

# Globaler Klimaschutz

Kosten, Strategien und Instrumente

Ergebnisse aus der Modellvergleichsstudie  
des Innovation Modelling Comparison Project (IMCP)

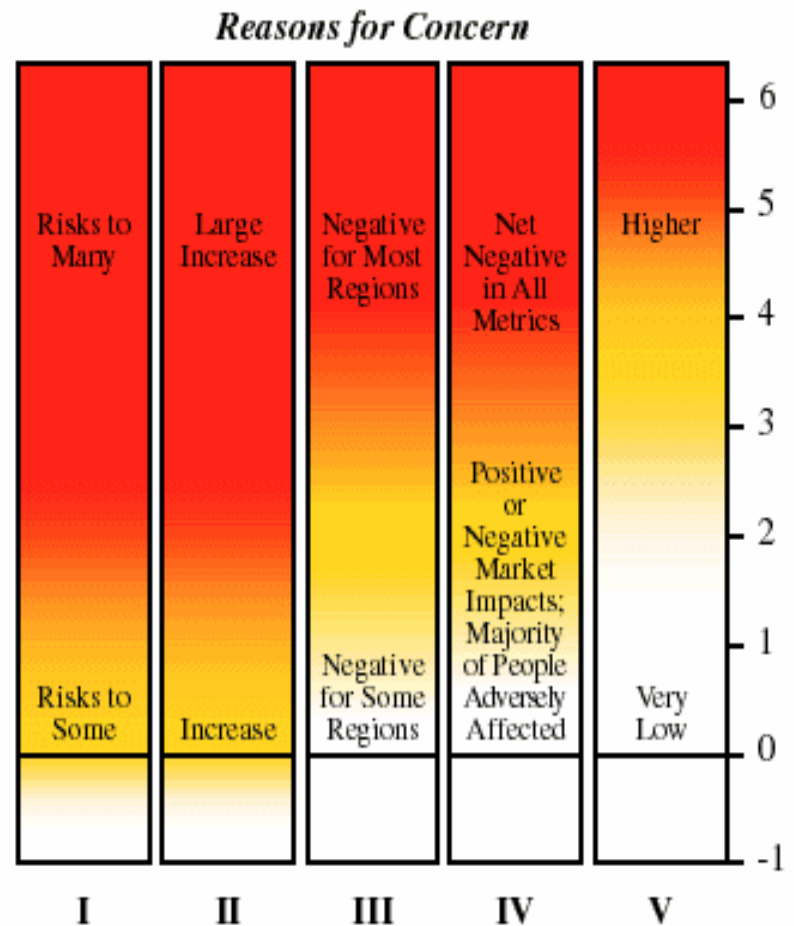
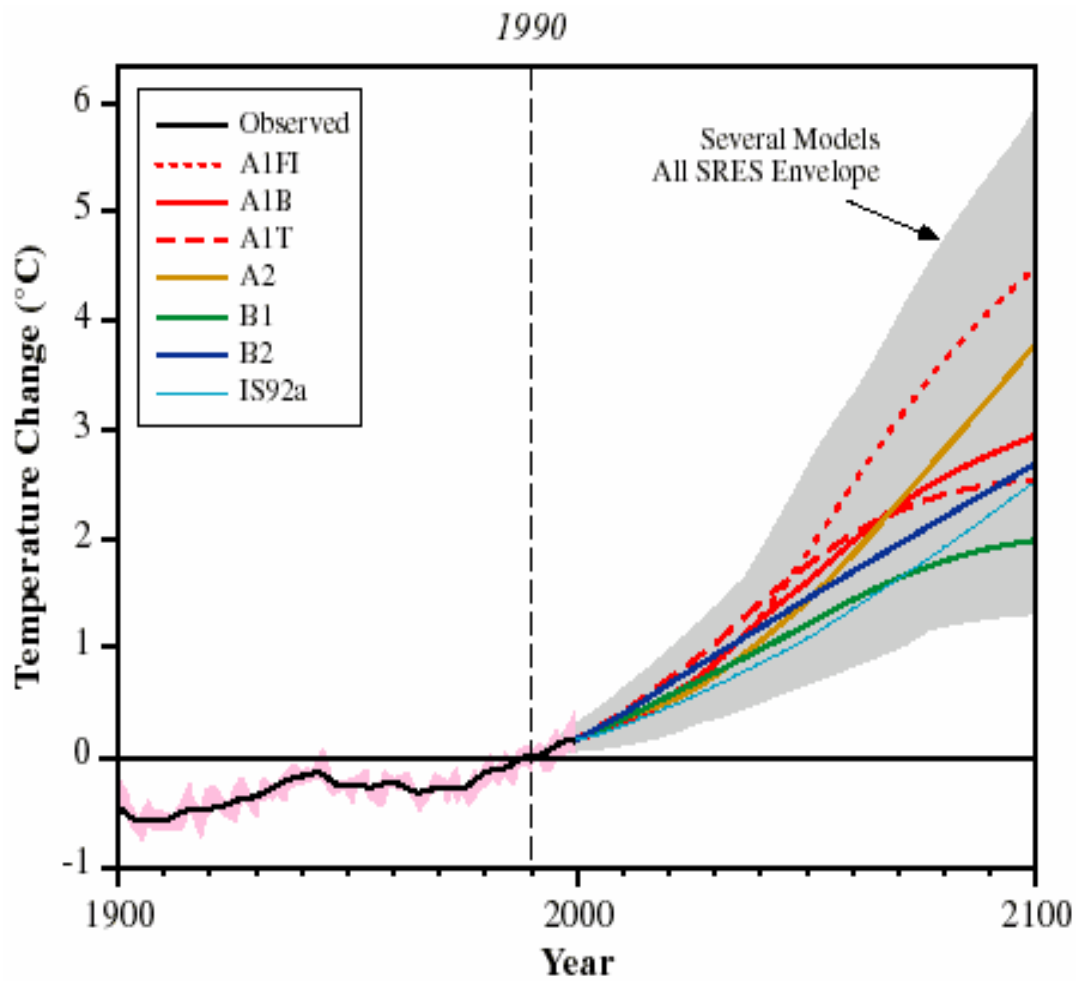
Pressekonferenz

am 16. März 2006 in Potsdam



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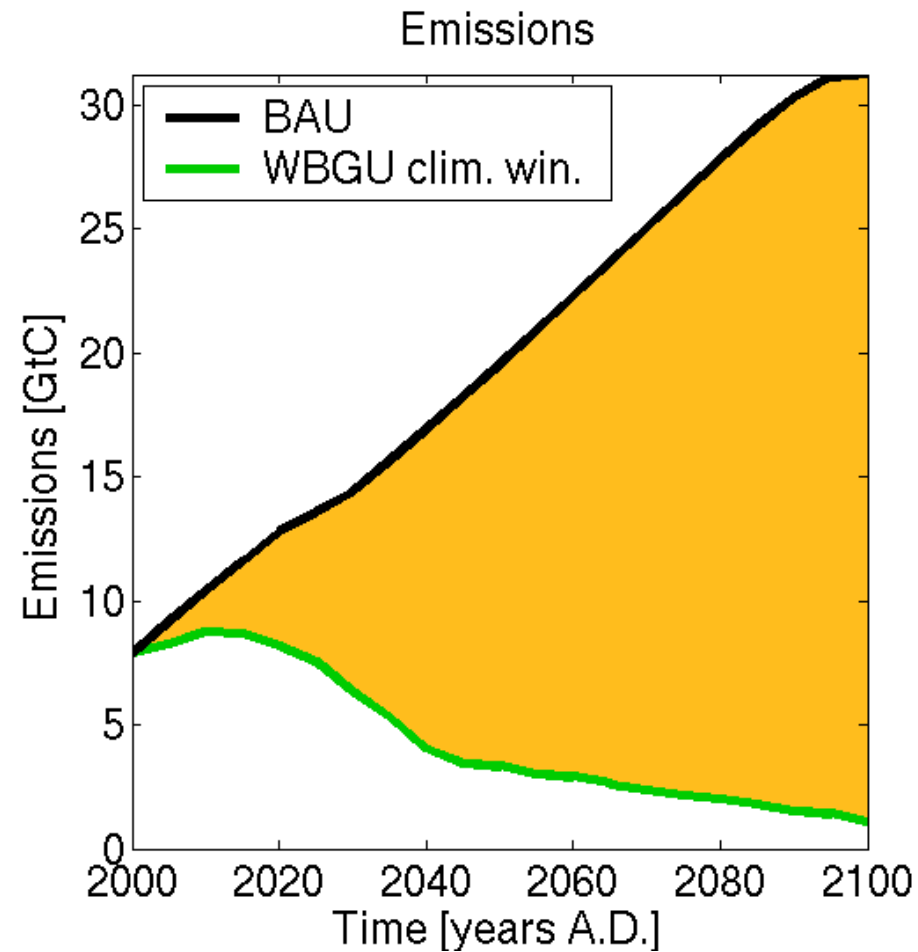
Dr. Ottmar Edenhofer



- |     |   |
|-----|---|
| I   | Risks to Unique and Threatened Systems        |
| II  | Risks from Extreme Climate Events             |
| III | Distribution of Impacts                       |
| IV  | Aggregate Impacts                             |
| V   | Risks from Future Large-Scale Discontinuities |

Source: IPCC (2001). „Climate Change 2001 – Impacts, Adaptation, and Vulnerability“

# Mitigation gap for “WBGU climate window”



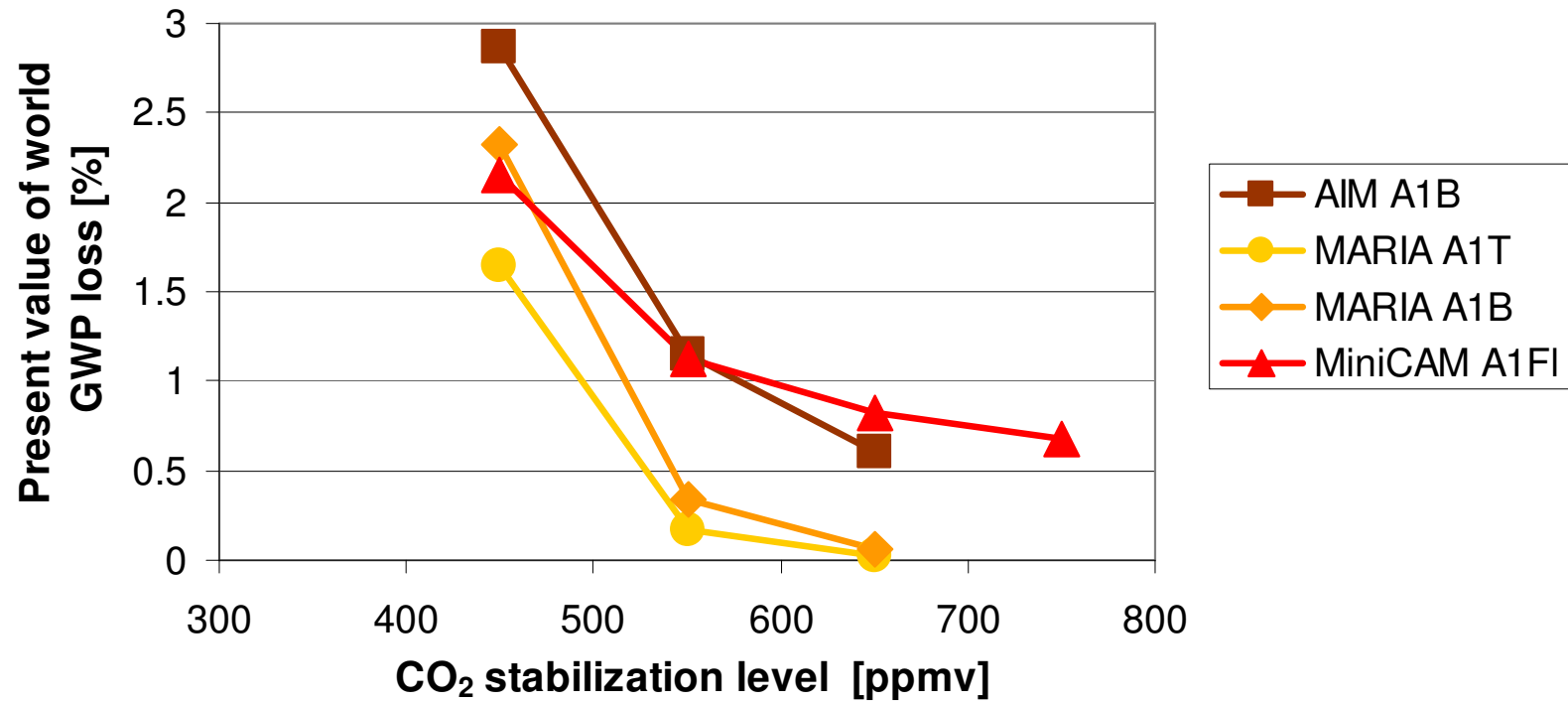
# Cost-Benefit Approach to Climate Change Management:

**Climate Protection  
Benefits**

=

**Avoided Damages** - **Adaptation Costs** - **Mitigation Costs**

## Mitigation costs



## SPECIAL REPORT

# The costs of global warming

Efforts to forecast how Earth's future climate will affect us must consider the economic growth of both rich and poor nations. But there are doubts over the theories being used, as **Quirin Schiermeier** explains.

**D**iscussions of climate change tend to involve uncertainties, and most climate researchers have come to accept the inherent unknowns of their business. After all, the climate models they use to project the course of global warming are generally seen as the best that science can offer. But there is a growing feeling that the economic assumptions on which their work is based are outdated and unreliable. And this could have serious implications for assessments of climate change.

The Intergovernmental Panel on Climate Change (IPCC), which coordinates efforts to predict the effects of global warming, is currently finalizing its fourth assessment report. It has asked 15 climate groups to run their models using output from a range of different 'scenarios', representing various assumptions about energy use, economic development

reflect how lifestyle and energy demand in both rich and poor countries are likely to change.

Climate researchers are familiar with the problem. "Some emissions scenarios are perhaps already demonstrably wrong," says Erich Roeckner, a climate modeller at the Max Planck Institute for Meteorology in Hamburg, Germany, who has modelled three of them for the IPCC (see "Early results"). "It is possible that all of them are wrong." But most feel that economics is a field they are not qualified to assess.

## Ridiculous assumption?

One key criticism is the assumption that the economies of poor countries will quickly catch up with those of rich nations. "It is ridiculous to assume, as the IPCC does, that rich and poor countries will economically converge as rapidly as the European Union has done over the past



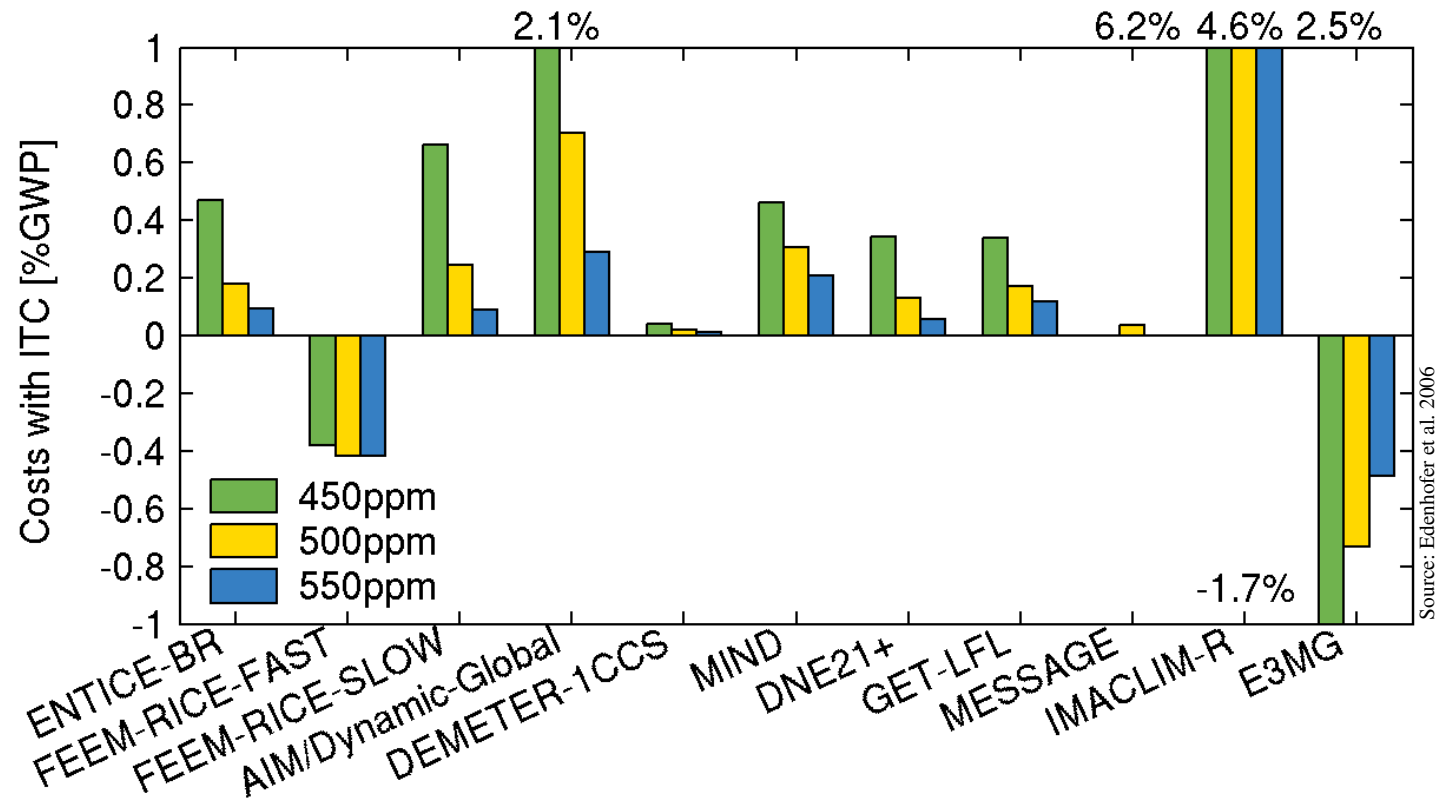
Translating temperature changes into impacts on society is beset with unknowns.

# Models in the IMCP

	Technological detail	
Calculus	<i>Top Down</i>	<i>Bottom Up</i>
<i>Welfare maximization</i>	<u>Optimal growth models</u> ENTICE-BR FEEM-RICE DEMETER-1CCS AIM/Dynamic-Global MIND 1.1	
<i>Cost minimization</i>		<u>Energy system models</u> MESSAGE-MACRO GET-LFL DNE21+
<i>Initial value problems</i>	<u>Simulation models</u> E3MG	
<i>Static equilibrium + recursive dynamics</i>	<u>Computational general equilibrium models (CGE)</u> IMACLIM-R	



# Mitigation Costs with ITC



Source: Edenhofer et al. 2006

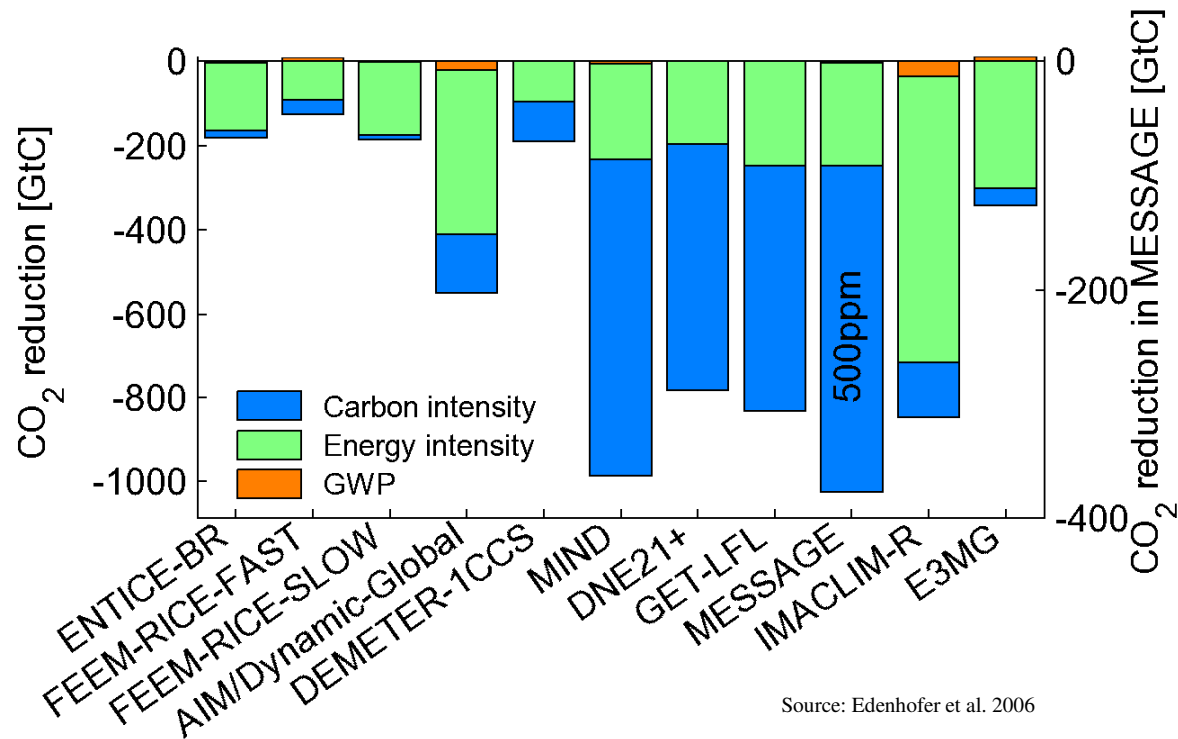


# Abschätzung der Vermeidungskosten

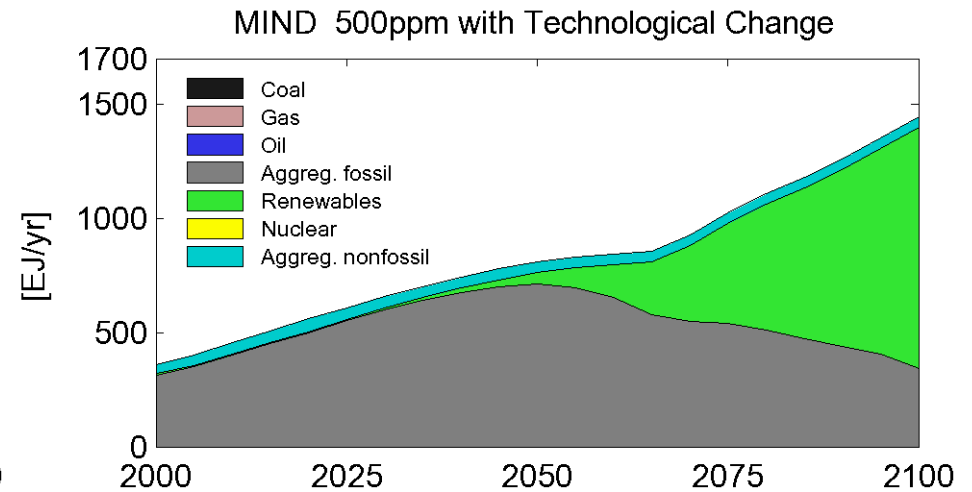
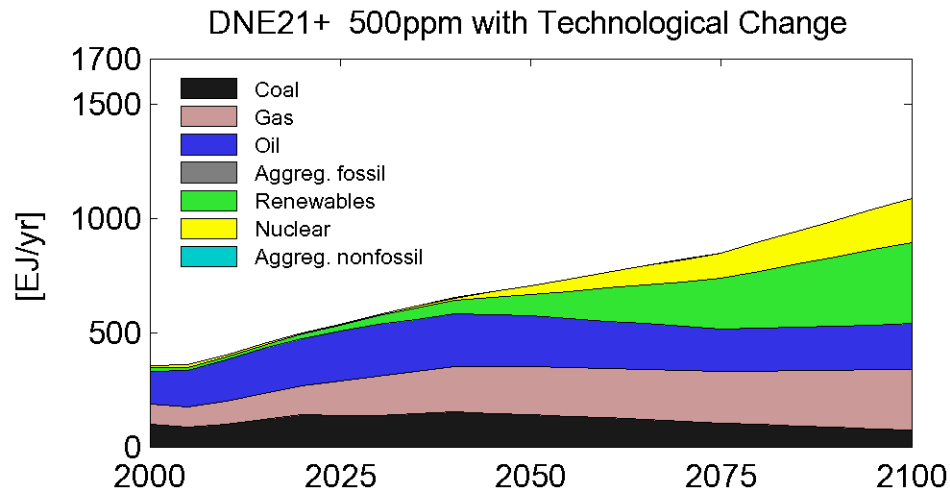
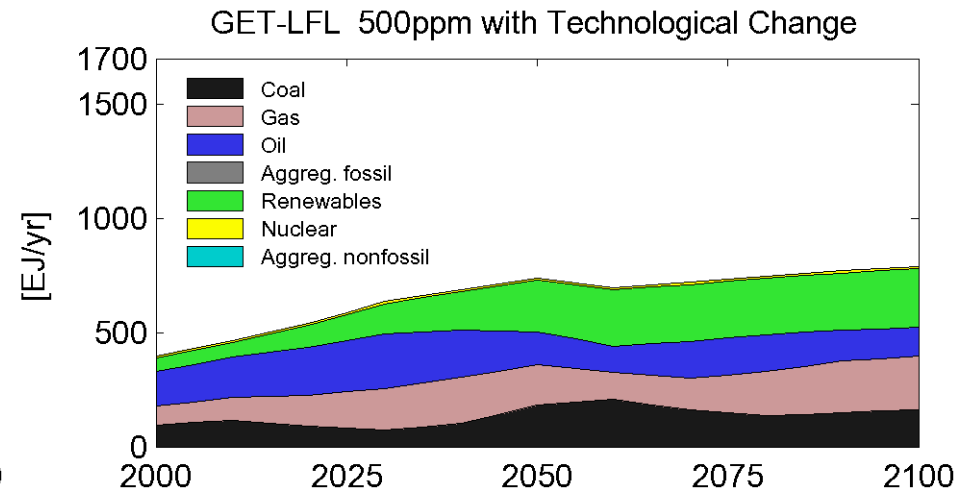
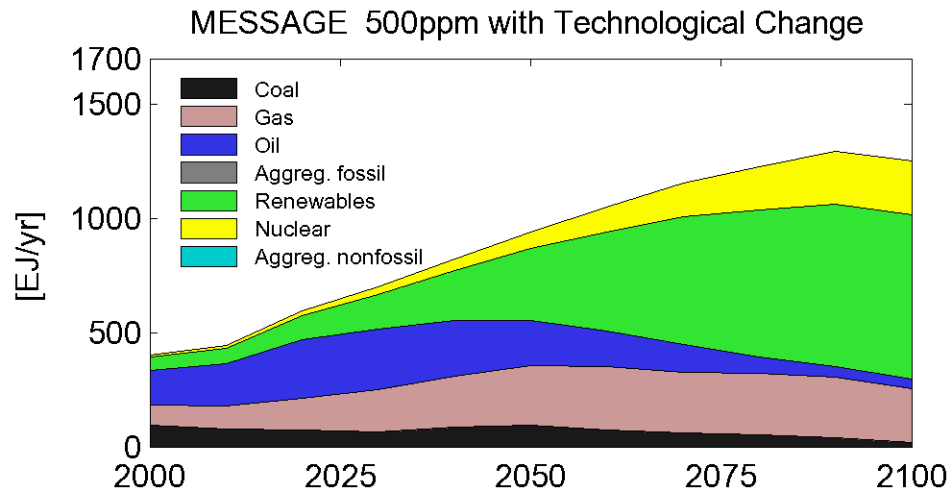
- Ein kluger Einsatz aller relevanten Vermeidungsoptionen senkt die Kosten des Klimaschutzes beträchtlich.
- Der Zielkonflikt zwischen Wirtschaftswachstum und Klimaschutz lässt sich entschärfen. Diese Erkenntnis erhöht die Wahrscheinlichkeit, dass China und Indien an einem “Kyoto-Plus” Regime teilnehmen können.
- Das “typische” IMCP Model berechnet Vermeidungskosten unter 1 % des weltweiten Sozialproduktes 2000-2100 für Stabilisierungsziele von 450 - 550ppm CO<sub>2</sub>.



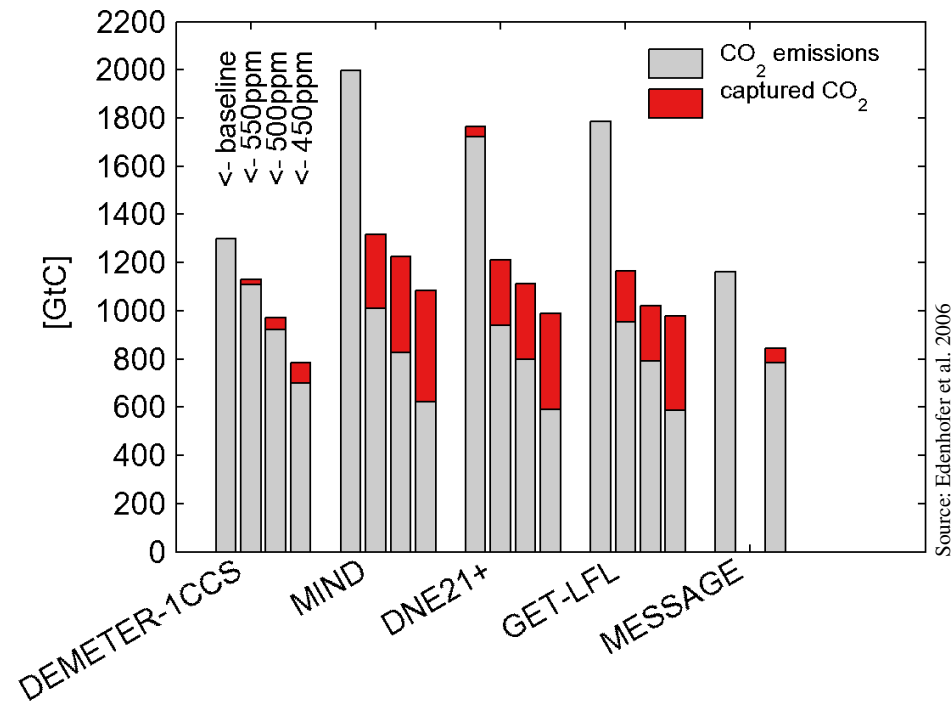
# Cumulative CO<sub>2</sub> Reduction for 550ppm Stabilization Scenario



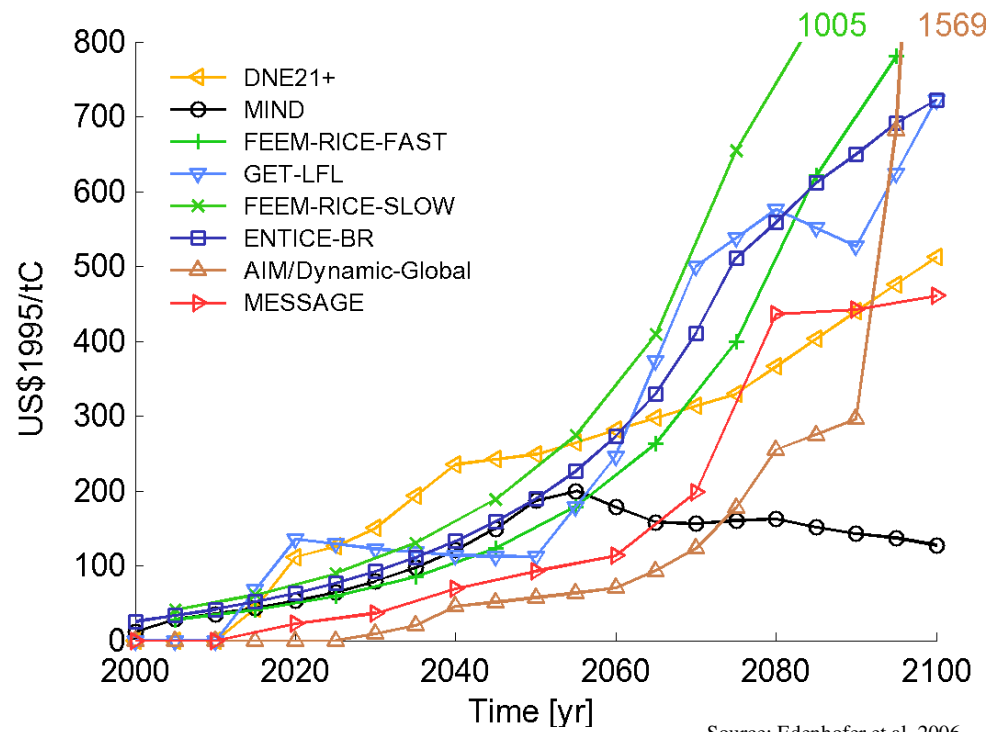
# Energy System and Hybrid Models



# Captured CO<sub>2</sub> and Total CO<sub>2</sub> Emissions



# Shadow Price with ITC



# Welche Vermeidungsoptionen sind wichtig?

- Wichtigste Vermeidungsoptionen:
  - Steigerung der Energieeffizienz
  - Einsatz erneuerbarer Energien
  - Abscheidung und Einlagerung von Kohlenstoff (CCS)
  - Umstritten: Die Rolle der Atomenergie
- Einige Modelle zeigen, dass niedrige Stabilisierungsniveaus durch extensive Nutzung der CCS Option (etwa in Verbindung mit Biomasse) erreicht werden kann. Für die Nutzung dieser Option fehlen im Rahmen des Kyoto Protokolls jedoch die wirtschaftspolitischen Voraussetzungen.
- Alle Modelle gehen davon aus, dass der Preis für Kohlenstoff bis zur Jahrhundertmitte ansteigen wird; wenn die Wirkung der kohlenstoffarmen Techniken greift, kann er wieder sinken. Die Verteuerung der Energie ist notwendig, dies führt jedoch nur zu einer geringfügigen Verzögerung des Wirtschaftswachstum.



# ... die umstrittene Rolle der Atomenergie?

- Das Ressourcenproblem (Uran)
- Der Nuklearabfall (Kapazitäten begrenzt)
- Die hohen Kapitalkosten der Reaktoren
- Proliferation
- Fusionstechnik ist erst ab 2050 verfügbar



# Weitere Materialien

<http://www.feem-web.it/potsdam/>

<http://www.pik-potsdam.de/>

