Carbon Pricing, Equity and the Paris Climate Goals

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Emissions are rising.
Does climate policy already show effects?

Data: CDIAC/GCP

CHN 10.4 ▼0.7%
Gt CO₂ in 2015

USA 5.4 ▼2.6%

EU28 3.5 ▲1.4%

IND 2.3 ▲5.2%

Coal 15.0 ▼1.0%
Gt CO₂ in 2015

Oil 12.2 ▲1.9%

Gas 6.8 ▲1.7%

Cement 2.0 ▼1.9%

Global Carbon Project

Technische Universität Berlin

Mercator Research Institute on Global Commons and Climate Change

PIK
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>
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Source: Bauer et al. (2014); Jakob, Hilaire (2015)
We are not on track.
The 2°C budget does not leave any leeway

Cheap and abundant coal is the driver of a „re-carbonisation“ of the energy system in some parts of the world

*All budgets are subject to considerable uncertainty, see Edenhofer et al. (2016)*
The coal pipeline in 2016

840 GW of coal fired capacity is in the pipeline across the globe. >85% is covered by 12 countries.
The Paris Agreement relies on voluntary emission reductions

- Does not allocate remaining budget
- Countries decide individually to what extent they reduce emissions
- Incentives to free-ride

Diagram:

- Global temperature target
- Pledges
- Nationally determined contributions
- Gap report
National emission reduction targets have to pay off internationally

The Nationally Determined Contributions are not transparent
  • Countries determine targets with different means and different reference years

The Nationally Determined Contributions are not comparable
  • Emission reduction targets based on the same year mean very different efforts depending on developmental stage of country

The Nationally Determined Contributions are not represented in energy policy
  • Lack of attractive policy instruments
    • Feed-in-tariff not an option in many countries
    • Fixed emission targets not an option in many countries
Way forward: internationally harmonized carbon prices

2005

Own presentation, based on Worldbank (2016)
Way forward: internationally harmonized carbon prices

A price on carbon is **transparent**
- Implementation as a carbon tax or cap and trade system

A price on carbon is **comparable**
- Same metric for all countries
- Measures to counteract free-riding as principle of reciprocity can be implemented

A price on carbon **drives** energy investments
- Makes more emission intensive ways of production more costly and less attractive
Comparability of NDCs through implicit CO₂ prices

Note: The implicit carbon prices shown here do not reflect the stringency level of the overall INDC of a region, as for some regions, additional policies are represented in the modelling that depress the prices shown here (see table 1 in the annex). As all countries are likely to implement dedicated technology policies, actual carbon prices in a trading scheme or a carbon tax scheme will be lower for regions for which the complementary policies are not yet represented. Monetary values are given in $US-2012. REMIND 2005 monetary values are scaled by 1.18 for conversion to 2012.

Source: REMIND model analysis

* Figure A1 of the policy report „Beyond the numbers: Understanding the Transformation Induced by INDCs“, October 2015, by the MILES project consortium
Harmonizing carbon prices among unequal countries

Climate finance to foster cooperation
• 100 bln promised in Paris decision
• Green Climate Fund operative

* Amounts indicated are in United States dollars equivalent (USD eq.)
Equity principle „equal-effort“ establishes cooperation

- Transfers conditional on carbon pricing level $p_i$ (Kornek und Edenhofer 2016)

- Compensating differences in mitigation costs:

$$T_i = T \cdot \left( C_i(p_i) - \frac{1}{N} \sum C_j(p_j) \right)$$

Magnitude of compensation Differences in costs $C$ between countries

- Cooperation established: a recipient is compensated for additional costs of reducing emissions

$\rightarrow$ „equal effort“ principle as in Tavoni et al. 2014
Equity principle „equal-effort“ establishes cooperation

- Scenario: 450 ppm CO₂-eq in carbon market
  → we do not require equalized carbon prices among countries
- Payments from Europe and North America ensure equal effort