

Global-Change Scenarios: their Development and Use US CCSP Synthesis and Assessment Product 2.1b

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Author team responses in italics:

Although I have the highest regard for the authors, I have somewhat mixed feelings about this draft report on “Global Change Scenarios: Their Development and Use.”

On the one hand, it is a highly professional piece of work: expert in every way, as well-informed about its topic as any such report could be, thorough, and well-written. What has been done here is very well-done indeed.

On the other hand, I have three general concerns:

1. It is not clear for what audience(s) this is intended. It comes across as a set of case study descriptions of scenario uses sandwiched between two tutorials. As an introduction to the art and science of climate change related scenarios, intended for graduate students and new-to-the-game technical staff people, it is very useful. Nothing else exists that is even remotely this good. But for people with some knowledge of the business already, it’s my guess that it is too long, discursive, and academically self-absorbed to be more than another document on the shelf – other than several of the case studies that people may not be familiar with.

The revised draft has attempted to state our two specific intended audiences more clearly and revised the text throughout to maintain consistency for these audiences. Among the resultant changes, the tutorial material has been greatly decreased in length.

2. In many cases, it addresses topics that are the subject of substantial research literatures without any references to those literatures whatsoever. Examples include decision support (2.6) and stakeholder interactions (4.3). As a general principle, it would appear that an SAP should at least provide links to such literatures where they exist.

These are vast areas of literature, which while relevant to scenarios also pertain to many other processes. The revised draft notes the existence of these literatures, and provides cites to a few of the major works in each field.

3. The report simply takes scenarios too seriously, as if they are almost always at the heart of climate science and policy analyses. To a degree not reflected in the cases described, scenario development often occurs in parallel with the analytic-deliberative process and is poorly integrated with it (although the resulting reports

may give a different impression). And then, too often, controversies about the scenarios end up undermining the credibility of assessment results that were not, in fact, very dependent on the scenarios. Frequently, at least in the world of today, the process of scenario development and refinement, especially when it is heavily quantitative, is a sidebar for decision support rather than a key building-block, which might raise questions about why it gets so much emphasis. Maybe there is a tendency to pretend to pay attention to scenarios because that seems to make an assessment process more structured and consistent, even if that is not what really happens; but there is a very real disconnect between the perspectives of scenario developers and the practices of climate change assessments. (More than two decades ago, I published a paper in an IIASA book which reported that policy analysis is used more often to support decisions already arrived at on other grounds than to decide what decisions should be.... Uses of scenarios might be yet another case of this familiar syndrome.) I'm not sure how to reflect this reality in the report, but it would help if scenarios were placed in a larger context, with a bit of humility.

All good points, although one is to some extent compelled to take scenarios seriously when tasked with writing a review of scenario methods. The revised draft has 1) more clearly distinguished scenarios from the models, analyses, and assessment in which they are used, and; 2) noted that scenarios are not the only, or in many cases even the most prominent or important parts, of these activities.

Further general comments:

4. By broadening the definition of scenarios to embrace entirely qualitative narratives, the report tends to lose focus, because so much of the discussion applies mainly to scenarios that are defined in quantitative terms. At the extreme of the use of narratives are “story lines,” like plots for a drama: e.g., the qualitative regional scenarios developed for the EU MedAction project in 2003 -- “Big is Beautiful”, “Convulsive Change”, and “Knowledge is King.” Are those sorts of things included here as “scenarios”? If not, it would be useful to indicate what the alternatives are to scenarios as ways to visualize possible futures.

The revised draft has elaborated on how we define scenarios and what activities are and are not included in our scope.

5. I would like to have seen a little more attention to challenges in developing scenarios of climate change impacts, which link knowledge bases about climate change with knowledge bases about exogenous change in impacted systems. There is a growing need for this, related to serious challenges with cascading uncertainties and – where human systems are concerned – serious challenges in developing scenarios for the human systems to go along with the scenarios of climate change (e.g., technological change, institutional change).

The discussion of scenarios for climate-change impacts assessment and decision-making, which are introduced in sections 2.6 and 2.7, have been expanded.

6. I think the report underplays the power of scenarios in “framing” climate change and other environmental discourses (as contrasted with supporting analyses) . SRES is a good example. This adds to the importance of considering who does the framing: -- i.e., how participative the process is – because the results can carry such weight.

We agree, and these points are made in the revised draft.

7. In IPCC and in most of the other SAPs, a central issue is indicating levels of confidence in the judgments being offered. Here, the conclusions summarized in Section 5 lack references back to their sources in the text (which are often judgments of the authors without other types of authority) and in general fail to differentiate, say, between (a) statements that are well-documented by case study experience, (b) statements about which the authors are highly confident even if evidence is lacking, and (c) statements that are probably true and worth thinking about – but which may not be true in all cases and/or still involve some uncertainty at this point.

In the revised draft, we have attempted to trace more clearly the foundations and support for our conclusions, and in many cases to delimit the conditions under which they apply.

A few more specific comments:

8. Page 3, lines 16-19: I think that impact scenarios will be at least as important and contentious, because discussions of emission stabilization will have to be set in a context of risks/costs of different stabilization levels.

*We agree. The treatment of impact scenarios (usually meaning scenarios **for** impacts, rather than scenarios **of** impacts – although we do consider the case of sea-level rise scenarios, which fall into the latter category) has been expanded – although it remains the case that scenarios of emissions and climate change have attracted the most prominence and controversy thus far.*

9. Page 9, lines 3-8: Also important as a stimulus for stakeholder participation.

We agree. This point has been added.

10. Page 19, Fig 2.4: I think the depiction of this process as being so linear is misleading; in fact, perspectives on impacts pay at least some attention to the kinds of feedbacks shown in Fig 2.6.

The simple linear depiction is explicitly presented as a simplified representation showing how scenarios are used, not showing all important causal linkages in the climate-change issue. In addition, Section 2.7 (and Figure 2.6) shows the more complicated causal linkages necessary for constructing comprehensive scenarios to assess impacts and vulnerability.

11. Page 29, lines 6 ff: Shouldn't this discussion reference the SAPs concerned with decision support?

We will add references to these other SAPs if citable drafts become available in time for further revisions of this report.

12. Pages 39-45: There are other issues as well (ref. F. Toth and T. Wilbanks, "Considering the Technical and Socioeconomic Assumptions Embedded in the SRES Scenario Families," *IPCC Working Group II Guidance Papers*, Fourth Assessment Report, September 2004), including:
- (1) Is this general approach to incorporating technological and socioeconomic uncertainties into GHG emission projections the best alternative? Are there other possible approaches that should be considered?
 - (2) Do the four scenario families, as described above, satisfactorily capture the range of possible global futures over the next century? Do they reflect current thinking about paths toward (and away from) sustainable development? A number of more recent efforts at narrative story-telling, some of them including quantitative projections, might be consulted about qualitative attributes, especially if any of them paint a substantially different picture than the SRES families. Examples include the U.S. National Academy of Science's sustainability transition study (1999) and multiscale scenario development at ICIS to support the MedAction project in the Mediterranean region (2003).
 - (3) Are there other ways to incorporate qualitative propositions in quantitative projections, more sensitive to fundamental differences between scenarios?
 - (4) What are the best current knowledge bases for forecasting global and regional demographic and economic change over the next century? It is not clear, for instance, that current socioeconomic assumptions are based on sound theory and data, e.g. regarding feedbacks among model elements (such as interactions between fertility and changing economic conditions and age distributions, and possible responses of consumption and income distribution to changes in trade patterns).
 - (5) How does one handle the challenge of looking at technological change well into the future, not only in energy technologies but also in other technology areas related to GHG emissions, such as materials supply and

consumer choice? For instance, how does one allow for the likelihood of significant technology breakthroughs over a one hundred year period?

- (6) Are there more systematic ways for considering and incorporating scenarios of institutional change and land-use change than were used in these SRES scenarios? For instance, how might developments in information technology change how institutions work, including across national and regional boundaries?
- (7) Are there additional ways for addressing technological and socioeconomic uncertainties that should be considered, beyond creating additional scenarios?

Several of these issues (e.g., points 2, 3, 5, and 6) are considered in the report, in particular in the discussion of the SRES exercise and in the discussion of uncertainties in scenarios. The other points (e.g., points 1, 4, and 7) either concern limitations in the underlying knowledge used to generate scenarios, or pose open-ended questions regarding whether any preferable approaches are available relative to those used in SRES. These are addressed implicitly in our criticisms of SRES, but beyond that we do not have any useful insights to offer on these.

- 13. Pages 45 ff: Regarding the National Assessment, I think this is an accurate representation of how the process looked from the top down, but it is not all that close to how it worked from the bottom up. A new NAS/NRC committee looking at assessment experiences heard several presentations a couple of weeks ago, including one from me, about lessons learned which might be considered in revisiting this section. In particular, I would encourage including in the concluding paragraph (page 54) the Dave Schimel concept of an “inverse” approach to scenario development, starting with end user questions and then developing scenarios that answer those questions.

We agree with this characterization of the National Assessment process as a whole, but this report focused only on the development and use of scenarios within the assessment, which was (and had to be) a more centralized process than the totality of the assessment activity. The report does discuss the unsuccessful attempt to use inverse scenarios in the assessment, although we suspect that the inverse approach proposed in the assessment is different from the inverse approach that the comment refers to. The inverse approach proposed in the comment refers to a more extensive process of involving users in the early development of scenarios. The report extensively discusses and endorses such involvement, but does not use the term “inverse” to describe it.

- 14. Page 62 re conclusions about MEA scenarios: In fact, the scenarios got a lot of attention from the people in that particular working group, but they were very

unevenly used elsewhere in the assessment: e.g., the subglobal component, where there was very little use of them – an example of my third general concern above.

The report does make this observation about MEA scenarios. In view of our primary mission to provide advice to inform future scenario exercises, however, we do not find it necessary to expand further upon this criticism.

15. Pages 66-68: Very useful case of uses of scenarios by decision-makers. It sort of stands out as an exception in this regard.

We agree. The revisions have retained this example, and noted more directly that the cases of effective use of climate-change scenarios in practical decision-making remain uncommon.

16. Pages 75-79: Also very useful as a demonstration that scenarios are used in the private sector by people who find them useful tools for financial risk assessment.

We agree. Same response as for point 15 above.

17. Pages 84ff: Re uncertainty in simple quantitative projections: I question the relevance of a lot of this to the broader scenario efforts that are described in the case studies – and that are in fact the norm. An example of my first general concern above.

This section has been substantially cut, in response to this and other reviewers' concerns that it was unnecessary for our intended audience.