Post-Durban Expectations for an International Climate Policy

GIZ Winter School “REDD+ Governance”
Berlin, 12 January 2011

Prof. Dr. Ottmar Edenhofer
Overview

1. The issue of climate change from a global perspective

2. Political economy of international climate policy

3. Durban outcome

4. Outlook
What should we expect?
“Tipping-processes in the climate system“ are characterized by strong responses even to small temperature changes.
Climate mitigation as insurance

- Martin Weitzman (2009): With the possibility of 'catastrophic climate damages' the conventional cost-benefit type of analysis does not work anymore, because risk-aversion implies that one would pay any price – e.g. entire income – in order to avoid the catastrophe.

- Climate policy as an insurance against catastrophic climate change!

<table>
<thead>
<tr>
<th>Stabilization level in ppm CO₂-eq</th>
<th>2°C</th>
<th>3°C</th>
<th>4°C</th>
<th>5°C</th>
<th>6°C</th>
<th>7°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>450</td>
<td>78</td>
<td>18</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>500</td>
<td>96</td>
<td>44</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>550</td>
<td>99</td>
<td>69</td>
<td>24</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>650</td>
<td>100</td>
<td>94</td>
<td>58</td>
<td>24</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>750</td>
<td>100</td>
<td>99</td>
<td>82</td>
<td>47</td>
<td>22</td>
<td>9</td>
</tr>
</tbody>
</table>

Probability (in percent) to exceed given global temperature increase

Stern 2008
Scarcity of fossil resources will not prevent climate change

SRREN IPCC 2011

Emitted to the Atmosphere
- Projected Use 2005-2100 (Mean of all Baseline Scenarios)
- Cumulative Historic Use

in the Ground / Recoverable
- Unconventional Resources Recoverable with Technological Progress
- Conventional Resources (Remaining to be Discovered, High Estimate)
- Unconventional Reserves Identified
- Conventional Reserves Identified

SRREN IPCC 2011
We are not on the right track…

SRREN IPCC 2011
The Atmosphere as a Global Common

Atmosphere: Limited Sink
~ 230 GtC

Resource Extraction
> 12,000 GtC
Is de-coupling possible?

Mitigation technologies: 450ppm World

Luderer et al. (2011)
Overview

1. The issue of climate change from a global perspective

2. Political economy of international climate policy

3. Durban outcome

4. Outlook
Global climate policy – a social dilemma

• Common sense and theory: Low prospects for international cooperation on climate change mitigation
  – abatement of emissions is a pure public good

• free-riding incentives inhibit cooperation, especially when there is much to gain from it  (Carraro & Siniscalco 1993, Barrett 1994)
Pledged reduction targets for 2020:

- Japan: 25% wrt 1990
- EU: 20-30% wrt 1990
- USA: 17% wrt 2005
- Canada: 17% wrt 2005

Implementation of the minimal Copenhagen targets means that emissions in 2020 will be 10-20% higher than today.

Copenhagen implications for 2050: high probability for exceeding 2°C warming target, 50% chance for exceeding 3°C.

Rogelj et al. 2010, Nature
Copenhagen Pledges – insufficient for 2°C

Rogelj et al. 2010, *Nature*
Searching for economic explanations: game theory

- **Game theory:** Analysis of strategic behavior in situations of conflict

- Equilibrium-state according to John Nash: Everybody chooses the strategy (=behavior) that is most advantageous for him/herself – given the behavior of everybody else

⇒ Incentives in the „climate-game“ correspond to famous *prisoners dilemma*
Searching for economic explanations: game theory

• Dilemma: Incentives in the „climate-game“
  – „Everybody cooperates on climate change“ is globally optimal
Searching for economic explanations: game theory

• Dilemma: Incentives in the „climate-game“
  – „Everybody cooperates on climate change“ is globally optimal
  – Every single country is better off if only the others mitigate
Searching for economic explanations: game theory

• Dilemma: Incentives in the „climate-game“
  – „Everybody cooperates on climate change“ is globally optimal
  – Every single country is better off if only the others mitigate
  – „No climate mitigation“ is the globally least-desirable state
Searching for economic explanations: game theory

- Dilemma: Incentives in the „climate-game“
  - „Everybody cooperates on climate change“ is globally optimal
  - Every single country is better off if only the others mitigate
  - „No climate mitigation“ is the globally least-desirable state

- Is it possible to modify the incentive structure?
# From Tragedy to Drama: Strategic Options

## Country Calculus for Mitigation Program

<table>
<thead>
<tr>
<th></th>
<th>Benefits</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domestic</strong></td>
<td>Avoided domestic damages &amp; Co-Benefits</td>
<td>Domestic mitigation costs (energy, growth)</td>
</tr>
<tr>
<td><strong>Global</strong></td>
<td>Avoided damages in other regions (ethics)</td>
<td>Costs for other regions (ethics); Access to mitigation in other regions</td>
</tr>
</tbody>
</table>

**Demand for Mitigation**  
**Supply of Mitigation**
Overview

1. The issue of climate change from a global perspective

2. Political economy of international climate policy

3. Durban outcome

4. Outlook
   • “develop a protocol, another legal instrument or an agreed outcome with legal force under the UNFCCC applicable to all Parties”
   • negotiation until 2015 / COP 21
   • implementation from 2020 onwards

2. Kyoto 2nd commitment period
   • agreement on length (2017 or 2020?) and ambition (targets for signatories) postponed → COP 18 in Qatar

3. “Operationalization” of Cancun Agreements
   • Establishment of Green Climate Fund
Phase-out of developed/developing differentiation

**Durban**

**AWG-KP**

2nd commitment period under Kyoto

likely participants: EU, Norway, Switzerland

**AWG-LCA (until 2012)**

and then **AWG-DPEA**

by 2015, prepare “outcome with legal force” and “applicable to all Parties”

**2020 International Agreement**

for both developed & developing countries
Operationalization of Green Climate Fund

For 2010 industrialized countries have earmarked US$ 12 billions (Source: WRI 2011)
Allocating money between mitigation and adaptation is still completely open.

If used overly (and efficiently) for mitigation, a 2°C target could again come within reach (Carraro/Massetti 2011).
Green Climate Fund

Funding
- Auctioning of emission allowances
- Levy on air and maritime transport
- Investments from private sector

Governance
- Institutional structure still unclear
- UNFCCC vs. World Bank under discussion
- „Access“ and „Ownership“: who will decide over allocation of funds?

Deployment
- Transformation of the energy system (e.g. NAMAs)
- Avoiding deforestation (REDD+)
- Technology transfer
- Adaptation
Overview

1. The issue of climate change from a global perspective

2. Political economy of international climate policy

3. Durban outcome

4. Outlook
   I. Less players: ’Major Economies‘ approach
   II. More issues: ’Issue-Linking‘
   III. Strategies not focusing on emission reductions
I. Less players: 'Major Economies‘ approach


- Reducing the complexity of negotiation process
- ... but at the price of cost-effectiveness
Cancun - Better REDD than dead?
Durban outcome regarding REDD+

- Final decision on (long-term) financing of REDD+ postponed to 2012
- Explicit link with adaptation, poverty and biodiversity objectives
- Clearer conditionalities on long term finance (safeguards, MRV)
- Consensus on reference levels
- Social and environmental safeguards reporting watered down

Mixed outcome for REDD+
Reducing Deforestation: Fossil vs. LUCF CO₂ Emissions

CO₂ emissions per person and year, 1950 - 2003

CO₂ emissions from fossil fuel combustion and cement production, and including land use change (kg C per person and year from 1950 - 2003)

-1000 - 0  
1000 - 2000  
0 - 100  
2000 - 5000  
100 - 1000  
5000 - 15000

Ratio

Emissions per year from fossil fuel combustion and cement production

Emissions per year from land use change

30
Global Deforestation

Loss of biomass (carbon) due to land use change (mostly deforestation), 1998-2003 average in g C/m² per annum

Vohland et al. 2008
Agriculture versus Forest Protection

- Agriculture and forest protection compete for scarce land
- Optimal allocation of available land

Available Land

<table>
<thead>
<tr>
<th>Land Rent (caused by of food/bioenergy production)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Forests Rent</td>
</tr>
</tbody>
</table>
Agriculture versus Forest Protection

- REDD protects forests

Available Land

$\downarrow$

Social Forest Rent

$\uparrow$

Private value of forests

Land Rent

Agricultural land

Forests

$\uparrow$

$\downarrow$
However, even an emission trading scheme would only count the carbon storage capacity.

In an ETS, forests would compete with other carbon storage technologies like CCS, Biomass+CCS. The ecosystem services have to be compensated otherwise.
Market Prices for staple foods and crude oil
monthly averages 1991 - 2008

annual price increase: 13.4%

IMF; FAO International Commodity Prices
Annual World Biofuel Production 1991 - 2008

Bioethanol (BE) forecast Biodiesel (BD)

average growth rate 7%

34%

BP Statistical Energy Review; WRI
Agriculture versus Forest Protection

- Rising demand for agricultural products (oil price, food, bioenergy) counters the effect of REDD programs
- Higher prices for forest protection!
Supposed Effects (II)

Costs of REDD are underestimated

Proposed solutions would have to stabilize price on a high level to compensate the effects of rising oil prices. This is politically unlikely.

Credits for avoided deforestation should not be calculated from hypothetical baselines but from the carbon storage capacity of forests and other ecosystem services.
How a Forest Trust Fund could be designed

Forest Trust Fund

- International payments
- Compensation for forest owners
- Investing in domestic/foreign assets
- Interest payments
- Forest bonds for up-front investments

International investors
Drawbacks of such a trust fund solution

• Subsidizing land owners because of increasing land rents

• Oil price development is not automatically internalized

• How to solve the problem: land taxation
Land taxation can compensate the increase of opportunity costs.
Forest Trust Fund improved

- International payments
- Land tax income
- Compensation for forest owners
- Investing in domestic/foreign assets
- Interest payments
- Forest bonds for up-front investments

International investors
Pitfalls of the land taxation solution

• Land taxation hard to implement

• Leakage because of increasing timber prices

• International payments would have to adjust to oil, biofuel, and timber prices
II. More issues: 'Issue-Linking'

Idea: Find mechanism to make cost-benefit ratio of climate mitigation (from individual country perspective) more attractive

- Link climate cooperation with R&D cooperation
- Create and link emission trading markets
- Trade sanctions against climate free-riders
Current energy system is dominated by fossil fuels

Shares of different energy carriers in total primary energy supply in 2008

SRREN IPCC 2011
The costs of renewables are mostly higher than of non-renewables, but ...
...some renewable technologies are already competitive

- Binary circulation electricity plant
- Domestic pellet heating boiler
- Palm oil-biodiesel

Levelized Cost of Electricity
Levelized Cost of Heat
Levelized Cost of Fuels

SRREN IPCC 2011
Technological advancement as potential „Game Changer“?

![Graph showing the trend of average price per unit of energy over cumulative global capacity]

- **Produced Silicon PV Modules (Global)**
- **Onshore Wind Power Plants (Denmark)**
- **Onshore Wind Power Plants (USA)**

SRREN IPCC 2011
Creation and ‘linking’ of emission trading schemes

- Canada: 0.74Gt
- USA: 6Gt
- RGGI: 0.17Gt
- MGGA: 0.83Gt
- EU ETS: 2Gt
- Australia: 0.45Gt
- New Zealand: 0.098Gt
- Japan: 1.4Gt
- Tokio: 0.012Gt
- S-Korea: 0.6Gt
- China: 6Gt
- California: 0.4Gt
- Chile: 0.073 Gt
- Mexico: 0.64Gt
- Brazil: 1 Gt
- India: 1.5 Gt
- Australia: 0.45Gt

Flachsländer (2011)

⇒ Reduction of mitigation costs by establishing access to low-cost abatement options
CO₂-trade balances for different world regions 1990-2008

Blue: CO₂-Importing
Red: CO₂-Exporting

Justification for trade sanctions?

Peters, Minx, Weber und Edenhofer (2011)
Reducing subsidies for fossil fuel energy: „No regret“

Fossil fuel subsidies have been driven higher by the rebound in international energy prices. They totalled $409 billion in 2010 — about $110 billion up on 2009.

IEA World Energy Outlook 2011
Reducing subsidies for fossil fuel energy: „No regret“

- Current subsidies for fossil fuel energy correspond to a **negative CO₂-price** of on average 9US$ per ton CO₂!
  [Source: own calculation]

- Without further reform, spending on fossil-fuel consumption subsidies is set to reach $660 billion in 2020, or 0.7% of global GDP.

- Phasing-out fossil-fuel consumptions subsidies by 2020 would:
  - slash growth in energy demand by 4.1%
  - reduce growth in oil demand by 3.7 mb/d
  - cut growth in CO₂ emissions by 1.7 Gt

- Many countries have started or planned reforms since early-2010
  - key driver has been fiscal pressure on government budgets
  - G20 & APEC commitments have also underpinned many reform efforts
  - much more remains to be done to realise full extent of benefits

IEA World Energy Outlook 2011
Recommended Reading