

August 1, 2005

**Report on the Independent Peer Review of the
“Synthesis Assessment of Long-Term Climate Change Technology Scenarios”
U.S. Climate Change Technology Program**

The U.S. Climate Change Technology Program (CCTP) is a multi-agency planning and coordinating entity, led by the Department of Energy (DOE). CCTP’s principal aim is to accelerate the development of new and advanced technologies to address climate change. The research, development, demonstration and deployment (R&D) activities falling under the auspices of CCTP embody the technology component of a comprehensive U.S. approach to climate change. This approach also includes undertaking near-term actions to reduce greenhouse gas emissions intensity, advancing climate change science, and promoting international cooperation. See: <http://www.climatechange.gov>.

CCTP works within DOE and with the other R&D agencies of the Federal Government to develop and provide strategic direction for the CCTP-related elements across the entire Federal R&D portfolio. CCTP also facilitates coordinated planning, programming, budgeting and implementation of the technology development and deployment aspects of U.S. climate change strategy.

In order for CCTP to develop plans, carry out its activities, and help shape an effective R&D portfolio, its activities need to be informed by a long-term planning context potentially aided by analyses from multiple sources, and by a variety of models and other decision support tools. An important aspect of shaping this planning context is the ability to make assessments of the potential contributions that advanced technologies could make to CCTP strategic goals if their technological potentials are realized. Such assessments are complex and subject to many uncertainties.

One approach to planning under such conditions of uncertainty is scenarios analysis. Many research organizations, university-based teams, government agencies, and other groups have engaged in scenario analysis efforts to explore these topics. Acknowledging this body of work, CCTP undertook to review and synthesize the results of recent efforts in this area to gain insights on the scope of the potential technological challenge and the potential contributions of advanced technologies to guide CCTP in developing an effective technology development strategy. The result of this review was a “Synthesis Assessment of Long-Term Climate Change Technology Scenarios,” which will appear in a forthcoming preliminary CCTP Strategic Plan intended for public review and comment.

Requirement for Peer Review

Pursuant to Section V of the “Information Quality Bulletin for Peer Review” of the Office of Management and Budget (OMB), under the authority of the Information Act of 2000 (P.L. 106-554), CCTP announced, on June 10, 2005, a plan to undertake a peer review of its “Synthesis Assessment of Long-Term Climate Change Technology Scenarios.” The synthesis assessment meets the criteria for a “Highly Influential Scientific assessment” (HISA), as that term is defined in the Bulletin, primarily because it addresses sensitive matters regarding climate change, forecasted emissions of greenhouse gases, technological options for their mitigation, and opportunities for economic benefits. It also helps shape a long-term planning context for CCTP as it carries out its interagency planning and coordination activities and advises on the

formulation of a related Government-wide R&D investment portfolio, the annual amount of which is about \$3 billion.

The goal of the assessment was to review and synthesize the results of many efforts to gain insights on the technological challenge to mitigate climate-changing emissions and to identify the potential contributions of advanced technologies. The assessment is expected to be used to help guide CCTP in developing an effective technology-development strategy.

Three independent experts reviewed the synthesis assessment and provided largely favorable evaluations. The peer review began on June 13 and ended on June 30. A summary report on the results of the three peer reviews is provided below.

Results of the Peer Review

The three expert reviewers¹ concluded that the goal of the assessment was met and that the conclusions and recommendations were adequately supported by evidence, analysis and argument. They also acknowledged that the assessment well reflected the uncertainty implicit in such analysis and effectively used a scenario approach to characterize the range of uncertainty. Nonetheless, the reviewers agreed with the assessment's main conclusion that a wide-range of currently available and speculative technologies are needed to achieve large reductions in greenhouse gas emissions.

The reviewers agreed that by using a scenario approach and relying on a wide variety of published studies, the assessment reduced the need for value judgments. They conclude that the report was fair and free of "special pleading."

Notwithstanding these positive views, the reviewers did suggest areas where the work could be strengthened. However, it is important to note that further work would not likely change the synthesis assessment's main conclusion (see above) although it might provide additional insights into the relative importance of particular technologies.

One expert recommended that the PNNL MiniCAM model, used to provide many specific estimates in the synthesis assessment, be augmented with "bottom-up" technology models that have more technology detail. This expert said that this would be especially helpful since many of the most promising technologies identified in the synthesis assessment are the most speculative. Using technology-rich bottom-up models could provide more technology-specific scenarios which, in turn, could provide additional insights to help guide the CCTP strategy. This same expert questioned how the technology "winners" would be selected as part of the CCTP strategy but this question is probably beyond the scope of the synthesis assessment. Nonetheless, his suggestion to use more technology-specific scenario analysis might provide additional insights to help guide R&D investment decisions.

Another observation made by one of the experts concerned the level of emission reductions that could be achieved before 2050 and how this should affect the timing of emission-reduction policies. The synthesis assessment calls for commercialization of new technologies between 2020 and 2040, with demonstrations between 2010 and 2030. This expert called for more discussion of possible problems including the cooperation of developing countries, participation by industry and resistance to higher energy prices.

¹ Leo Schrattenholzer (IIASA, Vienna), Dolf Gielen (IEA, Paris) and Cedric Philibert (IEA, Paris).

Another comment concerned the expectation of continued efficiency improvements in the reference case in which it was observed that the high efficiency gains in the '70's and '80's have flattened out and that there may be no precedent for a sustained 50 to 100 year improvement in energy efficiency.

One expert noted that the contributions of terrestrial sequestration and mitigation of non-CO₂ greenhouse gases were relatively invariant among the scenarios. This expert questioned what the consequences for energy-sector mitigation would be if there was a reduced contribution from terrestrial sequestration. It was also noted that terrestrial sequestration assumes significant cooperation by developing countries. Additional scenario analysis with more constraints on terrestrial sequestration is suggested.

Lastly, it was suggested by one expert that there is a greater potential for solar energy for low-temperature energy services than indicated in the report and that the report also underestimates the potential role of solar concentration technologies in power production.

Contact Information

Inquiries or comments regarding the peer review may be submitted to: CCTP@hq.doe.gov , or in writing to: Director, U.S. Climate Change Technology Program, 1000 Independence Avenue, S.W., U.S. Department of Energy, Washington, DC 20585.