

ADVISORY COUNCIL ON CLEAN AIR COMPLIANCE ANALYSIS

Summary of Project Team Responses to July 29 Council Advisory Letter Recommendations

September 2-3, 2010 Meeting

COUNCIL COMMENT FROM JULY 29, 2010 ADVISORY LETTER	AGENCY RESPONSE	INTEGRATED OR SUMMARY REPORT REFERENCE
<p>The primary integrated report should be accessible to knowledgeable readers and provide a clear explanation of the framing, primary analytic methods, and interpretation of the study results.</p>	<p>The Agency adopted the Council's suggestion during the May meeting to accomplish this objective by developing a ~30 page summary document for non-technical audiences. The summary document then explicitly references the more detailed integrated report, which has been revised and, in the process, lengthened somewhat to address many of the other comments of the Council.</p>	<p>Addressed through summary report, no direct change to integrated report.</p>
<p>Add a discussion of lessons learned and research priorities that emerge from those lessons. Consider use of formal value-of-information approach to determine priorities. Add reflection on efforts and document lessons learned regarding allocation of effort, types of analytic tools, and other choices from which subsequent efforts would benefit.</p>	<p>Both the new summary report and the revised integrated report include sections on lessons learned and research priorities. Although we were unable to apply a formal value-of-information approach at this time, it is suggested as a future step in the summary report.</p>	<p>- Section titled, "Looking Ahead" starting on page 26 of summary report; see page 28 for mention of value-of-information</p> <p>- New section in Chapter 7 of integrated report.</p>
<p>Comparison between the results of the second and first prospective reports are helpful for understanding the implications of the new analysis, but these are likely to be of more interest to technically oriented readers, and might better appear in an appendix or subsidiary report rather than in the primary integrated report.</p>	<p>The Agency retained these discussions comparing the results of the two studies in the longer integrated report, but relegated discussion in the shorter summary report to a text box.</p>	<p>Text box is on page 18 of summary report</p>
<p>The Council suggests it is important to provide sufficient context for understanding the primary results. The estimated benefits of the CAAA are on the order of \$2 trillion per year in 2020, on the order of \$5,000 per capita or 10 percent of income. To put these benefits in context, it would be useful to summarize the extent to which they reflect improvements in air quality subsequent to 1990 and to what extent they represent preventing deterioration of air quality that is assumed would have occurred in the absence of the CAAA.</p>	<p>This is a good suggestion, and there is some information on which to base this discussion. We can readily compare emissions estimates for 1990 to those for 2020, and we have calculated aggregate PM exposure for 2000, 2010, and 2020 (but it is not possible to do it for 1990, because we did not do MATS adjustments to the 1990 CMAQ results). The integrated report includes some new text on these comparisons in the discussion of aggregate benefits in Chapter 7. There is also a brief mention of this in the summary report.</p>	<p>- Paragraph starting at the bottom of page 9 of the summary report.</p> <p>- Page 7-4, Chapter 7 of integrated report.</p>

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<p>The report could discuss the possibility that, had the 1990 CAAA not been adopted, other federal or state regulations or voluntary actions might have prevented some of the degradation that is modeled in the without-CAAA scenario, and so some of the benefits of the CAAA would have been achieved. However, it should also note that these actions would have entailed costs, and so some of the costs of the CAAA would have also been incurred.</p>	<p>The prior draft of the integrated report included discussion of this issue in Chapter 1. That discussion has not been further revised. The new summary report includes discussion of this as well. Note that this question was also raised in the August 11 AQMS call.</p>	<p>- Page 30 in the "Frequently Asked Questions" section of the summary report addresses the question directly. References to State, local, and other actions also referenced on pages 3 and 6.</p> <p>- Page 1-6 in the integrated report.</p>
<p>The report also should provide some interpretation of the distribution of benefits and costs across components, both endpoints and control measures. As already noted, the quantified benefits are dominated by PM-related mortality, but other benefits that may be large are not well quantified. A substantial share of total compliance costs is associated with measures that regulate emissions from non-EGU industry, primarily to control ozone.</p>	<p>The summary report attempts to highlight key sources and pollutants contributing to benefits and costs, but also emphasizes why it is not possible to disaggregate benefits and costs by source or pollutant. There is new language in both reports.</p>	<p>Page 25 of the summary report.</p>
<p>Council suggests providing a more comprehensive discussion of the strategy for characterizing uncertainty, explaining when different approaches are adopted, and how the approaches should be interpreted.</p>	<p>New text in Chapter 7 of the integrated report attempts to address this point directly.</p>	<p>Chapter 7 of integrated re report.</p>
<p>Council suggests that the report discuss the extent to which there is evidence supporting variation in VSL by these factors and how much effect that could have on the total benefits (see, e.g., the symposium on age-dependence of VSL in the Review of Environmental Economics and Policy).</p>	<p>This is a very helpful comment - we added discussion to the integrated report.</p>	<p>Chapter 5, starting at the bottom of page 5-19</p>
<p>It would be useful to report on the consistency between APEEP and CMAQ estimates of SO₂ concentrations. As noted above, the exposure-response functions used for materials damage appear incomplete (they do not depend on humidity and acidity) and vary substantially across materials.</p>	<p>We were unable to compare APEEP and CMAQ SO₂ results because, at the time we completed the air quality modeling, we had not anticipated completing a materials damage analysis, and we did not recover the SO₂ values from those runs. We added a footnote to the integrated report to explain. Further work on the exposure-response functions was not completed for this draft.</p>	<p>Footnote 78 on page 6-32 of the integrated report</p>

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<p>While the Council endorses the use of CGE modeling, it has concerns about the particular model and its implementation, at least as described. First, the model seems to require that consumers purchase greater quantities of market goods to maintain their utility, as opposed to paying higher prices for the same quantities (e.g., a car may provide the same utility with and without the CAAA, but costs more in the with-CAAA case because of the required pollution control equipment). One symptom that this implementation may be misleading is the result that oil consumption is higher in the with-CAAA case.</p>	<p>The issue described arose because of the method used to incorporate costs of compliance that fall in the household sector. We modified the approach to adjust the price of petroleum and fuel products, rather than the quantity. The new results are incorporated in both reports, and the changes are highlighted in the results tables of the integrated report.</p>	<p>Chapter 8 of the integrated report, particularly tables and figures on pages 8-20 to 8-25.</p>
<p>The description of the CGE model and results should be improved. First, the description of one case as “benefits-adjusted” may be easily misinterpreted - it includes the benefits of greater time availability (among the labor force) and reduced medical expenditures, but does not include the major non-market benefits represented by VSL that dominate the partial-equilibrium analysis. The Council suggests this case be described as “labor-force adjusted” or some other alternative.</p>	<p>The reports adopt the term “labor force-adjusted” in lieu of the label “benefits-adjusted” used in the preliminary draft of the full integrated report. We also we specifically noted the omission of the non-market benefits represented by VSL in both reports.</p>	<p>Throughout Chapter 8 of the integrated report, also carried through all relevant discussions in the summary report.</p>
<p>Second, there should be more comparison between the cost estimates from the CGE model and the direct cost estimates including discussion of the various factors that account for the differences (e.g., labor/leisure tradeoff, tax interaction effects, changes in investment). This comparison would elucidate the types of adjustment that are incorporated in the CGE but not the direct cost estimates, and clarify which are the most important.</p>	<p>We made the suggested addition to the integrated report.</p>	<p>Page 8-19 of the integrated report.</p>
<p>Suggestions from the EES included revising the presentation of acid deposition estimates and correcting the units for the W126 ozone measure.</p>	<p>We made both recommended changes. Acid deposition is now characterized in units of equivalentents per hectare.</p>	<p>Pages 6-12, 6-13, and 6-16 of the integrated report</p>
<p>It would also provide helpful context to compare the simulated air quality with and without the CAAA with actual air quality in prior years (e.g., 1960, 1970, 1980) and particular locations (e.g., the six cities included in the Harvard cohort study).</p>	<p>The current drafts do not incorporate this information. One complicating factor is that monitor data for the critical PM 2.5 measure prior to 1990 is largely unavailable or, at best, available but unreliable (usually based on crude scaling of PM10 data). We did locate the PM 2.5 data from the six cities study, but we were unable to incorporate that information in this draft.</p>	

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<p>In presenting an overall summary, the project team may wish to include the benefits (and costs) of aspects of the CAAA that have not been analyzed as part of the second prospective report, but are available from the first prospective or retrospective reports. These include regulations on lead and on CFCs and other stratospheric-ozone depleters.</p>	<p>The summary report briefly mentions the relationship between the Second Prospective and the earlier reports in the series, mentioning that the Retrospective Study addresses lead phasedown and the First Prospective includes Title VI stratospheric ozone depleters such as CFCs.</p>	<p>- Page 4 of the summary report</p>
<p>The attempt to qualitatively characterize uncertainties with respect to the likely sign and magnitude of their effects, in the tables concluding each chapter, is laudable, although the Council suggests the project team may be able to better explain the magnitude (e.g., a 5 percent of net benefit cutoff for major effect may be too small given the scale of some of the uncertainties).</p>	<p>We struggled to develop options for articulating and applying a more explicit quantitative foundation for our judgments of potential significance, but in the end did not identify an acceptable strategy. Both of the current report drafts do, however, include tables that list the 15 “Potentially major” sources of uncertainty across all steps, and further discussion about which of these may be most important.</p>	<p>- Page 24 of the summary report - Table 7-6 of the integrated report</p>
<p>If the difference in risk between the with-CAAA and without-CAAA 39 scenarios is large, it may be inappropriate to use marginal estimates of rate of substitution between wealth and mortality risk. As noted above, the average per capita benefit is on the order of 10 percent of income in 2020. This value is large enough that the difference between Council advisories willingness to pay to reduce exposure from the without-CAAA scenario (compensating variation) and willingness to accept compensation to forgo the exposure reduction (equivalent variation) may be significant.</p>	<p>We have not incorporated this comment – it is probably too detailed for the summary report –which focuses more on results and interpretations and less on methodological details—but we have nevertheless added some discussion of a similar, less technical point in the summary report.</p> <p>While we acknowledge that the average estimated per capita benefit is large compared to income, there is no alternative value in the literature to reflect a non-marginal change, and we are not clear what other information should be added to the report.</p>	<p>Page 31 of the summary report</p>
<p>Estimates of the slope of the concentration-response function for PM and mortality are based on two well-studied epidemiological cohorts and an expert-elicitation study. The Council agrees with its Health Effects Subcommittee that these studies are a good foundation for the health benefit estimate for PM. The evidence concerning this parameter could be bolstered by discussion of several additional epidemiological studies (e.g., the Medicare cohort and the Nurses’ Health Study).</p>	<p>We added discussion of the epidemiological studies cited. The provided references were very helpful.</p>	<p>Page 5-11 of the integrated report</p>

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Although the possibility of differential toxicity among PM components could be an important issue, the Council concludes that the state of knowledge does not permit a useful sensitivity analysis at this point. However, the Project Team might discuss the extent to which there are large differences in the CAAA-related reductions for different PM components and to indicate whether differential toxicity could have a major effect on estimated benefits.	Research on differential toxicity is highlighted in both reports as a high priority. In addition the summary report includes a new discussion of the issue in the "Frequently Asked Questions" section.	- Page 31 of the summary report. - Chapter 7 of the integrated report
Consider alternative specification for visibility that only considers nighttime hours.	We were unable to perform this calculation for this draft.	
Most of the direct cost estimates are based on an engineering approach that may reflect ideal operating conditions and fail to capture input-substitution possibilities. For some components (e.g., EGUs), econometric estimates of the cost of compliance with at least part of the CAAA (Title IV) are available and could be usefully compared with the simulated results.	We added a new discussion in the direct cost chapter that references the Ellerman et al. and Carson et al. econometric estimates of Title IV compliance, and compares them to our estimates for Title IV.	Page 3-9 in the integrated report.
The justification for using different learning curves across different industries comes from estimates found in the empirical literature. The literature, however, is based on technologies that are more than 20 years old, and may not be relevant for the purposes of this study. Furthermore, there is some question as to what, exactly, is captured by the "learning curve" effect. A more straightforward approach would be to call this effect "technological change," and to use a single rate for all industries as there may not be enough evidence to justify different rates across industries.	We acknowledge that a substantial portion of the learning curve literature is based on older technologies. We are reluctant to label this effect as technological change, however, which could be interpreted as covering a much broader category of adaptive actions and induced technological change in response to regulation. Sensitivity analyses for this parameter were conducted and included in the direct cost report (including omission of learning effects), and are mentioned in the newly added uncertainty analysis section of Chapter 7.	Chapter 7 of the integrated report.
The direct cost methodology employed assumes very specific optimizing behavior by polluters. This assumption should be addressed in the uncertainty section. If polluters do not optimize in the manner assumed (which could very well be the case), the direct costs may under-estimate the true costs of compliance.	We acknowledge the validity of this point, and we added a mention in the uncertainty section of the integrated report.	Chapter 7 of the integrated report.
The document implies that the specific sequence of controls is important to the estimates of costs. If the sequence is imposed only to avoid double-counting of emissions controls, however, that should be made explicit in the document.	The sequence of controls can be important because of site-specific variation in costs. National rules and locally adopted measures rely on the same database of costs, however, so this is not a critically important factor. In light of this, we were unclear as to how to modify the document to address the Council's point.	

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The document should more clearly describe how the \$15K figure was developed for the cost of unidentified local controls	The underlying direct cost report notes that the \$15K figure is based on examination of the AirControlINET database and our knowledge of measures that have been applied in SIP preparation. The importance of this parameter led us to feature new research in this area as a high priority for follow-on to the project.	Research priorities section in Chapter 7 of the integrated report.
The dynamic population model is a significant advance over conventional static methods for estimating consequences of changes in mortality risk, especially when they are as large as those estimated for the CAAA. The Council encourages further development of this approach.	Updated life years lost and life expectancy results from the population simulation model were added to the integrated report.	Page 5-23 to 5-25 in integrated report
The benefits of decreased ozone exposures are based on fairly well-understood concentration-response relationships that indicate improved yields in specific agricultural crops and commercial timber species (see the EES report). The draft prospective report indicates that these changes in yield will be valued using the Forest and Agricultural Sector Optimization Model (FASOM), which allows optimization across crops and between agricultural and timber land uses. However, FASOM results were not available for the Council's May meeting. The Council expects that a more detailed description of the model, and the model results, will be provided in the next version of the integrated report so that the details of the methodology can be evaluated.	<p>The FASOM modeling of agricultural and commercial timber effects is now complete and the results incorporated in both the integrated report and the summary report. Monetized benefits for this endpoint in 2020 were approximately \$11 billion.</p> <p>Additional information on the FASOM model, including full documentation of the model itself and citations for recent applications of the model, is available on request. The model is currently undergoing and EPA-sponsored external peer review.</p>	<p>- Pages 6-22 to 6-24 of the integrated report</p> <p>- Summary benefits tables in Chapter 8 of the integrated report.</p>
The Council is impressed with the scale of effort the EPA Project Team has devoted to the series of Section 812 reports. It encourages the team to reflect on these efforts and to document lessons learned regarding allocation of effort, types of analytic tools, and other choices from which subsequent efforts would benefit.	The summary report includes a section that is directly responsive to this comment.	"Looking Ahead" section beginning on page 26 of the summary report.
<i>Other significant changes implemented for this revised draft</i>		
	We added an expanded discussion of the MATS results that was prompted by comments from the AQMS at their August 11 teleconference. We also replaced the CMAQ results presented in map form in that chapter with MATS-adjusted CMAQ results, so there is direct correspondence with the measures used in the benefits analysis.	Chapter 4 of the integrated report, starting at page 4-10

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	Chapter 7 of the integrated report was significantly amended to include a discussion of the strategy and results for uncertainty analyses, along with a brief section on lessons learned and implications for future research priorities	Latter half of Chapter 7 of the integrated report.
	Placeholders for future updating that were included throughout the prior draft of the integrated report were replaced with updated data and discussions that reflect the adjustments to the PM emissions data, adjustments to CMAQ results, the re-running of the MATS procedure, and the recalculation of health effects and monetized valuation results.	Various places in the integrated report
<p>Note: Not all text of the Council letter prompted a response. Only those comments that specifically suggested modification of the integrated report, or made recommendations on the most effective presentation of information, are listed here.</p>		