

# Current Activities in the IAMC Community

# Agricultural Model Intercomparison and Improvement Project (AgMIP)

## ❖ Two main working groups

- Bio-physical models of crop/livestock production systems
- Global economic models with a focus on agriculture (mix of PE/CGE)

## ❖ Major driving issues

- Physical and economic impacts of climate change on crop and livestock production in the context of global agricultural system over the next 4 decades: how much needs to be produced? where will it be produced? how will it be produced? and impacts on food security and under-nourishment

## ❖ Major scenarios

- Efforts to harmonize across models population, GDP and yield growth
- Reference no climate change scenario—SSP2 and SSP3 (OECD)
- 1 climate change scenario (RCP 8.5 with 2 GCMs and 2 crop models)
- Aggressive 2<sup>nd</sup> generation biofuels (limited number of models)

## ❖ Schedule

- Just held 3<sup>rd</sup> Annual workshop (2<sup>nd</sup> for global economists)
- Final drafts due end-January 2013 for special issue of Agricultural Economics

The logo for the LIMITS project. It features a large, red-outlined square on the left. To its right, the word "LIMITS" is written in a bold, red, sans-serif font. The vertical line of the square is positioned such that it aligns with the first 'L' of the word "LIMITS".

# LIMITS

## Project description

**Low climate Impact scenarios and the Implications of required  
Tight emission control Strategies**



The research leading to these results has received funding from the European Community's Seventh Framework Programme FP7/2007-2013 under grant agreement n° 282846 (LIMITS)

## LIMITS in a nutshell

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LIMITS is a research programme funded by the European Commissions whose main objective is to provide an assessment of the emissions reductions strategies at the level of the world and the major global economies, and to assess their implementation in terms of:

- Defining the **feasibility space of low carbon scenarios** and the associated emission reduction pathways according to different assumptions about technology availability, policy regimes, implementation obstacles, and level of commitment at the regional level
- Assessing the **investment** requirements to implement these transformation pathways **and the financing** mechanisms such that these resources can be best raised and allocated.
- Quantifying the changes in the **energy infrastructure and land use** which major economies would need to implement to attain stringent climate policies, and assessing the feasibility and risks of such changes.
- Evaluating the linkages of climate policies with other pressing social and environmental issues such as **energy security, air pollution and economic development**.
- **Team:** FEEM (coordinator), PIK, IIASA, Univ. Utrecht, ERI-NDRC, LSE, JRC-IES, CEU, IIM, PNNL, NIES

# EMF 26 Overview

- Major Driving Issues
  - Which US energy sources will more abundant natural gas supplies replace over the next several decades? Coal, oil, nuclear, renewables, energy efficiency, other sources?
  - Which US sectors will create the demand for more abundant natural gas? Power, industrial, exports, commercial, households?
  - How do North American natural gas prices respond to expanded demand conditions?
  - Will more natural gas reduce US GHG emissions for similar abatement costs?
- EMF 26 Scenarios
  - Baseline Gas Supply: Baseline Demand, High Economic Growth and Technology Supply, Carbon Constrained, LNG exports
  - High Gas Supply: Baseline Demand, High Economic Growth, Carbon Constraint
  - Low Gas Supply: Baseline Demand
- Schedule
  - Upcoming meetings:
    - November 28-29, 2012: review revised scenarios & supporting analysis, develop initial conclusions.
    - Spring 2013: review final results and draft report.
  - Final report and papers expected in summer 2013.

# EMF 24 Overview

- **Major Driving Issues: Complementary to EMF 27**
  - What would the U.S. energy system transition look like to reduce U.S. emissions by 50% and 80%?
  - What are the potential implications of transportation and electric sector regulatory approaches to emissions reductions in meeting this goal?
  - How might the technological improvements and technological availability influence the answers to both of the above questions?
- **EMF 24 Scenarios**
  - Includes similar technology dimensions to EMF 27
  - Looking at 50% and 80% reduction scenarios using carbon price
  - Adds in a set of scenarios on CAFE standards, requirements for CCS on new coal, renewable portfolio standards.
- **Modeling Teams: Mostly U.S. Models**
  - ADAGE, EC-IAM, NewERA, US-REGEN, US-REP, CIMS, GCAM, IPM, ReEDS, FARM
- **Schedule**
  - Most submissions are in.
  - Runs are completed.
  - Overviews are most of the way done.
  - Should all be in review in another month.

## EMF 27: Technology Strategies for Achieving Climate Policy Objectives

### Key questions:

- What are the implications of technology availability for reaching long-term environmental goals?
- What are the implications of different policy configurations for the role of technology?

### Special Issue in Climatic Change:

- Submission of papers in October / November 2012
- Technology and policy overviews
- X-cut papers on Non-Kyoto forcing, Energy Efficiency, Fossil resources, Renewables, Bioenergy, Land use implications, Nuclear Power
- Modeling team papers
  - AIM/CGE (Japan)
  - AIM/End Use (Japan)
  - BET (Japan)
  - DNE 21+ (Japan)
  - EC-IAM (Canada)
  - ENV-Linkages(OECD)
  - FARM (US)
  - GCAM (U.S.)
  - GCAM-IIM (India)
  - GRAPE (Japan)
  - IMACLIM (France)
  - IMAGE (Netherlands)
  - MERGE (U.S.)
  - MESSAGE (IIASA)
  - Phoenix (US)
  - POLES (France)
  - REMIND (Germany)
  - TIAM-World (Canada)
  - WITCH (Italy)



# AMPERE (February 2011 – January 2014)



**How sensitive are mitigation scenarios and costs to model assumptions and structural differences, and why?**

**How are mitigation scenarios and costs affected by**

- Feedbacks in the climate response
- Technology availability and planning horizons (Special Issue January 2013)
- Fragmented climate policy (Special Issue January 2013)

**What are the implications for climate policy, particular for the EU27?**

<b>MODELS</b>	Inter-temporal GE model	CGE	Partial equilibrium energy system model		Other (Bottom-up / econometric models)
Global	REMIND	IMACLIM	IMAGE / TIMER	DNE21+	
Global	WITCH	WorldScan (EU detail)	TIAM-IER	IPAC	
Global	MESSAGE-MACRO	GEM-E3	POLES	GCAM	
Global	MERGE-ETL	AIM			
EU27		GEM-E3	PRIMES, Green-X TIMES-PanEU		GAINS, NEMESIS

- Plus 2 climate modeling groups (ClimateAnalytics, Hadley Centre)



# RoSE: Roadmaps towards sustainable energy futures



## Key questions:

- How do different assumptions about population and economic growth and fossil resource availability affect mitigation strategies and costs?
- What effect of delaying mitigation action until 2020 / 2030?

Project Duration: 2010-13

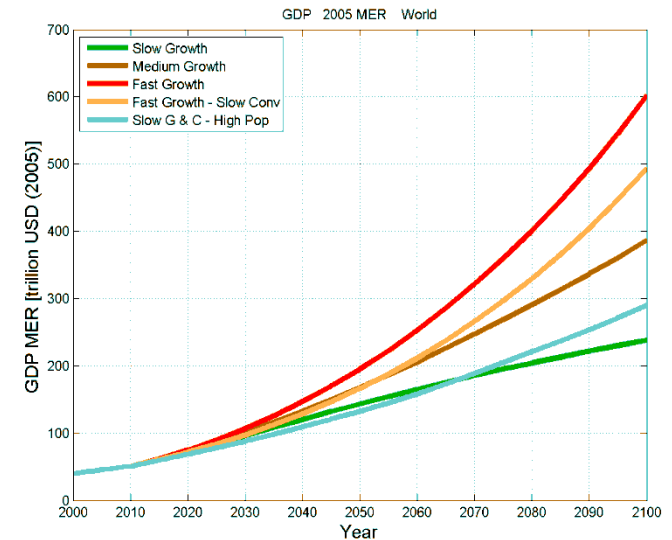
Special issue in Climatic Change

## Modeling teams:

GCAM (PNNL), IPAC (ERI), REMIND (PIK), WITCH (CMCC), China-TIMES (Tsinghua)

## Domain experts:

- **Aleh Cherp** (Central European University; *Energy Security*)
- **Hans-Holger Rogner** (IIASA; *Energy Resources*)
- **Andreas Schäfer** (UCL; *Transport*)
- **Shonali Pachauri** (IIASA; *Energy Access and Household Consumption*)



# **ADVANCE:** Advanced Model Development and Validation for the Improved Analysis of Costs and Impacts of Mitigation Policies

## **Scope:**

Methodological improvement of IAMs in four focus areas

- Energy demand, energy services and end-use
- Heterogeneity, behavior, and consumer choices
- Technical change and uncertainty
- System integration, path dependencies, and resource constraints

+ work on model transparency, documentation

+ creation of open-access resources of methodologies and input data bases

+ analysis of impacts of mitigation policies in the EU and beyond

**Funded** under EU Framework Programme 7.

**Participants:** PIK (coord.), IIASA, PBL, FEEM, CIRED, IPTS, ICCS, UPMF, UCL

+ domain experts on energy demand, resource flows, RE integration

+ non-EU partners (PNNL-JGCRI, NCAR, NIES, SFU)

**Time frame:** January 2013-December 2016, kickoff meeting 18-20 Feb 2013

# EMF28: The Effects of Technology Choices on European Climate Policy

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- Guiding questions:
  - What are the requirements for the EU to meet a 80% GHG reduction target by 2050 in terms of technologies, sectoral shifts and costs?
  - What do different long term developments suggest for the near term actions? What does this imply for targets and timing beyond 2020?
  - How do the findings from EMF28 relate to those of the European “Energy Roadmap 2050”?
- Timeframe:
  - EMF28 Special Issue in CCE: until end of Jan 2013
  - Special Issue on Infrastructure: Feb 2013
- Participating models:
  - EMELIE-ESY, LIMES, EPPA, FARM EU, GEM-E3, PACE, MERGE-CPB, WITCH, POLES, TIAM-UCL, TIMES-VTT, PRIMES, TIMES-PanEU, PET
  - In addition: 4 infrastructure models

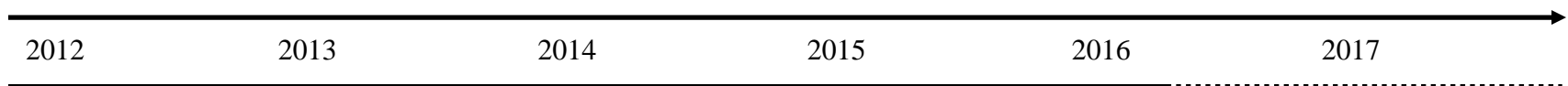
# Low-Carbon Asia Research Project

**Objective:** Develop a methodology to evaluate mid to long term environmental policy options and analyze strategies and roadmaps by applying it toward low-carbon society in Asia

**Participants** (Leading researcher, Institution, Country):

- T. Masui (NIES, Japan)
- P.R. Shukla (IIM, India)
- K. Jiang (ERI, China)
- D. K. Lee (SU, Korea)
- R. Shrestha (AIT, Thailand)
- C. S. Ho (UTM, Malaysia)
- R. Boer (BAU, Indonesia)
- A. Deshpande (NITTTR, India)
- B. Limmeechokchai(TU, Thailand)
- T. L. Ngugen (ISPONRE, Vietnam)
- M. S. Ali (MoE, Bangladesh)

**Time line:**



- Develop LCS methodology, - develop action plans and roadmaps, - analyze feasibility

Low Carbon Asia Research Network (LoCARNet) :

Establish researchers network in Asia

# The TEAM Project

- Leads
  - Valentina Bosetti, Erin Baker
- Goals and Structure
  - Exploring the uncertain implications of technology development.
  - The analysis is intended to inform R&D planning activities.
  - Distributions based on expert elicitations and other means of assessment.
- Participating Models
  - MARKAL-US, WITCH, GCAM
  - A range of other experts on expert elicitation and R&D planning.
- Timeline
  - A special issue should be getting submissions sometime early to mid-next year.

# Yale Model Uncertainties Comparison Project

## Modeling Uncertainty Group (MUG)

Bill Nordhaus/Ken Gillingham

- Stochastic ensemble construction across many uncertainties and models (refined version of Webster-Forest MIT stochastic  $\Delta T$  Pdf construction with many models/uncertainties)
  - Modeling teams are identifying key uncertainties and doing one standard deviation sensitivities
  - PDFs on key uncertainties to be assessed by “expert” teams
  - $\Delta T$  and possibly other Pdfs to be constructed from this information
- Schedule
  - Organizational meeting in Snowmass 2011 and 2012.
  - Completion by late Summer/Early Fall 2013
- Participating Modeling Teams
  - PAGE, Fund, DICE/RICE
  - GCAM, MERGE, IGSM
  - MESSAGE, REMIND, WITCH
  - Possibly others?

# Latin American Modeling Project

- ▶ What is the study addressing?
  - The effect of climate change on Latin America.
  - This includes mitigation and impacts/adaptation.
  - We are looking at both energy system and agriculture/land-use.
  
- ▶ What is the time frame of the study?
  - We have had 2 meetings and expect to have 3 more (roughly 6-9 months apart).
  - Papers will likely be due by the end of 2014
  
- ▶ Participating modeling teams?
  - EPPA, GCAM, iPETS, MEG4C, MESSAGE-Brazil, Phoenix, POLES, TIAM-World, more?