Emissions are rising

Data: CDIAC/GCP

CO₂ emissions (Gt CO₂/yr)

Fossil fuels and cement

Land–use change

Global Carbon Project

Mercator Research Institute on Global Commons and Climate Change

Technische Universität Berlin
What about the renaissance of coal?
There is some progress, especially in China

Does the renaissance of coal come to a standstill?

Climate Projections and Associated Risks

Slide by H. J. Schellnhuber
LETTER

Global non-linear effect of temperature on economic production

Marshall Burke¹², Solomon M. Hsiang³⁴ and Edward Miguel⁴⁵

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

Based on SYR Figure SPM.10
The Paris Agreement & the general structure of mitigation pathways

- Re-directing investments from fossils to low carbon and efficiency solutions
- Carbon neutral economy
  - Electrification of end uses
  - Challenges:
    - Freight transport, aviation, shipping
    - Heavy industry
    - Ag emissions (CH4, N2O)

- Power sector decarbonization
- Compensate residual emissions
- Compensate budget overshoot

No Policies
Reference
2°C 500 ppm

Carbon neutrality
Net CO2 removal
Peak in 2020
Steep emissions reduction

YEAR
2010 2020 2030 2040 2050 2060 2070 2080 2090 2100

LIMITS Study: Kriegler, Tavoni et al., 2013, Clim Change Econ 04:1340008
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, Hilaire (2015)
How much fossil energy the atmosphere can put up with

Vorhandene Reserven an fossilen Energieträgern im Vergleich mit der Menge, die noch benutzt werden kann, um das 2°C-Ziel zu erreichen
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.
Renaissance of Coal
Social Costs vs subsidies

"one ton of CO₂ receives, on average, more than 150 US$ in subsidies"

Source: Science, 18 September 2015, Vol 349, Issue 6254, 1286ff
Why a carbon price is important

• A carbon price counteracts the oversupply of fossil fuels.

• Due to the fact that fossil fuels are largely subsidized the negative price is at ~150 €/tCO₂ presently.

• A carbon price changes the relative prices:
  • Relative prices of the renewables are often higher in emerging countries. High costs of capital are a significant problem.
  • The historic and present fluctuations of the oil price show transformative power of energy prices.
  • Climate policy would not have to fight constantly against market forces.
  • If interest rates rise, technological progress of the renewables is undone at least partly.

• Carbon price as hedging strategy, if price of renewables is not reduced fast enough.
Carbon pricing restructures investment portfolios

- A global price on carbon makes climate policy part of every investment decision
- This leads to a restructuring of investment portfolios and eventually divestment
Carbon pricing and international cooperation

- Common work by leading economists in the field – including nobel laureates Stiglitz and Tirole
- Implementation of the Paris Agreement requires reciprocity
- A common commitment to carbon pricing can both enhance efficiency and facilitate global cooperation
Phasing out fossil fuel subsidies and carbon pricing (with taxes or emission trading systems) is essential
Carbon Pricing in G20 Countries

Own presentation, based on Worldbank (2016)
Report of the High-Level Commission on Carbon Prices

Joseph Stiglitz and Nicholas Stern
Co-chairs of the Commission

May 29, Berlin, Germany
Conclusion of the Stiglitz-Stern Commission

• Based on the analysis of three approaches: technical roadmaps, national roadmaps, global models

• Carbon price is necessary to implement the Paris Agreement: 40-80 $/t CO₂ until 2020 and 50-100 $/t CO₂ until 2030

• Assuming that the carbon price is complemented by measures and policies such as efficiency standards, R&D, urban development, favorable investment climate, etc.

• Emphasis on the relevance of the revenue side. Use for the reduction of other taxes, investments in clean infrastructure, etc.

Stiglitz, Stern et al. CPLC (2017)
Projected cumulative infrastructure demand, 2015-2030

2014 US$, trillions

Source: Bhattacharya, Chattopadhyay, and Nagrah (forthcoming)
Carbon pricing revenues are sufficient to finance universal access to infrastructure

Except for roads where Africa’s & Latin America’s costs still partially exceed revenues

Jakob et al. (2016)
CO₂-pricing worldwide

Hardly any ETS has a significant carbon price.
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
Why coal is experiencing a renaissance

Stromerzeugung und daraus resultierende CO₂-Emissionen in Deutschland

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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**

![Chart showing EUA Nearest Contract and Futures and cost-efficient CO₂ price from models](chart.png)

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

- Reliable environment for investment decisions
- Instrument: Introduction of an auction reserve price
Available now

www.mcc-berlin.net/klimabuch