



# Emission Scenarios: Report 2.1

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**Climate Change Science Program Workshop:  
Climate Science in Support of Decision Making**

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Office of Science  
U.S. Department of Energy**



## Product 2.1 – Emission Scenarios

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Topic

Completion

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Updating scenarios of greenhouse gas emissions and concentrations, in collaboration with the CCTP (Part A).

Within 2 years.

Review of integrated scenario development and application (Part B).



## Schedule

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Feb 2005 Prospectus posted on CCSP web site for public comment (30 days)

Nov 2005 Final prospectus posted on the CCSP web site

Dec 31, 2005 Draft #1 provided to peer reviewers (30 days)

Mar 2006 Draft #2 made available for public comment (45 days)

Jun 2006 FACA Advisory Committee meeting to review responses

Jul 2006 Draft #3 submitted to CCSP interagency committee for review and processing through Administration

Aug 2006 Final product posted on CCSP web site



## What is a Scenario?

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- A scenario is a description of potential future conditions, which is developed to inform decision-making under uncertainty.
- Scenarios are images of the future, or alternative futures. They are neither predictions nor forecasts. (IPCC SRES, pg. 62)
- A scenario is a coherent, internally consistent, and plausible description of a possible future state of the world. (IPCC TAR WG2, p. 149)





# Study Design

## Part A

- Four stabilization scenarios roughly consistent with 450 ppmv through 750 ppmv CO<sub>2</sub>, along with one reference case.
- Long-term (many century) stabilization; study period through 2100.
- Stabilize total radiative forcing from CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, HFCs, PFCs, and SF<sub>6</sub>.
- Assumptions (e.g., population, economic growth, technological change) developed individually by the modeling teams.
- All models assume existing climate programs (Kyoto, U.S. intensity target).
- Three integrated assessment modeling teams.
- New analysis rather than synthesis of existing studies



# Products

## Part A

- Products will focus on:
  - Emissions, concentrations, radiative forcing
  - Energy systems – quantities, prices, characteristics
  - Economics
  - Land use and land use change
- Summary of the scenarios for interested non-specialists.
- Technical report that provides documentation and discussion of the scenarios.
- Cross-model data set.
  - Aggregate-level results (e.g., emissions trajectories, energy contributions over time, and population trajectories)
  - Modelers will make additional information available as appropriate
  - Disaggregated by U.S. and global results



## Audience

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1. Decision-makers and analysts to better understand the potential characteristics of futures with stabilization constraints
2. Technology planners for timing, quantity, cost, resource utilization context
3. Climate modelers for sample emission inputs
4. Impacts modelers for information on future climate, demographic, resource, economic parameters, etc.
5. Other activities that create emission scenarios (c.f. subsequent presentation by de La Chesnaye)

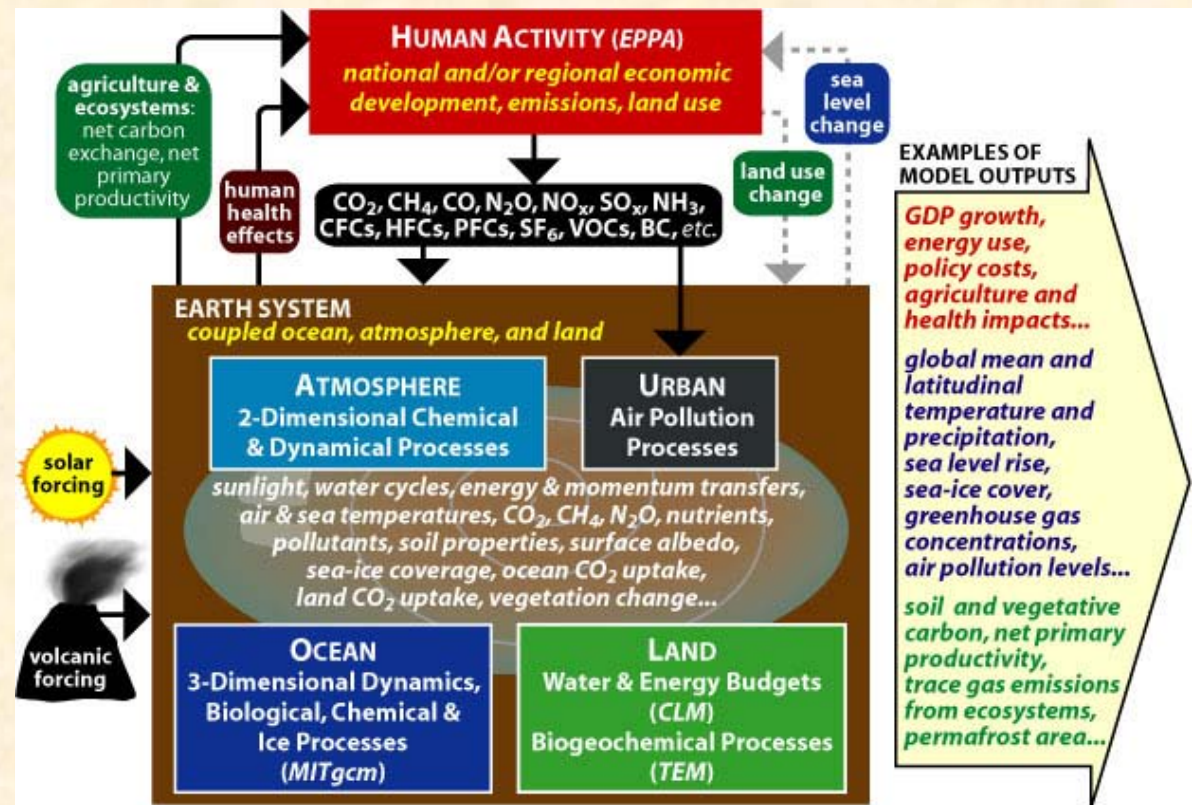


# Integrated Assessment Modeling

## Integrated Assessment Models:

Computer-based models that combine, into an integrated framework, the socioeconomic and natural processes and systems that define the human influence on, and interactions with, the global climate.

## Example: MIT Integrated Assessment Approach







## Participating Models

## Part A

- EPPA (MIT)
  - General equilibrium framework; detailed earth systems component.
- MERGE (Stanford/EPRI)
  - General equilibrium framework; full intertemporal optimization.
- MiniCAM (Pacific Northwest National Laboratory)
  - Partial equilibrium framework; detailed energy sector representation.



# Review of Integrated Scenario Development and Application

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## Part B

- Emissions scenarios
- Climate-change scenarios
- Impacts scenarios
- Socio-economic scenarios



# Objectives

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## Part B

- Review and evaluate how global-change scenarios have been defined, developed, implemented, communicated, and used
- Review specific past scenario development and application efforts
- Identify and assess key decisions, issues, and challenges
- Inform preparation and application of future scenarios



- Report of findings
- Summary for non-specialists





## Audience

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All participants in the integrated scenario development and application process, e.g.,

- ▶ Analysts charged with producing scenarios for particular users and purposes
- ▶ Designers and managers of assessment, planning, or decision support activities
- ▶ Climate modelers, integrated-assessment modelers
- ▶ Impacts researchers
- ▶ Technology planners
- ▶ Decision-makers who must use or interpret scenarios or scenario-based assessments



# Scenario Activities to be Reviewed

## Part B

- IPCC Emissions Scenarios (IS92, SRES)
- US National Assessment
  - Climate scenarios
  - Socio-economic scenarios
- Millennium Ecosystem Assessment
- UK Climate Impacts Program
- Plus other smaller-scale activities in private and public sector ...



## Issues to be Examined

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- Relationship between intended use/audience and scenario design
- Single-purpose vs. general-purpose scenarios
- Representation and communication of uncertainty in scenarios
- Scenario process: role of experts and stakeholders
- Role of scenarios in assessment design



## Lead Authors

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