

The ENERGY MODELING FORUM (EMF)

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Sponsors: The U.S. Department of Energy, The U.S. Environmental Protection Agency, National Renewable Energy Laboratory, and EMF affiliate's program members

Description: The Energy Modeling Forum (EMF) was established in 1976 to provide a structured framework within which energy experts from government, industry, universities, and other research organizations could meet to study important energy and environmental issues of common interest. Each study is conducted by an ad hoc working group, which compares the results from numerous models to help understand how these models differ from each other and how they collectively can be used to improve decisions. In the process, the forum provides an interesting and productive approach for identifying future research needs that will address policymaking and corporate strategies.

Each study focuses upon a specific study. In an issues-oriented process, each working group first identifies the questions of paramount concern to policymakers and decision makers. The group decides which issues can be best addressed with available energy and environmental policy models. In a decentralized approach, each model proprietor simulates his own model according to key assumptions and standards agreed upon by the larger working group. The Forum staff provides an integrating role in comparing the results and focusing the group's discussion on the critical issues. Each study produces a short summary document for policymakers and corporate decision makers as well as a technical volume with supporting papers by participating experts.

The EMF has completed major studies on a wide range of energy and environmental problems. Final reports for EMF 19 on "Alternative Technology Strategies for Climate Change Policy" and EMF 20 on "Natural Gas, Fuel Diversity and North American Energy Markets" were published during 2004. In addition, EMF 21 on "Multi-Gas Mitigation and Climate Change." entered the publication process. Finally two new studies EMF 22 on "Long Run Climate Policy Scenarios and Scenarios in Transition," and EMF 23 on "World Natural Gas Markets and Trade" were initiated. EMF continues to run a yearly multidisciplinary workshop featuring many of the leading experts on climate change adaptation, mitigation and modeling.

The EMF 20 study on "Natural Gas, Fuel Diversity and North American Energy Markets" addresses whether the nation can rely upon natural gas as a potential bridge fuel to a more environmentally friendly future. Working with the National Renewable Energy Laboratory and Stanford's Program on Energy Sustainability and Development, the EMF has organized a set of working groups to evaluate a range of available and cost-effective technologies and options that use gas. These prospects would allow non-carbon energy sources to be developed over the next several decades. A much greater reliance upon natural gas would be possible if technology could find new ways to discover gas

resources cheaply. On the other hand, increasing reliance upon natural gas could force higher prices that would make natural gas less desirable, if gas supplies were more limited. Through model comparison and supporting analysis, the EMF 20 group explored these issues.

The EMF 21 study on “Multi-Gas Mitigation and Climate Change” seeks to evaluate the effects of including mitigation of non-CO₂ GHGs and terrestrial sequestration into climate change targets. The Non-CO₂ GHG Network, organized by the IEA Greenhouse Gas R&D Programme, the US Environmental Protection Agency, and the European Commission Environment Directorate-General, is also coordinating the study with EMF. The study includes over 20 modeling and analysis teams from 11 countries and the modeling work for it was concluded in early 2004.

In the last few years, much advancement have been made in climate policy analyses with the incorporation of non-CO₂ GHGs (methane, nitrous oxide, HFCs, PFCs, and SF₆) into economic models. The objectives of this new study group are to:

- Conduct a new comprehensive, multi-gas policy assessment to improve the understanding of the effects of including non-CO₂ GHGs and terrestrial sequestration into short- and long-term mitigation policies. The study will answer the question: How important are non-CO₂ GHGs and terrestrial sequestration in climate policies?
- Advance the state-of-the-art in integrated assessment/climate economic modeling.
- Strengthen collaboration between non-CO₂ GHG and terrestrial sequestration experts and modeling teams.
- Publish the results as a special issue of The Energy Journal.

This study has brought together the traditional EMF climate economic modelers with experts on non-CO₂ GHGs and terrestrial sequestration to foster better cross-discipline understanding and improve the overall analysis of climate change mitigation. In addition, the non-CO₂ GHG and terrestrial sequestration experts have developed new data specifically for the study in collaboration with the modelers. This data has allowed the development of global and tropical forest carbon sequestration supply curves.

The EMF 22 study will consider new climate policy stabilization and transition scenarios, as well as pushing the state-of-the-art in modeling black carbon and land use forward. About twenty modeling teams from all regions of the world have expressed interest in participating in this study.

The EMF 23 study on "World Natural Gas Markets and Trade" addresses the pending international competition for natural gas resources and its competitive future against other energy sources. A key world energy transition over the next several decades will be the extent to which natural gas can replace coal in the electric power sector as nations seek to improve the environment. The EMF is currently organizing a set of working

group meetings to evaluate a range of available and cost-effective technologies and options that produce, transport and use natural gas. These prospects would allow non-carbon energy sources to be developed over the next several decades. A much greater reliance upon natural gas would be possible if technology could find new ways to discover gas resources cheaply. On the other hand, increasing reliance upon natural gas could force higher prices that would make natural gas less desirable, if gas supplies were more limited. Through model comparison and supporting analysis, the EMF 23 group will explore these issues.

The EMF has also sponsored yearly two-week summer workshops on integrated assessment of climate change for ten years. The goal is to improve the representation of climate impacts within the integrated assessment modeling frameworks.

These workshops bring together researchers working on climate change impacts with those working on integrated assessments and modeling of climate change.

The workshops are funded by the U.S. Department of Energy, U.S. Environmental Protection Agency, U.S. National Oceanographic and Atmospheric Administration, U.S. National Science Foundation, National Institute of Environmental Studies of Japan, the Australian Bureau of Agricultural and Resource Economics, Electric Power Research Institute and ExxonMobil Research and Engineering.

These “Snowmass” workshops have been extraordinarily successful in increasing the level of interactions between the integrated assessment modeling teams, between that group and the climate impacts community and even, in some cases, among key researchers in the climate impacts community. These workshops will continue for at least another few years.

Publications:

E. Farrow, “Energy Modeling Forum Conference: Retail Participation in Competitive Power Markets,” in *Electricity Pricing in Transition*, 2002.

H. Huntington, “Market Based U.S. Electricity Prices: A Multi-Model Evaluation,” in *Electricity Pricing in Transition*, 2002.

J. Weyant, editor, on “The Costs of the Kyoto Protocol: A Multi-Model Evaluation,” Special Issue of *The Energy Journal*, 1999.

J. Weyant, editor, "EMF 19: Alternative Technology Strategies for Climate Change Policy," Special Issue of *Energy Economics*, 2004.

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