SUMMARY OF AND RESPONSE TO STAKEHOLDER COMMENTS ON THE MANE-VU CAIR/CAIR+ REPORT

August 2, 2007

The report titled "Comparison of CAIR and CAIR Plus Proposal using the Integrated Planning Model (IPM®)" was posted for external review on the MARAMA website from June 4th to Jun 15th, 2007. Stakeholders were invited to comment. Two stakeholders commented on the report. Comments and responses are summarized here. In brief, the following comments were received and are summarized and addressed below:

1. Additional reductions are unnecessary to meet visibility goals.
2. Natural gas prices used in the report are unrealistic.
3. What is the technical basis for the study?
4. The OTC did not adopt CAIR+ model rules at the March 2007 meeting.
5. What is the impact of the CAIR+ policy on coal and electricity markets?
6. No evidence has been provided of visibility impacts by the facilities selected for reductions.
7. The method used to select plants for controls is inappropriate.
8. The study does not reflect the increased cost of SCR and FGD installation.
9. The stated pollutant control goals cannot be met without the installation of more control devices.
10. The study does not correctly characterize the problems encountered when permitting new electric power generation capacity.
11. The report should not be used in making policy judgments.

1. ADDITIONAL REDUCTIONS ARE UNNECESSARY TO MEET VISIBILITY GOALS

A commenter stated that the Class I areas in the MANE-VU region are expected to meet or surpass EPA's suggested "glide-path" approach for measuring progress toward meeting national visibility goals. As such, and in light of EPA's June 2007 revised reasonable progress guidance, the commenter perceives no need for MANE-VU to pursue any of the CAIR+ controls analyzed in the report.

- *Emissions from EGUs contributed substantially to regional haze in Class I areas throughout the eastern US in the 2002 base year. Therefore, states must evaluate strategies for reducing emissions from EGUs as part of their efforts to achieve reasonable progress in improving visibility at Class I areas.*
- *EPA's guidance on reasonable progress as revised in June 2007 requires states to conduct a reasonable progress analysis regardless of whether projected improvements in visibility will meet or surpass the uniform rate of progress.*

2. NATURAL GAS PRICES USED IN THE REPORT ARE UNREALISTIC

A commenter states that the report assumes a long-term decline of natural gas prices to a level of $4 per mcf by 2018 (Table 11b), one-half the current price of natural gas. Many of the proposed CAIR+ emission reductions are achieved through increased use of natural gas combined cycle generation (Table 13). The commenter states that future gas price levels in the report are equivalent to an assumption that world oil prices will drop to $30 per barrel by 2018. EIA's reference case projection for 2020 – which the commenter regards as conservative - is nearly 50% higher than projections in the CAIR+ case. [Source: DOE/EIA, 2007 Annual Energy Outlook (2007).]

The commenter provided a chart showing the price of natural gas delivered to electric utility plants over time. The commenter asserts that the escalation of natural gas prices is caused by:

1) Declining productivity of U.S. gas wells,
2) A lack of large new accessible gas reserves, and
3) Increased gas demand in the utility and other consuming sectors.

The commenter states that low gas price projections similar to those at issue here were used in modeling of the Regional Greenhouse Gas Initiative ("RGGI") in 2004. As a result of steady increases in the market price of natural gas, RGGI eventually developed alternative gas price sensitivity analyses including longer-term $6/mcf and $11/mcf projections. The commenter states that these higher gas prices substantially impacted the projected cost of implementing the RGGI greenhouse gas control plan.

The commenter recommends that MARAMA include alternative natural gas price sensitivity analyses in any subsequent version of this analysis, similar to those used in the RGGI high gas price sensitivity analyses.

A commenter states that very few of the substantial SO_2 emission reductions projected by the MARAMA CAIR+ strategy are achieved by retrofitting flue gas scrubbers. Only 17 GW of incremental scrubber capacity is retrofitted, mainly at CAVR units located outside the CAIR region (Table A3.5a). The commenter

stated that more credible projections of gas prices would significantly increase the ~$3 billion annual projected costs of the MARAMA CAIR+ proposal, and would provide a better measure of potential costs and risks.

A commenter suggests that the report projects natural gas prices that are unrealistically low, thus underestimating the cost of CAIR+. Specifically, the report says that during the next 10 years, during a time when the model predicts a substantial increase in the demand for natural gas by utilities building new gas-fired generation, the price of natural gas will fall, from $7.39/MMbtu in 2008 to about $4/MMbtu in 2018 (*see* Table 11b). This assumes the construction of new LNG terminal capacity (resulting in a significant increase in LNG import capacity), the construction of an Alaska natural gas pipeline (projected to begin operation in 2018), and increased unconventional natural gas production. It is far from certain that all these things will occur -- or that they will occur in the timeframe currently assumed by the report.

The commenter stated that the assumptions lead to serious underestimation of the costs of implementing CAIR+. The commenter stated that these assumptions should be stated clearly in the report. The commenter further stated that sensitivity runs should be performed to consider a broader range of assumptions concerning gas prices.

- *The commenter is directed to Table A3.2 of the report that provides a complete table of the natural gas supply curves used for the report. As can be seen in that table, gas prices for 2015 can range from 3.22 to 9.72 1999$/mmbtu depending on the demand for natural gas in that year. The commenter mentioned that gas prices decline to a level of $4 per mcf in 2018. This is only true because the model has predicted that the market will respond to high gas prices in previous years and install SCR and FGD systems so that natural gas does not need to be burned to comply with the caps in place at that time. In other words, the model does not fix the price of natural gas; rather a range of gas prices is used, where the price of gas is high in a scenario where demand for gas is high and low where the demand for gas is low.*

- *The natural gas supply curves used in the MARAMA study are the best that had been formulated by the Environmental Protection Agency (EPA) at the time. MARAMA agrees that it would be helpful to perform sensitivity runs to understand how the variability in gas prices might affect implementation of CAIR+, however such runs are expensive and outside the budget available to MARAMA for this study. MARAMA selected the best available gas pricing for the single run that could be completed within the available budget and time constraints.*

- *The following table compares the Henry Hub natural gas prices that were used in various IPM analyses. As can be noted from the table, when compared for the same year dollars (e.g., $2007), the values used in the*

MARAMA IPM runs compare favorably with the DOE/EIA Feb. 2007 projections and in fact are higher than the DOE/EIA Feb. 2007 projections for 2008 through 2015. This table indicates that the Henry Hub prices used in the MARAMA runs were higher than those used previously in IPM 2.1.9 and the same as those being used by EPA in IPM 3.0.

Natural Gas Prices ($/MMBtu)
Draft 06/14/07

Year	2007	2008	2009	2010	2012	2015	2018	2020	2025	2026
EPA CAIR Base Case 2.1.9 $1999	3.45	-	-	3.4	-	3.47	-	3.41	-	3.51
EPA CAIR Base Case 2.1.9 $2007	5.07	-	-	4.99	-	5.10	-	5.01	-	5.16
EPA CAIR Base Case 3.0 $2004	-	-	-	5.90	-	5.46	-	5.29	5.44	-
EPA CAIR Base Case 3.0 $2007	-	-	-	6.86	-	6.35	-	6.15	6.32	-
EPA CAIR Base Case 3.0 for RPOs $2004	-	-	-	5.90	5.75	5.44	5.13	-	5.44	-
EPA CAIR Base Case 3.0 for RPOs $2007	-	-	-	6.86	6.68	6.32	5.96	-	6.32	-
Current Henry Hub $2007	7.89	-	-	-	-	-	-	-	-	-
MARAMA Base Case $1999	-	7.39	6.98	4.82	4.75	4.15	4.01	-	-	-
MARAMA Base Case $2007	-	10.85	10.25	7.08	6.98	6.10	5.89	-	-	-
DOE/EIA Feb. 2007 Projections $2005	7.23	7.17	6.6	6.28	5.66	5.46	5.68	5.71	6.14	6.17
DOE/EIA Feb. 2007 Projections $2007	7.90	7.84	7.21	6.86	6.19	5.97	6.21	6.24	6.71	6.74

3. WHAT IS THE TECHNICAL BASIS FOR THE STUDY?

A commenter states that the report does not describe the basis for the increased surrender ratios for SO_2 allowances or reduced NO_x budgets in the CAIR+ Policy Case (Tables 3-4). The absolute levels of SO_2 and NO_x emission reductions achieved in various RPOs (Tables 8-9) suggest that MARAMA has used the Ozone Transport Commission's proposed Model Rules for CAIR+ reductions at electric generating units. These model rules proposed to retire 25% to 40% of CAIR allowances in a two-phase program. The report should clarify the air quality or other technical bases supporting its choice of emission reduction levels.

Another commenter stated that the OTC proposal called for NOx reductions of about 40% beyond CAIR (e.g., a NOx emission reduction scenario under which EGUs would reduce their 2015 NO_x emissions to an average rate of 0.07 pounds/million Btu, which is approximately 40% below the 0.125 pounds/million Btu target rate to be achieved by 2015 under EPA's CAIR program); an additional 25% reduction in CAIR-state SO_2 emissions; and the installation of more SO_2 controls on EGUs outside the CAIR region (i.e., controls on non-CAIR-state EGUs that have capacity greater than 200 MW and that are at least potentially subject to EPA's CAVR). The commenter stated that to comment meaningfully on the conclusions of the report, it is essential that the key emission reduction assumptions in the report be spelled out clearly.

- *The IPM runs in this analysis built on the accepted IPM framework developed for EPA's analysis of its CAIR proposal and the subsequent updates made for the inter-RPO VISTAS IPM runs. The input assumptions that differ from the inter-RPO VISTAS run of the IPM model are specified in the report and were*

designed to simulate a CAIR+ program similar to that being discussed by the OTC and other surrounding states.

- *The CAIR+ scenario is intended to provide additional insight into the feasibility of implementing the OTC's multi-pollutant proposal or a similar proposal. The scenario provides an indication of the effect of lowering pollutant caps below the existing USEPA CAIR caps.*

4. THE OTC DID NOT ADOPT CAIR+ MODEL RULES AT THE MARCH 2007 MEETING

A commenter notes that the OTC did not adopt CAIR+ Model Rules for EGUs at its March 2007 Special Meeting. Instead, the OTC developed a Memorandum of Understanding focused on controlling emissions from CAIR and non-CAIR sources on High Electric Demand Days (HEDD). The HEDD MOU was developed after an extensive stakeholder process aimed at identifying stationary emission sources contributing to high ozone levels along the I-95 Corridor. The HEDD MOU provides target NOx reductions for certain states to achieve through state-determined processes. This commenter supported the development of the HEDD MOU.

A commenter states that in any consultations MANE-VU should acknowledge to the other RPOs that although the OTC did evaluate a possible CAIR+ approach, the OTC and OTC member states have not adopted such an approach.

- *The High Electric Demand Day (HEDD) MOU is another strategy intended to address high pollutant concentrations. Implementation of that strategy does not eliminate the possibility of implementation of the CAIR+ strategy as well.*

- *While neither the OTC nor MANE-VU have adopted model rules for a CAIR+ program, the states remain interested in working with EPA and stakeholders to strengthen CAIR. In view of the continuing importance of annual SO_2 emissions from EGUs in impairing visibility in eastern Class I areas, the many restrictions on individual state action under the CAIR program, and the need for a broad regional approach, the MANE-VU member states have approved a statement that calls upon EPA to work with the states to strengthen CAIR.*

5. WHAT IS THE IMPACT OF THE CAIR+ POLICY ON COAL AND ELECTRICITY MARKETS?

A commenter states that the report should identify the impact of the CAIR+ proposal on coal markets and electricity rates. The large SO_2 reductions called for by MARAMA's proposal suggest the possibility of substantial switching from low- and medium-sulfur coals at unscrubbed CAIR units to ultraslow sulfur coals (e.g., <0.8 lb. SO_2/MMBtu). The commenter states that this could discriminate against coal-producing states such as Alabama, Pennsylvania, West Virginia,

Ohio, Virginia, Kentucky, Indiana and Illinois. The commenter states that RPOs should not encourage policies that risk major coal market distortions, or create competitive imbalances.

- *Evaluation of these impacts is beyond the scope of the current study.*

6. NO EVIDENCE HAS BEEN PROVIDED OF VISIBLITY IMPACTS BY THE FACILITIES SELECTED FOR REDUCTIONS

The commenter notes that the basis for the selection of plants to be retrofitted with FGD controls is "All CAVR eligible, unscrubbed, non-CAIR and non-WRAP affected sources larger than 200 MW" The commenter objects to this approach to select units for the installation of FGD and SCR controls. Furthermore the commenter stated that the analysis includes proposed controls on power plants outside the CAIR region (Tables A3.5a, A3.5b) including dozens of units in the CENRAP and WRAP regions. The commenter states that no air quality evidence is presented to show that the selected units contribute to visibility impacts at any Class I area.

A second commenter states that the report contains no air quality evidence to show that any EGUs (including, for example, those listed in Tables A3.5a and A3.5b of the report) make a perceptible contribution to visibility impairment at any Class I area or that the level of additional emission reductions envisaged in the CAIR+ proposal are needed to achieve reasonable progress goals.

- *Visibility impacts of EGUs are not addressed in this report because they are addressed separately in other reports and documents.*

- *Emissions from EGUs have been shown to contribute to regional haze. This has been well documented in many studies, including the MANE VU Contribution Assessment, which can be found at: http://manevu.org/Document.asp?fview=Reports. NESCAUM is continuing to provide updated modeling results showing impacts of EGUs after implementation of the CAIR program, which are posted on the NESCAUM website at www.nescaum.org.*

- *In a "Cap and Trade" program like CAIR, individual facilities are not selected for control, as would be the case where BART was implemented. A cap and trade program, which is simulated by the IPM model, does not target particular facilities for controls. Rather, the model attempts to minimize costs while meeting emissions targets.*

- *However, the BART requirement exists and must be reflected in the model. For purposes of estimating the impact of the BART requirement in their analysis of the impact of the CAIR program, EPA chose to define a subset of sources as BART-eligible and then apply controls to units selected from that*

subset based on the stated criteria. This application of IPM relied on EPA's assumptions, and the list of sources to which BART controls were applied is provided in Appendices A3.5a and A3.5b.

7. THE METHOD USED TO SELECT PLANTS FOR CONTROLS IS INAPPROPRIATE

A commenter states that the statutory factors required to support BART determinations at BART-eligible sources are not addressed. The commenter states that the use of a 200-MW threshold for selecting units to be retrofitted is arbitrary. The commenter states that this grouping of sources constitutes a form of "Group BART" rejected by the D.C. Circuit in the American Corn Growers case. In this case, the D.C. Circuit struck down EPA's proposed grouping of power plants for purposes of determining their collective impact on Class I area visibility, contrary to the plant specific approach to BART determinations established by section 169A of the Clean Air Act.

The commenter states that the criteria for including non-CAIR units for the application of FGD and SCR technologies are equivalent to the Group-BART approach invalidated by *Corn Growers*. The commenter recommends that this component of the CAIR+ policy be eliminated, or restructured to comport with applicable case law and EPA regulations.

- *The CAIR+ policy evaluated in this report builds on the framework EPA developed to evaluate their existing CAIR program, and this analysis is consistent with that existing program. As noted above, EPA chose certain assumptions to use in modeling the impact of the BART requirement.*

- *BART requirements and requirements for reasonable progress in improving visibility are separate elements of EPA's regional haze rules, and both must be met. Consistent assumptions about BART were used in both the CAIR base case and the CAIR+ policy case.*

- *The assumptions used in this application of the IPM model do not change the way BART is being applied by the States and may or may not represent the actual BART requirements for any particular source. The IPM model is designed to provide regional forecasts, and results for individual sources are more uncertain than the overall regional result.*

8. THE STUDY DOES NOT REFLECT THE INCREASED COST OF SCR AND FGD INSTALLATION

A commenter stated that the report does not reflect the significant increase in the costs utility companies incur to install and operate flue gas desulfurization

systems ("FGDs") to remove SO_2 and selective catalytic reduction systems ("SCRs") to remove NOx. The recent increases in demand for emissions control systems has caused large escalations in the costs of the workforce and materials to build and operate the equipment. IPM modeling runs do not consistently reflect these increased costs. Thus, recent IPM runs done for the Lake Michigan Air Directors Consortium ("LADCO") assume that FGD capital costs are approximately $200/kW less than the actual costs utilities are encountering and SCR equipment costs are approximately $25 to $45/kW less than currently being encountered by actual purchasers of such equipment. If the IPM model runs for MANE-VU include the same unrealistically low emission control costs, then the report's estimates of the total costs of the CAIR+ approach will be unrealistically low.

The commenter stated that the assumptions lead to serious underestimation of the costs of implementing CAIR+. The commenter stated that these assumptions should be stated clearly in the report. The commenter further stated that sensitivity runs should be performed to consider a broader range of assumptions concerning the cost of installing and operating FGD and SCR systems.

- *MARAMA agrees that it would be helpful to perform sensitivity runs to understand how the variability in FGD and SCR prices might affect implementation of CAIR+, however such runs are expensive and outside the budget available to MARAMA for this study.*

- *MARAMA used the same assumptions for this study about control costs as EPA's Base Case v. 2.1.9 assumptions plus updated natural gas prices because these data were the best available at the time.*

9. THE STATED POLLUTANT GOALS CANNOT BE MET WITHOUT THE INSTALLATION OF MORE CONTROL DEVICES

A commenter states that the Report assumes that the CAIR+ SO_2 emission reduction goals can be achieved without the need for utilities in the East to install new FGD systems on a substantial amount of their capacity. (See Table 7.) This conflicts with the assessments made by others analyzing similar emission reduction scenarios.

The commenter states that further information is needed to evaluate whether any valid basis exists for the report's very low estimates of the amount of capacity that would have to operate with FGD systems to achieve the apparent objectives of the CAIR+ program. The commenter states that IPM should be re-run to analyze the cost of the CAIR+ approach if substantially more than 15 GW of capacity in the East had to install new FGD systems.

The commenter stated that the assumptions lead to serious underestimation of the costs of implementing CAIR+. The commenter stated that these assumptions should be stated clearly in the report. The commenter further stated that

sensitivity runs should be performed to consider a broader range of assumptions concerning the amount of capacity that would have to be served by new control systems, the time it takes to build new generation or install new control systems on existing EGUs.

- *The amount of FGD and SCR capacity installed was deliberately capped in 2008, 2009 and 2010 of the CAIR+ scenario in order to account for the scarcity of resources to quickly install these units in such short order. Table 2 of the report indicates the caps that were introduced to prevent the model from predicting the installation of control devices that were presumed to be beyond the capacity of the industry to provide. These caps were based in part on available information about actual planned SCR and FGD installations. The 2010 limit for FGD is intended to be similar to the level of scrubber installations under the EPA's CAIR rule.*

- *Note that for the 2008, 2009, and 2010 run years, the individual unit level decisions were not hard-wired; IPM chose to build the most economic SCRs and scrubbers up to the stated limits. As can be seen in Table 7 of the report the simulation predicts that most of the allowed capacity is installed each of those early years of the simulation.*

- *MARAMA agrees that it would be helpful to perform sensitivity runs to understand how the variability in FGD and SCR installation caps might affect implementation of CAIR+, however such runs are expensive and outside the budget available to MARAMA for this study. MARAMA selected the best available control device installation caps for the single run that could be completed within the available budget.*

10. THE STUDY DOES NOT CORRECTLY CHARACTERIZE THE PROBLEMS ENCOUNTERED WHEN PERMITTING NEW ELECTRIC POWER GENERATION CAPACITY

A commenter states that the report assumes that many power plant retirements will occur in the next 3 - 5 years and that in that same timeframe, utilities will be able to build substantial amounts of new generation to make up for the retired generation and to serve growing demand. See, e.g., Tables 12 - 14. The commenter states that this underestimates the problems encountered by utilities trying to build new generation, including well-controlled new generation. While it is true that many companies have plans to build new generation, the permitting of such generation (and construction of the generation only after all key permitting is completed) will take many more years than is assumed by the report. The commenter states that IPM should be re-run in order to take into account the much longer timeframes needed to permit and construct new generation.

A commenter states that in a world where it can take 6 to 12 months to gain the approvals necessary to construct something as beneficial to the environment as a new FGD or SCR system and where virtually all state permitting decisions can

be tied up for years in administrative and judicial challenges, it is unrealistic to conclude (as the Report does) that substantial amounts of new generation will be built and operational through-out this country in the next 3 - 5 years.

- *The IPM model utilizes the anticipated available capacity to meet projected demand. There are uncertainties in both the projections of electricity demand and in projections of when and where new capacity will be built or existing plants retired. However, the model represents the most economic manner in which future demand will be met.*

- *The IPM model is designed to perform best at a national or regional level, and projections with respect to individual plants may be less accurate than aggregate forecasts. MARAMA agrees that it is unlikely that all the shutdowns and new plants forecast by the model will actually occur.*

11. THE REPORT SHOULD NOT BE USED IN MAKING POLICY JUDGMENTS

A commenter asks for information about how the report will be used to affect policy. The commenter stated that the flaws in the report make it inappropriate for purposes of consultations with other RPOs, or for making any policy judgments about the options for CAIR+ controls it describes.

- *This report provided information that was used in MANE-VU's reasonable progress report and that was used in developing the statement approved by MANE-VU calling upon EPA to work with the states to make the CAIR program more effective in improving visibility in Class I areas.*

- *MANE-VU does not agree that this report is inappropriate for use in interstate consultations or in supporting policy judgments. It is part of a broad set of technical analyses conducted to help MANE-VU states assess what emission reduction strategies are reasonable to include in their regional haze SIPs.*