



POTSDAM INSTITUTE FOR
CLIMATE IMPACT RESEARCH

Climate Policy after Paris

Prof. Dr. Ottmar Edenhofer

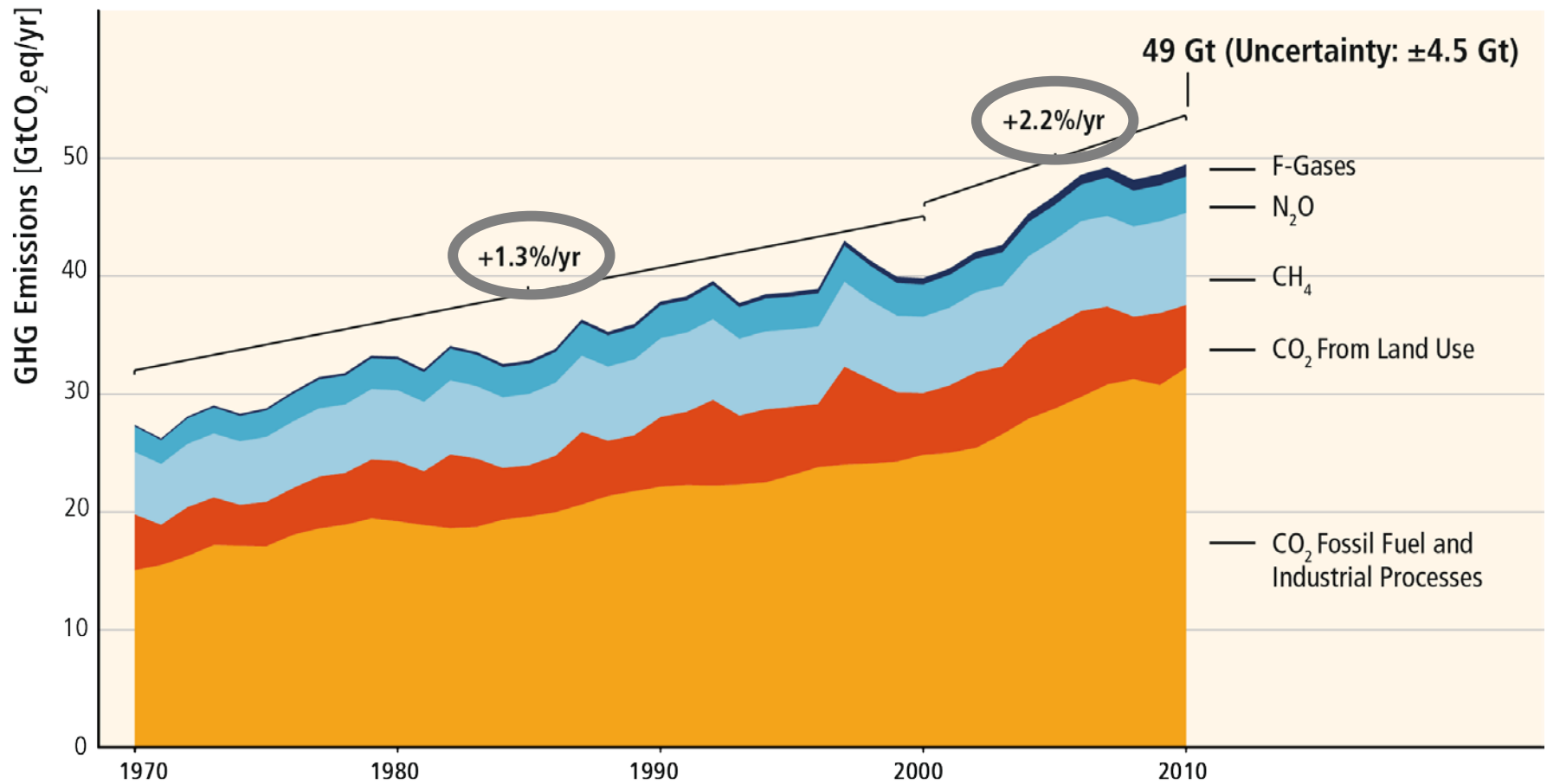
New School for Social Research

Department of Economics

New York

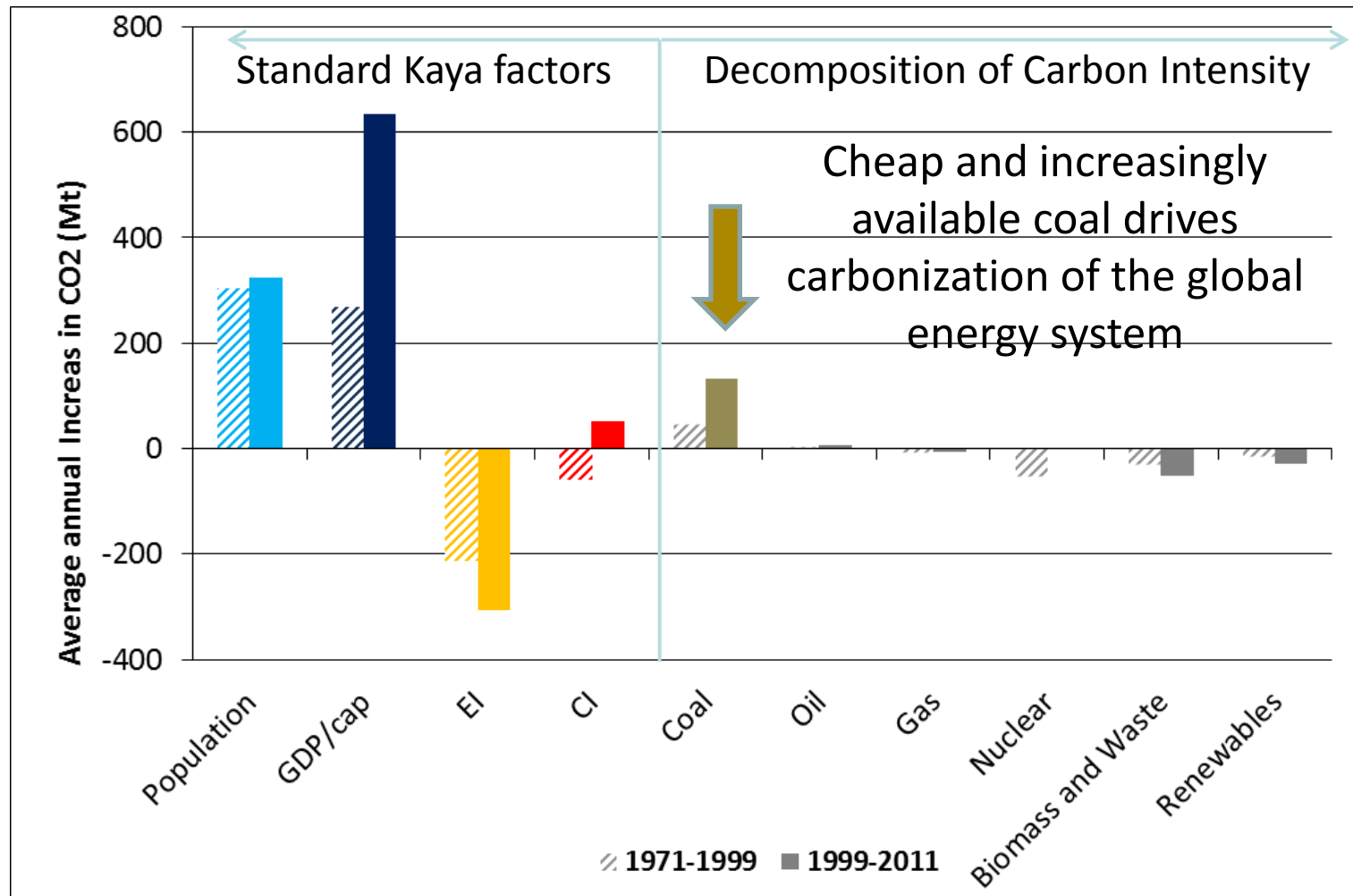
23 May 2016

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



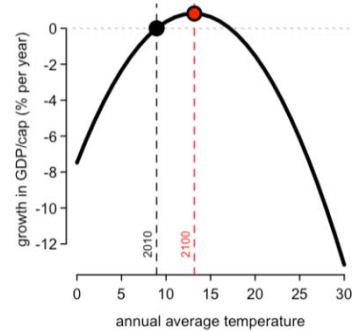
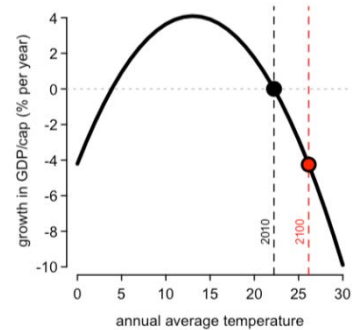
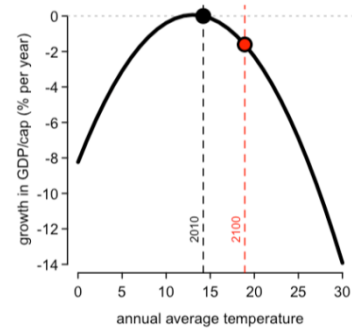
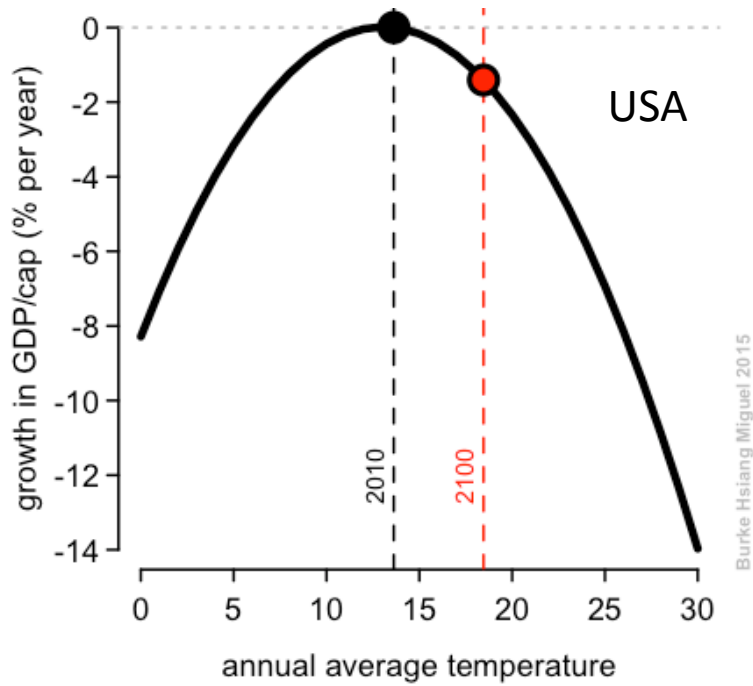
Based on Figure 1.3

A renaissance of coal drives the global carbonization.



Steckel, Edenhofer and Jakob, in press

Growth vs. temperature

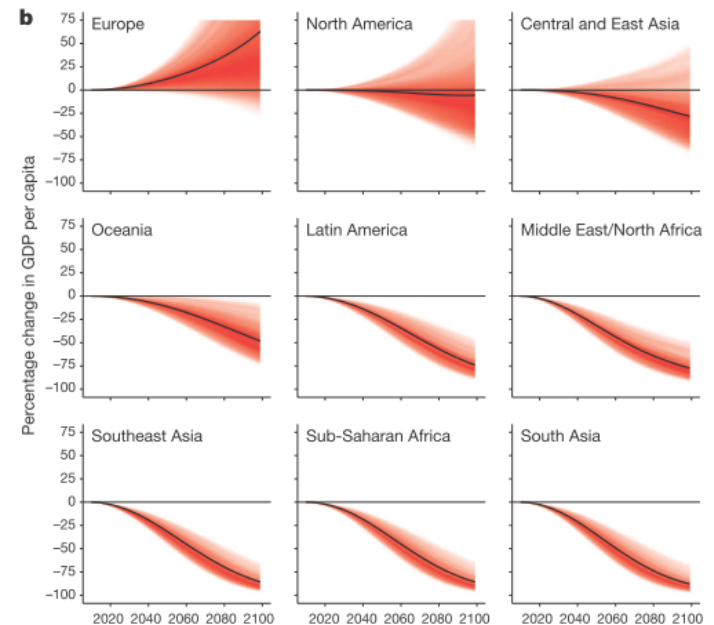
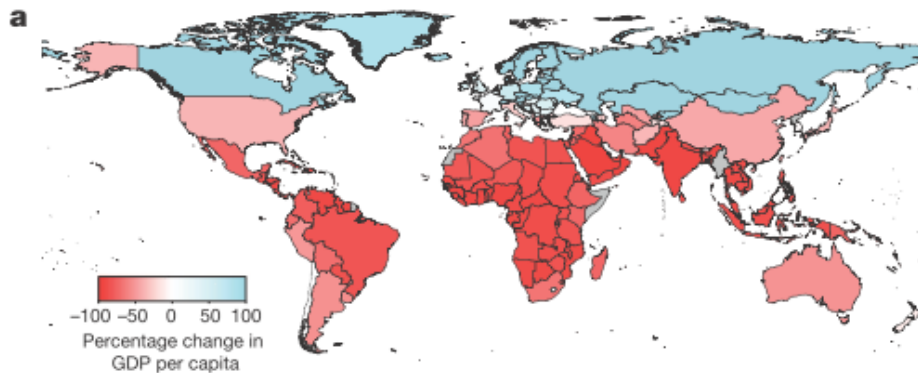


LETTER

Global non-linear effect of temperature on economic production

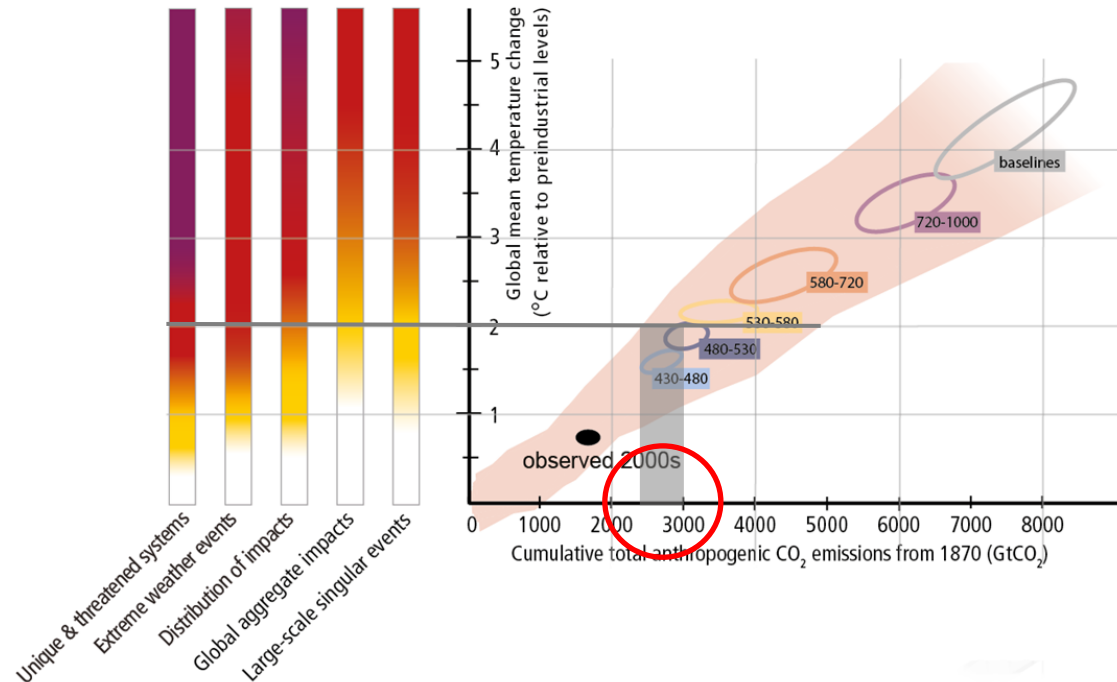
Marshall Burke^{1,2*}, Solomon M. Hsiang^{3,4*} & Edward Miguel^{1,5}

nature



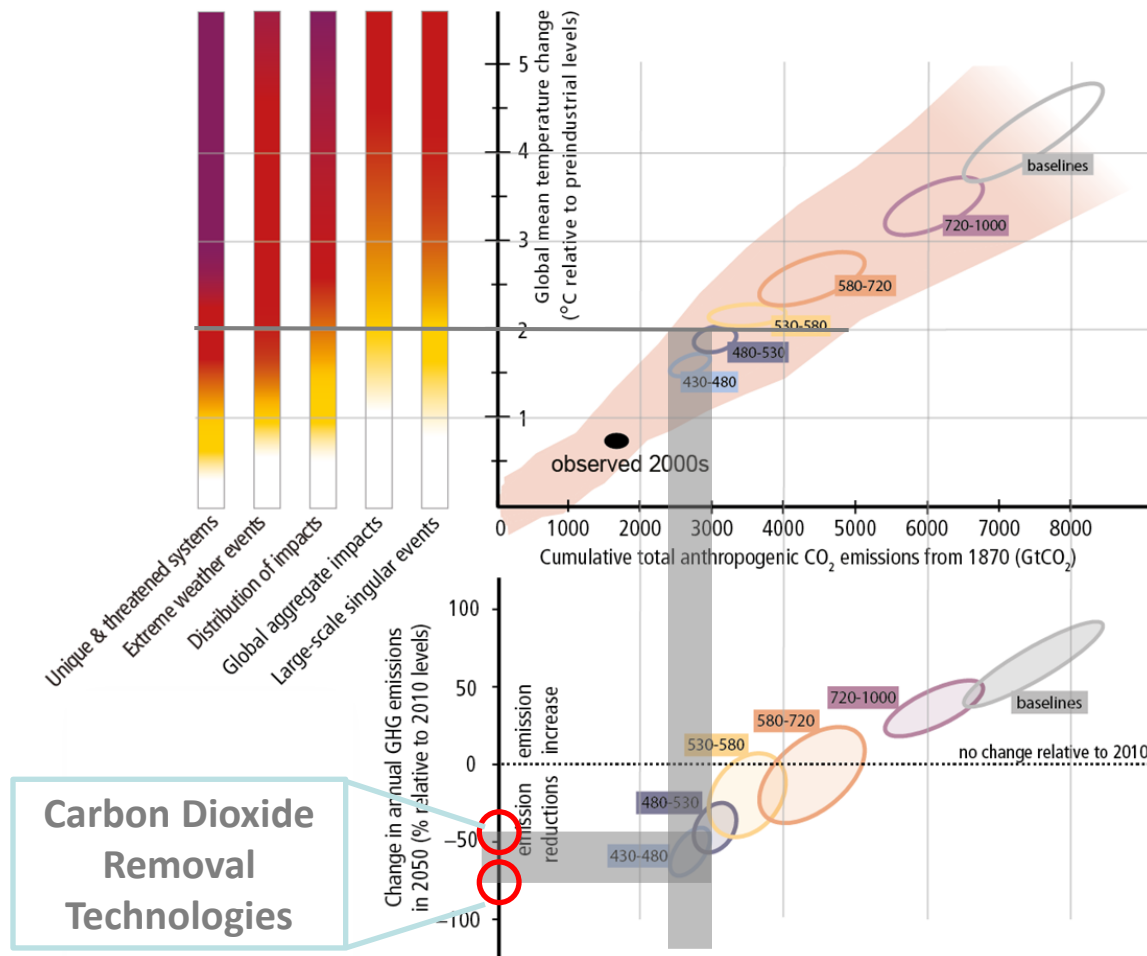
Quelle: Nature, doi:10.1038/nature15725

Risks from climate change depend on cumulative CO₂ emissions...



Based on SYR Figure SPM.10

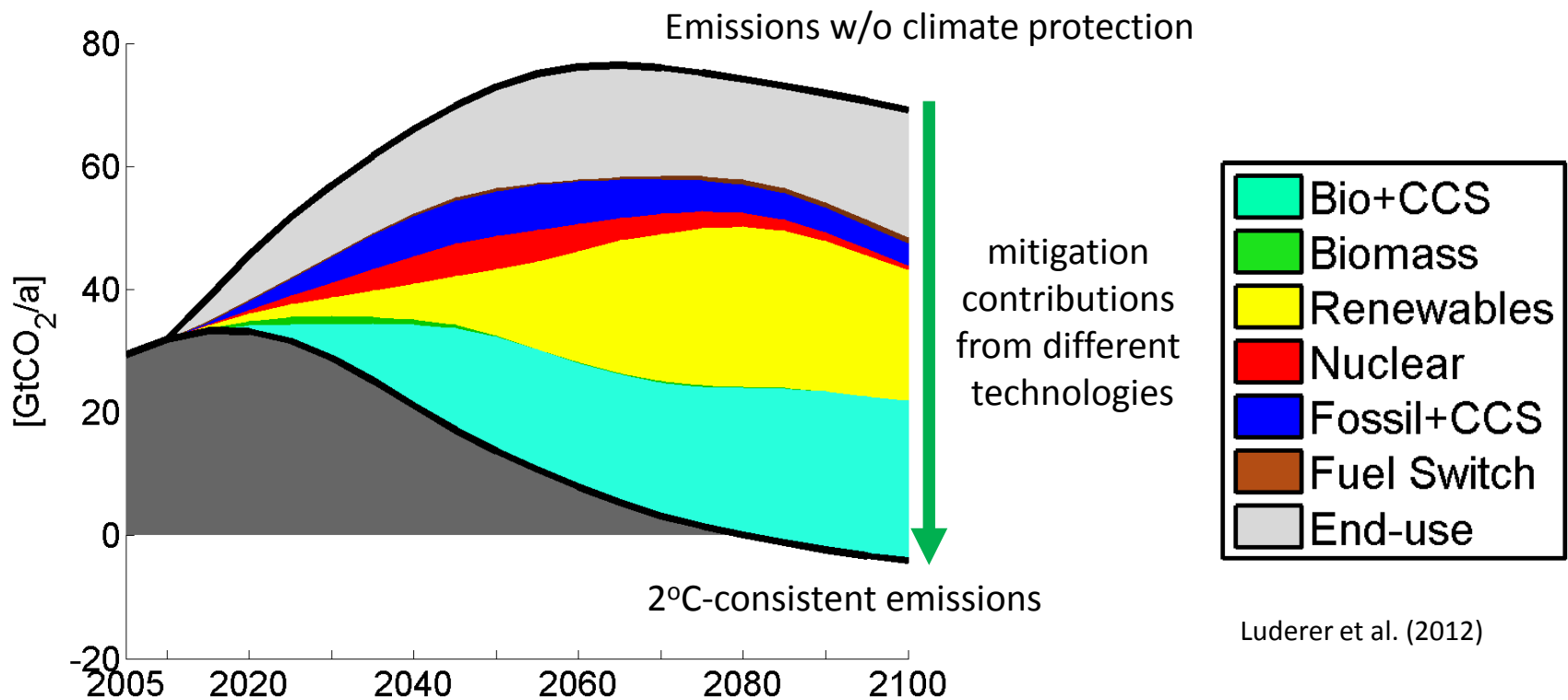
...which in turn depend on annual GHG emissions over the next decades.



Basiert auf SYR IPCC AR5 Figure SPM.10

The great transformation

CO₂ emissions from fossil fuels

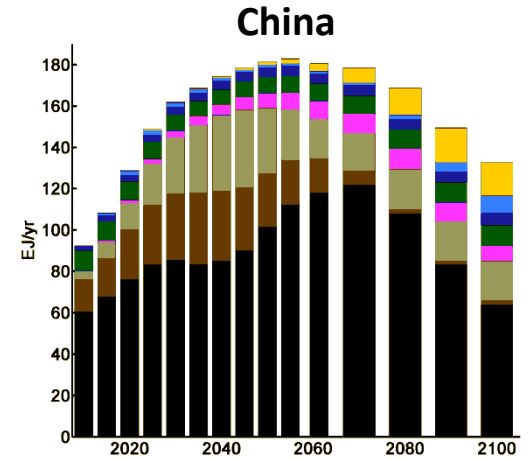
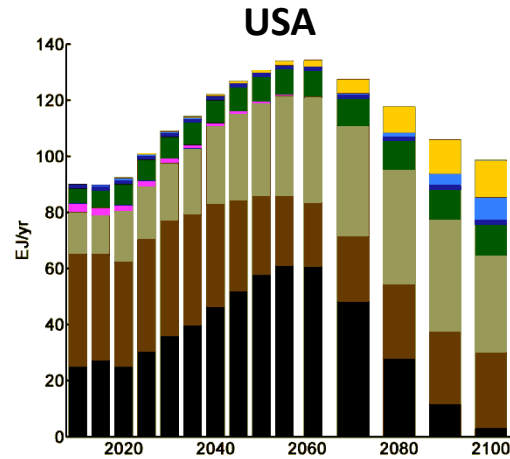
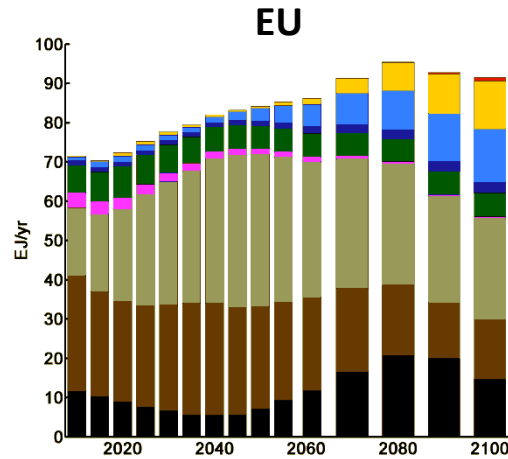


Luderer et al. (2012)

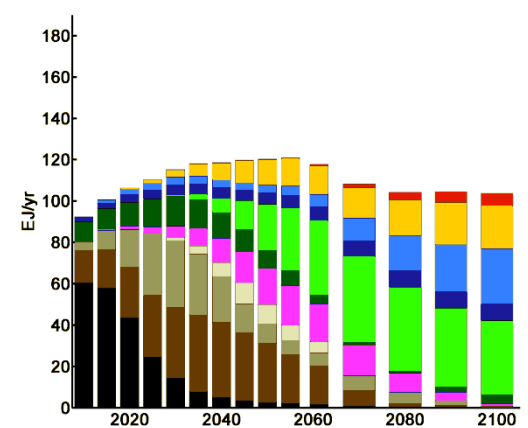
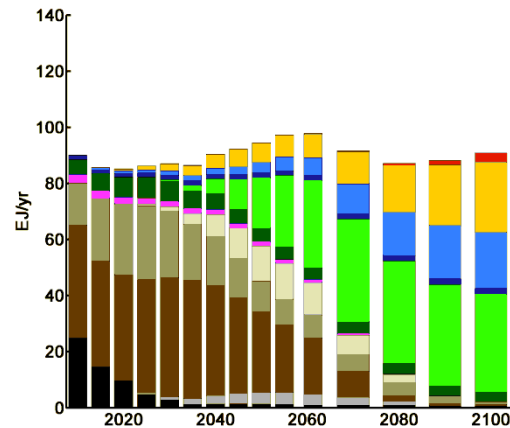
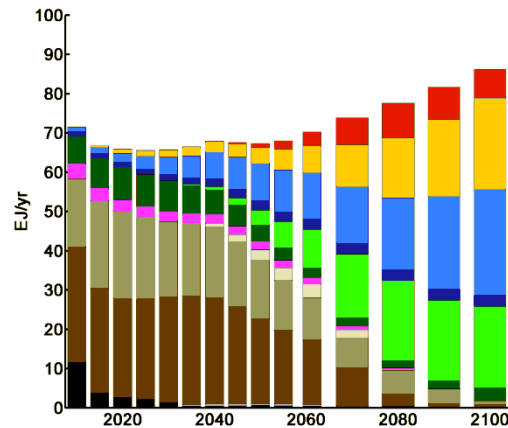
All regions see radical transformation of their energy system

Primary Energy

Baseline

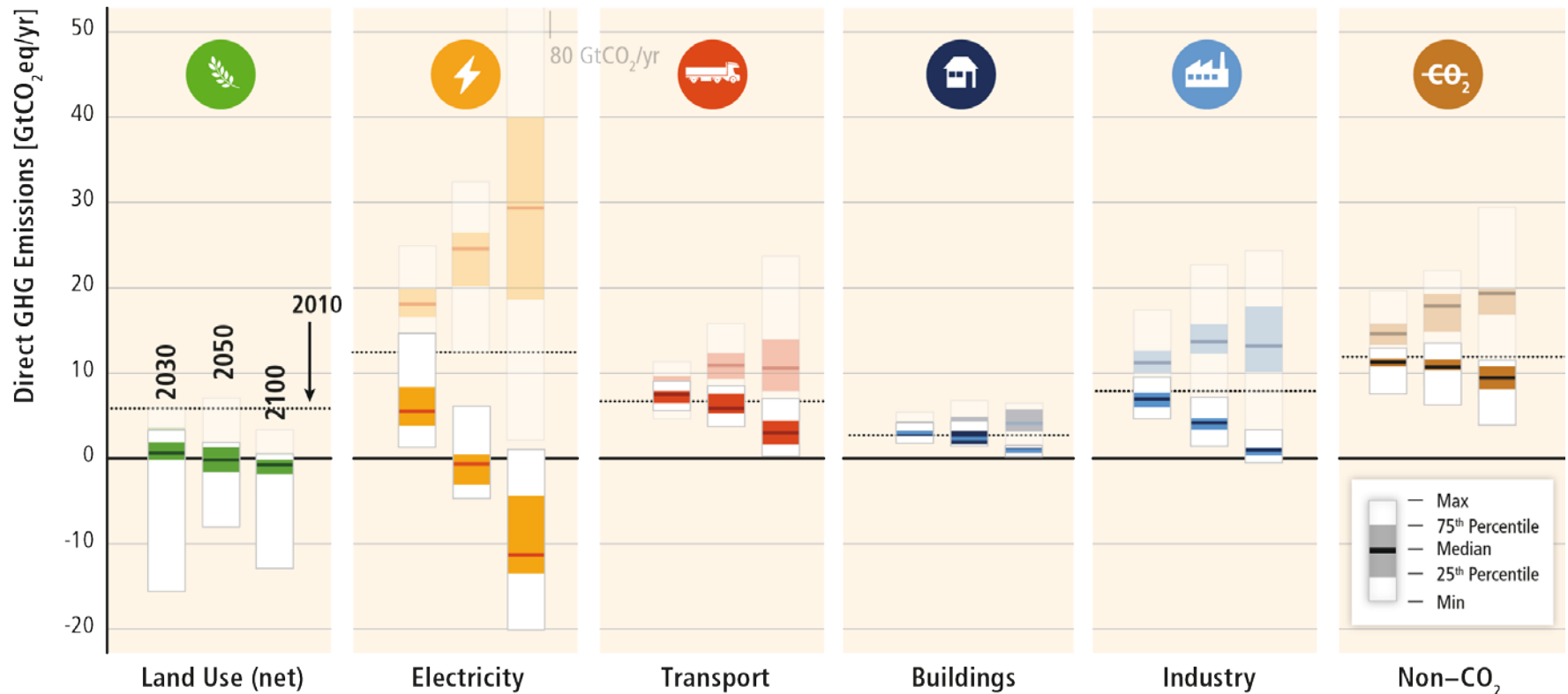


Climate Policy
2°C (50% likelihood)



Each Sector has to contribute – The power sector most

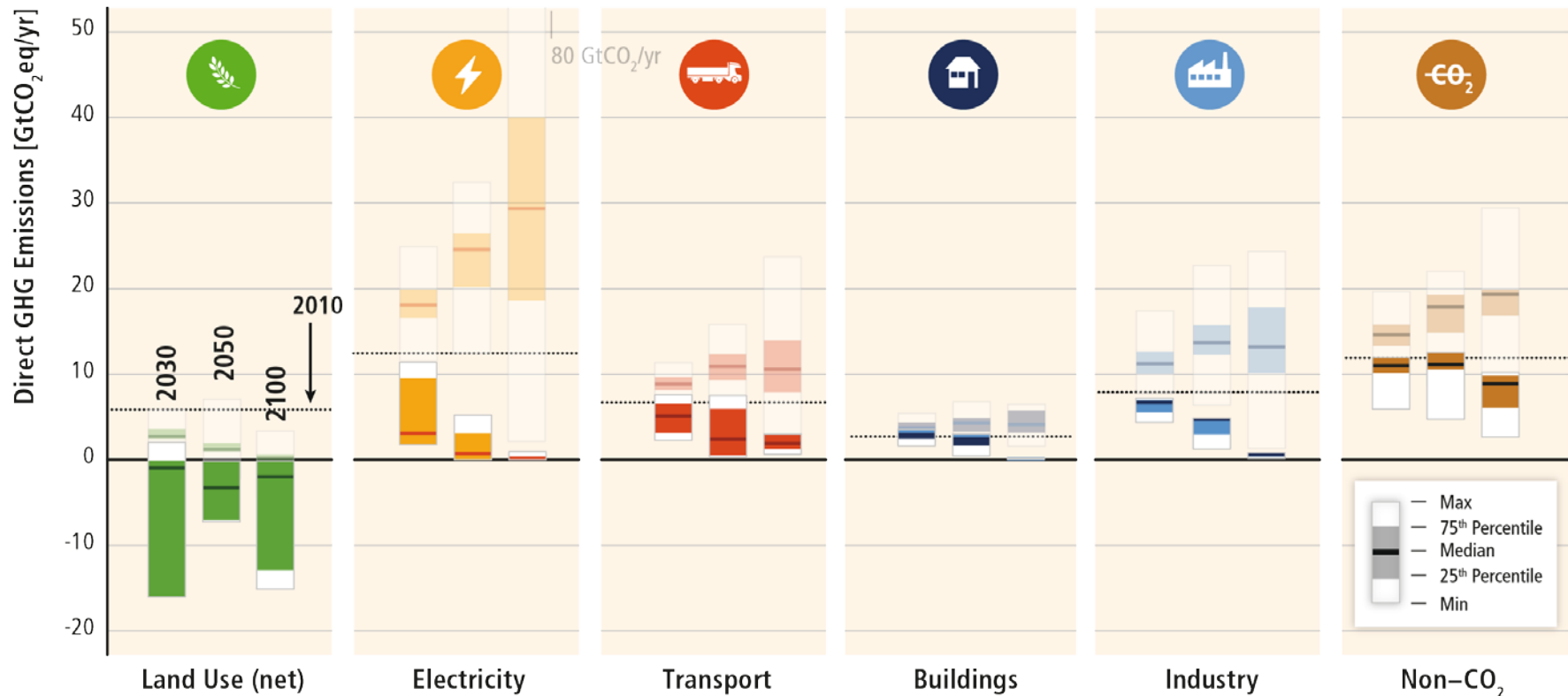
450 ppm CO₂eq with Carbon Dioxide Capture and Storage



Based on IPCC AR5 WGIII Figure TS.17

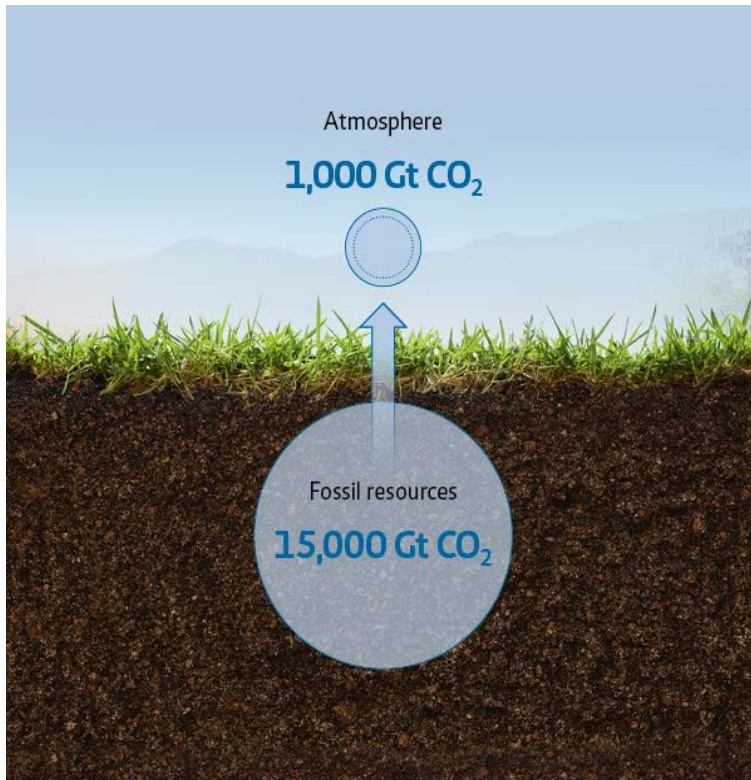
Afforestation becomes important when CCS is not available

450 ppm CO₂eq without Carbon Dioxide Capture and Storage



Based on IPCC AR5 WGIII Figure TS.17

The climate problem at a glance



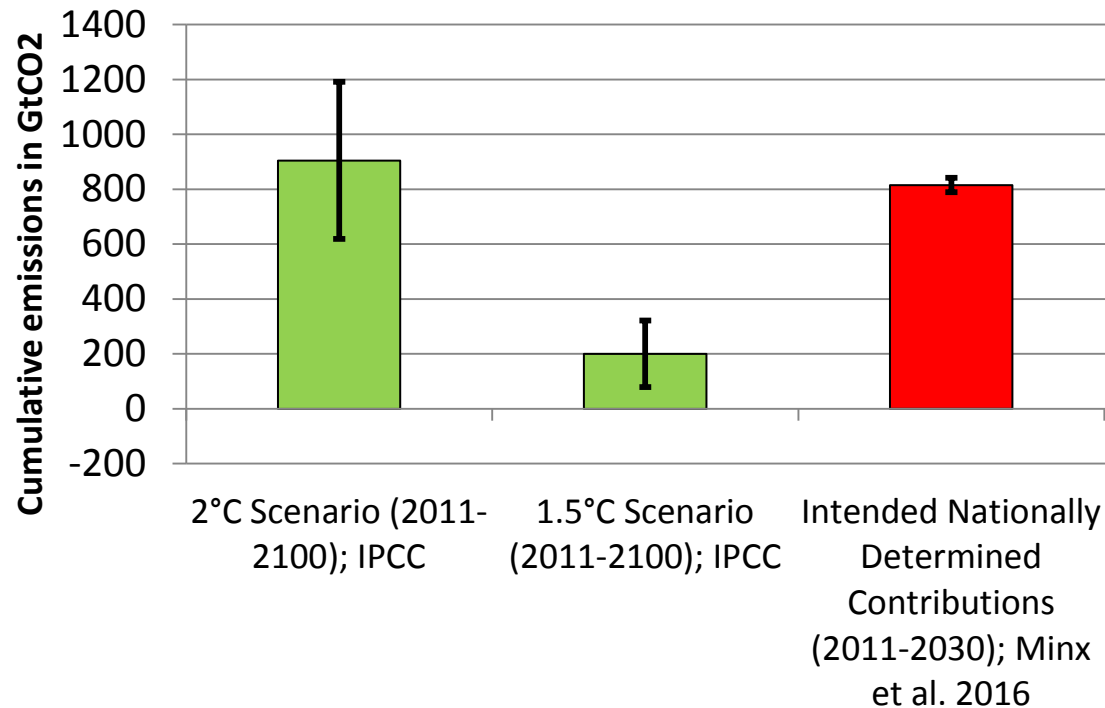
Resources and reserves to remain underground until 2100 (median values compared to BAU, AR5 Database)

Until 2100	With CCS [%]	No CCS [%]
Coal	70	89
Oil	35	63
Gas	32	64

Source: Bauer et al. (2014); Jakob, Hilaire (2015)

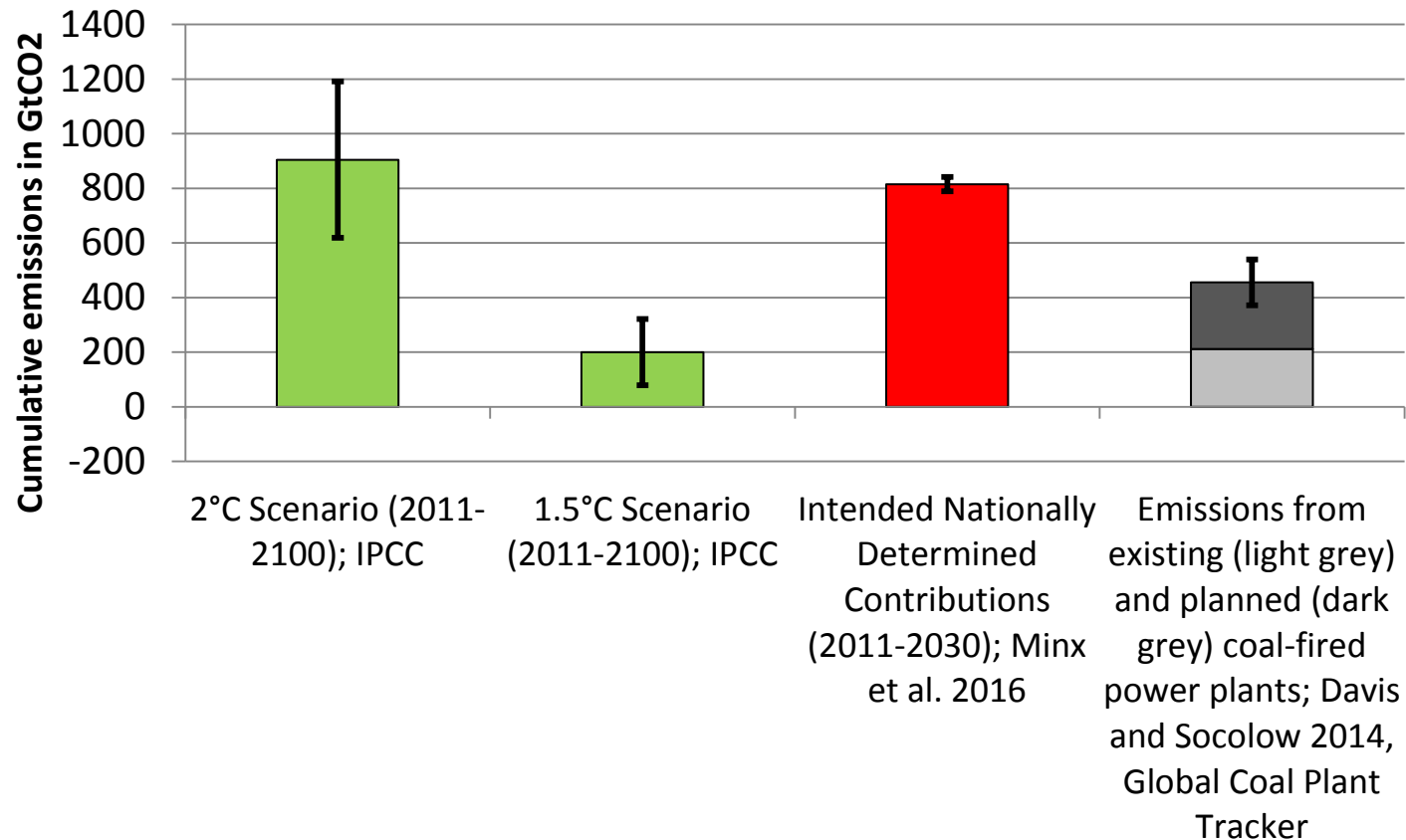
The Paris Agreement

Intended Nationally Determined Contributions are inconsistent with the temperature target

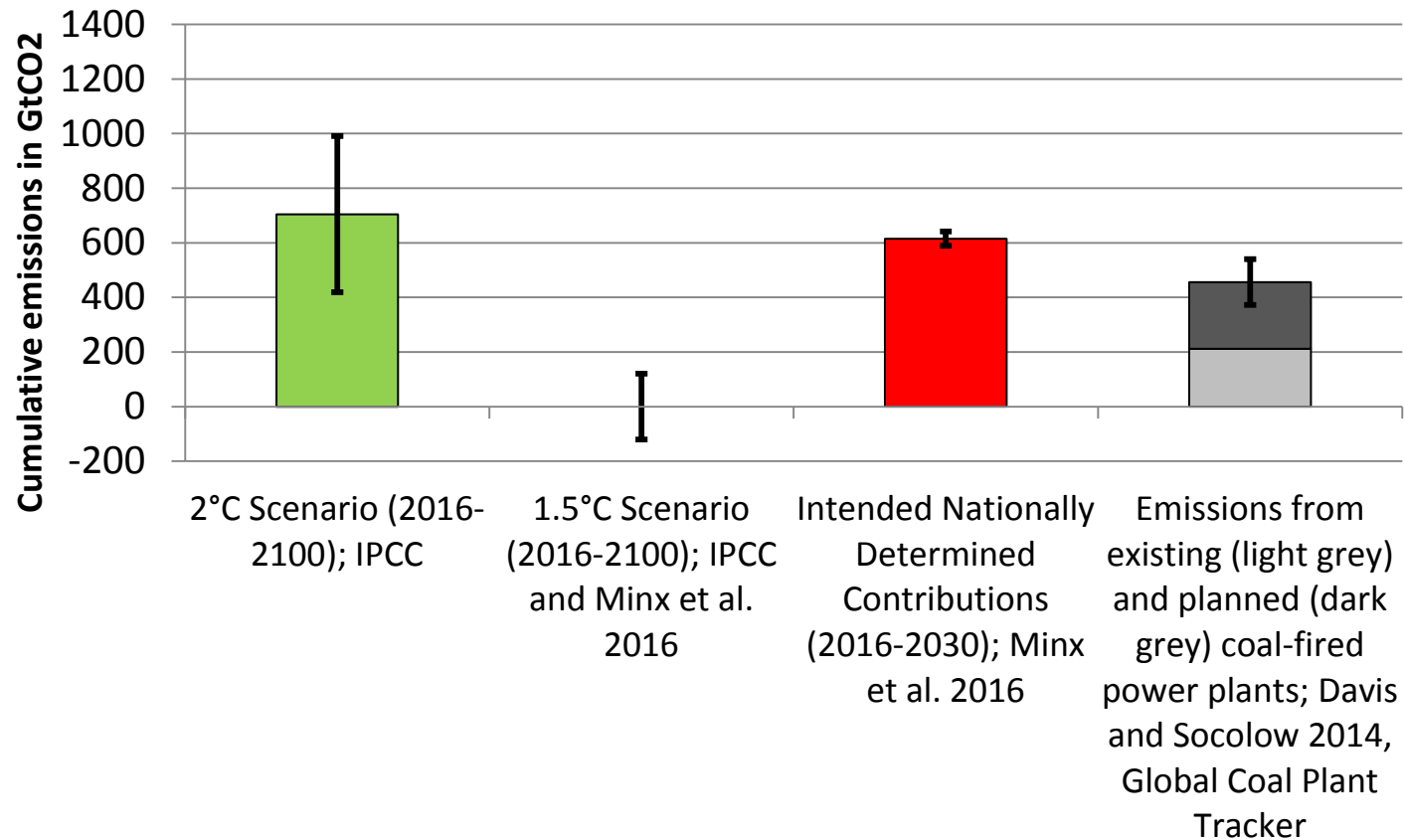


The Paris Agreement

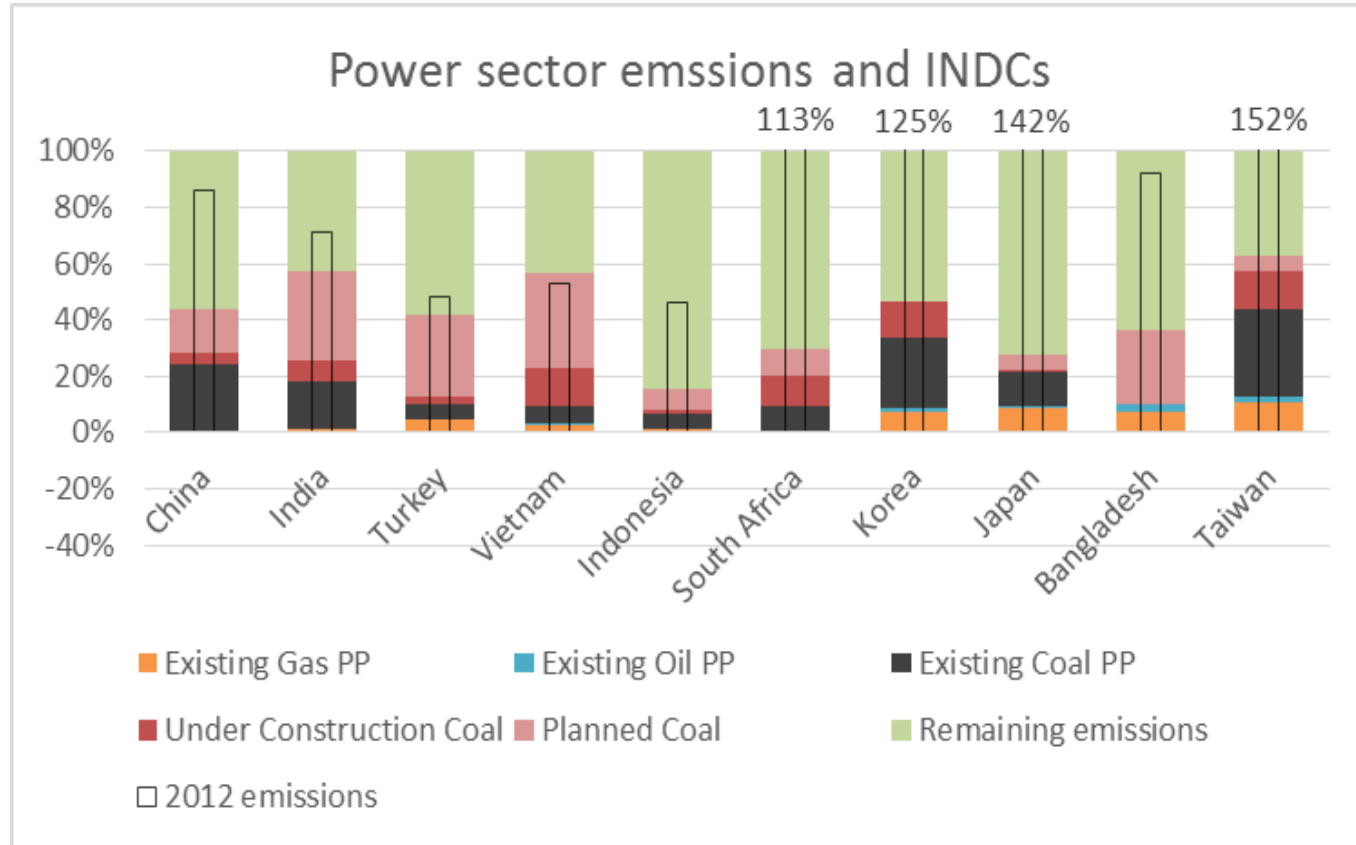
Intended Nationally Determined Contributions are inconsistent with current energy-policy



The current carbon budget



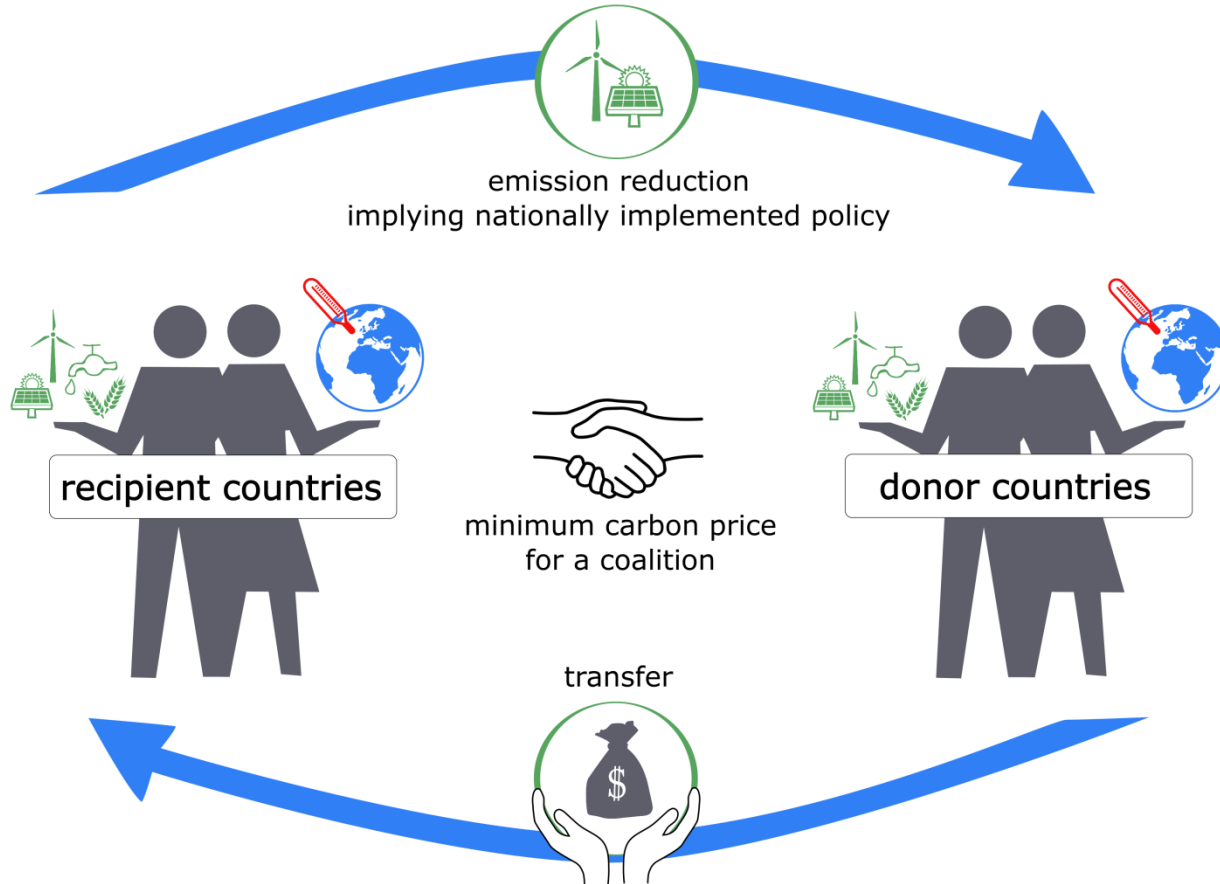
The INDCs are inconsistent



Edenhofer et al. submitted (Science)

Countries with highest ongoing and planned coal investment

Minimum Carbon Price and Transfers



Global Minimum Carbon Price and Transfers

Ausweg aus der Klima-Sackgasse

Die Treibhausgasemissionen müssen sinken. Aber sie steigen. Ein Durchbruch ist auf dem Klimagipfel in Paris nicht in Sicht. Dabei ist kluge Klimapolitik ganz einfach.

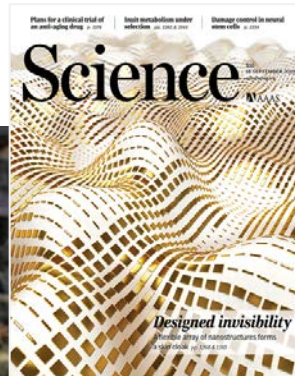
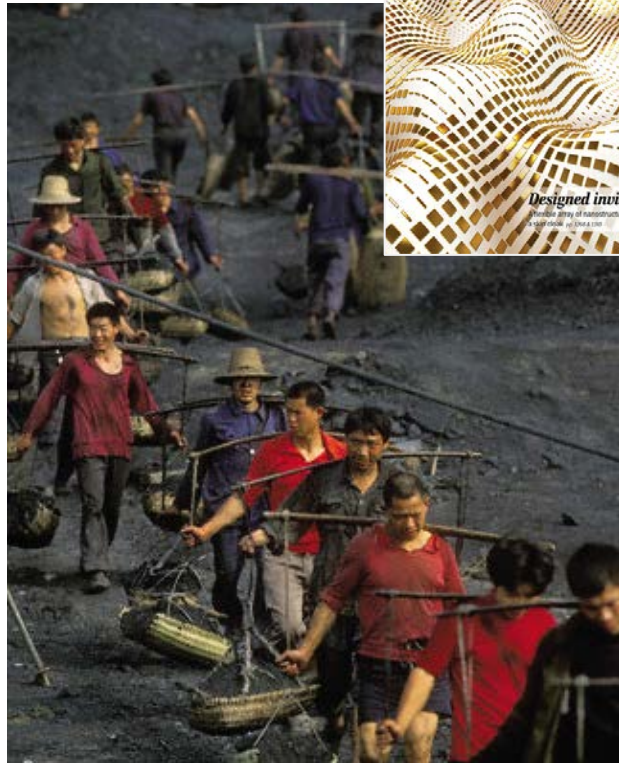
26.10.2015, von OTTMAR EDENHOFER UND AXEL OCKENFELS



Source: Frankfurter Allgemeine Zeitung, online, 26.10.2015

Renaissance of Coal

Social Costs vs subsidies



ENERGY

September 2015

King Coal and the Queen of Subsidies

The window for fossil fuel subsidy reform is closing fast

By Ottmar Edenhofer

Coal is the most important energy source for the Chinese economy (see the photo). Other rapidly growing economies in Asia and Africa also increasingly rely on coal to satisfy their growing appetite for energy. This renaissance of coal is expected to continue in the coming years (1) and is one of the reasons that global greenhouse gas (GHG) emissions are increasing despite the undisputed worldwide technological progress and expansion of

wide emissions are expected to continue to rise. After all, a reduction in coal demand in one region reduces world market prices, incentivizing an increasing demand in other regions (6).

What explains this renaissance of coal? The short answer is the relative price of coal. The price of coal-based electricity generation remains much lower than that of renewable power when the costs of renewable intermittency are taken into account.

As a result of technological progress and economies of scale, the costs of generating

“one ton of CO₂ receives, on average,
more than **150 US\$** in subsidies”

Source: Science, 18 September 2015, Vol 349, Issue 6254, 1286ff

Climate Policy and Poverty reduction

- A contradiction?



Water availability



Sanitation

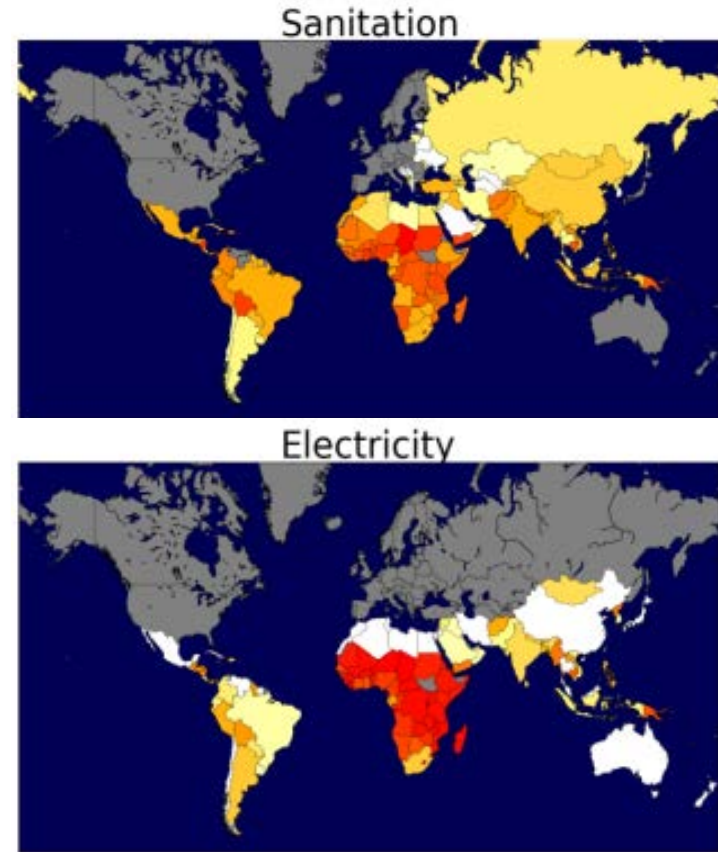
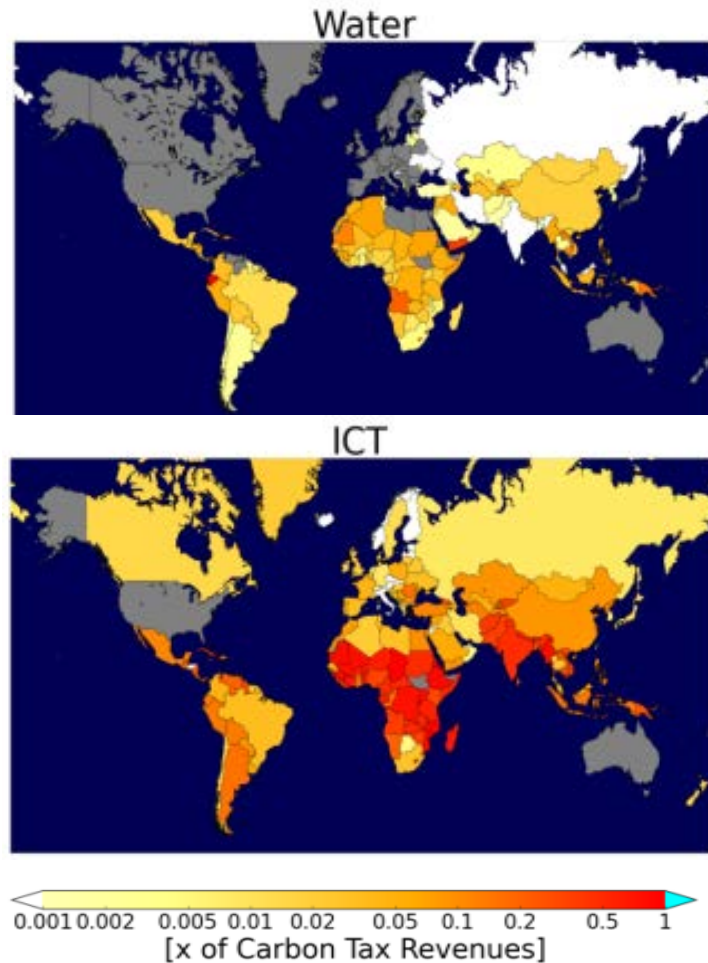


Telecommunication



Access to electricity

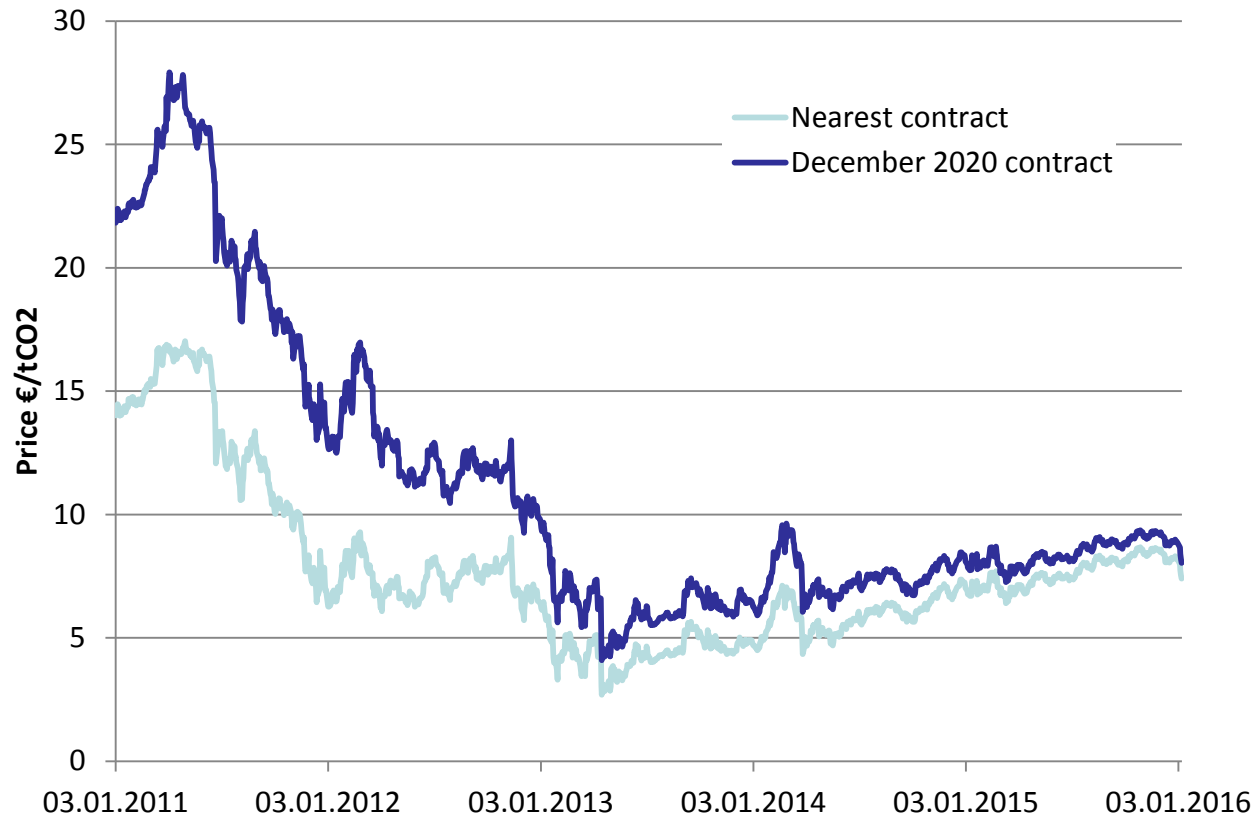
Carbon pricing revenues to close infrastructure gaps



Source: Jakob et al., in press

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

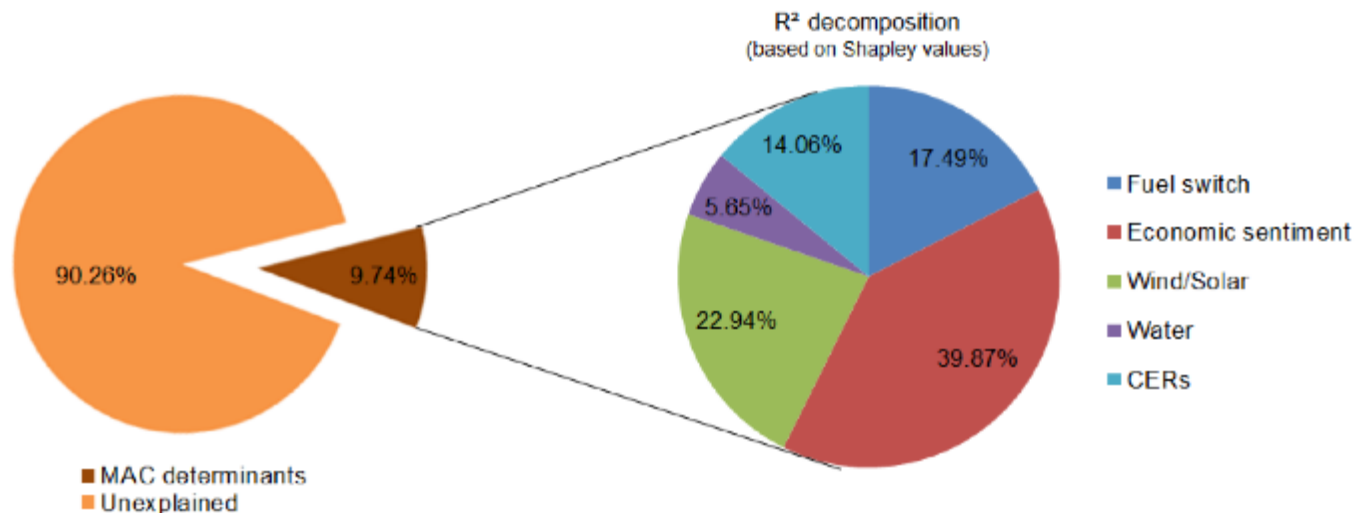
ETS lack dynamical cost efficiency



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

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

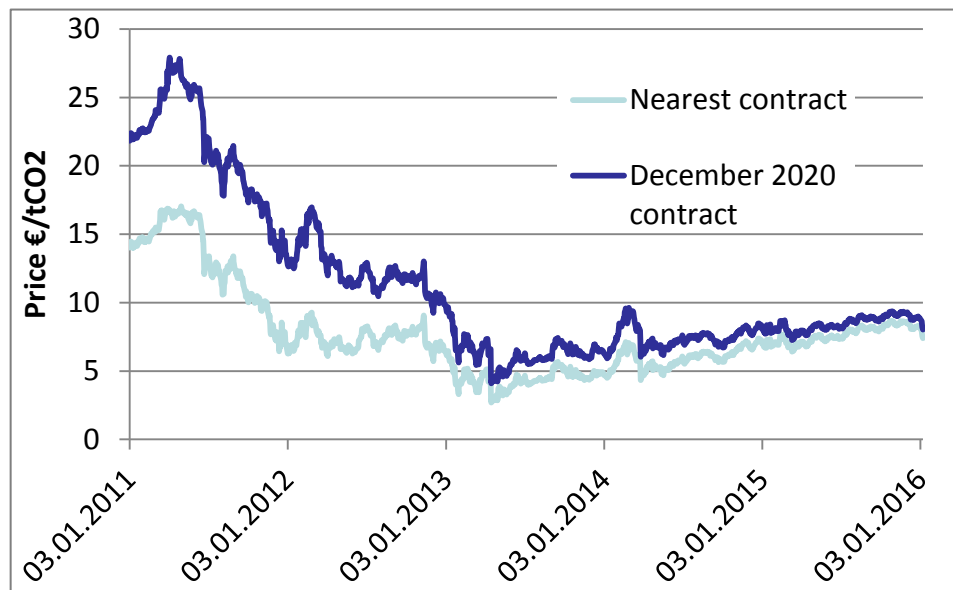


Koch et al. (2016)

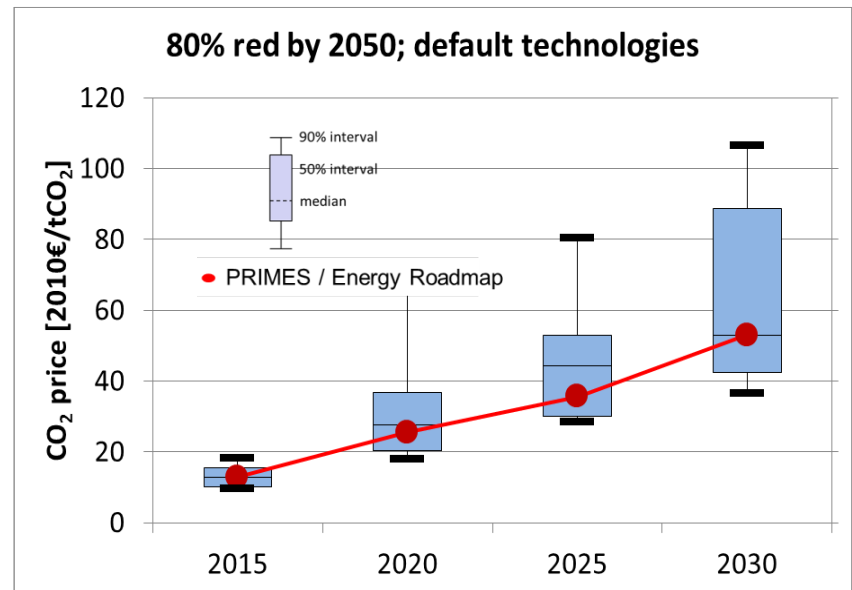
ETS lack dynamical cost efficiency

- 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

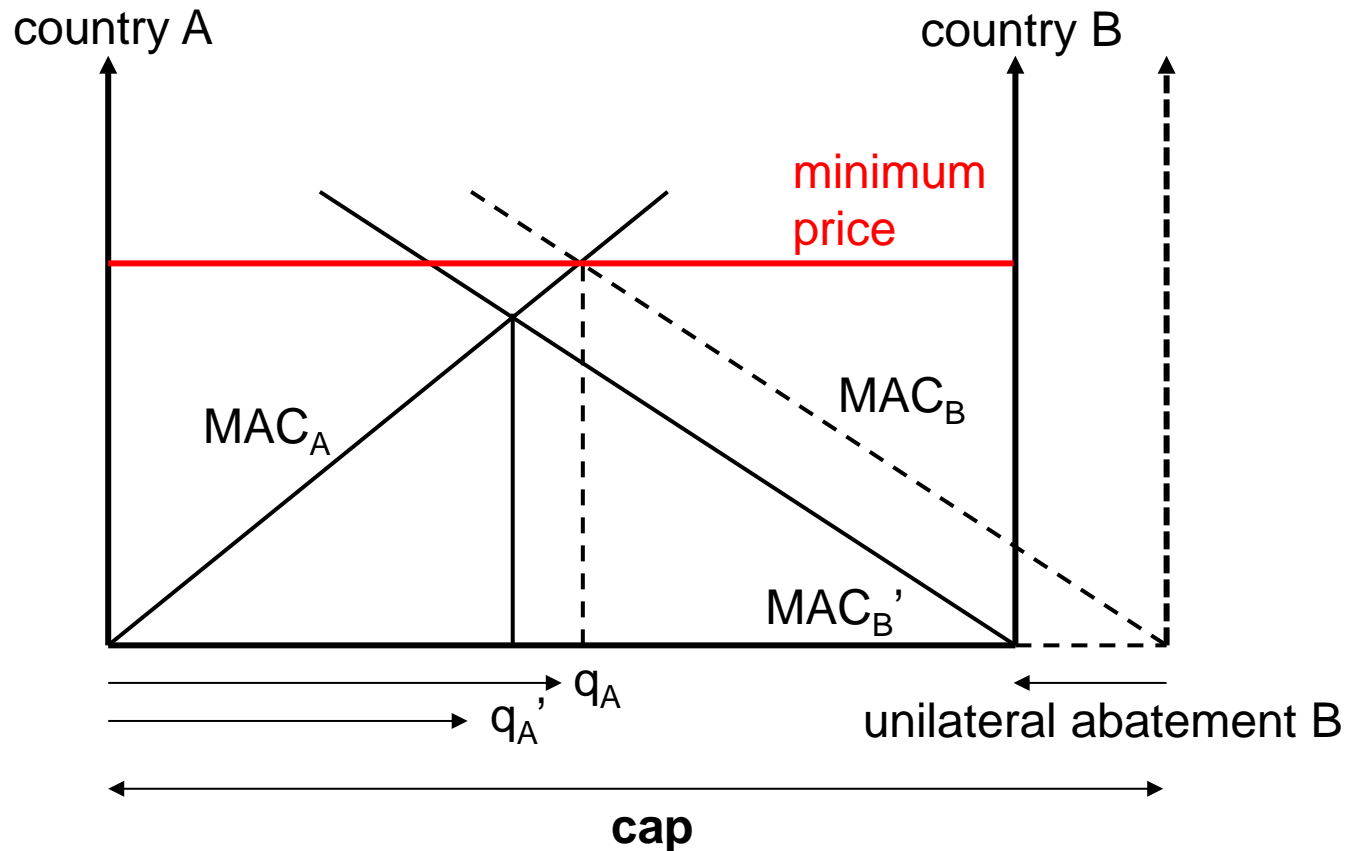


Cost-efficient CO₂ price from models



Knopf et al. (2013)

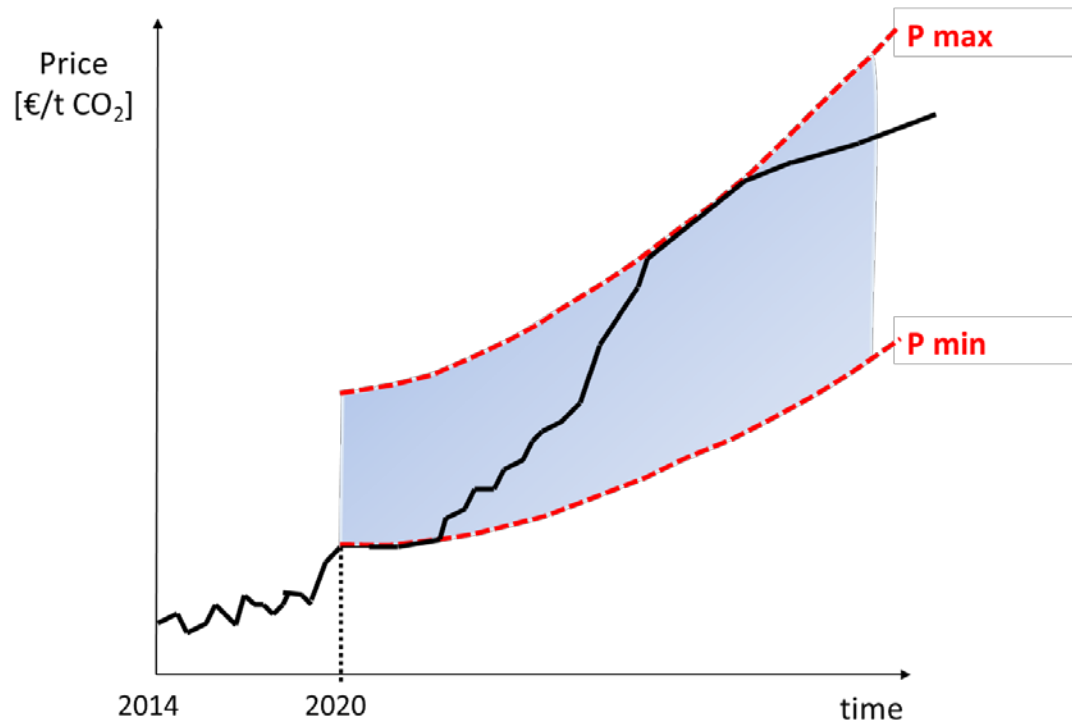
Minimum price prevents leakage in case of unilateral abatement



Minimum price prevents reduction from q_A to q_A' !

Introduction of a price corridor

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



**Thank you for your
attention!**