	0.22	-0.10	0.10	0.15	-0.17	0.17	0.19	-0.13	0.13	0.23	-0.09	0.09
PA	0.23	-0.09	0.09	0.18	-0.14	0.14	0.21	-0.11	0.11	0.25	-0.07	0.07
SC	0.24	-0.08	0.08	0.29	-0.03	0.03	0.35	0.03	0.03	0.43	0.11	0.11
TN	0.30	-0.02	0.02	0.24	-0.08	0.08	0.30	-0.02	0.02	0.35	0.03	0.03
TX	0.54	0.22	0.22	0.93	0.61	0.61	0.57	0.25	0.25	0.33	0.01	0.01
VA	0.25	-0.07	0.07	0.32	0.00	0.00	0.35	0.03	0.03	0.43	0.11	0.11
WV	0.31	-0.01	0.01	0.22	-0.10	0.10	0.28	-0.04	0.04	0.34	0.02	0.02
WI	0.25	-0.07	0.07	0.32	0.00	0.00	0.35	0.03	0.03	0.43	0.11	0.11
Total		0.63	2.35		1.67	4.00		1.00	2.62		0.48	2.08
Average	0.35	0.05	0.20	0.39	0.14	0.33	0.36	0.08	0.22	0.34	0.04	0.17
Percent Positive		39%			43%			52%			57%	

Source: EPA, 2006

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April 12, 2006

To: Chitra Kumar

From: William Warren-Hicks, Ph.D.

Subject: Evaluation of Alternative SO2 Allocation Approaches under CAIR

Introduction

This memorandum presents an analysis of alternative approaches for generating SO2 allocations and State budgets under EPA's Clean Air Interstate Rule (CAIR). The analysis was conducted, in part, in response to petitions for reconsideration of the SO2 allocation approach based on Title IV which EPA relied upon for CAIR. The objective of the analyses presented in this report are to statistically evaluate the relationship among allocations and State budgets generated by EPA's approach and alternative approaches. All data evaluated in this report were generated by EPA.

A complete description of EPA's procedures for projecting allocations and emissions in the years 2010 and 2015 is found in the CAIR SO2 Allocation Approach Analysis Technical Support Document (TSD, EPA Docket number OAR-2003-0053) and a memorandum from Perrin Quarles Associates dated March 2006 which can be found in the Docket number OAR-2003-0053. In the Notice of Final Action on Reconsideration SO2 TSD, EPA evaluated the ratio of SO2 allowances to total projected emissions before CAIR controls (called the base case) and with CAIR controls installed (called the control case). We provide further evaluation of each of these cases in this report. In addition to the EPA approach, the following three alternative approaches (which were also evaluated by EPA) are addressed in this report:

1. allowances based on heat input data (termed heat input approach),

2. allowances based on heat input data adjusted for fuel factor (e.g., coal, oil, and gas; termed the heat input & fuel factor approach), and

3. allowances based on heat input data adjusted both for fuel type and coal type (e.g., bituminous, sub-bituminous, and lignite; termed the heat input & fuel factor, coal type approach).

Allocations and emissions in the years 2010 and 2015 were aggregated at the company owner-level and company parent-level. A complete explanation of these organizational units and approaches for aggregating emissions is available in the TSD.

In addition to the parent-level and owner-level allowance allocations, EPA generated allowance budgets for States (see memorandum from Perrin Quarles Associates, March 2006). In this report, we evaluate the ratio (termed State coverage ratios) of the 2010 and 2015 CAIR State SO2 allowance budgets to projected State-level emissions for each of the four alternative approaches. EPA also generated region-wide SO2 budgets. The relationship of a State allowance budget to the region-wide allowance budget was computed for each of the four alternative approaches, as well as four additional approaches (see Notice of Final Action on Reconsideration in the docket). We examine the above State and region-wide data in the analyses presented in this report.

Statistical Approach

The objective of the analyses presented in this report is to compare allocations and budgets generated based on EPA's approach and alternative approaches proposed by commenters on the CAIR. We evaluate the relationship among the candidate approaches based on an analysis of distribution and an analysis of centrality. In the context of the CAIR, an approach is biased if it results in allocations or budgets that are consistently higher or lower than other possible approaches. Bias is generally assessed against a measure of centrality, like the sample mean. In this report, the concept of bias is addressed in the calculation of a percent difference. Generally, four allocations (or budgets) are available for each source (e.g., parent, owner, or State) in a data set (e.g., four allocation values, each from a different approach, associated with a specific parent company for the year 2015). The mean of these four approaches represents a measure of central tendency among the alternative approaches. Calculation of the approach-specific percent difference provides a measure of relative bias with respect to the other approaches. The average of all the percent differences (i.e., across all sources in the spreadsheet) provides an objective approach for judging the overall relationship among the four approaches. The perfect approach would have an average percent difference of zero, indicating that allocations generated by the approach were on average near the center of all allocations associated with the source population. An approach that consistently results in a positive percent difference could be considered to be biased high relative to the other approaches. An approach that consistently results in a negative percent difference could be considered to be biased low. The magnitude of the percent differences for any single source is not of particular interest, but the average of the percent differences across all sources effectively increases the sample size available for judging bias and provides an overall measure of the degree of bias associated with a single approach. The use of zero values in the calculations results in non-interpretable results, therefore, sources with zero allocations are not used to generate this statistic. By examining the average percent differences calculated across all sources in the spreadsheet, the effective sample size is increased and the results are interpretable.

The other approach used in this study to evaluate allocation approaches extends the analysis beyond measures of centrality and examines the distribution of allocations across all sources. From a regulatory perspective, EPA is charged with reducing SO2 emissions that significantly contribute to non-attainment through the CAIR. Therefore, rather than examining individual sources subject to CAIR, a statistical method that evaluates the entire population of sources subject to the rule is preferable. Examination of distributions provides an approach for assessing allocations across the entire population affected by the program. For any given company or State, EPA's approach may produce a different result than an alternative approach. However, from a regulatory perspective, the objective is to examine the entire population of sources subject to CAIR, and evaluate the relationship among the competing approaches. Two fundamental approaches are used for these evaluations. First, a cumulative distribution of allocations or State budgets provides a visual examination of the relative consistency among the results generated by the four competing approaches. Overlapping distributions indicate a general consistency among the approaches. Second, examination of the number of positive and negative percent differences provides a semi-qualitative approach for examining the relative bias associated with an approach. The perfect approach would be associated with 50% positive readings and 50% negative readings, indicating that the approach is not biased high, nor biased low.

Results: Parent- and Owner/Operator-level Analyses

Figures 1 - 4 display cumulative distributions of the ratio of allocations to emissions at the parent-level and owner/operator-levels of aggregation in the years 2010 and 2015. Data in the four figures represent the CAIR control case. Examination of the figures provides the following findings:

- At the owner-level, the distributions of EPA and the heat input & fuel factor approaches seem to be grouped separately from the other two approaches. The owner-level of aggregation displays a large variability among the four approaches, with each approach somewhat distinct from the others. The EPA approach results in approximately 28% of the owner/operators having zero allocations. Examination of the data indicates that the zero allocations are associated with gas-fired units (see additional comments in the conclusions section of this report). Regeneration of the distributions after eliminating those owner/operators in which any of the four approaches resulted in a zero allocation (Figures 5 and 6) indicates that the resulting distributions are very similar.

- At the parent-level, the ratio of distributions are similar among the four approaches. The EPA approach is in general agreement with the other approaches at the smaller ratios (ratio < 0.7). As the cumulative percentage approaches a ratio of 1.0, EPA's approach is shown to have a larger number of owner/operators in this range than the other approaches. The number of owner/operators with zero allocations is similar among the four approaches.

Base case distributions of the ratios are displayed in Figures 7 - 10. Examination of the figures provides the following findings:

- The patterns for the base case are similar to those for the CAIR control case. The four distributions at the owner-level are generally distinct. Again, EPA has a larger number of owner/operators with zero allocations. Figures 11 and 12 display the distributions after those owners/operators with a zero allocation for any approach are eliminated from the data. As in the CAIR control case, the elimination of sources in which any of the four approaches resulted in a zero allocation dramatically changes the distribution shape and indicates that the four approaches have similar distributions.

- At the parent-level, the distributions among the four approaches are very close in the range of 0 <= ratio <= 0.7. As the distribution approaches 1.0, EPA's approach incorporates a larger number of parents than the other approaches. This effect extends to a ratio of about 1.2. One way of visualizing this effect is to notice that the EPA curve is steeper in this range. Also, in this range, the EPA approach separates from the other approaches, indicating a larger percentage of parents associated with any given ratio in the range.

Tables 1 - 4 present the calculations of percent difference in allocations for owner/operators and parents in the years 2010 - 2015. Results using the base case and CAIR control case are similar, therefore only the CAIR control case is presented. For each owner or parent, the allocation associated with each of the four approaches is shown. In addition, the percent difference from the mean allocation for each of the four approaches is displayed. At the bottom of the table, the average percent difference and the number of positive percent differences is indicated for each of the four approaches. Examination of the tables results in the following findings:

- Table 1 indicates that the average percent difference for the EPA approach (8.8%) is slightly larger than the other approaches at the owner-level in 2010. However, in 2015 (Table 2) the EPA approach has an average percent difference near zero (1.07%). In both 2010 (Table 1) and 2015 (Table 2), the percent of positive values associated with the EPA approach is near 50% (44.8% and 45.1%, respectively). The heat input and heat input & fuel factor are shown to have average percent differences near zero in 2010 and 2015 (2.32% and -2.58%, respectively), however, the number of positive values in these years are distant from the ideal 50% value (17.8% and 75.9%, respectively). The statistics for the four approaches in 2015 (Table 2) at the owner-level indicate that all of the approaches are very similar.

- Table 3 and 4 indicate relatively good agreement among all four approaches at the parent-level of aggregation. The average percent difference associated with the EPA allocation approach is larger than the other approaches in both 2010 and 2015 (11.1% and 12.5%, respectively). However, the percent of positive values is

near the ideal 50% value in both years (51.8% and 52.8%). The heat input & fuel factor, coal type on average has allocations that are less than the other approaches in both 2010 and 2015 (-13.3% and -12.8%, respectively). The heat input and heat input & fuel factor approaches have average percent differences near zero in both 2010 and 2015.

Results: State Budget Analyses

Figures 13 and 14 present cumulative distributions of State coverage ratios for 2010 and 2015, respectively. Examination of the figures indicates that the EPA distribution overlaps and is similar to the distributions associated with the other approaches. Effectively, the distributions associated with the four approaches are indistinguishable.

Figure 15 presents cumulative distributions for EPA and seven alternative approaches based on the percent of region-wide budgets associated with twenty-five CAIR States. Data used to generate Figure 15 are shown in Table 5. Again, the distributions are similar.

Conclusions

The objective of this analysis was to compare allocations and State budgets generated using EPA approaches to alternative approaches. An evaluation of the ratio of allowance allocations to emissions at the parent- and owner-level of aggregation generally showed that the approaches perform similarly. At the owner-level, the EPA approach results in a distribution of ratios that is similar to the heat input with fuel factors distribution, but is dissimilar to the distributions associated with the other approaches. Examination of the data indicated that the distributions were sensitive to the number of sources with zero allocations (and therefore a ratio of zero allowances to emissions). Companies may have zero allocations because the units they operate commenced operations after 1990. This is true for both 2010 and 2015, and with base case and control case emissions. The vast majority of these companies are primarily gas-fired facilities, which have little or no emissions. For example, about 94% of the 64 companies with a ratio of zero allowances to emissions were gas-fired for the 2010 CAIR control case. This is true for at least 90% of companies for other years and cases, as well. Since these units have negligible SO2 emissions, receiving no allowances will not significantly impact the operating companies (see docket EPA-HQ-OAR-2003-0053, ‘SO2 State Budget Analysis’, for related data). When the distributions are re-evaluated after eliminating owners/operators where any of the approaches resulted in a zero allocation, the EPA approach appears to be very similar to the other approaches.

An analysis of the parent-level distributions indicates that the four approaches are very similar across all sources.

Examination of percent differences based on allocations, including the percent of positive values, indicates that the four approaches perform similarly.

The EPA approach is shown to have a higher percentage of owner/operators and parents with ratios in the range between 0.7 and 1.0.

Examination of both State coverage ratios and the distribution of percent of region-wide budgets indicates that the four approaches have very similar distributions.

For any single parent, owner, or State, the four approaches can provide very different allocations. However, when the populations of interest are evaluated, the approaches have similar characteristics.

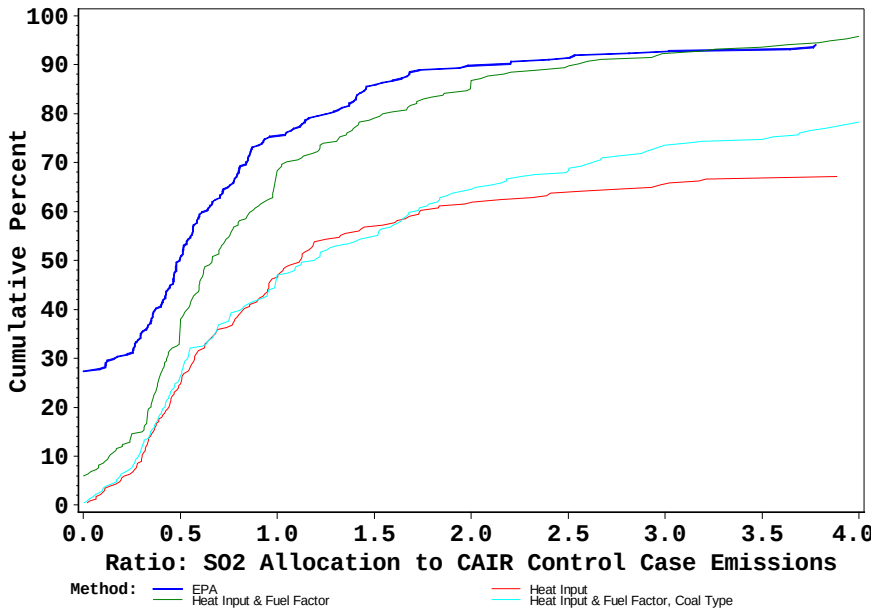

Figure 1. Ratio of SO2 Allowances to CAIR Control Case Emissions in 2010 for 234 Company Owner/Operators under EPA's CAIR Approach and Alternatives*

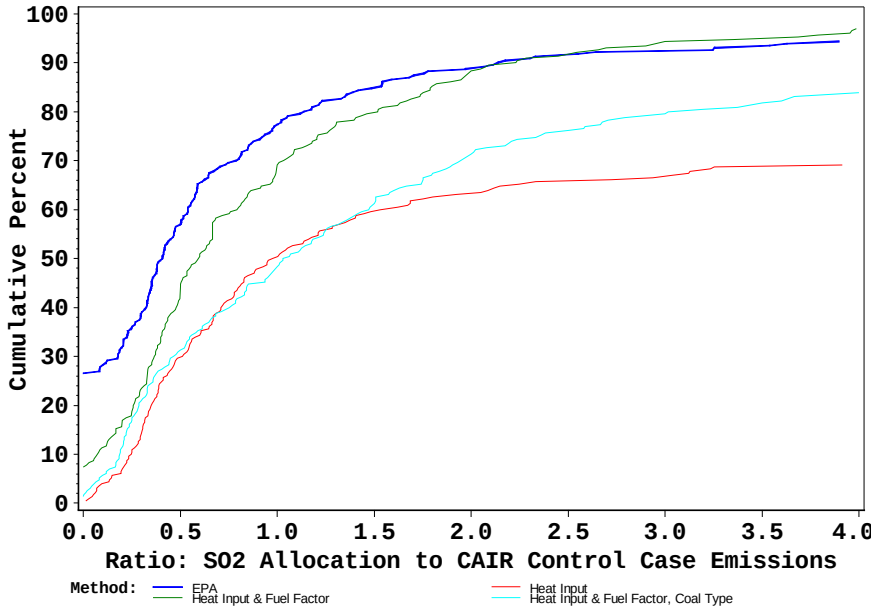

Figure 2. Ratio of SO2 Allowances to CAIR Control Case Emissions in 2015 for 230 Company Owner/Operators under EPA's CAIR Approach and Alternatives*

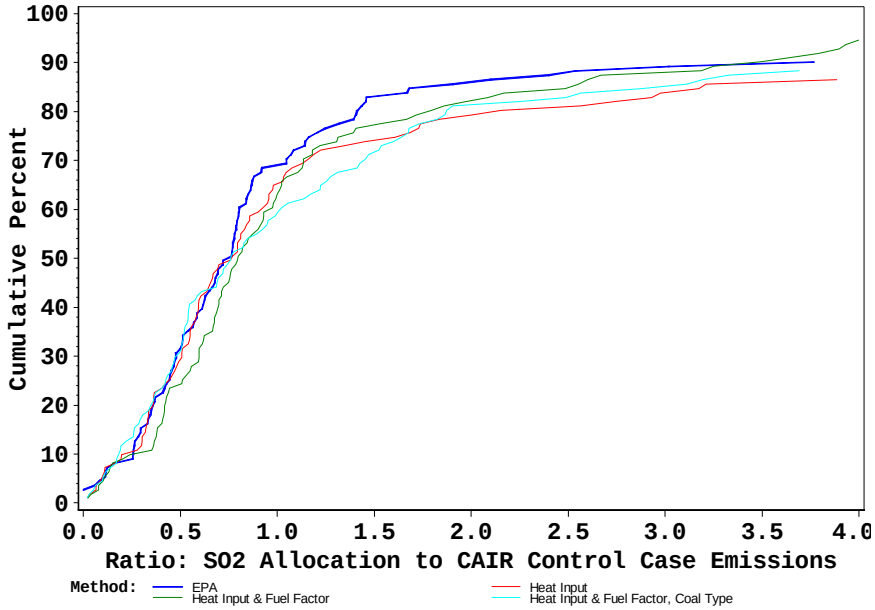

Figure 3. Ratio of SO2 Allowances to CAIR Control Case Emissions in 2010 for 111 Parent Companies under EPA's CAIR Approach and Alternatives*

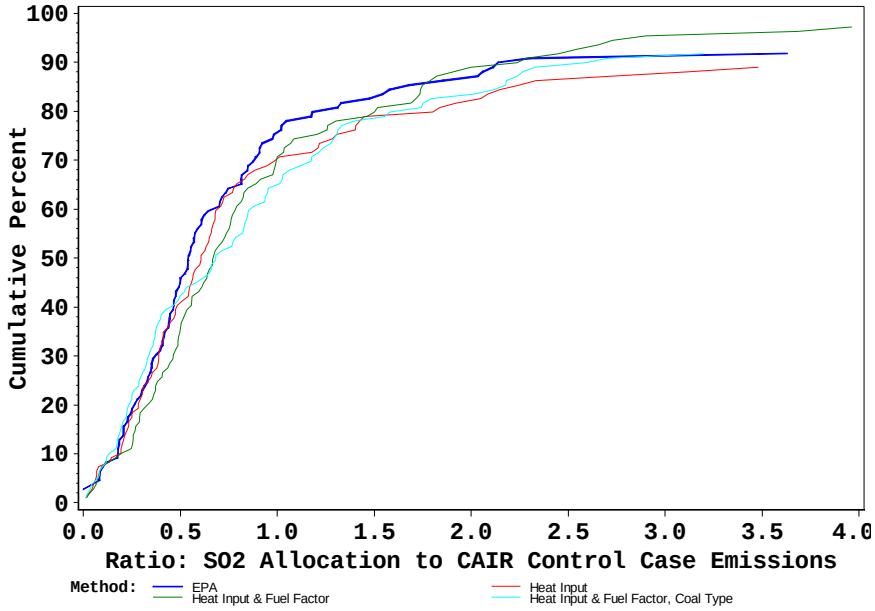

Figure 4. Ratio of SO2 Allowances to CAIR Control Case Emissions in 2015 for 109 Parent Companies under EPA's CAIR Approach and Alternatives*

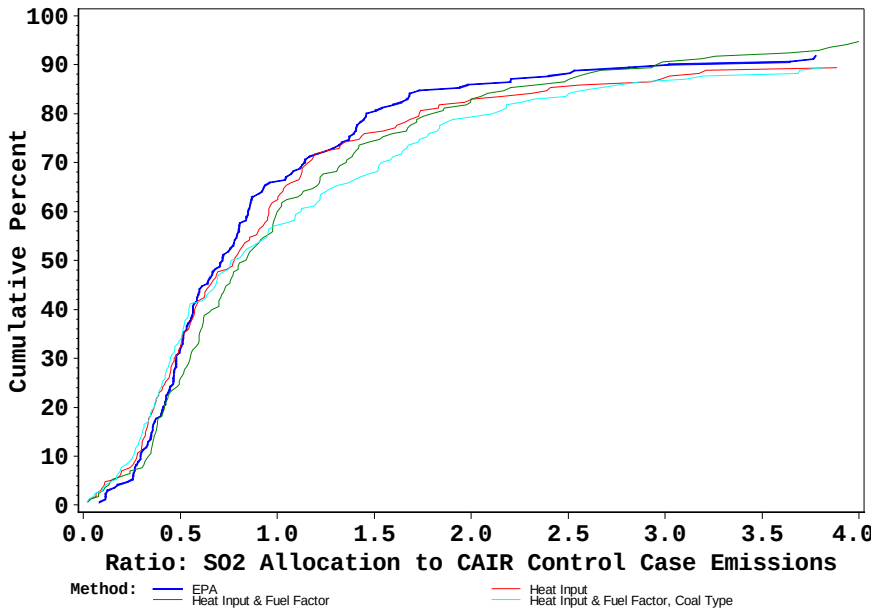

Figure 5. Ratio of SO2 Allowances to CAIR Control Case Emissions in 2010. Company Owner/Operators with Zero Allocations Removed From Data*

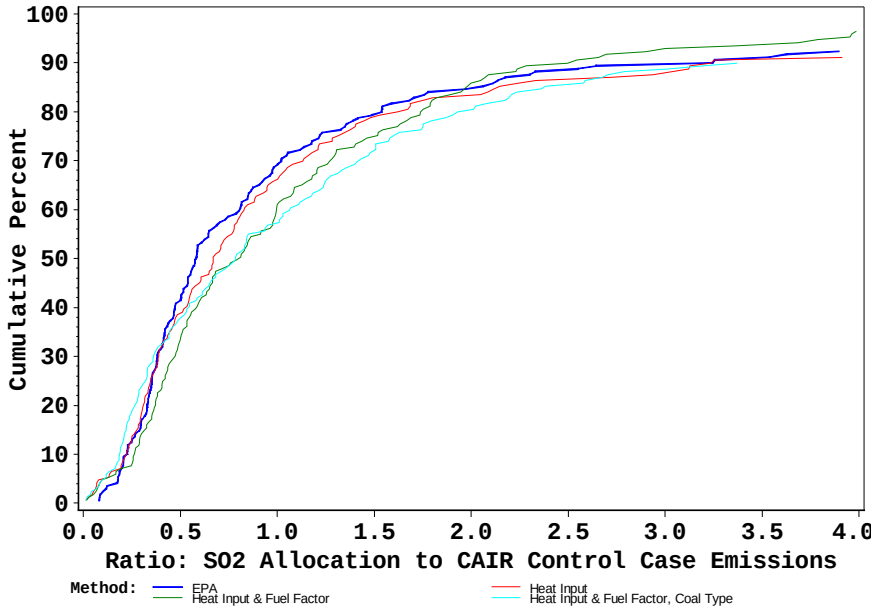

Figure 6. Ratio of SO2 Allowances to CAIR Control Case Emissions in 2015. Company Owner/Operators with Zero Allocations Removed From Data*

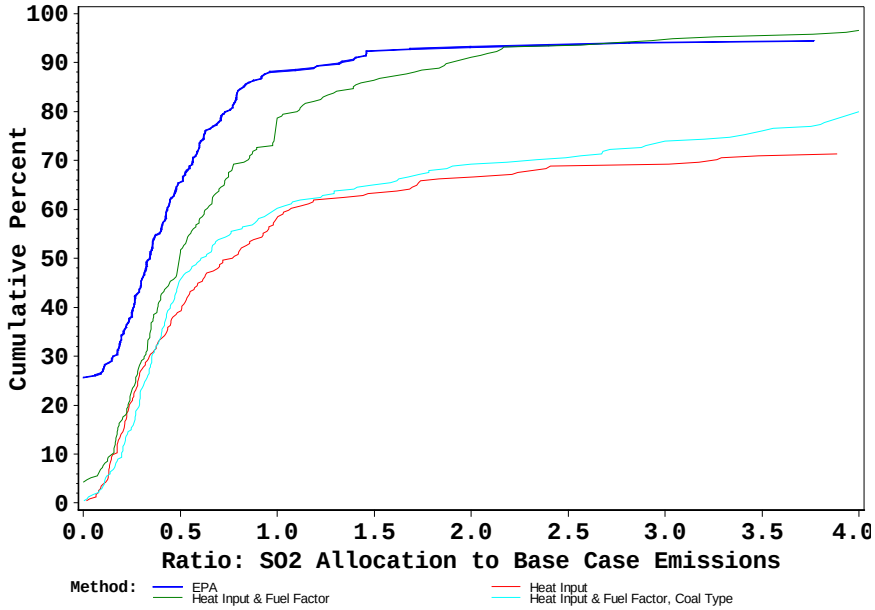

Figure 7. Ratio of SO2 Allowances to CAIR Base Case Emissions in 2010 for 234 Company Owner/Operators under EPA's CAIR Approach and Alternatives*

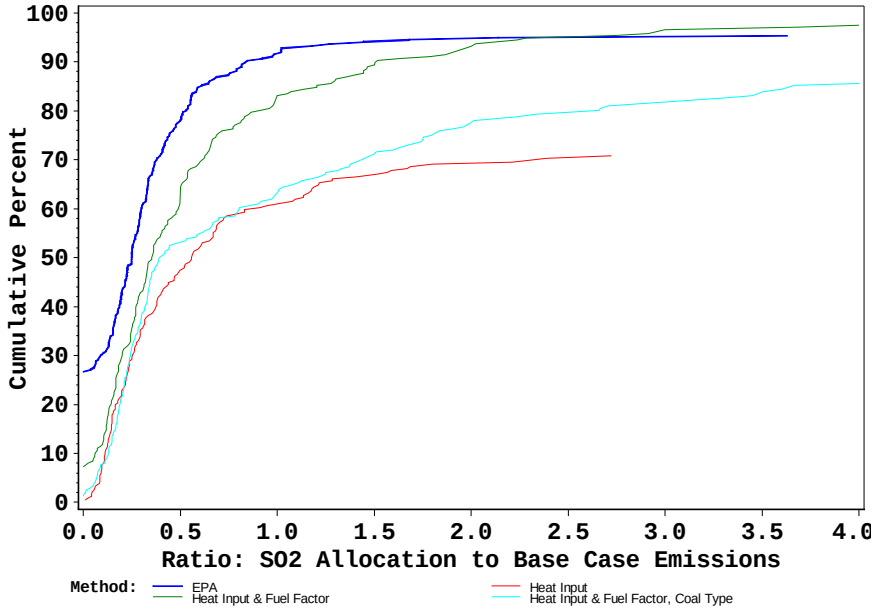

Figure 8. Ratio of SO2 Allowances to CAIR Base Case Emissions in 2015 for 236 Company Owner/Operators under EPA's CAIR Approach and Alternatives*

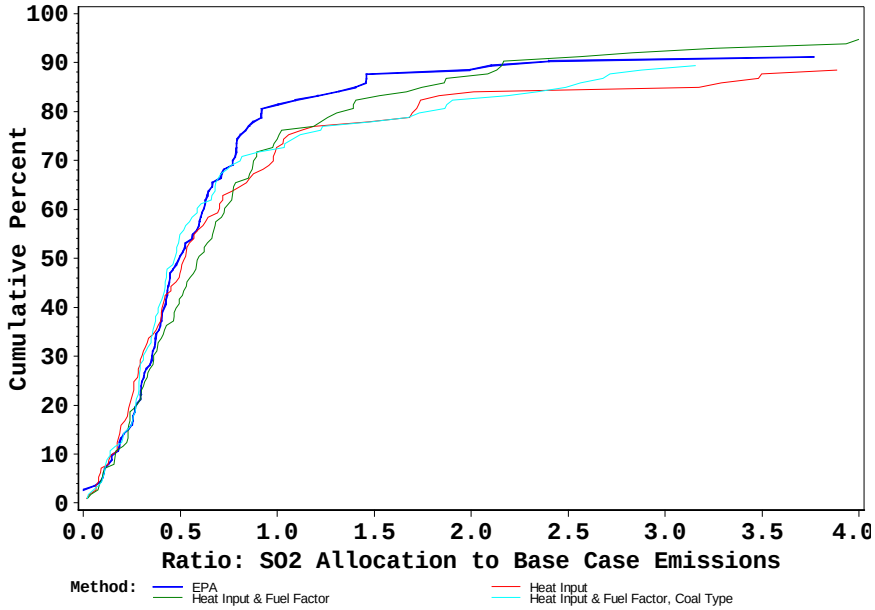

Figure 9. Ratio of SO2 Allowances to CAIR Base Case Emissions in 2010 for 113 Parent Companies under EPA's CAIR Approach and Alternatives*

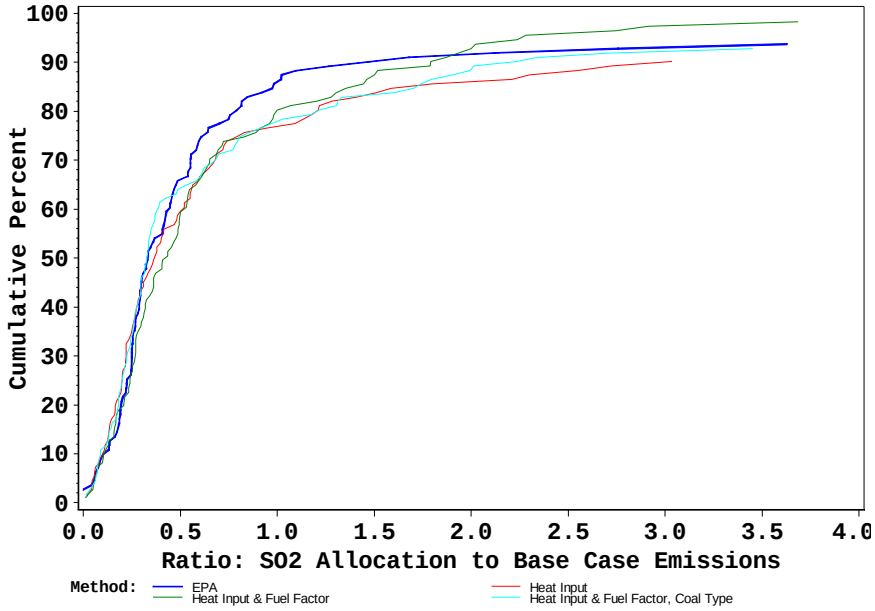

Figure 10. Ratio of SO2 Allowances to CAIR Base Case Emissions in 2015 for 111 Parent Companies under EPA's CAIR Approach and Alternatives*

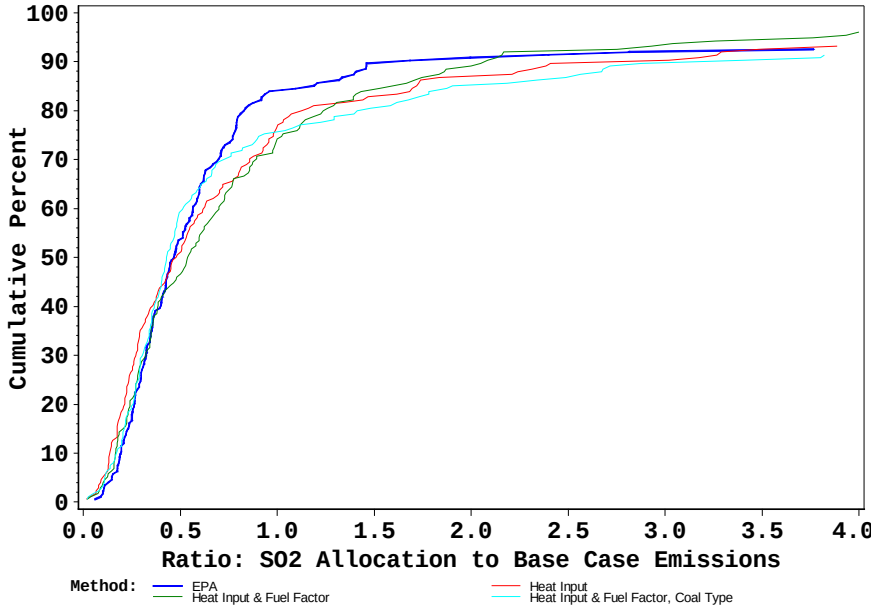

Figure 11. Ratio of SO2 Allowances to Base Case Emissions in 2010. Company Owner/Operators with Zero Allocations Removed From Data*

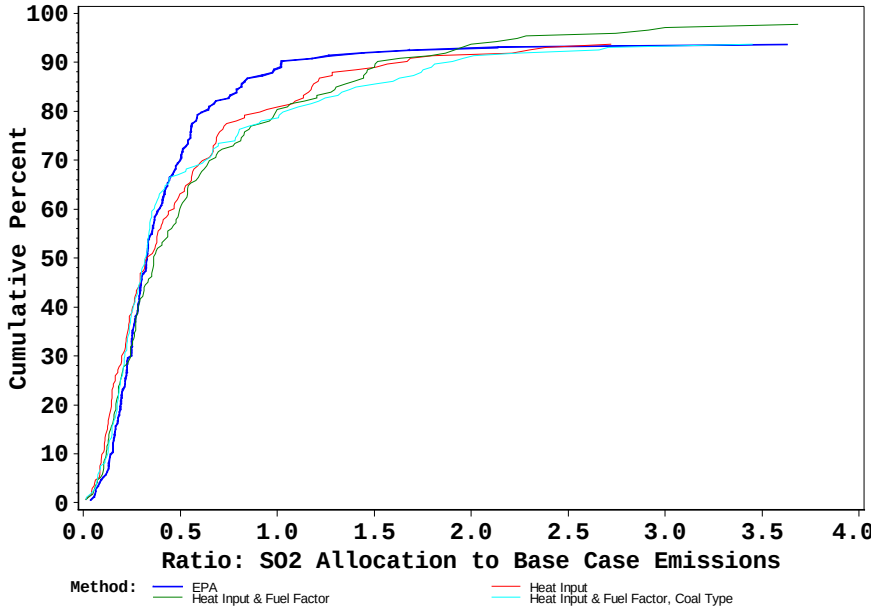

Figure 12. Ratio of SO2 Allowances to Base Case Emissions in 2015. Company Owner/Operators with Zero Allocations Removed From Data*

* Note: Ratios greater than 4.0 are not shown on the graphic. Therefore, the cumulative distributions may not reach 100% within the range of the displayed graphic. Greater than 85% of the companies with ratios greater than 4.0 are projected to emit less than 100 tons of SO2 under the both the CAIR Control Case and the Base Case.

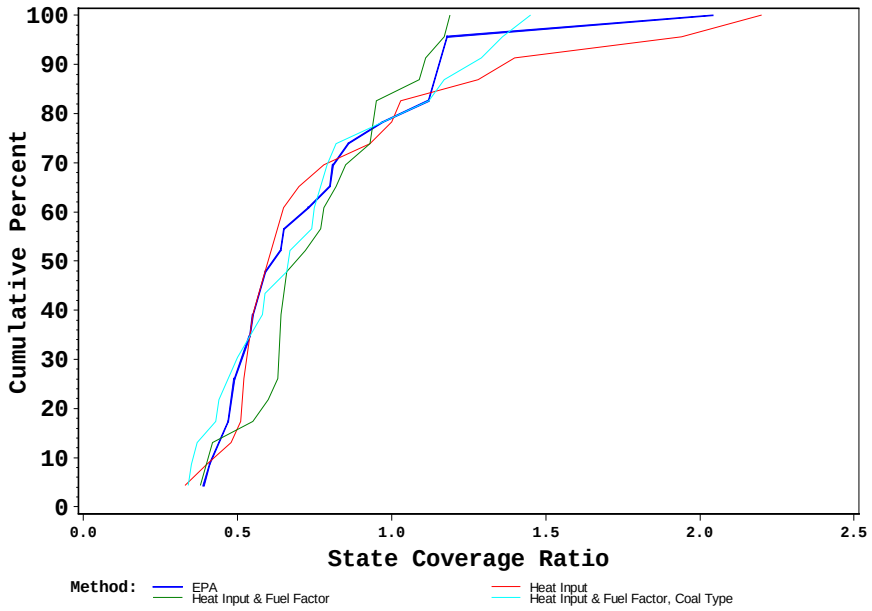

Figure 13. State Coverage Ratios in 2010 for 23 CAIR States under EPA's CAIR Approach and Alternatives

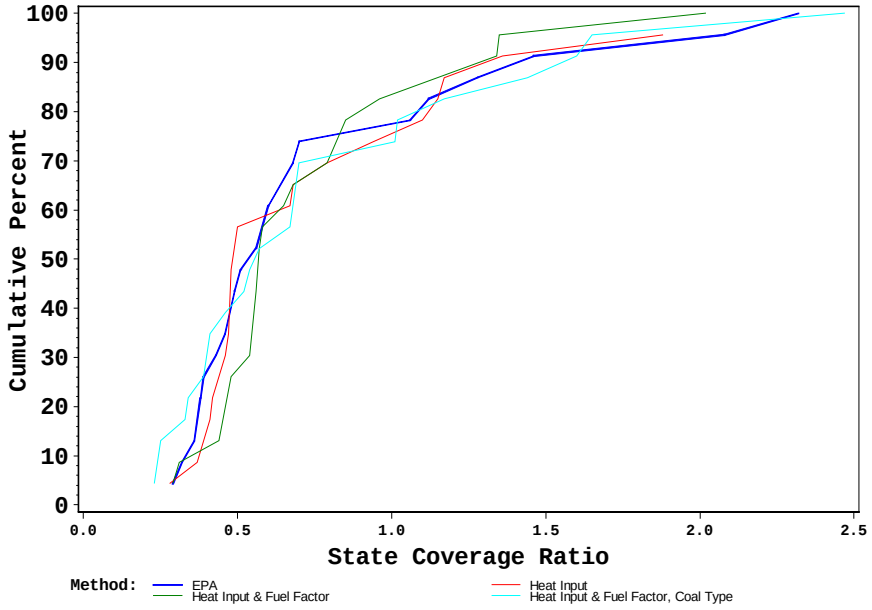

Figure 14. State Coverage Ratios in 2015 for 23 CAIR States under EPA's CAIR Approach and Alternatives

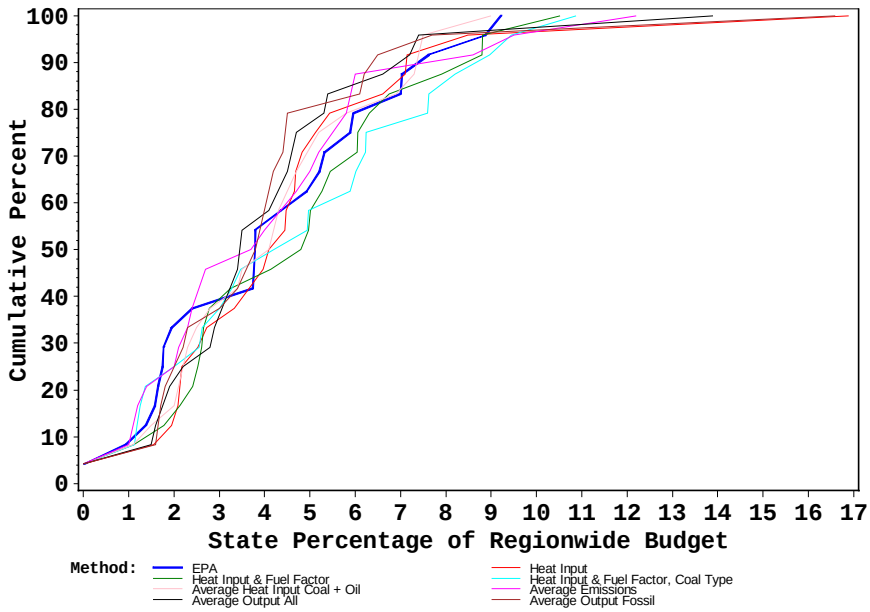

Figure 15. Percent of Region-wide Budget for 24 CAIR States under EPA's CAIR Approach and Alternatives

Table 1. 2010 Owner-Level Company Allocations								
Allocations to 2010 Company Owner/Operators					Difference from Mean			
Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
AEP Texas Central Company	7,525	16,142	9,683	13,275	-35.44%	38.48%	-16.93%	13.89%
AEP Texas North Company	362	4,386	498	1,885	-79.69%	146.04%	-72.06%	5.72%
AES Beaver Valley	1,219	2,446	3,115	4,156	-55.41%	-10.53%	13.94%	52.01%
AES Cayuga LLC	5,080	4,173	5,286	5,052	3.72%	-14.80%	7.93%	3.15%
AES Greenidge	2,577	2,027	2,568	2,382	7.90%	-15.13%	7.52%	-0.28%
AES Somerset LLC	6,956	8,426	10,675	12,405	-27.66%	-12.37%	11.02%	29.01%
AES Westover LLC	2,434	1,728	2,189	1,872	18.40%	-15.94%	6.48%	-8.94%
AES WR Ltd Partnership	899	2,008	2,478	3,374	-58.94%	-8.30%	13.16%	54.08%
Alabama Electric Coop Inc	7,534	8,634	9,674	10,754	-17.65%	-5.63%	5.74%	17.54%
Alabama Power Co	111,840	109,468	129,297	134,325	-7.75%	-9.70%	6.65%	10.80%
Alcoa Generating Corp	5,264	10,476	12,970	17,276	-54.21%	-8.88%	12.82%	50.27%
Allegheny Energy Supply Co LLC	100,447	76,148	94,092	83,874	13.32%	-14.09%	6.15%	-5.38%
Ameren Energy Generating Co	46,968	37,622	45,413	41,779	9.37%	-12.40%	5.75%	-2.72%
American Bituminous Power LP	717	1,448	1,783	2,382	-54.67%	-8.50%	12.67%	50.50%
Ames City of	1,120	981	1,207	1,190	-0.39%	-12.75%	7.34%	5.80%
Appalachian Power Co	88,571	66,508	81,578	71,893	14.82%	-13.78%	5.76%	-6.80%
Aquila, Inc.	4,730	7,200	8,437	10,496	-38.70%	-6.68%	9.35%	36.03%
Associated Electric Coop Inc	28,196	30,442	36,295	39,743	-16.26%	-9.58%	7.80%	18.04%
Austin City of (MN)	528	313	388	270	40.93%	-16.46%	3.56%	-28.02%
Austin Energy	258	5,244	7	1,585	-85.45%	195.67%	-99.61%	-10.61%
Birchwood Power Partners LP	776	2,393	2,874	4,112	-69.44%	-5.74%	13.20%	61.98%
Black River Power LLC	198	845	1,070	1,576	-78.56%	-8.38%	16.01%	70.93%
Brazos Electric Power Coop Inc	1,024	2,825	4	264	-0.52%	174.45%	-99.61%	-74.32%
Cambria CoGen Co	748	1,501	1,911	2,550	-55.42%	-10.52%	13.93%	52.01%
Cardinal Operating Co	24,410	16,151	19,986	15,758	27.96%	-15.33%	4.77%	-17.39%
Carolina Power & Light Co	65,479	57,348	67,278	65,167	2.60%	-10.14%	5.42%	2.11%
Cedar Falls City of	278	122	149	54	84.41%	-19.07%	-1.16%	-64.18%
CenterPoint Energy Houston Electric, LLC	53,249	86,097	67,645	83,393	-26.65%	18.60%	-6.82%	14.87%
Central Electric Power Coop	2,733	702	873	-424	181.46%	-27.70%	-10.09%	-143.67%
Central Iowa Power Coop	2,792	515	582	-914	275.35%	-30.76%	-21.76%	-222.83%
Central Power & Lime Inc	877	1,657	2,144	2,826	-53.24%	-11.68%	14.28%	50.64%
Cincinnati Gas & Electric Co	47,307	51,692	62,995	69,686	-18.32%	-10.75%	8.76%	20.31%
CLECO Power LLC	21,143	22,494	18,222	17,699	6.30%	13.10%	-8.38%	-11.01%
Cleveland Electric Illuminating Co	27,454	14,137	17,494	9,735	59.57%	-17.83%	1.68%	-43.42%
Cogentrix of Richmond Inc	983	3,241	3,894	5,617	-71.39%	-5.61%	13.40%	63.59%
Cogentrix of Rocky Mount Inc	558	1,800	2,242	3,218	-71.47%	-7.90%	14.72%	64.64%
Colmac Clarion Inc	264	537	684	915	-56.04%	-10.50%	14.00%	52.54%
Columbia City of	2,334	173	209	-1,220	523.93%	-53.75%	-44.13%	-426.04%
Columbus Southern Power Co	23,556	18,225	22,554	20,443	11.14%	-14.01%	6.41%	-3.55%
Constellation Power Source Gen	25,002	27,397	31,581	34,572	-15.64%	-7.56%	6.56%	16.65%

Table 1. 2010 Owner-Level Company Allocations								
Allocations to 2010 Company Owner/Operators					Difference from Mean			
Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
Consumers Energy Co	47,623	39,280	45,748	42,342	8.86%	-10.21%	4.57%	-3.21%
Corn Belt Power Coop	190	97	120	66	60.79%	-17.91%	1.55%	-44.43%
Dairyland Power Coop	9,179	9,167	11,339	12,055	-12.04%	-12.15%	8.66%	15.52%
Dayton Power & Light Co	48,054	35,034	43,085	37,089	17.73%	-14.16%	5.56%	-9.13%
Detroit Edison Co	105,695	79,349	94,568	82,077	16.89%	-12.25%	4.58%	-9.23%
Dominion Energy Services Co	14,313	10,796	13,534	12,102	12.82%	-14.90%	6.68%	-4.61%
Dominion Virginia Power	71,177	78,603	85,994	93,408	-13.51%	-4.49%	4.49%	13.50%
Duke Energy Corp	71,382	73,583	90,974	98,238	-14.56%	-11.92%	8.89%	17.59%
Dynegy Midwest Generation Inc	45,326	33,507	41,440	36,205	15.87%	-14.35%	5.93%	-7.45%
Dynegy Northeast Gen Inc	19,270	11,068	7,773	1,207	96.04%	12.60%	-20.92%	-87.72%
E S Joslin LP	105	1,017	1	270	-69.86%	191.96%	-99.71%	-22.39%
East Kentucky Power Coop Inc	19,695	17,220	20,776	20,311	1.00%	-11.69%	6.54%	4.16%
Ebensburg Power Co	562	968	1,233	1,592	-48.36%	-11.09%	13.25%	46.20%
Edison Mission	30,454	20,999	26,739	22,349	21.16%	-16.46%	6.38%	-11.09%
Electric Energy Inc	14,520	15,673	19,648	21,742	-18.86%	-12.42%	9.79%	21.49%
Empire District Electric Company	4,897	4,405	2,858	2,014	38.19%	24.31%	-19.35%	-43.16%
Entergy Gulf States Inc	11,186	45,840	9,163	20,040	-48.11%	112.64%	-57.49%	-7.04%
Exelon Generation Co LLC	8,243	19,308	10,319	14,699	-37.28%	46.91%	-21.48%	11.85%
Florida Power & Light Co	59,086	85,708	21,426	17,747	28.47%	86.36%	-53.41%	-61.41%
Florida Power Corp	58,664	48,503	38,998	29,056	33.92%	10.72%	-10.97%	-33.67%
Gainesville Regional Utilities	4,234	3,581	3,220	2,664	23.63%	4.56%	-5.98%	-22.21%
Garland City of	108	2,476	4	759	-87.09%	195.94%	-99.52%	-9.32%
Georgia Power Co	201,120	133,210	164,824	130,089	27.85%	-15.32%	4.78%	-17.30%
Gilberton Power Co	835	1,429	1,820	2,346	-48.04%	-11.11%	13.21%	45.93%
Grand Haven City of	744	641	795	778	0.62%	-13.31%	7.52%	5.17%
Gulf Power Co	22,014	17,581	19,155	16,724	16.67%	-6.82%	1.52%	-11.36%
Hamilton City of	581	518	641	640	-2.35%	-12.94%	7.73%	7.56%
Henderson City Utility Comm	406	66	82	-139	291.64%	-36.33%	-20.90%	-234.41%
Holland City of	824	482	444	203	68.74%	-1.30%	-9.08%	-58.36%
Hoosier Energy R E C Inc	18,533	17,557	21,596	22,292	-7.31%	-12.19%	8.01%	11.49%
Independence City of	2,339	294	365	-975	362.41%	-41.88%	-27.84%	-292.69%
Indiana Michigan Power Co	45,648	41,151	50,948	51,216	-3.37%	-12.89%	7.85%	8.41%
Indiana-Kentucky Electric Corp	25,288	14,609	18,087	12,127	44.27%	-16.65%	3.19%	-30.81%
Indianapolis Power & Light Co	35,996	33,089	40,621	41,194	-4.58%	-12.29%	7.68%	9.19%
Indiantown Cogeneration LP	1,193	3,659	4,734	6,736	-70.76%	-10.33%	16.01%	65.08%
Interstate Power and Light Co	22,966	24,559	29,925	32,776	-16.66%	-10.88%	8.60%	18.94%
James River Cogeneration Co	753	1,321	1,586	2,053	-47.27%	-7.51%	11.04%	43.74%
Jamestown City of	1,522	531	598	-40	133.20%	-18.64%	-8.38%	-106.18%
JEA	21,444	27,980	28,386	32,879	-22.51%	1.11%	2.58%	18.81%
Kansas City Power & Light Co	34,564	20,670	24,464	16,466	43.77%	-14.02%	1.76%	-31.51%
Kentucky Power Co	12,512	12,045	14,924	15,572	-9.09%	-12.48%	8.43%	13.14%

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Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
Kentucky Utilities Co	38,767	34,627	42,200	41,964	-1.58%	-12.09%	7.13%	6.54%
KeySpan Generation LLC	26,514	22,819	6,627	-1,234	93.79%	66.79%	-51.56%	-109.02%
Lakeland City of	6,431	7,634	6,740	7,244	-8.29%	8.87%	-3.88%	3.30%
Lansing City of	8,710	5,237	6,493	4,596	39.16%	-16.33%	3.74%	-26.57%
LG&E Power Services	894	2,830	3,526	5,049	-70.93%	-7.96%	14.68%	64.21%
Lon C Hill, LP	172	2,715	4	796	-81.34%	194.58%	-99.57%	-13.67%
Louisiana Generating LLC	21,321	23,536	30,127	33,801	-21.60%	-13.46%	10.78%	24.28%
Louisville Gas & Electric Co	31,190	30,880	37,710	39,780	-10.60%	-11.49%	8.08%	14.02%
Lower Colorado River Authority	21,360	27,414	26,613	30,382	-19.22%	3.67%	0.65%	14.90%
Madison Gas & Electric Co	546	1,296	1,315	1,821	-56.13%	4.13%	5.66%	46.34%
Manitowoc Public Utilities	862	628	778	672	17.28%	-14.56%	5.85%	-8.57%
Marquette City of	251	659	817	1,142	-65.00%	-8.11%	13.92%	59.19%
Michigan South Central Pwr Agy	907	765	948	914	2.65%	-13.42%	7.29%	3.48%
MidAmerican Energy Co	32,911	40,437	49,452	57,474	-26.98%	-10.28%	9.73%	27.53%
Midwest Generations EME LLC	57,288	58,103	66,137	69,358	-8.66%	-7.36%	5.45%	10.58%
Minnesota Power Inc	11,580	16,846	20,234	24,874	-37.01%	-8.36%	10.07%	35.31%
Mirant Chalk Point LLC	15,249	12,659	10,760	8,400	29.59%	7.58%	-8.56%	-28.61%
Mirant Mid-Atlantic LLC	26,285	17,912	21,716	17,402	26.20%	-14.00%	4.26%	-16.45%
Mirant New York Inc	9,148	8,191	6,190	4,885	28.78%	15.31%	-12.86%	-31.23%
Mirant Potomac River LLC	6,024	5,085	6,109	5,824	4.57%	-11.73%	6.05%	1.11%
Mississippi Power Co	23,995	25,286	23,361	23,580	-0.25%	5.12%	-2.89%	-1.98%
Monongahela Power Co	8,207	6,816	8,396	7,995	4.50%	-13.21%	6.91%	1.80%
Morgantown Energy Associates	636	1,041	1,283	1,634	-44.66%	-9.35%	11.72%	42.29%
Muscatine City of	1,697	3,209	3,948	5,202	-51.71%	-8.68%	12.35%	48.04%
Northampton Generating Co LP	604	1,438	1,831	2,518	-62.23%	-10.00%	14.60%	57.62%
Northeastern Power Co	557	1,272	1,620	2,213	-60.65%	-10.13%	14.45%	56.33%
Northern Indiana Pub Serv Co	25,352	33,752	41,011	49,031	-32.01%	-9.48%	9.99%	31.50%
Northern States Power Co	35,221	48,441	58,587	70,782	-33.87%	-9.04%	10.01%	32.91%
NRG Dunkirk Operations Inc	8,650	6,107	7,736	6,584	19.00%	-15.99%	6.42%	-9.43%
NRG Huntley Operations Inc	10,847	6,492	8,225	5,899	37.90%	-17.47%	4.57%	-25.00%
Nueces Bay WLE, LP	273	3,683	5	1,052	-78.22%	193.86%	-99.60%	-16.04%
Ohio Edison Co	48,259	29,758	35,929	25,652	38.28%	-14.73%	2.95%	-26.50%
Ohio Power Co	86,379	63,892	78,941	68,966	15.88%	-14.29%	5.90%	-7.48%
Ohio Valley Electric Corp	19,610	12,411	15,358	11,541	33.13%	-15.74%	4.26%	-21.65%
Orion Power Holdings Inc	19,804	15,576	18,688	16,907	11.61%	-12.22%	5.32%	-4.72%
Orion Power Holdings-Newcastle	5,645	3,343	4,257	3,027	38.77%	-17.82%	4.65%	-25.59%
Orion Power Midwest LP	8,460	5,898	7,510	6,339	19.97%	-16.36%	6.50%	-10.10%
Orlando Utilities Comm	5,977	10,573	13,362	17,356	-49.42%	-10.53%	13.08%	46.87%
Otter Tail Power Company	15,285	1,734	2,147	-6,749	392.40%	-44.14%	-30.83%	-317.43%
Owensboro City of	4,517	5,774	7,153	8,451	-30.23%	-10.81%	10.49%	30.54%
Panther Creek Partners	817	1,427	1,817	2,354	-49.05%	-11.02%	13.30%	46.77%

Table 1. 2010 Owner-Level Company Allocations								
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Pella City of	882	272	333	-53	146.08%	-24.11%	-7.09%	-114.88%
Pennsylvania Power Co	20,666	24,844	31,634	36,683	-27.38%	-12.70%	11.17%	28.91%
Power Authority of State of NY	3,225	7,613	1,906	2,929	-17.69%	94.30%	-51.36%	-25.25%
PPL Brunner Island LLC	24,340	13,102	16,683	10,385	50.92%	-18.76%	3.44%	-35.61%
PPL Martins Creek LLC	18,179	5,374	4,009	-4,983	222.05%	-4.80%	-28.98%	-188.27%
PPL Montour LLC	24,370	14,666	18,674	13,541	36.81%	-17.67%	4.84%	-23.98%
PSI Energy Inc	71,955	64,059	76,914	75,935	-0.36%	-11.29%	6.51%	5.15%
Public Service Co of Oklahoma	22,012	8,068	10,923	2,579	102.03%	-25.95%	0.25%	-76.33%
R J Reynolds Tobacco Co	2,901	1,411	1,758	880	66.98%	-18.80%	1.17%	-49.35%
Reliant Energy Mid-Atlantic PH	79,188	53,327	67,686	55,232	24.01%	-16.49%	5.99%	-13.51%
Richmond City of	4,474	1,318	1,632	-367	153.60%	-25.29%	-7.49%	-120.82%
Rochester Gas & Electric Corp	4,433	2,930	3,712	2,971	26.25%	-16.56%	5.71%	-15.40%
Rochester Public Utilities	1,569	404	483	-267	186.75%	-26.17%	-11.73%	-148.86%
San Antonio Public Service Bd	21,754	29,172	24,038	27,272	-14.89%	14.14%	-5.95%	6.70%
San Miguel Electric Coop Inc	8,326	5,863	7,937	6,986	14.40%	-19.44%	9.05%	-4.01%
Savannah Electric & Power Co	5,986	4,994	5,095	4,467	16.56%	-2.76%	-0.79%	-13.01%
Schuylkill Energy Resource Inc	1,797	1,683	2,142	2,219	-8.32%	-14.14%	9.27%	13.19%
Scrubgrass Generating Co LP	822	1,477	1,881	2,453	-50.45%	-10.92%	13.45%	47.92%
Seminole Electric Coop Inc	18,420	18,090	21,437	22,333	-8.22%	-9.87%	6.81%	11.27%
Sempra Energy Resources	2,817	4,032	5,458	6,743	-40.85%	-15.34%	14.60%	41.59%
Sikeston City of	3,401	3,444	4,282	4,590	-13.44%	-12.35%	8.98%	16.82%
South Carolina Electric&Gas Co	22,813	22,460	26,640	27,798	-8.48%	-9.90%	6.87%	11.51%
South Carolina Genertg Co Inc	7,924	7,624	9,654	10,131	-10.29%	-13.69%	9.29%	14.69%
South Carolina Pub Serv Auth	21,577	34,920	41,801	52,990	-42.95%	-7.67%	10.52%	40.10%
South Mississippi El Pwr Assn	5,106	5,059	5,080	5,056	0.61%	-0.32%	0.10%	-0.38%
Southern Illinois Power Coop	4,160	3,082	3,864	3,406	14.66%	-15.05%	6.50%	-6.12%
Southern Indiana Gas & Elec Co	10,234	11,446	13,857	15,469	-19.74%	-10.24%	8.67%	21.31%
Southwestern Electric Power Co	37,276	34,927	38,055	37,532	0.89%	-5.47%	3.00%	1.58%
Southwestern Public Service Co	26,681	35,807	38,335	45,262	-26.94%	-1.96%	4.97%	23.93%
Springfield City of	8,965	10,052	12,324	13,806	-20.57%	-10.94%	9.19%	22.32%
State Line Energy LLC	4,742	5,295	6,556	7,345	-20.76%	-11.52%	9.55%	22.73%
Sunbury Generation LLC	8,291	4,054	5,162	2,707	64.07%	-19.78%	2.15%	-46.44%
Tallahassee City of	3,030	3,742	5	-766	101.63%	149.01%	-99.67%	-150.97%
Tampa Electric Co	41,972	30,401	37,936	32,734	17.37%	-14.99%	6.08%	-8.46%
Tennessee Valley Authority	208,137	185,217	226,027	224,350	-1.33%	-12.19%	7.16%	6.36%
TES Filer City Station LP	253	961	1,191	1,740	-75.58%	-7.25%	14.94%	67.89%
Texas Municipal Power Agency	6,952	5,218	7,064	6,523	7.96%	-18.97%	9.70%	1.30%
TIFD VIII-W Inc	2,500	4,889	1,632	2,139	-10.39%	75.23%	-41.51%	-23.34%
Toledo Edison Co	12,059	6,529	7,697	4,400	57.20%	-14.89%	0.34%	-42.65%
Trigen-Syracuse Energy Corp	435	1,063	1,347	1,860	-62.98%	-9.64%	14.50%	58.12%
TXU Generation Co LP	123,836	124,513	102,722	95,910	10.82%	11.43%	-8.07%	-14.17%

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Allocations to 2010 Company Owner/Operators					Difference from Mean			
Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
UAE Mecklenburg Cogeneration LP	467	1,503	1,806	2,598	-70.71%	-5.67%	13.34%	63.04%
UGI Development Co	1,130	655	764	484	49.04%	-13.61%	0.77%	-36.21%
Union Electric Co	61,989	56,996	70,452	71,609	-5.01%	-12.67%	7.95%	9.73%
US Operating Services Co.-Cedar Bay	1,271	3,762	4,867	6,896	-69.73%	-10.41%	15.91%	64.23%
Vandolah Power Co LLC	0	45	0	15				
Victoria WLE, LP	168	1,680	2	451	-70.79%	192.09%	-99.65%	-21.65%
Western Kentucky Energy Corp	26,290	24,066	29,817	30,251	-4.77%	-12.82%	8.01%	9.58%
Wheelabrator Environmental Systems	637	805	1,025	1,210	-30.68%	-12.44%	11.49%	31.63%
Whiting Clean Energy Inc	0	778	1	261				
Wisconsin Electric Power Co	42,903	42,759	52,168	55,208	-11.10%	-11.40%	8.10%	14.40%
Wisconsin Power & Light Co	28,260	26,701	32,051	32,795	-5.65%	-10.85%	7.01%	9.49%
Wisconsin Public Service Corp	10,005	12,851	15,106	17,755	-28.17%	-7.74%	8.45%	27.47%
Wyandotte Municipal Serv Comm	547	702	812	952	-27.38%	-6.80%	7.80%	26.39%
Average					8.82%	2.32%	-2.58%	-8.55%
Percent Positive					44.83%	17.82%	75.86%	54.02%

Table 2. 2015 Owner-Level Company Allocations								
Allocations to 2015 Company Owner/Operators					Difference from Mean			
Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
AEP Texas Central Company	5,267	11,299	6,776	7,132	-30.87%	48.31%	-11.06%	-6.39%
AEP Texas North Company	253	3,071	348	478	-75.61%	196.00%	-66.46%	-53.93%
AES Beaver Valley	853	1,712	2,180	2,727	-54.32%	-8.36%	16.70%	45.98%
AES Cayuga LLC	3,556	2,921	3,700	4,826	-5.19%	-22.12%	-1.35%	28.67%
AES Greenidge	1,804	1,419	1,798	2,345	-2.04%	-22.94%	-2.36%	27.34%
AES Somerset LLC	4,870	5,898	7,473	9,746	-30.40%	-15.70%	6.81%	39.29%
AES Westover LLC	1,704	1,209	1,532	1,998	5.79%	-24.94%	-4.89%	24.04%
AES WR Ltd Partnership	629	1,405	1,735	2,129	-57.32%	-4.72%	17.66%	44.38%
Alabama Electric Coop Inc	5,274	6,044	6,772	7,561	-17.76%	-5.75%	5.60%	17.91%
Alabama Power Co	78,288	76,628	90,508	88,644	-6.26%	-8.25%	8.37%	6.14%
Alcoa Generating Corp	3,684	7,333	9,079	4,455	-39.98%	19.47%	47.92%	-27.42%
Allegheny Energy Supply Co LLC	70,314	53,304	65,864	82,196	3.53%	-21.52%	-3.03%	21.02%
Ameren Energy Generating Co	32,878	26,335	31,787	31,931	6.98%	-14.31%	3.43%	3.90%
American Bituminous Power LP	502	1,013	1,248	1,556	-53.49%	-6.19%	15.58%	44.10%
Ames City of	784	687	845	405	15.25%	0.99%	24.22%	-40.46%
Appalachian Power Co	62,000	46,555	57,105	71,272	4.67%	-21.40%	-3.59%	20.32%
Aquila, Inc.	3,310	5,041	5,906	2,852	-22.61%	17.86%	38.08%	-33.32%
Associated Electric Coop Inc	19,737	21,309	25,407	12,262	0.30%	8.28%	29.11%	-37.69%
Austin City of (MN)	369	219	271	339	23.21%	-26.88%	-9.52%	13.19%
Austin Energy	180	3,671	5	63	-81.63%	274.69%	-99.49%	-93.57%
Birchwood Power Partners LP	543	1,675	2,012	2,524	-67.84%	-0.80%	19.16%	49.48%
Black River Power LLC	138	591	749	489	-71.86%	20.16%	52.28%	-0.58%
Brazos Electric Power Coop Inc	717	1,978	3	33	5.02%	189.71%	-99.56%	-95.17%
Cambria CoGen Co	523	1,051	1,338	1,673	-54.34%	-8.32%	16.72%	45.94%
Cardinal Operating Co	17,086	11,305	13,990	17,432	14.26%	-24.40%	-6.44%	16.58%
Carolina Power & Light Co	45,835	40,143	47,094	58,315	-4.20%	-16.10%	-1.57%	21.88%
Cedar Falls City of	194	85	104	129	51.56%	-33.59%	-18.75%	0.78%
CenterPoint Energy Houston Electric, LLC	37,272	60,270	47,349	26,278	-12.90%	40.84%	10.65%	-38.59%
Central Electric Power Coop	1,913	491	611	736	104.00%	-47.64%	-34.84%	-21.51%
Central Iowa Power Coop	1,955	361	407	506	142.18%	-55.28%	-49.58%	-37.32%
Central Power & Lime Inc	614	1,160	1,501	1,923	-52.74%	-10.74%	15.50%	47.98%
Cincinnati Gas & Electric Co	33,115	36,184	44,096	54,956	-21.32%	-14.03%	4.77%	30.57%
CLECO Power LLC	14,799	15,746	12,756	7,830	15.77%	23.18%	-0.21%	-38.75%
Cleveland Electric Illuminating Co	19,218	9,896	12,246	14,989	36.42%	-29.75%	-13.07%	6.40%
Cogentrix of Richmond Inc	688	2,269	2,726	3,419	-69.77%	-0.28%	19.80%	50.26%
Cogentrix of Rocky Mount Inc	390	1,260	1,570	1,942	-69.76%	-2.37%	21.65%	50.47%
Colmac Clarion Inc	185	376	479	599	-54.93%	-8.21%	16.93%	46.22%
Columbia City of	1,634	121	146	71	231.44%	-75.46%	-70.39%	-85.60%
Columbus Southern Power Co	16,489	12,757	15,788	19,671	1.93%	-21.14%	-2.40%	21.60%
Constellation Power Source Gen	17,500	19,176	22,107	27,060	-18.46%	-10.65%	3.01%	26.09%
Consumers Energy Co	33,336	27,495	32,024	31,701	7.06%	-11.70%	2.84%	1.80%
Corn Belt Power Coop	133	68	84	104	36.76%	-30.08%	-13.62%	6.94%
Dairyland Power Coop	6,425	6,417	7,937	5,915	-3.72%	-3.84%	18.93%	-11.37%
Dayton Power & Light Co	33,637	24,523	30,159	37,580	6.87%	-22.09%	-4.18%	19.40%
Detroit Edison Co	73,987	55,547	66,196	50,841	20.03%	-9.89%	7.39%	-17.52%
Dominion Energy Services Co	10,019	7,557	9,474	6,604	19.08%	-10.18%	12.60%	-21.51%
Dominion Virginia Power	49,823	55,024	60,198	75,160	-17.03%	-8.37%	0.24%	25.16%
Duke Energy Corp	49,967	51,509	63,682	78,818	-18.08%	-15.55%	4.41%	29.22%

Table 2. 2015 Owner-Level Company Allocations								
Allocations to 2015 Company Owner/Operators					Difference from Mean			
Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
Dynegy Midwest Generation Inc	31,729	23,456	29,007	35,521	6.02%	-21.63%	-3.08%	18.69%
Dynegy Northeast Gen Inc	13,489	7,747	5,441	6,864	60.87%	-7.61%	-35.11%	-18.14%
E S Joslin LP	74	712	1	12	-62.95%	256.45%	-99.50%	-93.99%
East Kentucky Power Coop Inc	13,787	12,054	14,542	18,137	-5.76%	-17.61%	-0.60%	23.97%
Ebensburg Power Co	394	678	863	1,080	-47.77%	-10.04%	14.51%	43.30%
Edison Mission	21,317	14,700	18,717	23,413	9.11%	-24.76%	-4.20%	19.84%
Electric Energy Inc	10,164	10,971	13,753	6,617	-2.05%	5.73%	32.54%	-36.23%
Empire District Electric Company	3,427	3,084	2,001	1,199	41.16%	27.03%	-17.58%	-50.61%
Entergy Gulf States Inc	7,830	32,088	6,414	4,345	-38.20%	153.27%	-49.37%	-65.70%
Exelon Generation Co LLC	5,771	13,515	7,224	9,036	-35.06%	52.08%	-18.71%	1.68%
Florida Power & Light Co	41,360	59,995	14,999	17,527	23.57%	79.25%	-55.19%	-47.63%
Florida Power Corp	41,064	33,951	27,297	34,478	20.08%	-0.72%	-20.18%	0.82%
Gainesville Regional Utilities	2,963	2,507	2,253	2,897	11.60%	-5.57%	-15.14%	9.11%
Georgia Power Co	140,781	93,246	115,376	130,230	17.41%	-22.24%	-3.78%	8.61%
Gilberton Power Co	585	1,000	1,274	613	-32.62%	15.21%	46.78%	-29.37%
Grand Haven City of	520	449	556	700	-6.52%	-19.28%	-0.04%	25.84%
Gulf Power Co	15,411	12,307	13,409	17,205	5.68%	-15.61%	-8.05%	17.98%
Hamilton City of	407	363	449	559	-8.44%	-18.34%	1.01%	25.76%
Henderson City Utility Comm	284	46	57	71	148.03%	-59.83%	-50.22%	-37.99%
Holland City of	577	338	311	392	42.65%	-16.44%	-23.11%	-3.09%
Hoosier Energy R E C Inc	12,973	12,291	15,117	18,851	-12.39%	-17.00%	2.09%	27.30%
Independence City of	1,637	206	256	320	170.69%	-65.94%	-57.67%	-47.09%
Indiana Michigan Power Co	31,953	28,806	35,664	23,838	6.28%	-4.19%	18.62%	-20.71%
Indiana-Kentucky Electric Corp	17,702	10,226	12,661	9,613	41.05%	-18.52%	0.88%	-23.41%
Indianapolis Power & Light Co	25,196	23,163	28,435	35,223	-10.03%	-17.29%	1.54%	25.78%
Indiantown Cogeneration LP	835	2,561	3,314	4,246	-69.50%	-6.50%	20.99%	55.01%
Interstate Power and Light Co	16,073	17,191	20,948	11,530	-2.21%	4.60%	27.46%	-29.85%
James River Cogeneration Co	527	924	1,111	536	-31.94%	19.30%	43.44%	-30.80%
Jamestown City of	1,065	372	419	211	106.10%	-28.01%	-18.92%	-59.17%
JEA	15,010	19,585	19,870	20,345	-19.74%	4.72%	6.24%	8.78%
Kansas City Power & Light Co	24,195	14,469	17,125	8,306	50.99%	-9.70%	6.87%	-48.16%
Kentucky Power Co	8,759	8,432	10,447	13,027	-13.84%	-17.06%	2.76%	28.14%
Kentucky Utilities Co	27,136	24,239	29,539	35,950	-7.12%	-17.04%	1.11%	23.05%
KeySpan Generation LLC	18,561	15,973	4,638	5,478	66.28%	43.10%	-58.45%	-50.92%
Lakeland City of	4,501	5,344	4,717	5,793	-11.55%	5.02%	-7.31%	13.84%
Lansing City of	6,097	3,667	4,545	3,986	33.30%	-19.83%	-0.63%	-12.85%
LG&E Power Services	626	1,981	2,469	3,055	-69.22%	-2.54%	21.47%	50.30%
Lon C Hill, LP	120	1,900	3	32	-76.64%	269.83%	-99.42%	-93.77%
Louisiana Generating LLC	14,925	16,475	21,089	12,777	-8.53%	0.97%	29.25%	-21.69%
Louisville Gas & Electric Co	21,833	21,617	26,396	32,919	-15.02%	-15.86%	2.74%	28.13%
Lower Colorado River Authority	14,951	19,190	18,630	10,266	-5.13%	21.77%	18.22%	-34.86%
Madison Gas & Electric Co	382	906	920	1,023	-52.71%	12.16%	13.90%	26.65%
Manitowoc Public Utilities	603	440	545	262	30.38%	-4.86%	17.84%	-43.35%
Marquette City of	176	461	572	277	-52.62%	24.09%	53.97%	-25.44%
Michigan South Central Pwr Agy	635	535	664	803	-3.68%	-18.85%	0.72%	21.81%
MidAmerican Energy Co	23,037	28,307	34,617	16,590	-10.14%	10.41%	35.02%	-35.29%
Midwest Generations EME LLC	40,103	40,671	46,295	22,323	7.38%	8.90%	23.96%	-40.23%
Minnesota Power Inc	8,106	11,793	14,164	6,841	-20.73%	15.32%	38.51%	-33.10%
Mirant Chalk Point LLC	10,674	8,861	7,532	9,093	18.08%	-1.98%	-16.68%	0.59%
Mirant Mid-Atlantic LLC	18,400	12,538	15,201	18,657	13.59%	-22.60%	-6.16%	15.17%

Table 2. 2015 Owner-Level Company Allocations								
Allocations to 2015 Company Owner/Operators					Difference from Mean			
Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
Mirant New York Inc	6,403	5,733	4,333	5,486	16.66%	4.45%	-21.06%	-0.05%
Mirant Potomac River LLC	4,217	3,560	4,276	5,363	-3.15%	-18.24%	-1.79%	23.17%
Mississippi Power Co	16,796	17,700	16,353	17,253	-1.35%	3.96%	-3.95%	1.34%
Monongahela Power Co	5,745	4,771	5,877	7,328	-3.12%	-19.55%	-0.90%	23.57%
Morgantown Energy Associates	445	729	898	1,120	-44.25%	-8.64%	12.54%	40.36%
Muscatine City of	1,188	2,247	2,764	1,324	-36.83%	19.47%	46.96%	-29.60%
Northampton Generating Co LP	422	1,007	1,282	617	-49.23%	21.02%	54.06%	-25.85%
Northeastern Power Co	390	891	1,134	546	-47.33%	20.37%	53.20%	-26.24%
Northern Indiana Pub Serv Co	17,746	23,627	28,708	26,146	-26.23%	-1.79%	19.33%	8.68%
Northern States Power Co	24,655	33,907	41,010	19,999	-17.52%	13.43%	37.19%	-33.10%
NRG Dunkirk Operations Inc	6,055	4,275	5,415	7,063	6.19%	-25.03%	-5.03%	23.87%
NRG Huntley Operations Inc	7,593	4,544	5,757	7,509	19.56%	-28.45%	-9.35%	18.24%
Nueces Bay WLE, LP	191	2,578	4	44	-72.88%	266.06%	-99.43%	-93.75%
Ohio Edison Co	33,780	20,831	25,149	31,202	21.77%	-24.91%	-9.34%	12.48%
Ohio Power Co	60,464	44,724	55,259	68,869	5.47%	-21.99%	-3.61%	20.13%
Ohio Valley Electric Corp	13,727	8,688	10,751	13,395	17.93%	-25.36%	-7.64%	15.07%
Orion Power Holdings Inc	13,864	10,903	13,081	16,329	2.36%	-19.50%	-3.42%	20.56%
Orion Power Holdings-Newcastle	3,952	2,340	2,980	3,727	21.61%	-27.99%	-8.30%	14.69%
Orion Power Midwest LP	5,922	4,129	5,257	6,576	8.24%	-24.53%	-3.91%	20.20%
Orlando Utilities Comm	4,184	7,401	9,353	11,986	-49.17%	-10.08%	13.63%	45.62%
Otter Tail Power Company	10,701	1,214	1,503	722	202.72%	-65.66%	-57.48%	-79.58%
Owensboro City of	3,162	4,041	5,007	6,158	-31.14%	-12.00%	9.04%	34.10%
Panther Creek Partners	572	999	1,272	612	-33.79%	15.66%	47.27%	-29.14%
Pella City of	617	190	233	112	114.24%	-34.03%	-19.10%	-61.11%
Pennsylvania Power Co	14,466	17,391	22,144	25,568	-27.28%	-12.57%	11.32%	28.53%
Power Authority of State of NY	2,258	5,329	1,334	1,587	-14.05%	102.85%	-49.22%	-39.59%
PPL Brunner Island LLC	17,038	9,171	11,678	14,607	29.83%	-30.12%	-11.01%	11.30%
PPL Martins Creek LLC	12,725	3,762	2,806	3,401	124.29%	-33.69%	-50.54%	-40.05%
PPL Montour LLC	17,059	10,266	13,072	16,351	20.24%	-27.64%	-7.86%	15.25%
PSI Energy Inc	50,368	44,839	53,840	67,151	-6.81%	-17.04%	-0.39%	24.24%
Public Service Co of Oklahoma	15,408	5,648	7,646	4,177	87.45%	-31.29%	-6.98%	-49.18%
R J Reynolds Tobacco Co	2,031	988	1,231	1,523	40.73%	-31.54%	-14.71%	5.53%
Reliant Energy Mid-Atlantic PH	55,432	37,329	47,381	58,990	11.35%	-25.02%	-4.82%	18.49%
Richmond City of	3,131	923	1,142	1,424	89.18%	-44.23%	-31.00%	-13.96%
Rochester Gas & Electric Corp	3,104	2,051	2,598	3,389	11.43%	-26.37%	-6.73%	21.67%
Rochester Public Utilities	1,098	283	338	422	105.14%	-47.13%	-36.85%	-21.16%
San Antonio Public Service Bd	15,228	20,420	16,826	9,322	-1.43%	32.18%	8.91%	-39.66%
San Miguel Electric Coop Inc	5,828	4,104	5,556	3,035	25.85%	-11.38%	19.98%	-34.46%
Savannah Electric & Power Co	4,191	3,496	3,566	4,457	6.71%	-10.99%	-9.20%	13.48%
Schuylkill Energy Resource Inc	1,258	1,178	1,500	722	8.03%	1.16%	28.81%	-38.00%
Scrubgrass Generating Co LP	575	1,034	1,317	1,647	-49.69%	-9.56%	15.19%	44.06%
Seminole Electric Coop Inc	12,894	12,663	15,005	18,500	-12.67%	-14.24%	1.62%	25.29%
Sempra Energy Resources	1,972	2,822	3,821	2,087	-26.29%	5.48%	42.81%	-22.00%
Sikeston City of	2,381	2,411	2,997	1,445	3.14%	4.44%	29.82%	-37.41%
South Carolina Electric&Gas Co	15,969	15,722	18,649	23,395	-13.37%	-14.71%	1.17%	26.91%
South Carolina Genertg Co Inc	5,547	5,337	6,758	8,474	-15.04%	-18.26%	3.51%	29.79%
South Carolina Pub Serv Auth	15,105	24,445	29,262	36,696	-42.73%	-7.32%	10.94%	39.12%
South Mississippi El Pwr Assn	3,574	3,541	3,556	4,848	-7.88%	-8.73%	-8.34%	24.96%
Southern Illinois Power Coop	2,912	2,158	2,705	3,384	4.38%	-22.65%	-3.04%	21.30%
Southern Indiana Gas & Elec Co	7,164	8,012	9,700	12,097	-22.49%	-13.32%	4.94%	30.87%

Table 2. 2015 Owner-Level Company Allocations								
Allocations to 2015 Company Owner/Operators					Difference from Mean			
Owner/Operator	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
Southwestern Electric Power Co	26,094	24,447	26,638	14,632	13.69%	6.51%	16.06%	-36.25%
Southwestern Public Service Co	18,677	25,066	26,834	14,744	-12.44%	17.51%	25.80%	-30.88%
Springfield City of	6,274	7,036	8,626	7,434	-14.55%	-4.17%	17.48%	1.25%
State Line Energy LLC	3,320	3,707	4,589	2,201	-3.89%	7.32%	32.85%	-36.28%
Sunbury Generation LLC	5,804	2,838	3,613	3,276	49.48%	-26.91%	-6.95%	-15.63%
Tallahassee City of	2,121	2,619	4	39	77.38%	119.03%	-99.67%	-96.74%
Tampa Electric Co	29,380	21,281	26,556	30,462	9.14%	-20.95%	-1.35%	13.16%
Tennessee Valley Authority	145,695	129,649	158,219	193,448	-7.05%	-17.29%	0.94%	23.41%
TES Filer City Station LP	177	672	834	1,049	-74.07%	-1.61%	22.10%	53.58%
Texas Municipal Power Agency	4,866	3,653	4,945	2,701	20.41%	-9.61%	22.36%	-33.16%
TIFD VIII-W Inc	1,750	3,422	1,143	1,429	-9.60%	76.75%	-40.96%	-26.19%
Toledo Edison Co	8,441	4,570	5,388	2,757	59.60%	-13.59%	1.87%	-47.87%
Trigen-Syracuse Energy Corp	305	744	943	473	-50.53%	20.74%	53.03%	-23.24%
TXU Generation Co LP	86,685	87,160	71,906	39,836	21.41%	22.08%	0.71%	-44.20%
UAE Mecklenburg Cogeneration LP	327	1,052	1,264	1,586	-69.10%	-0.49%	19.56%	50.02%
UGI Development Co	791	459	535	361	47.44%	-14.45%	-0.28%	-32.71%
Union Electric Co	43,393	39,896	49,319	27,499	8.41%	-0.33%	23.22%	-31.30%
US Operating Services Co.- Cedar Bay	890	2,633	3,407	4,365	-68.49%	-6.75%	20.66%	54.59%
Victoria WLE, LP	118	1,176	2	20	-64.13%	257.45%	-99.39%	-93.92%
Western Kentucky Energy Corp	18,401	16,846	20,871	21,814	-5.55%	-13.53%	7.12%	11.96%
Wheelabrator Environmental Systems	446	564	718	345	-13.93%	8.82%	38.54%	-33.43%
Wisconsin Electric Power Co	30,030	29,933	36,518	25,188	-1.27%	-1.59%	20.06%	-17.19%
Wisconsin Power & Light Co	19,782	18,691	22,435	10,782	10.38%	4.29%	25.18%	-39.84%
Wisconsin Public Service Corp	7,003	8,996	10,574	5,085	-11.52%	13.66%	33.60%	-35.75%
Wyandotte Municipal Serv Comm	383	492	569	276	-10.93%	14.42%	32.33%	-35.81%
Average					1.07%	4.57%	-0.70%	-4.94%
Percent Positive					45.09%	32.37%	53.76%	53.76%

Table 3. 2010 Parent Company Allocations								
Allocations to 2010 Parent Companies					Difference from Mean			
Parent Company	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
AE	108,654	83,426	102,488	127,896	2.88%	-21.01%	-2.96%	21.10%
AEP	393,878	310,508	362,178	377,306	9.12%	-13.98%	0.34%	4.53%
AES	57,975	57,511	68,187	86,110	-14.04%	-14.73%	1.10%	27.67%
ALABAMA ELECTRIC COOPERATIVE	7,534	8,634	9,674	10,801	-17.76%	-5.75%	5.60%	17.91%
Alcoa	5,264	10,476	12,970	6,364	-39.97%	19.47%	47.92%	-27.42%
ALLETE INC	11,580	16,846	20,234	9,772	-20.73%	15.32%	38.51%	-33.11%
Alliant Energy	51,226	51,752	61,977	31,880	4.10%	5.17%	25.95%	-35.21%
Ameren	123,596	110,291	135,513	94,354	6.60%	-4.87%	16.88%	-18.62%
AMERICAN CONSUMER INDUSTRIES INC	264	537	684	855	-54.91%	-8.19%	16.94%	46.17%
AQUILA INC	4,730	7,203	8,437	4,074	-22.60%	17.87%	38.06%	-33.33%
ASSOCIATED ELECTRIC COOPERATIVE INC	28,196	30,442	36,295	17,518	0.30%	8.29%	29.11%	-37.69%
Austin City of (MN)	528	313	388	484	23.29%	-26.91%	-9.40%	13.02%
Austin Energy	258	5,244	7	90	-81.57%	274.64%	-99.50%	-93.57%
Austin Energy and Lower Colorado River Authority	21,018	19,651	26,602	14,532	2.77%	-3.91%	30.08%	-28.94%
BLACK RIVER POWER LLC	198	845	1,070	698	-71.86%	20.25%	52.27%	-0.67%
BOARD OF PUBLIC UTILTIIES JAMESTOWN	1,522	531	598	301	106.23%	-28.05%	-18.97%	-59.21%
Brazos Electric Power Coop Inc	1,024	2,825	4	49	4.97%	189.60%	-99.59%	-94.98%
Calpine	0	11,703	16	195				
Cedar Falls City of	278	121	149	185	51.71%	-33.97%	-18.69%	0.95%
CenterPoint	53,249	86,097	67,645	37,543	-12.90%	40.83%	10.65%	-38.59%
CENTRAL ELECTRIC POWER COOPERATIVE	2,733	702	873	1,052	103.96%	-47.61%	-34.85%	-21.49%
CENTRAL IOWA POWER COOPERATIVE	2,792	515	582	724	142.10%	-55.34%	-49.53%	-37.22%
Cinergy	119,262	115,751	139,909	174,439	-13.16%	-15.72%	1.87%	27.01%
CITY OF AMES	1,120	981	1,207	578	15.29%	0.98%	24.24%	-40.50%
CITY OF COLUMBIA, MO	2,334	173	209	101	231.42%	-75.43%	-70.32%	-85.66%
CITY OF GAINESVILLE	4,234	3,581	3,220	4,139	11.61%	-5.60%	-15.12%	9.11%
CITY OF INDEPENDENCE	2,339	294	365	458	170.72%	-65.97%	-57.75%	-46.99%
CITY OF ROCHESTER, MN	1,569	404	483	603	105.17%	-47.17%	-36.84%	-21.15%
CITY OF SIKESTON	3,401	3,444	4,282	2,065	3.12%	4.43%	29.84%	-37.39%
CLECO CORPORATION	21,143	22,494	18,222	11,187	15.78%	23.18%	-0.22%	-38.74%
CMS ENERGY	47,623	39,280	45,748	45,287	7.06%	-11.70%	2.84%	1.80%
Cogentrix	5,533	16,694	20,843	24,637	-67.31%	-1.38%	23.14%	45.55%
Conectiv	8,251	72	9	11	295.59%	-96.55%	-99.57%	-99.47%
CONSTELLATION ENERGY GROUP	28,319	33,713	35,030	41,573	-18.29%	-2.73%	1.07%	19.95%
Corn Belt Power Coop	190	97	120	149	36.69%	-30.22%	-13.67%	7.19%
DAIRYLAND POWER COOPERATIVE	9,179	9,167	11,339	8,449	-3.72%	-3.84%	18.94%	-11.38%
Delta Power Company	877	1,657	2,144	2,747	-52.74%	-10.74%	15.50%	47.98%
Dominion	91,334	98,717	109,174	123,833	-13.64%	-6.66%	3.22%	17.08%
DPL INC	48,054	35,034	43,085	53,687	6.87%	-22.09%	-4.18%	19.40%
DTE ENERGY CO	105,695	79,349	94,568	72,628	20.03%	-9.89%	7.39%	-17.52%
Duke	83,314	76,989	90,977	112,646	-8.43%	-15.38%	0.00%	23.81%
Dynegy	64,596	44,575	49,213	60,551	18.02%	-18.56%	-10.09%	10.63%
EAST KENTUCKY POWER COOPERATIVE	19,695	17,220	20,776	25,910	-5.77%	-17.61%	-0.59%	23.97%

Table 3. 2010 Parent Company Allocations								
Edison International	88,459	80,550	94,659	67,559	6.83%	-2.73%	14.31%	-18.41%
EL PASO CORP	748	1,501	1,911	2,391	-54.34%	-8.35%	16.69%	46.00%
Empire District Electric Company	4,897	4,405	2,858	1,713	41.20%	27.01%	-17.60%	-50.61%
ENERGY EAST CORPORATION	4,433	2,930	3,712	4,841	11.41%	-26.36%	-6.71%	21.66%
Entergy	20,548	88,813	11,960	10,205	-37.51%	170.10%	-63.63%	-68.96%
Exelon	31,963	20,675	10,321	12,931	68.47%	8.97%	-45.60%	-31.84%
First Energy	109,909	75,549	92,754	106,457	14.29%	-21.44%	-3.55%	10.70%
FPL	59,921	88,196	23,247	25,930	21.49%	78.81%	-52.87%	-47.43%
Garland City of	108	2,476	4	42	-83.57%	276.58%	-99.39%	-93.61%
Grand Haven City of	744	641	795	999	-6.39%	-19.35%	0.03%	25.70%
GREAT PLAINS ENERGY	34,564	20,670	24,464	11,865	51.00%	-9.70%	6.87%	-48.17%
Henderson City Utility Comm	406	66	82	102	147.56%	-59.76%	-50.00%	-37.80%
HOLLAND BOARD OF PUBLIC WORKS	824	482	444	561	42.62%	-16.57%	-23.15%	-2.90%
HOOSIER ENERGY REC INC	18,533	17,557	21,596	26,931	-12.39%	-17.00%	2.09%	27.31%
JEA	21,444	27,980	28,386	29,063	-19.74%	4.72%	6.24%	8.78%
KeySpan	31,940	32,206	10,194	12,002	47.97%	49.20%	-52.77%	-44.40%
Kissimmee Utility Authority	0	2,093	3	31				
LAKELAND ELECTRIC	6,431	7,634	6,740	8,275	-11.54%	5.01%	-7.29%	13.82%
Lansing City of	8,710	5,237	6,493	5,694	33.31%	-19.84%	-0.62%	-12.85%
LGE	97,141	96,610	113,259	133,986	-11.89%	-12.37%	2.73%	21.53%
Lower Colorado River Authority	342	7,763	11	133	-83.42%	276.43%	-99.47%	-93.55%
Madison Gas & Electric Co	546	1,296	1,315	1,462	-52.72%	12.23%	13.88%	26.61%
MANITOWOC PUBLIC UTILITIES	862	628	778	374	30.51%	-4.92%	17.79%	-43.38%
Marquette City of	251	659	817	395	-52.69%	24.22%	54.01%	-25.54%
MCDERMOTT INTERNATIONAL	562	968	1,233	1,542	-47.76%	-10.06%	14.56%	43.27%
Michigan South Central Pwr Agy	907	765	948	1,147	-3.69%	-18.77%	0.66%	21.79%
Mid-America Energy	32,911	40,437	49,452	23,701	-10.14%	10.41%	35.02%	-35.29%
Mirant	72,299	46,440	44,779	55,182	32.23%	-15.06%	-18.10%	0.93%
MORA-SAN MIGUEL ELECTRIC CO-OP	8,326	5,863	7,937	4,336	25.86%	-11.37%	19.98%	-34.46%
MUSCATINE POWER & WATER	1,697	3,209	3,948	1,892	-36.83%	19.45%	46.96%	-29.57%
Nisource	25,352	33,752	41,011	37,350	-26.23%	-1.79%	19.34%	8.68%
Northampton Generating Company LP, Cogentrix, and Foster Wheeler	604	1,438	1,831	881	-49.21%	21.00%	54.08%	-25.87%
NRG Energy	50,948	44,210	47,096	40,303	11.63%	-3.13%	3.19%	-11.69%
ORLANDO UTILITIES CO	5,977	10,573	13,362	17,123	-49.17%	-10.08%	13.63%	45.62%
Otter Tail Corp	15,285	1,734	2,147	1,031	202.72%	-65.66%	-57.48%	-79.58%
OWENSBORO MUNICIPAL UTILITIES	4,517	5,774	7,153	8,797	-31.15%	-11.99%	9.04%	34.10%
Pella City of	882	272	333	160	114.21%	-33.94%	-19.13%	-61.14%
PG&E CORP	8,235	1,477	1,881	2,353	136.19%	-57.64%	-46.05%	-32.51%
Power Authority of State of NY	3,225	7,613	1,906	2,266	-14.06%	102.88%	-49.21%	-39.61%
PP&L	81,781	33,733	39,924	49,359	59.73%	-34.11%	-22.02%	-3.59%
Progress Energy	124,143	106,938	106,277	132,581	5.67%	-8.98%	-9.54%	12.85%
Reliant	129,292	96,864	102,152	127,111	13.56%	-14.92%	-10.28%	11.64%
Reynolds American Inc.	2,901	1,411	1,758	2,176	40.74%	-31.56%	-14.73%	5.55%
RICHMOND POWER & LIGHT	4,474	1,318	1,632	2,035	89.20%	-44.26%	-30.99%	-13.94%
San Antonio Public Service Bd	21,754	29,172	24,038	13,317	-1.43%	32.18%	8.92%	-39.66%
SCANA CORPORATION	30,737	30,084	36,294	45,526	-13.81%	-15.64%	1.78%	27.67%
SCHUYLKILL ENERGY RESOURCES	1,797	1,683	2,142	1,031	8.05%	1.18%	28.78%	-38.01%
SEMINOLE ELECTRIC COOPERATIVE INC	18,420	18,090	21,437	26,428	-12.68%	-14.24%	1.63%	25.29%
SEMPRA ENERGY	3,535	13,127	5,470	3,137	-44.04%	107.80%	-13.41%	-50.34%
SOUTH CAROLINA PUBLIC SERVICE AUTH.	21,577	34,920	41,801	52,423	-42.74%	-7.33%	10.94%	39.13%
SOUTH MISSISSIPPI ELECTRIC POWER ASSOC.	5,106	5,059	5,080	6,924	-7.87%	-8.72%	-8.34%	24.93%

Table 3. 2010 Parent Company Allocations								
Southern	364,955	291,167	341,733	368,281	6.86%	-14.75%	0.06%	7.83%
Southern Illinois Power Coop	4,160	3,082	3,864	4,834	4.39%	-22.66%	-3.04%	21.30%
Springfield CWLP	8,965	10,052	12,324	10,621	-14.54%	-4.18%	17.48%	1.24%
SUEZ ENERGY INTERNATIONAL	557	4,989	6,454	3,308	-85.45%	30.36%	68.64%	-13.56%
Tallahassee City of	3,030	3,742	5	55	77.40%	119.09%	-99.71%	-96.78%
TECO ENERGY INC	41,972	30,401	37,936	43,517	9.14%	-20.95%	-1.35%	13.16%
TEXAS MUNICIPAL POWER AGENCY	6,952	5,218	7,064	3,859	20.42%	-9.62%	22.36%	-33.16%
Tondu Corporation	253	961	1,191	1,498	-74.07%	-1.51%	22.06%	53.52%
TRIGEN ENERGY CORP	435	1,063	1,347	676	-50.54%	20.75%	53.00%	-23.21%
TVA	208,137	185,217	226,027	276,356	-7.05%	-17.29%	0.93%	23.41%
TXU	123,836	124,513	102,722	56,908	21.41%	22.08%	0.71%	-44.20%
UGI CORPORATION	1,130	655	764	516	47.47%	-14.52%	-0.29%	-32.66%
VECTREN CORP	10,234	11,446	13,857	17,282	-22.50%	-13.32%	4.94%	30.88%
WE Energies	42,903	42,759	52,168	35,984	-1.27%	-1.60%	20.05%	-17.19%
Wheelabrator Technologies Inc.	637	805	1,025	493	-13.89%	8.77%	38.50%	-33.38%
WPS	18,496	18,649	21,774	12,690	3.32%	4.17%	21.63%	-29.12%
WYANDOTTE DEPARTMENT OF MUNICIPAL Services	547	702	812	394	-10.88%	14.38%	32.30%	-35.80%
XCel Energy	61,902	84,248	96,922	49,634	-15.41%	15.13%	32.45%	-32.17%
Average					11.08%	5.73%	-3.54%	-13.27%
Percent Positive					51.82%	34.55%	56.36%	43.64%

Table 4. 2015 Parent Company Allocations

Allocations to 2015 Parent Companies					Difference from Mean			
Parent Company	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
AE	76,059	58,399	71,741	89,529	2.88%	-21.01%	-2.96%	21.10%
AEP	275,713	217,353	253,524	264,113	9.12%	-13.98%	0.34%	4.53%
AES	40,583	40,256	47,731	60,276	-14.04%	-14.73%	1.10%	27.67%
ALABAMA ELECTRIC COOPERATIVE	5,274	6,044	6,772	7,561	-17.76%	-5.75%	5.60%	17.91%
Alcoa	3,684	7,333	9,079	4,455	-39.98%	19.47%	47.92%	-27.42%
ALLETE INC	8,106	11,793	14,164	6,841	-20.73%	15.32%	38.51%	-33.10%
Alliant Energy	35,855	36,226	43,383	22,317	4.09%	5.17%	25.95%	-35.21%
Ameren	86,518	77,202	94,859	66,047	6.61%	-4.87%	16.88%	-18.62%
AQUILA INC	3,310	5,043	5,906	2,852	-22.62%	17.89%	38.06%	-33.33%
ASSOCIATED ELECTRIC COOPERATIVE INC	19,737	21,309	25,407	12,262	0.30%	8.28%	29.11%	-37.69%
Austin City of (MN)	369	219	271	339	23.21%	-26.88%	-9.52%	13.19%
Austin Energy	180	3,671	5	63	-81.63%	274.69%	-99.49%	-93.57%
Austin Energy and Lower Colorado River Authority	14,712	13,756	18,622	10,173	2.77%	-3.91%	30.08%	-28.94%
BLACK RIVER POWER LLC	138	591	749	489	-71.86%	20.16%	52.28%	-0.58%
BOARD OF PUBLIC UTILITIES JAMESTOWN	1,065	372	419	211	106.10%	-28.01%	-18.92%	-59.17%
Brazos Electric Power Coop Inc	717	1,978	3	33	5.02%	189.71%	-99.56%	-95.17%
Cedar Falls City of	194	84	104	129	51.86%	-34.25%	-18.59%	0.98%
CenterPoint	37,272	60,270	47,349	26,278	-12.90%	40.84%	10.65%	-38.59%
CENTRAL ELECTRIC POWER COOPERATIVE	1,913	491	611	736	104.00%	-47.64%	-34.84%	-21.51%
CENTRAL IOWA POWER COOPERATIVE	1,955	361	407	506	142.18%	-55.28%	-49.58%	-37.32%
CINERGY	83,483	81,023	97,936	122,107	-13.16%	-15.72%	1.87%	27.01%
CITY OF AMES	784	687	845	405	15.25%	0.99%	24.22%	-40.46%
CITY OF COLUMBIA, MO	1,634	121	146	71	231.44%	-75.46%	-70.39%	-85.60%
CITY OF GAINESVILLE	2,963	2,507	2,253	2,897	11.60%	-5.57%	-15.14%	9.11%
CITY OF INDEPENDENCE	1,637	206	256	320	170.69%	-65.94%	-57.67%	-47.09%
CITY OF ROCHESTER, MN	1,098	283	338	422	105.14%	-47.13%	-36.85%	-21.16%
CITY OF SIKESTON	2,381	2,411	2,997	1,445	3.14%	4.44%	29.82%	-37.41%
CLECO CORPORATION	14,799	15,746	12,756	7,830	15.77%	23.18%	-0.21%	-38.75%
CMS ENERGY	33,336	27,495	32,024	31,701	7.06%	-11.70%	2.84%	1.80%
Cogentrix	3,873	11,685	14,592	17,247	-67.31%	-1.39%	23.15%	45.55%
Conectiv	5,775	51	6	7	295.62%	-96.51%	-99.59%	-99.52%
CONSTELLATION ENERGY GROUP	19,822	23,597	24,522	29,101	-18.30%	-2.73%	1.08%	19.95%
Corn Belt Power Coop	133	68	84	104	36.76%	-30.08%	-13.62%	6.94%
DAIRYLAND POWER COOPERATIVE	6,425	6,417	7,937	5,915	-3.72%	-3.84%	18.93%	-11.37%

Table 4. 2015 Parent Company Allocations

Parent Company	Allocations to 2015 Parent Companies				Difference from Mean			
	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
Delta Power Company	614	1,160	1,501	1,923	-52.74%	-10.74%	15.50%	47.98%
Dominion	63,934	69,105	76,424	86,685	-13.65%	-6.66%	3.22%	17.08%
DPL INC	33,637	24,523	30,159	37,580	6.87%	-22.09%	-4.18%	19.40%
DTE ENERGY CO	73,987	55,547	66,196	50,841	20.03%	-9.89%	7.39%	-17.52%
Duke	58,320	53,891	63,684	78,854	-8.43%	-15.38%	-0.01%	23.81%
Dynegy	45,218	31,203	34,448	42,385	18.02%	-18.56%	-10.09%	10.63%
EAST KENTUCKY POWER COOPERATIVE	13,787	12,054	14,542	18,137	-5.76%	-17.61%	-0.60%	23.97%
Edison International	61,922	56,384	66,260	47,292	6.83%	-2.73%	14.31%	-18.41%
EL PASO CORP	523	1,051	1,338	1,673	-54.34%	-8.32%	16.72%	45.94%
Empire District Electric Company	3,427	3,084	2,001	1,199	41.16%	27.03%	-17.58%	-50.61%
ENERGY EAST CORPORATION	3,104	2,051	2,598	3,389	11.43%	-26.37%	-6.73%	21.67%
Entergy	14,383	62,169	8,371	7,145	-37.51%	170.10%	-63.63%	-68.96%
Exelon	22,376	14,472	7,225	9,050	68.48%	8.97%	-45.60%	-31.86%
First Energy	76,935	52,885	64,927	74,519	14.29%	-21.44%	-3.55%	10.70%
FPL	41,945	61,736	16,274	18,151	21.49%	78.81%	-52.87%	-47.43%
Grand Haven City of	520	449	556	700	-6.52%	-19.28%	-0.04%	25.84%
GREAT PLAINS ENERGY	24,195	14,469	17,125	8,306	50.99%	-9.70%	6.87%	-48.16%
Henderson City Utility Comm	284	46	57	71	148.03%	-59.83%	-50.22%	-37.99%
HOLLAND BOARD OF PUBLIC WORKS	577	338	311	392	42.65%	-16.44%	-23.11%	-3.09%
HOOSIER ENERGY REC INC	12,973	12,291	15,117	18,851	-12.39%	-17.00%	2.09%	27.30%
JEA	15,010	19,585	19,870	20,345	-19.74%	4.72%	6.24%	8.78%
KeySpan	22,359	22,544	7,135	8,401	47.98%	49.20%	-52.78%	-44.40%
LAKELAND ELECTRIC	4,501	5,344	4,717	5,793	-11.55%	5.02%	-7.31%	13.84%
Lansing City of	6,097	3,667	4,545	3,986	33.30%	-19.83%	-0.63%	-12.85%
LGE	67,996	67,628	79,279	93,788	-11.89%	-12.37%	2.73%	21.53%
Lower Colorado River Authority	239	5,434	8	93	-83.44%	276.45%	-99.45%	-93.56%
Madison Gas & Electric Co	382	906	920	1,023	-52.71%	12.16%	13.90%	26.65%
MANITOWOC PUBLIC UTILITIES	603	440	545	262	30.38%	-4.86%	17.84%	-43.35%
Marquette City of	176	461	572	277	-52.62%	24.09%	53.97%	-25.44%
MCDERMOTT INTERNATIONAL	394	678	863	1,080	-47.77%	-10.04%	14.51%	43.30%
Michigan South Central Pwr Agy	635	535	664	803	-3.68%	-18.85%	0.72%	21.81%
Mid-America Energy	23,037	28,307	34,617	16,590	-10.14%	10.41%	35.02%	-35.29%
Mirant	50,609	32,507	31,345	38,628	32.23%	-15.06%	-18.10%	0.93%
MORA-SAN MIGUEL ELECTRIC CO-OP	5,828	4,104	5,556	3,035	25.85%	-11.38%	19.98%	-34.46%
MUSCATINE POWER & WATER	1,188	2,247	2,764	1,324	-36.83%	19.47%	46.96%	-29.60%
Nisource	17,746	23,627	28,708	26,146	-26.23%	-1.79%	19.33%	8.68%
Northampton Generating Company LP, Cogentrix, and Foster Wheeler	422	1,007	1,282	617	-49.23%	21.02%	54.06%	-25.85%

Table 4. 2015 Parent Company Allocations

Parent Company	Allocations to 2015 Parent Companies				Difference from Mean			
	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
NRG Energy	35,664	30,946	32,967	28,213	11.63%	-3.13%	3.19%	-11.69%
ORLANDO UTILITIES CO	4,184	7,401	9,353	11,986	-49.17%	-10.08%	13.63%	45.62%
Otter Tail Corp	10,701	1,214	1,503	722	202.72%	-65.66%	-57.48%	-79.58%
OWENSBORO MUNICIPAL UTILITIES	3,162	4,041	5,007	6,158	-31.14%	-12.00%	9.04%	34.10%
Pella City of	617	190	233	112	114.24%	-34.03%	-19.10%	-61.11%
PG&E CORP	5,764	1,034	1,317	1,647	136.18%	-57.63%	-46.04%	-32.51%
Power Authority of State of NY	2,258	5,329	1,334	1,587	-14.05%	102.85%	-49.22%	-39.59%
PP&L	57,246	23,613	27,947	34,549	59.73%	-34.11%	-22.02%	-3.60%
Progress Energy	86,899	74,854	74,391	92,804	5.67%	-8.98%	-9.54%	12.85%
Reliant	90,507	67,805	71,504	88,976	13.56%	-14.92%	-10.28%	11.64%
Reynolds American Inc.	2,031	988	1,231	1,523	40.73%	-31.54%	-14.71%	5.53%
RICHMOND POWER & LIGHT	3,131	923	1,142	1,424	89.18%	-44.23%	-31.00%	-13.96%
San Antonio Public Service Bd	15,228	20,420	16,826	9,322	-1.43%	32.18%	8.91%	-39.66%
SCANA CORPORATION	21,516	21,059	25,407	31,869	-13.81%	-15.64%	1.78%	27.67%
SCHUYLKILL ENERGY RESOURCES	1,258	1,178	1,500	722	8.03%	1.16%	28.81%	-38.00%
SEMINOLE ELECTRIC COOPERATIVE INC	12,894	12,663	15,005	18,500	-12.67%	-14.24%	1.62%	25.29%
SEMPRA ENERGY	2,475	9,188	3,831	2,195	-44.03%	107.77%	-13.37%	-50.36%
SOUTH CAROLINA PUBLIC SERVICE AUTH.	15,105	24,445	29,262	36,696	-42.73%	-7.32%	10.94%	39.12%
SOUTH MISSISSIPPI ELECTRIC POWER ASSOC.	3,574	3,541	3,556	4,848	-7.88%	-8.73%	-8.34%	24.96%
Southern	255,467	203,816	239,213	257,795	6.86%	-14.75%	0.06%	7.83%
Southern Illinois Power Coop	2,912	2,158	2,705	3,384	4.38%	-22.65%	-3.04%	21.30%
Springfield CWLP	6,274	7,036	8,626	7,434	-14.55%	-4.17%	17.48%	1.25%
SUEZ ENERGY INTERNATIONAL	390	3,493	4,518	2,316	-85.45%	30.37%	68.63%	-13.56%
Tallahassee City of	2,121	2,619	4	39	77.38%	119.03%	-99.67%	-96.74%
TECO ENERGY INC	29,380	21,281	26,556	30,462	9.14%	-20.95%	-1.35%	13.16%
TEXAS MUNICIPAL POWER AGENCY	4,866	3,653	4,945	2,701	20.41%	-9.61%	22.36%	-33.16%
Tondu Corporation	177	672	834	1,049	-74.07%	-1.61%	22.10%	53.58%
TRIGEN ENERGY CORP	305	744	943	473	-50.53%	20.74%	53.03%	-23.24%
TVA	145,695	129,649	158,219	193,448	-7.05%	-17.29%	0.94%	23.41%
TXU	86,685	87,160	71,906	39,836	21.41%	22.08%	0.71%	-44.20%
UGI CORPORATION	791	459	535	361	47.44%	-14.45%	-0.28%	-32.71%
VECTREN CORP	7,164	8,012	9,700	12,097	-22.49%	-13.32%	4.94%	30.87%
WE Energies	30,030	29,933	36,518	25,188	-1.27%	-1.59%	20.06%	-17.19%
Wheelabrator Technologies Inc.	446	564	718	345	-13.93%	8.82%	38.54%	-33.43%
WPS	12,947	13,054	15,241	8,883	3.32%	4.17%	21.62%	-29.11%

Table 4. 2015 Parent Company Allocations								
	Allocations to 2015 Parent Companies				Difference from Mean			
Parent Company	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type	EPA	Heat Input	Heat Input & Fuel Factor	Heat Input & Fuel Factor, Coal Type
WYANDOTTE DEPARTMENT OF MUNICIPAL Services	383	492	569	276	-10.93%	14.42%	32.33%	-35.81%
XCel Energy	43,332	58,973	67,844	34,743	-15.41%	15.13%	32.45%	-32.17%
Average					12.49%	3.10%	-2.83%	-12.76%
Percent Positive					52.78%	34.26%	55.56%	43.52%

Table 5. Percent of Region-wide Budget for 24 CAIR States under EPA's CAIR Approach and Alternatives (Data Used To Generate Cumulative Distributions)

State	EPA Title IV	Average (Pure) Heat Input	Heat Input w/ Fuel Factors	Heat Input w/ Fuel Factors & Coal Type	Average Heat Input Coal + Oil	Average Emissions	Average Output All	Average Output Fossil
Alabama	4.4%	4.7%	5.4%	5.9%	4.7%	5.0%	4.7%	4.2%
District of Columbia	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Florida	7.0%	8.5%	6.3%	7.6%	7.3%	6.0%	7.2%	7.7%
Georgia	5.9%	4.5%	5.3%	6.0%	4.5%	5.2%	4.5%	4.2%
Iowa	1.8%	5.1%	6.1%	5.0%	2.3%	1.4%	1.5%	1.8%
Illinois	5.3%	7.2%	8.8%	9.0%	5.2%	4.7%	6.6%	4.4%
Indiana	7.0%	2.1%	2.7%	1.4%	7.5%	8.6%	4.6%	6.2%
Kentucky	5.2%	5.4%	6.7%	8.2%	5.8%	5.8%	3.5%	4.5%
Louisiana	1.7%	3.7%	1.8%	1.1%	1.5%	1.1%	3.4%	3.6%
Maryland	2.0%	1.9%	2.1%	2.6%	2.0%	2.7%	1.9%	1.7%
Michigan	4.9%	4.7%	5.0%	4.2%	4.3%	3.7%	4.1%	4.2%
Minnesota	1.4%	2.1%	2.5%	1.3%	2.2%	1.0%	1.9%	1.7%
Missouri	3.8%	1.5%	1.1%	1.2%	4.1%	2.4%	2.9%	3.4%
Mississippi	0.9%	4.0%	4.8%	2.6%	1.1%	1.2%	1.6%	1.6%
North Carolina	3.8%	4.4%	2.4%	3.0%	4.3%	4.7%	4.5%	3.8%
New York	3.7%	4.1%	5.0%	6.2%	3.4%	2.7%	5.3%	3.9%
Ohio	9.2%	7.1%	8.8%	10.9%	7.5%	12.2%	5.4%	6.5%
Pennsylvania	7.6%	6.6%	7.9%	9.5%	6.9%	9.5%	7.4%	6.1%
South Carolina	1.6%	2.2%	2.6%	3.3%	2.2%	2.1%	3.4%	2.0%
Tennessee	3.8%	3.3%	4.1%	4.9%	3.5%	4.0%	3.5%	3.0%
Texas	8.9%	16.9%	10.5%	6.2%	9.0%	6.0%	13.9%	16.6%
Virginia	1.8%	2.5%	2.8%	3.5%	2.5%	2.3%	2.8%	2.3%
Wisconsin	2.4%	4.8%	6.0%	7.6%	2.8%	2.0%	2.2%	2.2%
West Virginia	6.0%	2.7%	3.3%	2.0%	5.2%	5.8%	3.4%	4.5%

Source: EPA, 2006

Appendix C: Commenter Information Summary Table

Company	Preferred Allocations Approach	Best Allocation Approach (in terms of coverage)	2010: Emissions – Allowances	2010: Cost of Allowances (million 2004$)	Revenues (million 2004$)	2010: Allowance Costs as Percent of Revenue (%)	2010: Coal Capacity (GW)
AES	Updating	HI w/FF & Coal Type	17,808	12	9,463	0.1	3.2
Minnesota Power	HI w/FF (coal & oil only)	HI w/ FF	16,785	12	737	1.6	1.3
Duke	HI w/ FF	HI w/FF & Coal Type	80,328	55	16,746	0.3	8.3
FPL	Output or Simple HI	Simple HI	-56,160	-39	10,522	-0.4	0.2
JEA	HI w/FF	HI w/FF & Coal Type	-6,177	-4	1,013	-0.4	3.5
NIPSCO	HI w/FF	HI w/ FF	43,541	29	6,666	0.4	3.1
South Carolina Public Service Authority	HI w/FF	HI w/FF & Coal Type	15,221	10	1,350	0.8	2.8

2010: Total Coal Capacity by these Companies: 22.4 / Total CAIR-affected Coal Capacity: 243.8 GW = 9.2%

Note: (Emission-Allowances) are based on 2010 CAIR projected emissions and CAIR allocations. Cost of allowances are based on IPM modeling run CAIR_CAMR_CAVR available at www.epa.gov/airmarkets/mp adjusted to 2004$. Electric power revenues and capacity are based on company information given to EPA or available at company websites.
Source: EPA, 2006