Die Atmosphäre als globales Gemeinschaftseigentum

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GHG emissions growth between 2000 and 2010 has been larger than in the previous decades.

Based on Figure 1.3
A renaissance of coal drives the global carbonization.

Steckel, Edenhofer and Jakob, in press
Climate Projections and Associated Risks
Growth vs. temperature

USA

China

Brazil

Germany

Global non-linear effect of temperature on economic production

Marshall Burke¹,², Solomon M. Hsiang³,⁴,⁵ & Edward Miguel⁴,⁵

Quelle: Nature, doi:10.1038/nature15725
Risks from climate change depend on cumulative CO$_2$ emissions...

Based on SYR Figure SPM.10
...which in turn depend on annual GHG emissions over the next decades.
What are the consequences for international energy and climate policy?
The great transformation

CO₂ emissions from fossil fuels

Luderer et al. (2012)

mitigation contributions from different technologies

Luderer et al. (2012)
Global energy system transformation pathways

Baseline

Climate Policy

2°C (50% likelihood)
All regions see radical transformation of their energy system.
All regions see radical transformation of their power system

Electricity

EU

USA

China

Baseline

Climate Policy

2°C (50% likelihood)
Sectoral Emissions

Based on IPCC AR5 WGIII Figure TS.17
Each Sector has to contribute – The power sector most

450 ppm CO₂ eq with Carbon Dioxide Capture and Storage

Based on IPCC AR5 WGIII Figure TS.17
Afforestation becomes important when CCS is not available

450 ppm CO$_2$ eq without Carbon Dioxide Capture and Storage

Based on IPCC AR5 WGIII Figure TS.17
The climate problem at a glance.

Resources and reserves to remain underground until 2100 (median values compared to BAU, AR5 Database)

<table>
<thead>
<tr>
<th></th>
<th>Until 2100</th>
<th>With CCS [%]</th>
<th>No CCS [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>70</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>35</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>32</td>
<td>64</td>
<td></td>
</tr>
</tbody>
</table>

Source: Bauer et al. (2014); Jakob, Hillaire (2015)
The Paris agreement: INDCs

- Intended Nationally Determined Contributions are inconsistent with the temperature target.

Data sources: Le Quere et al. (2015), Rogelj et al. (2015), Luderer et al. (2015); Fig. adapted from Jan Minx 2016
The Paris agreement: INDCs

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The INDCs are inconsistent

Countries with highest ongoing and planned coal investment
Minimum Carbon Price and Transfers

- Emission reduction, implying nationally implemented policy
- Recipient countries
- Minimum carbon price for a coalition
- Donor countries
- Transfer
Global Minimum Carbon Price and Transfers

Ausweg aus der Klima-Sackgasse


26.10.2015, von OTTMAR EDENHOFER UND AXEL OCKENFELS

Source: Frankfurter Allgemeine Zeitung, online, 26.10.2015
"one ton of CO₂ receives, on average, more than 150 US$ in subsidies"
Climate Policy and Poverty reduction - A contradiction?

- Water availability
- Sanitation
- Telecommunication
- Access to electricity
Carbon pricing revenues to close infrastructure gaps

Revenues invested 2015-2030, 450ppm goal, full technological availability, C&C allocation of emission permits

Source: Jakob et al., in press
Options for a coal phase-out in Germany

„Coal Commission“:
Should explore alternative options with respect to costs, distributional questions, energy security, regional structural change, implication on EU level

Regulation (as for nuclear phase-out)
National floor price (or „Klimabeitrag“)
Competitive bidding process for exit payments
Reform of EU-ETS with EU-wide floor price

Knopf (2016)
CO₂ emissions from power sector stagnate despite increasing deployment of renewables.

- Main reason: emissions from lignite (due to low carbon price in EU ETS)
Germany is not on track.

Source: UBA (2016), Agora calculation

* temporary
The energy sector has not performed.

Source: UBA (2016), Agora calculation; target range: -92.5% till 2050
ETS lacks dynamic cost efficiency.

- Falling CO₂ price
- No increase expected before 2020
- Market Stability Reserve will be implemented, but effect might be limited

Source: ICE Futures Europe
Empirical evidence: demand shock

• Consensus that carbon prices are driven to *certain extent* by demand-side fundamentals related to abatement cost (Hintermann 2010)

• But: EUA price dynamics cannot be solely explained by demand-side fundamentals (Koch et al. 2014)
EU ETS betting shop for political decisions

Koch et al. (2016)
ETS lacks dynamic cost efficiency.

- The price expectations for 2020 can serve as a benchmark for the evaluation of the dynamical cost efficiency of the ETS
- There is a gap between expectations and models showing a cost-efficient price of more than 20 €/t CO₂ in 2020

**EUA Nearest Contract and Futures**

**Cost-efficient CO₂ price from models**

80% red by 2050; default technologies

Knopf et al. (2013)
Introduction of a price corridor

- Reliable environment for investment decisions
- Instrument: Introduction of an auction reserve price
Thank you for your attention!