



**energy
modeling
forum**

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EMF 25: Energy Demand and Efficiency in a Growing Economy

Summary:

The Energy Modeling Forum (EMF) 25 study will evaluate energy demand in a growing economy and the opportunities for reducing electricity and fuel demand through energy conservation programs.

Major Questions:

- How does economic growth change energy service demands (household size, floor space, vehicle miles traveled and industrial mix)?
- How costly is it to substitute away from the use of carbon-based fossil fuels and petroleum?
- How do programs that improve end-use energy efficiency affect the final demand for electricity and fuels?

Motivation:

- Business-as-usual (BAU) energy demand projections are extremely uncertain, given major changes in economic growth and structure as well as recent energy price increases.
- Federal and state policies will emphasize end-use efficiency because many policymakers consider it quicker and less costly than other options.
- Energy demand options are often represented in aggregated ways in many climate change models and therefore may be less insightful for policymakers who want to promote improved end-use efficiency.

Analysis:

- Compare model results for BAU scenarios incorporating different assumptions about economic growth, energy service demands and the cost of capital.
- Compare model results for constrained scenarios incorporating different assumptions about fossil-fuel price levels and the price relationship between fuels.
- Evaluate the role of energy-efficiency improvements relative to supply-side investments in reducing greenhouse gas emissions.
- Compare (and perhaps conduct) different *ex post* evaluations of conservation programs on electricity loads.
- Collect data and document promising approaches that may facilitate the representation of important end-use technologies in top-down climate change models.
- Document the role of changing economic structure on aggregate energy intensity.

Scope¹:

- End-use energy demand sectors, excluding electric generation and petroleum refining.
- Data and model availability may initially restrict the formal model comparison to North America. Where data is available, however, current plans include extending the study's focus to other major regions where economic growth and energy demand are expanding.
- Emphasis will be on next 30 years when evaluating the penetration of existing technologies.
- Coverage will include the very long run when evaluating development of new technologies.
- Focus will be on what may happen under different conditions rather than on what government policy should do. Policy conclusions about how much energy efficiency is cost effective are unlikely, given that the study will bring together a diverse group of experts who may hold diverse opinions on the size of the energy-efficiency "gap".

Potential Modeling Systems²:

- Existing climate change integrated assessment models - e.g., MiniCAM, EPPA (MIT), MERGE, ADAGE, MS-MRT (CRA).
- Existing energy system models - e.g., NEMS, NEMS-GPRA, U.S. MARKAL, CIMS.
- Existing energy-economy models – e.g., Dale W. Jorgenson Associates IGEM, U. Maryland Inforum LIFT (Long-term Interindustry Forecasting Tool).
- Existing electricity models – e.g., HAIKU (RFF).
- Sectoral models.

Communication of Findings:

- The study will communicate these results through
 - a summary final report for policymakers,
 - a more technical volume for modelers and other experts,
 - and testimony and presentations by study group participants.
- Additionally, the EMF is planning a website covering critical data, key study conclusions, and supporting and related papers on methodology and results.

¹ Scope may change as EMF updates information about data and modeling.

² Named models are examples of systems that could be included. We hope to solicit their participation in the coming months.