Global Change Scenarios: Their Development and Use
Synthesis and Assessment Product 2.1b, US CCSP

Responses to comments from discussion in CPDAC meeting, August 18, 2006

(Note: Comments are excerpted from meeting minutes, as posted.)

November 1, 2006

Busalacchi said that he did not understand where the three U.S. models discussed in Part a fit in with the Hadley Centre models used in Part b. There is a British program that uses a variety of models. Most models are using the SRES scenarios.

> **Response:** Part B reviewed historical experience with scenarios, which has used multiple climate and energy models. Part A has produced new scenarios, using three current-generation energy-economic models.

Hawkins pointed out that, in the Executive Summary, on page 11, it says that "scenarios should be global in scope and century-scale in time." That may be misinterpreted to apply to all models and needs qualification. Also, in regard to the comments calling for a more probabilistic approach, nations are often not able to respond to a threat unilaterally; rather, they assess strategic alliances with scenario analysis, which is done for these high-risk decisions without high quantification.

> **Response**:
> 1) The text has been edited to clarify the recommendation that scenarios extend a century or more into the future, but also include nearer-term descriptions for those analyses that require them.
> 2) While many scenario exercises in the security field seek to probe the implications of alternative strategic choices by specific other actors, this situation is relatively uncommon in climate-change uses of scenarios. One major exception is use of scenarios to formulate national mitigation strategies, in the context of mitigation choices being made by other major nations. Although there is no publicly available instance of scenarios yet being used in this way, the report does discuss their potential value and some of the requirements of doing them.

Pizer said that the report is an incredible effort. The extent to which scenarios are used for input into another analytical process involves visions of the future. An end user cares about what happens 10 years from now and how the available options will be altered.

> **Response:** The report stresses the importance of scenarios being both:
> 1) periodically updated as knowledge and capabilities change and new decision problems must be addressed, and
> 2) subjected to systematic, retrospective evaluations that have been lacking thus far.

Gutowski said that there is a disconnect among scenarios and modelers and users. There could be more substantive integration among these groups.

> **Response:** the report stresses the importance of effective communication among the diverse areas of knowledge participation in scenario development, and between scenario producer and users.

Edmonds asked what that "permanent capacity" suggested by the SAP 2.1.b writing team might be. Might it be integrated assessment? That could develop decision-making tools. One could have a steady scenario development. He would see the tools as useful, but was not sure that constantly changing scenarios would be helpful.

> **Response**: The section of the conclusions recommending establishment of a program to support scenario methods has been extensively revised based on the discussion at the CPDAC meeting and further discussions among the author team. The revised text sharpens substantially what is recommended, and pays more attention to the pitfalls to be avoided in establishing such a new program.

Winkler had some terminology issues and asked if they could be clarified in the report (e.g., between scenarios and projections). This will be an issue in SAP 3.1 and SAP 3.2, also. Are the model results a scenario or projections? Another issue is climate change versus emissions and global climate change scenarios.

> **Response**: The report discusses the not always sharp distinctions between projections and scenarios in Section 1.1. In addition, the recent edits increased the consistency of usage throughout the report.

Flannery had hoped that this report would demystify scenarios. However, it often descends into heavy terminology. The Subcommittee might want to divide the use of scenarios into those considered by decision analysts and those considered by insiders. Decision makers have a reference case in their heads. Scenario writers should make a reference case of where things are going and make that explicit. There is a real merit in discussing the use of reference cases. However, using the scenario to organize the assessment becomes incestuous. Also, some large assessments are done on the basis of bad assumptions. Finally, the recommendation on capacity needs to be explained much more clearly. There are other tools (e.g., integrated assessment tools) that can be used. Scenarios are context-specific.

> **Response**: Because current usage is often unclear and occasionally contradictory, the report spends some time attempting to clarify and demystify scenarios. Unfortunately, this has required drawing some rather academic sounding distinctions. The report does explicitly distinguish between scenarios used for decision-making more or less directly, and scenarios that serve as inputs to other analyses, model runs, or assessments. Sections 4.1 and 4.2, and the recommendations in 5.1, and 5.2, attempt to draw out the practical implications of this distinction. We do not agree that it is usually appropriate for scenario exercises to rely upon one reference case that is judged highly probable. In fact,

the report argues that scenario-based analysis is most useful when there is no basis for such confidence regarding important future trends. It is because scenarios can so readily be based on erroneous or biased assumptions that the report argues so forcefully for increased transparency regarding the underlying reasoning and assumptions that produced scenarios, rather than merely conveying the contents of the scenarios themselves. Finally, as noted in response to Edmonds' comment above, the recommendation for establishment of a new program to build scenario capacity has been substantially sharpened and clarified.

Pizer noted that nothing is exempt from politics. This report needs to communicate. Standardized emission scenarios are needed. That is a communication issue. One needs to think about the germane economic issues. Higher-resolution data may be needed in the results. This is not a trivial problem.

Response: We agree with these points, and the report addresses them.

Zhang said that one might want to refer to conditional probability in regard to scenarios.

Response: We agree, and the report addresses this point, in particular as regards making climate-change scenarios conditional on specified emissions scenarios.

Keith said that there are times when people need a set of references. One can look at how people thought 25 years ago and see how little they knew. People are probably not that much better at viewing the future now.

Response: The report discusses the risks of over-confidence in some detail, and does not recommend that scenario exercises adopt a single highest-priority reference case.

Miller asked how one prioritizes among uncertain scenarios.

Response: The report argues that this should be achieved through consultation and negotiation between those producing scenarios and those using them – or, in those cases when the set of all potential users is too large and diverse to involve directly, between producers and an appropriately diverse and representative group of potential users.

Yohe stated that one view is that everything is so inadequate that one cannot do anything. One of the clients that is not addressed is the research community itself. It is there that an infrastructure would pay off. The emphasis on the decision maker focuses on someone who needs something else. One learns from the improvements of scenarios. … The inability to craft scenarios cannot be allowed to cripple decision making.

Response: One uses scenarios when decisions are being made, or must be, and uncertainty is too deep for conventional decision-analytic methods to be of much use. That is, an inability for decisions to wait upon more complete and precisely

specified information is one of the indicators for the potential value of scenarios. Although the report has not addressed the question of what climate-related decisions need to be made immediately, the report's recommendation for development of scenario methods is not intended to provide justification for delay when the need for near-term decisions or actions is evident. Rather, the report argues for a strongly adaptive approach to developing scenario-related capabilities: undertaking near-term activities that serve clear needs or promise potentially valuable new approaches, and progressively evaluating these and adapting the endeavor to allow more useful subsequent scenario-related activities. The revised report has added a more explicit statement that the need to improve scenario methods does not provide general justification for delaying decisions to the final concluding point in Section 5.1.

Reilly said that the report raises good issues: If one creates capacity to create scenarios, does one produce separation between institutions? Do generic scenarios separate one from the users?

Keith shared Reilly's concern. A centralized office that serves everyone and therefore no one is not wanted. What is wanted is a group to focus on history, process, and pitfalls.

> **Reply (to both Reilly and Keith):** The revisions have stressed that the report is are not recommending establishment of a "Scenarios Central" office that would (impossibly) attempt to provide all scenarios for all purposes. In fact, supporting methods development, convening ongoing evaluations, and building and sustaining relationships among research, analytic, and user communities are among the primary roles of the scenario program that the report recommends.

Burkett noted that there is a tension between efficiency and specific needs of users. The National Park Service is using the National Assessment for long-range plans for several national parks. The Department of Transportation needs to know how climate change will affect a highway in California.

> **Reply**: We agree, and the report stresses the need for scenarios that meet users' needs for particular variables, scale, and time horizons.

Flannery suggested that what is being asked for is a capacity for agencies to ask for scenarios to help in long-range planning, not an ability to construct scenarios.

> **Reply**: We agree, and this observation is consistent with the recommendation in the revised report. The proposed program would seek to advance methods and the ability to develop and use scenarios, but would not develop scenarios itself.