Existing Models of Global Climate Change

GCAM, IMAGE, MESSAGE, REMIND, TIAM-ECN, WITCH...

IAMs (Integrated Assessment Models), GCMs (General Circulation Models)

GCMs: focus on the physical climate system alone.

IAMs:

What: is a type of scientific modelling often used by the environmental sciences and environmental policy analysis. Integrated assessment models generally include both physical and social science models that consider demographic, political, and economic variables that affect greenhouse gas emission scenarios in addition to the physical climate system.

Why build?

•To provide a coherent framework for organizing and assessing knowledge about climate change.

•To help differentiate among policy options.

•To understand which of the many uncertainties about the modeled systems are most important.

•To provide an organizing framework for conducting research.

•To help inform the research planning process.

•To garner qualitative judgments and insights into the interaction of components of the modeled systems.

Who builds?

researchers at universities, government agencies, and research institutions…This work is often supported by grants from government agencies and private foundations.

How build?

Base: IAMs are based on a multitude of assumptions about the atmosphere and oceans, land cover and land use, economic growth, fossil fuel emissions, population growth, technological change, etc.

Insightes builders garner:

•A suggestion that a ten-year delay in the implementation of greenhouse gas emission control strategies may not have a noticeable effect on society's ability to respond to the climate change problem.

•A coordinated, multi-lateral approach among nations to formulating and implementing climate change policy is likely to be more effective than a unilateral approach.

•The overall impact of global warming on the global economy may only be modest; however, local and regional impacts could still be very significant.

Recent examples of publications with contributions from IAMs:

- Special Report on Renewable Energies (IPCC, 2011)
- World Energy Outlook 2011 (International Energy Agency, 2011).
- EU Energy Roadmap 2050 (EC COM, 2011)

Limitations:

•The systems modeled are large, complex, and chaotic.

•The complexity of natural and social systems cannot be captured by IAMs.

•The full consequences of policies considered will not be known for decades or centuries.

•Large span of time, many surprises will occur.

•Scientific knowledge is incomplete or absent in many areas.

•Values of human, animal, and plant life, health, and diversity are difficult to quantify.