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Policy Challenges in Setting 2050 GHG Targets

Francisco C. de la Chesnaye
Electric Power Research Institute

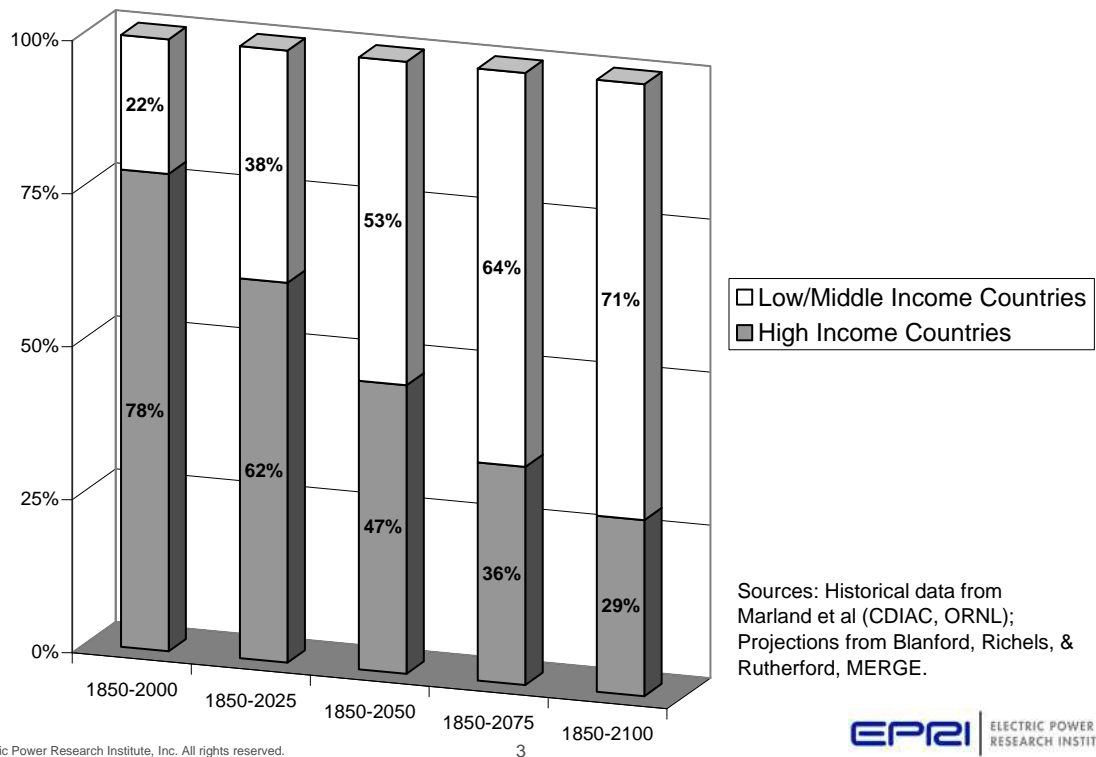
Jae Edmonds
Pacific Northwest National Laboratory

June 18, 2009
International Energy Workshop
Venice, Italy

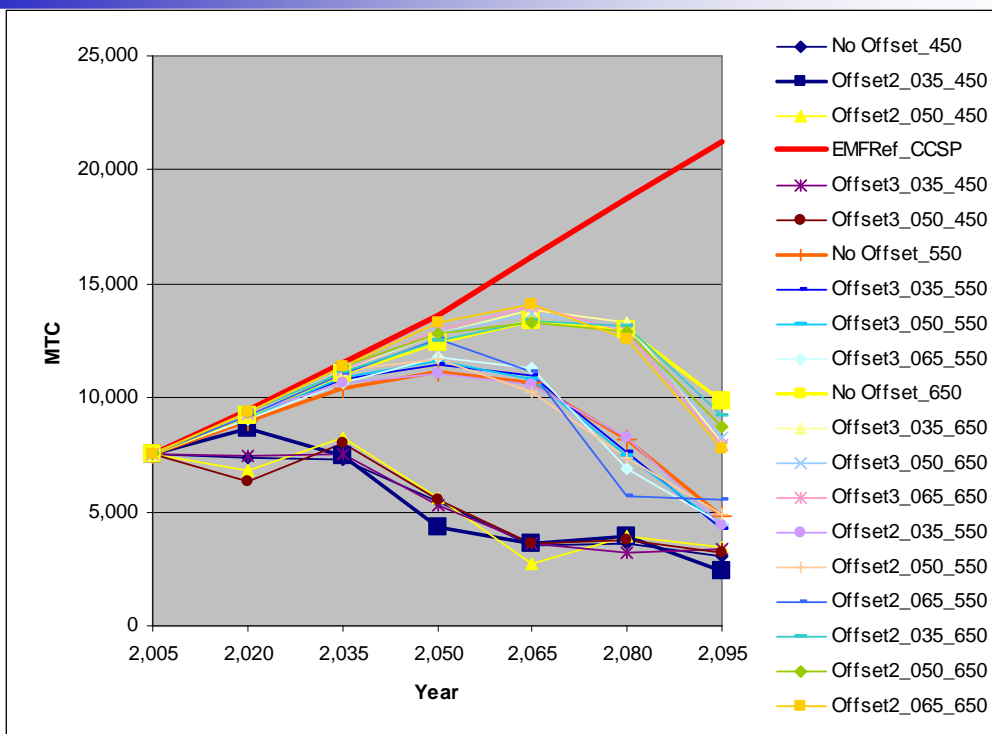
Main Points

- The US and other OECD countries have emitted the largest share of GHG emissions since pre-industrial times. However, this will shift to High-Income countries over the course of this century.
- Even if US and other OECD countries were to *completely eliminate* their own GHG emissions by 2020, emissions from developing countries in a business-as-usual scenario could push CO₂ concentration above 450 ppm between 2020 and by 2030 and above 550 ppm shortly after 2030.
- No one country alone can appreciably mitigate climate change; global cooperation is required to tackle the problem. And reductions of GHGs, no matter where they occur —whether in China, the EU, or the US, have the same environmental benefit.
- U.S. and other OECD action on climate change is important. However, unless the U.S. and other OECD countries incentivize significant global action to reduce GHG emissions, particularly in the large developing countries, climate change will continue for the remainder of the century and beyond.

Share of cumulative CO₂ emissions between OECD and non-OECD regions for fossil fuels and cement



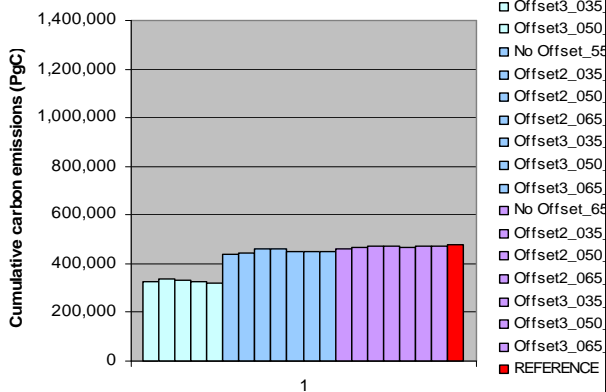
Global CO₂ emissions for 20 stabilization cases from MiniCAM



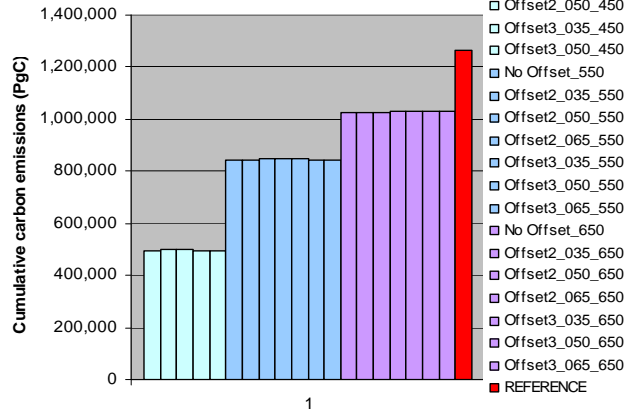
Source: Edmonds et al., 2008

Cumulative global CO₂ emissions for three alternative long-term CO₂ concentration limits over two integration periods, 2005 to 2050 and 2005 to 2095.

Cumulative Emissions 2005 to 2050 for Three Alternative Stabilization Limits

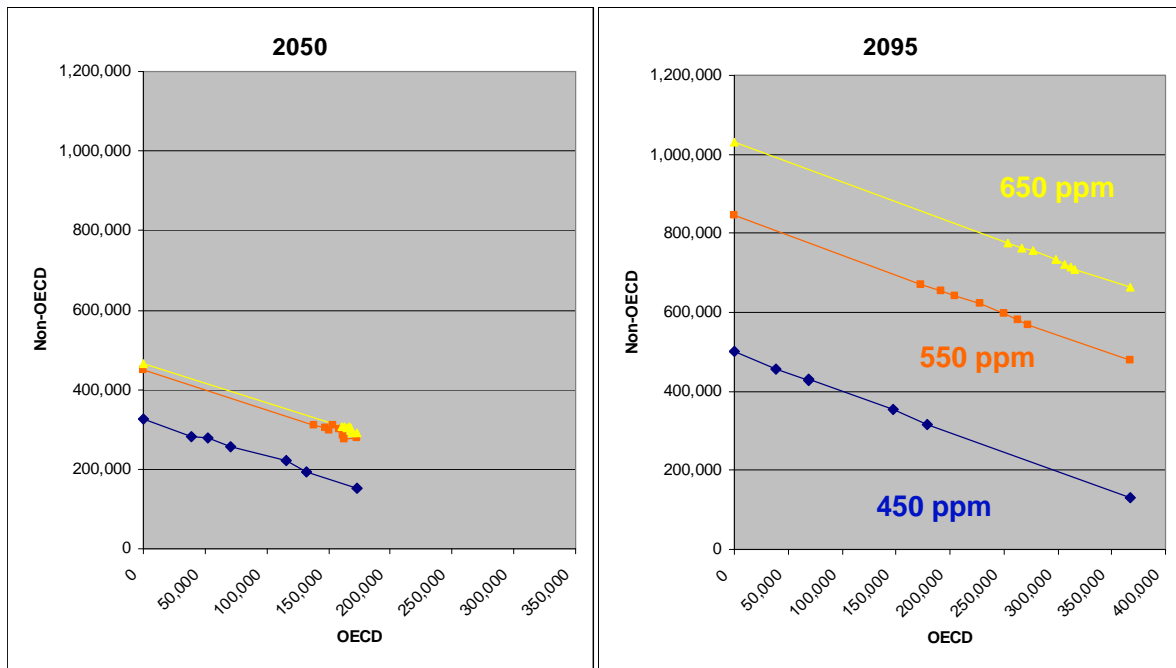


Cumulative Emissions 2005 - 2095 for Three Alternative Stabilization Limits



Source: Edmonds et al., 2008

Cumulative emissions in 2050 and 2095 for OECD and Non-OECD regions for three alternative concentration stabilization cases

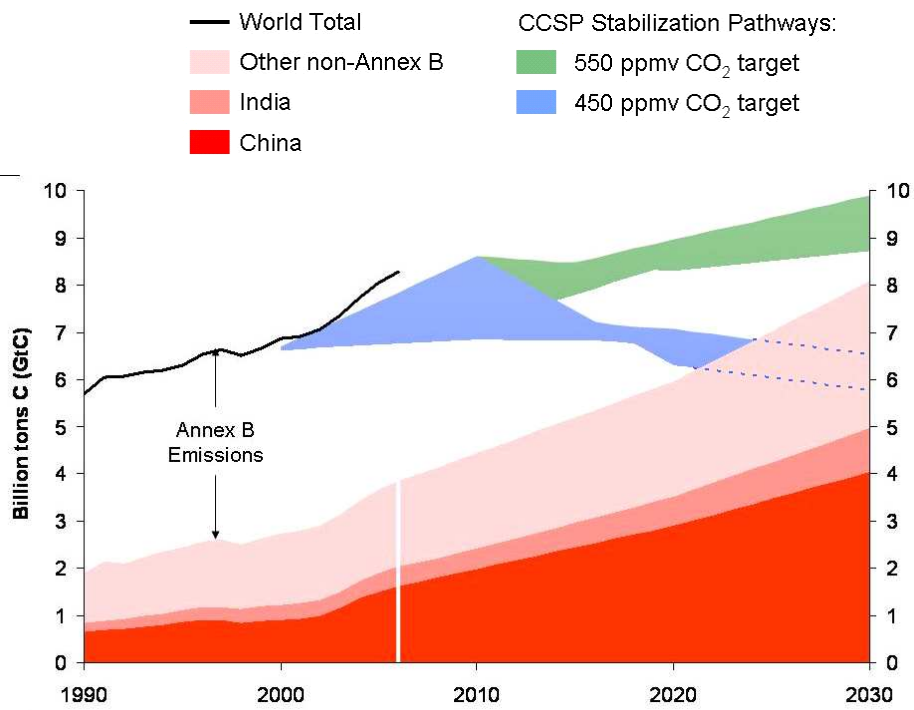


Source: Edmonds et al., 2008

Emissions Mitigation in Aggregate OECD and Non-OECD Regions For Alternative CO₂ Stabilization Concentrations

		OECD 2050 Emissions Relative to 2005					
		-95%	-75%	-50%	-10%	0%	10%
Non-OECD 2050 Emissions Relative to 2005	-10%			450 ppm			
	0%		450 ppm				
	33%	450 ppm					
	90%					550 ppm	
	110%				550 ppm		650 ppm
	140%			550 ppm		650 ppm	

Difficulty of tight targets



Source: Blanford, Richels, & Rutherford, 2009.

Overview of the EMF 22 International Scenarios

- Ten modeling teams from North America and Europe.

ETSAP-TIAM (Canada)

FUND (E.U.)

GTEM (Australia)

IMAGE (E.U.)

MERGE (U.S.)

MESSAGE (E.U.)

MiniCAM (U.S.)

POLES (E.U.)

SGM (U.S.)

WITCH (E.U.)

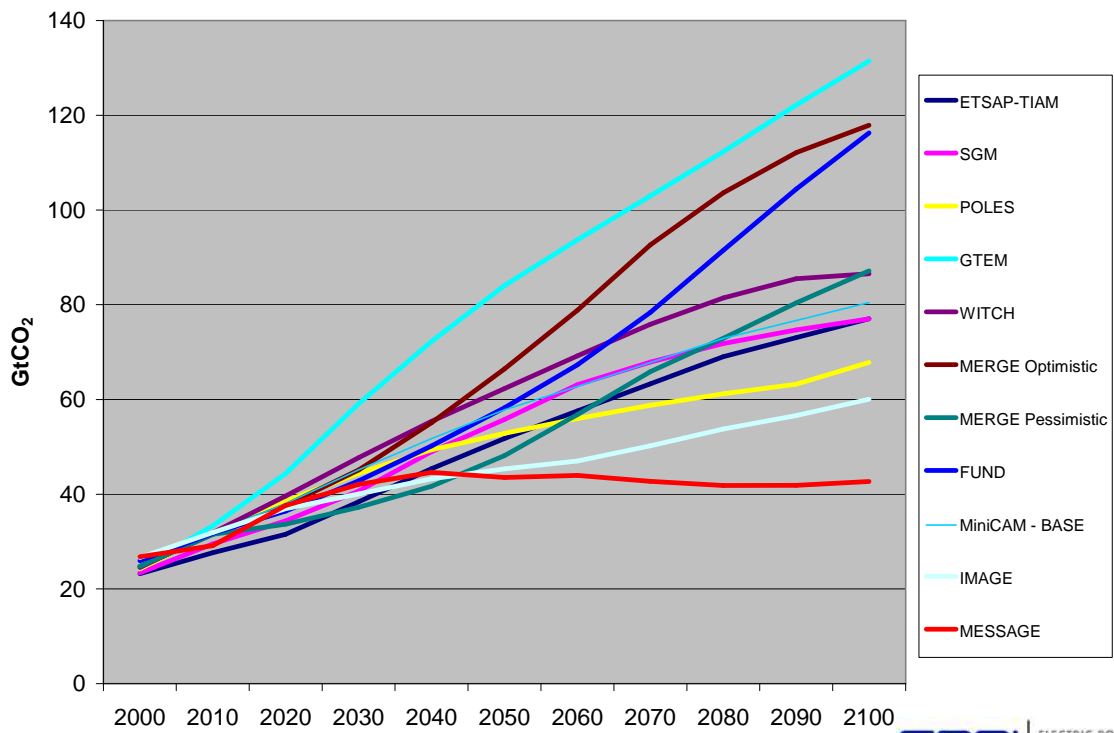
EMF Director: John Weyant

Study Chairs: Leon Clarke, Tom Rutherford, Chris Boehringer

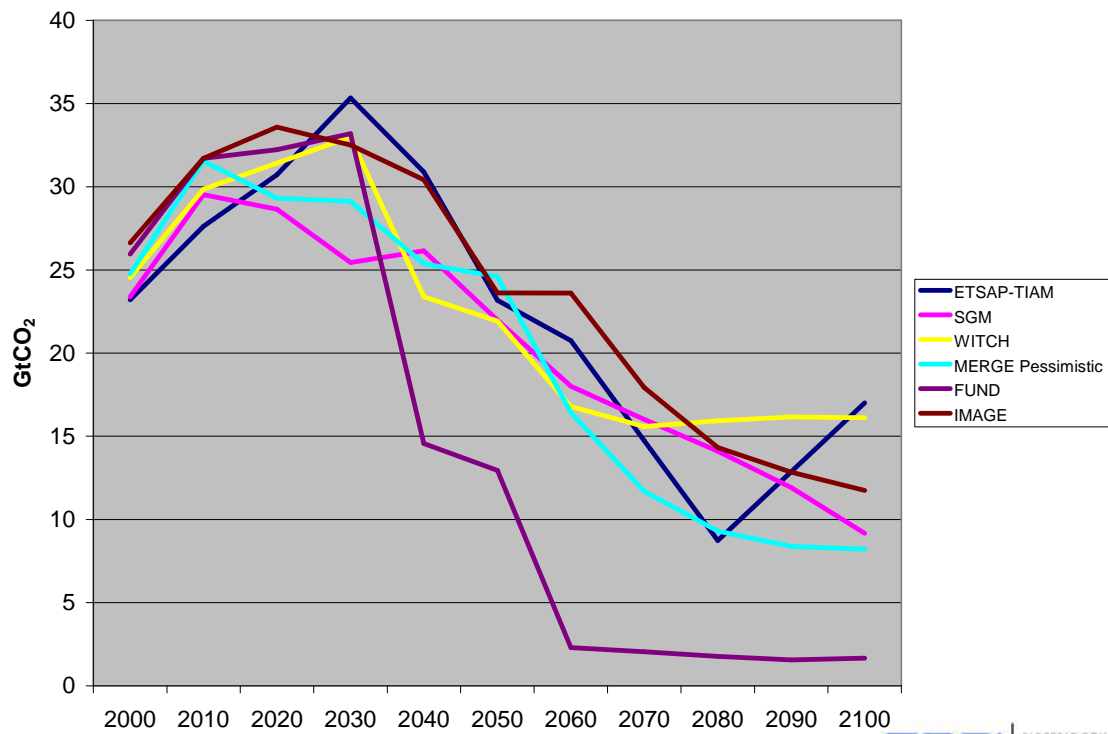
Study results at <http://emf.stanford.edu/>

- Exploring ten possible scenarios, which are combinations of
 - Three concentration goals
 - (1) 450 CO₂-e, (2) 550 CO₂-e, and (3) 650 CO₂-e
 - Two means of achieving concentration goals
 - (1) not-to-exceed and (2) overshoot through 2100
 - Two international policy regimes
 - (1) Full participation immediately and (2) delayed participation by non-Annex 1 regions and Russia

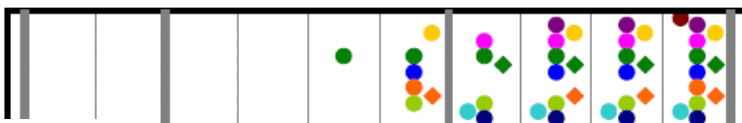
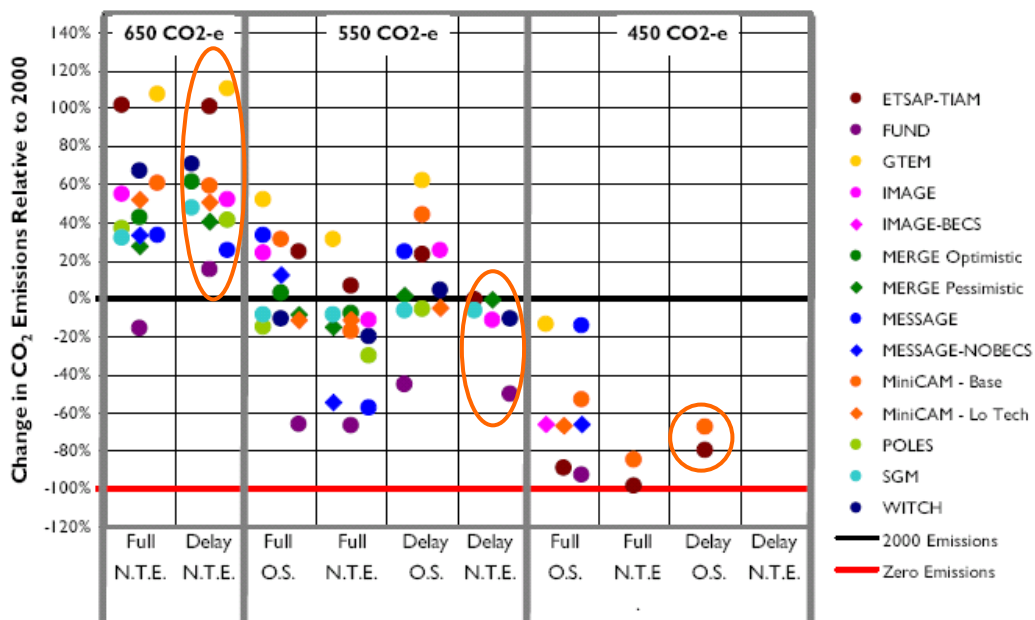
EMF 22: Reference Fossil & Industrial CO₂ Emissions



EMF 22: 550CO₂-E Stabilization Fossil & Industrial CO₂ Emissions



Global Emissions Reductions: 2050

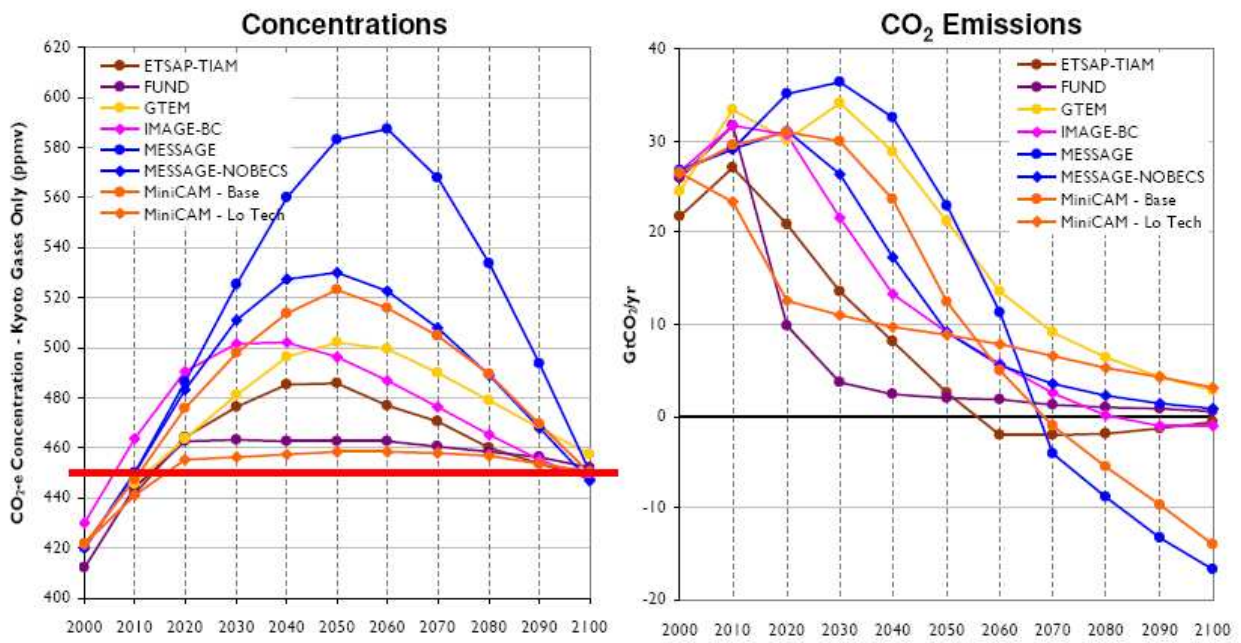


Scenarios that could not be modeled under criteria of study.

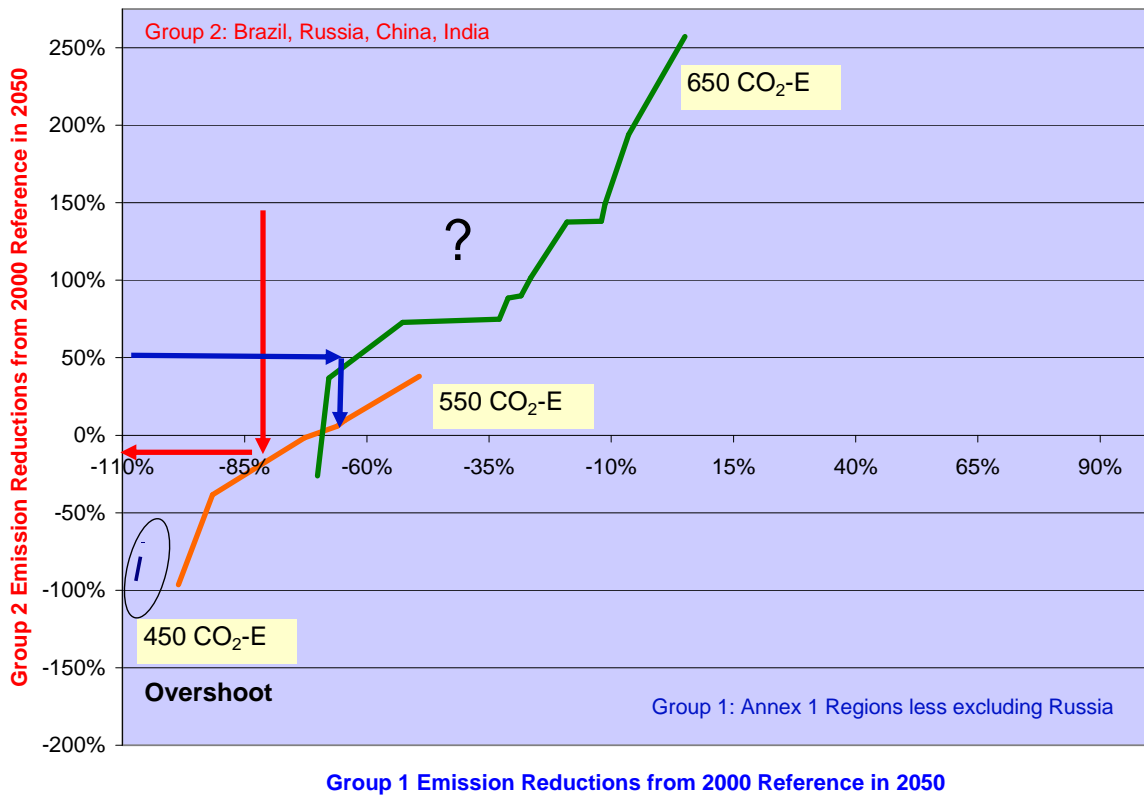
Source: Leon Clarke, PNNL

A Word on Overshoot

450 CO₂-e Overshoot: Full Participation



EMF 22: Stabilization Target Feasibility and Tradeoffs



Conclusions

- The US and other OECD countries have emitted the largest share of GHG emissions since pre-industrial times. However, this will shift to High-Income countries over the course of this century.
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- U.S. and other OECD action on climate change is important. However, unless the U.S. and other OECD countries incentivize significant global action to reduce GHG emissions, particularly in the large developing countries, climate change will continue for the remainder of the century and beyond.
- *To assist policymakers in understanding many complex interactions, the climate mitigation community needs to improve the way we communicate insights from analyses.*