POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

„Paris, Trump and Climate"

Prof. Dr. Ottmar Edenhofer

Berlin Green Investment Forum

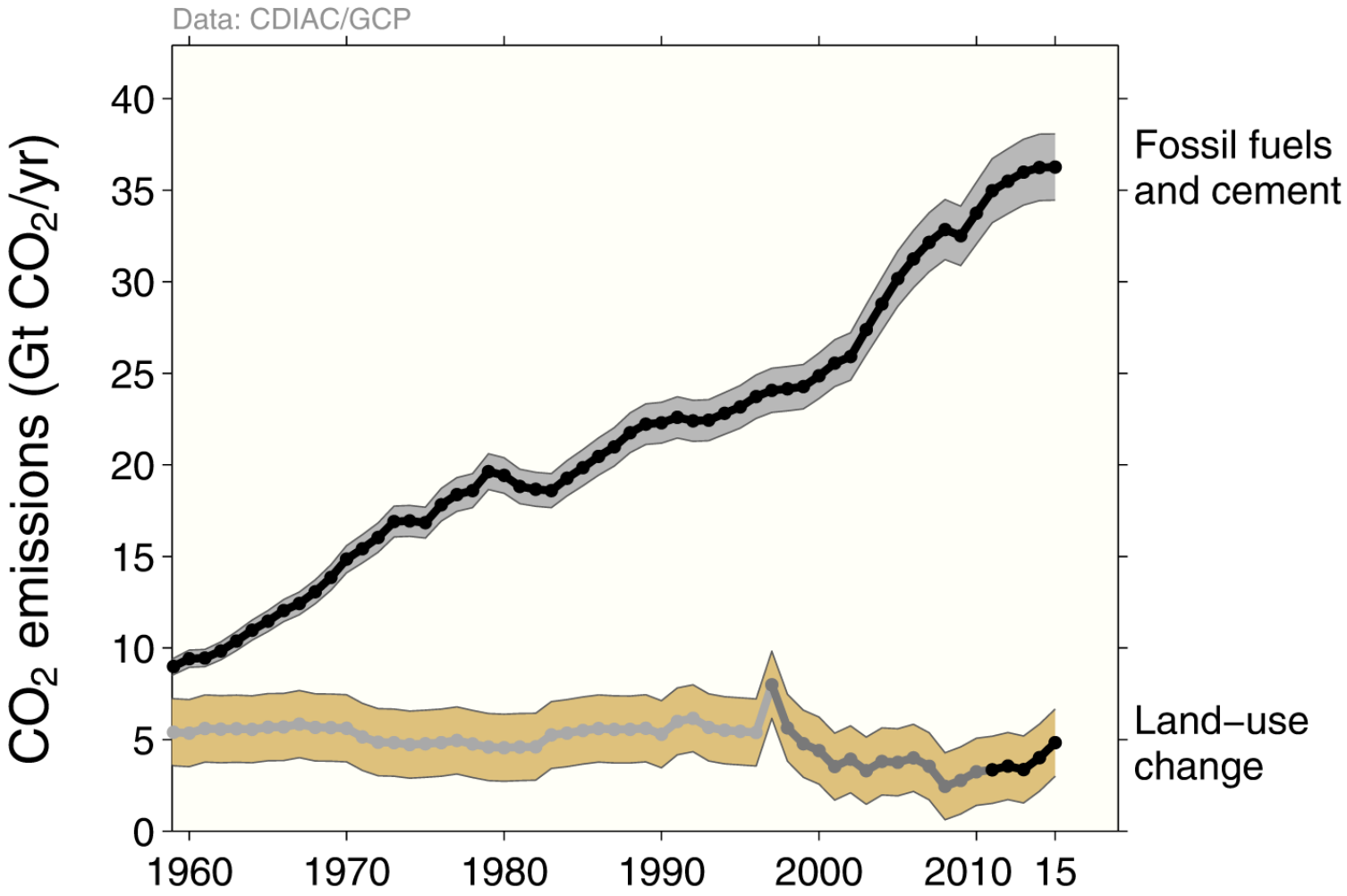
Berlin, 20 June 2017

Leibniz Gemeinschaft

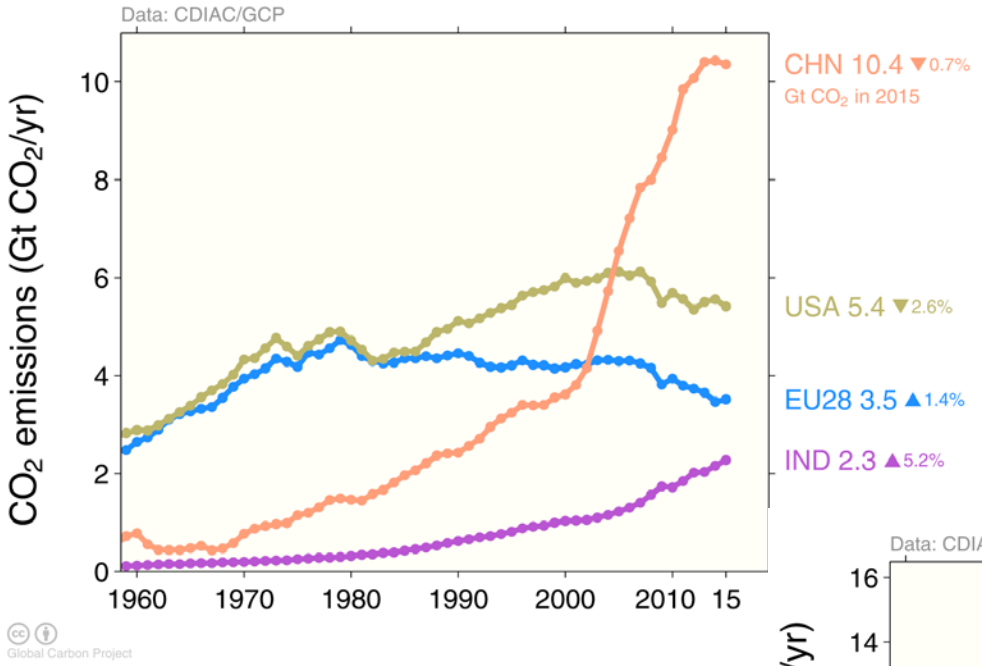
MCC Mercator Research Institute on Global Commons and Climate Change

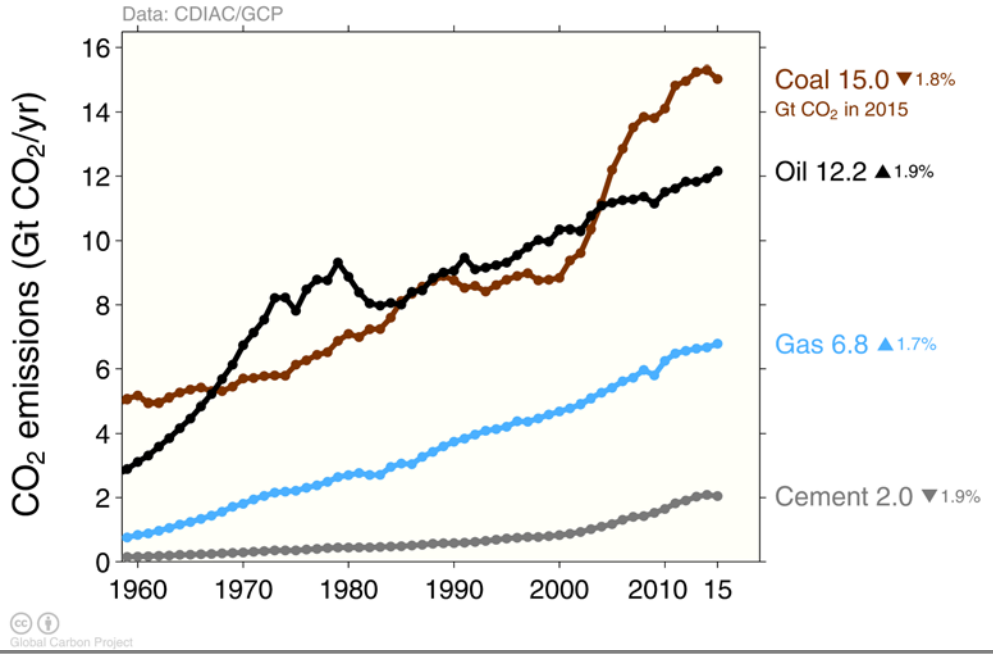
Technische Universität Berlin

Emissions are rising

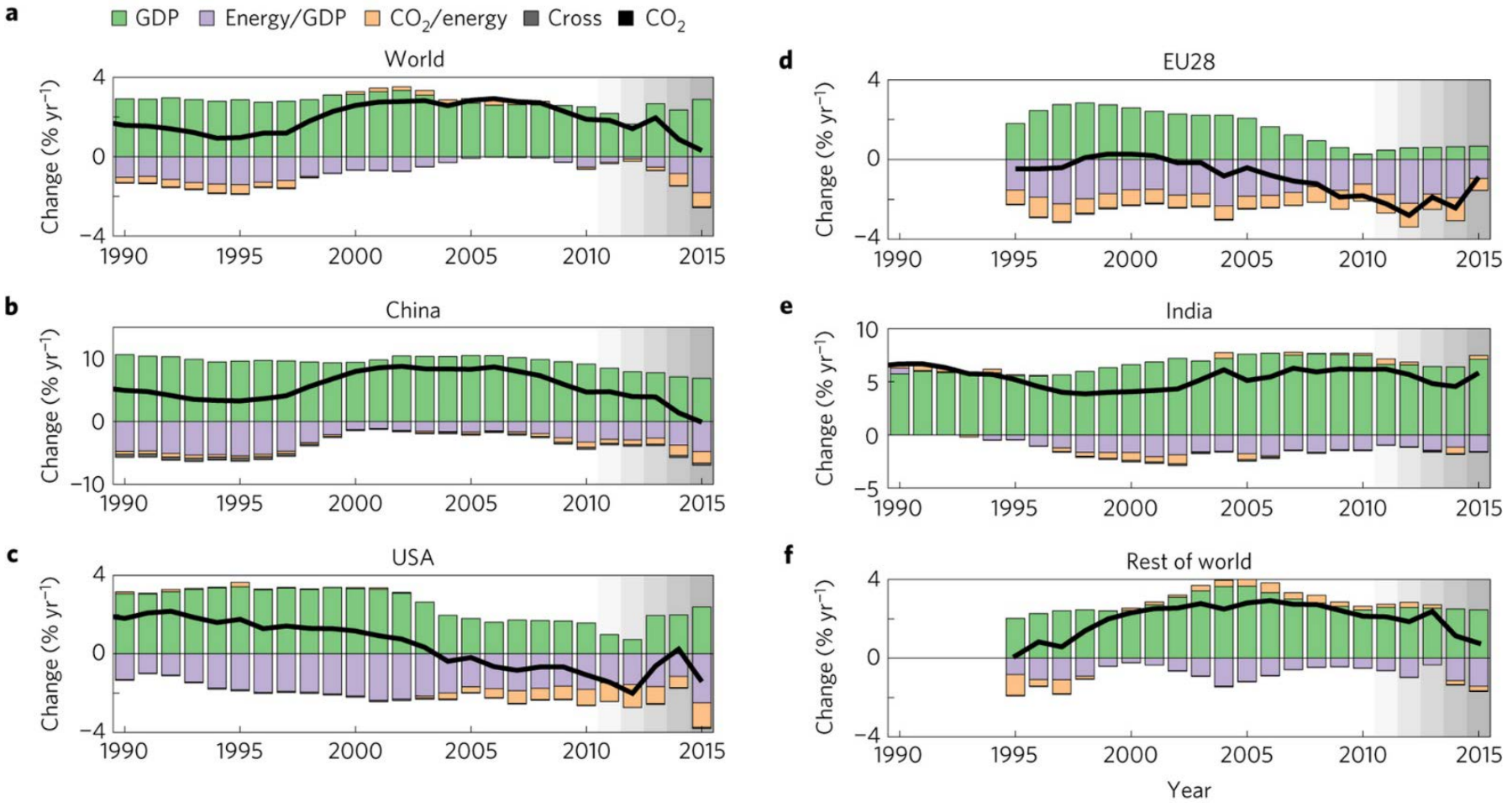


What about the renaissance of coal?

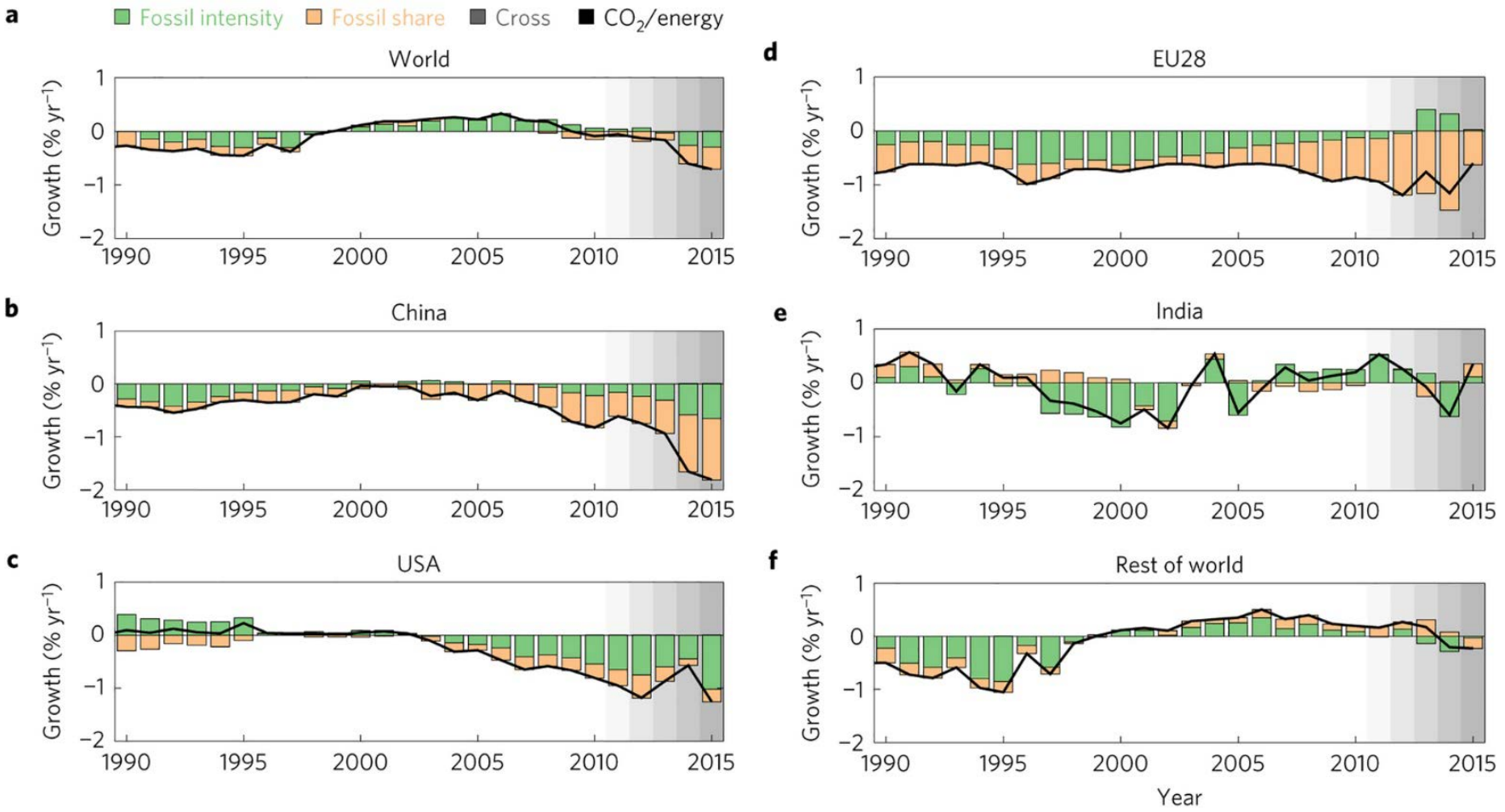




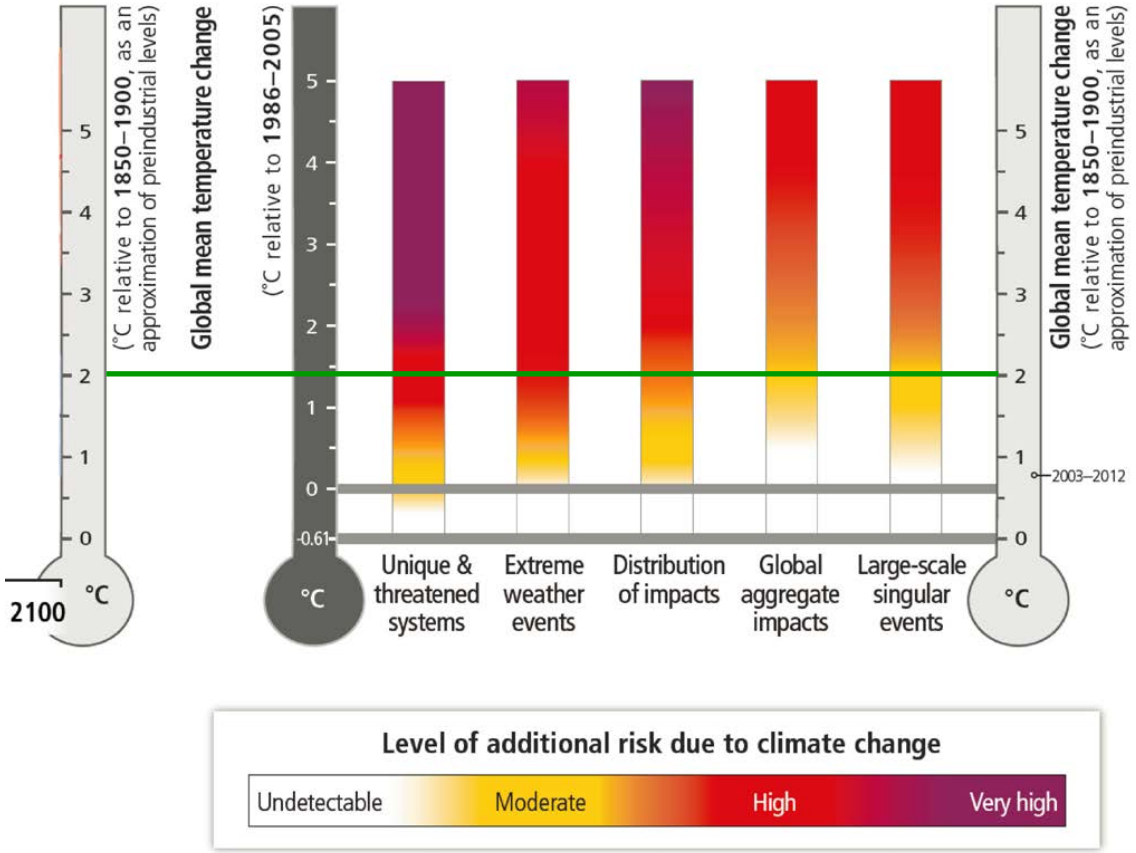
There is some progress, especially in China



Does the renaissance of coal come to a standstill?



Climate Projections and Associated Risks



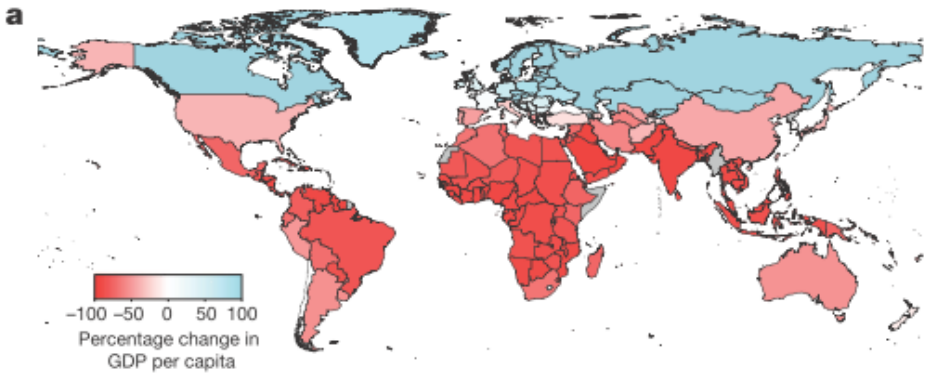
Slide by H. J. Schellnhuber

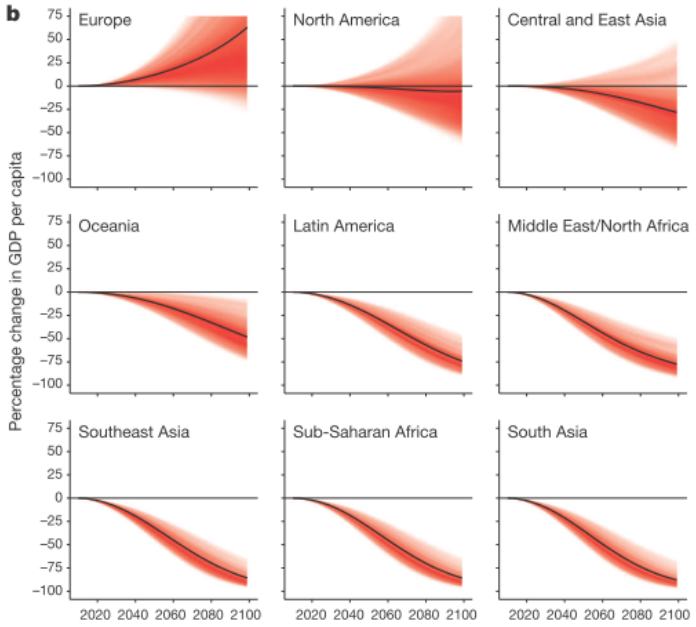
LETTER

nature

Global non-linear effect of temperature on economic production

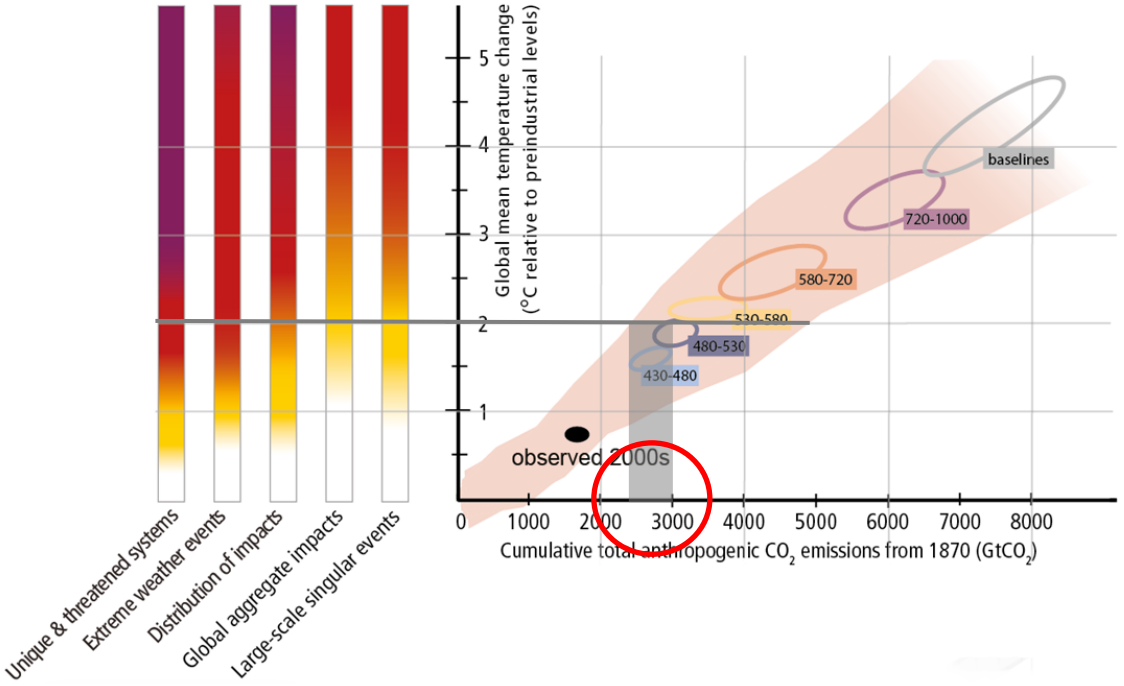
Marshall Burke[1,2]*, Solomon M. Hsiang[3,4]* & Edward Miguel[4,5]





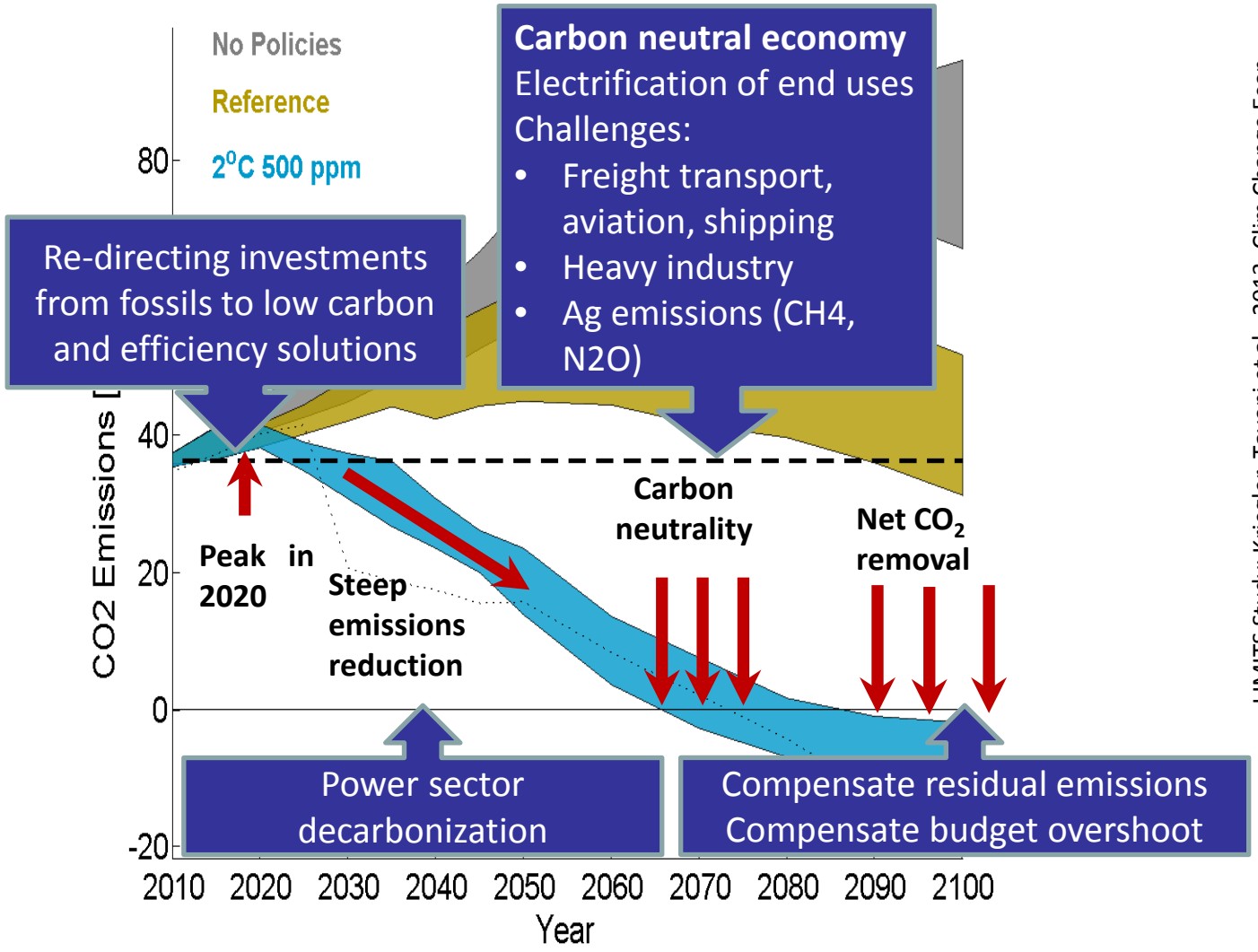
Quelle: Nature, doi:10.1038/nature15725

Risks from climate change depend on cumulative CO_2 emissions…



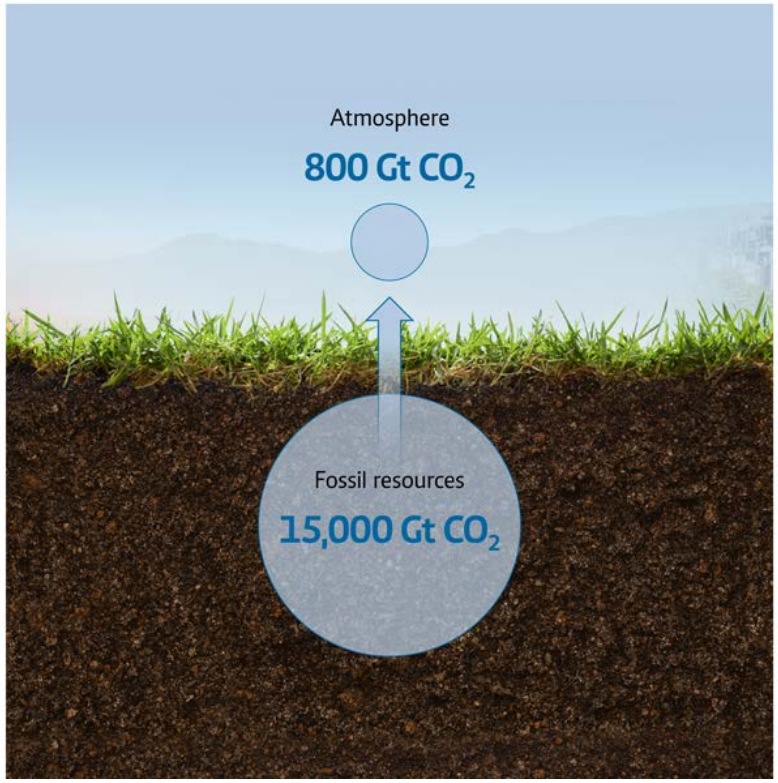
Based on SYR Figure SPM.10

The Paris Agreement & the general structure of mitigation pathways



LIMITS Study: Kriegler, Tavoni et al., 2013, Clim Change Econ 04:1340008

The climate problem at a glance.



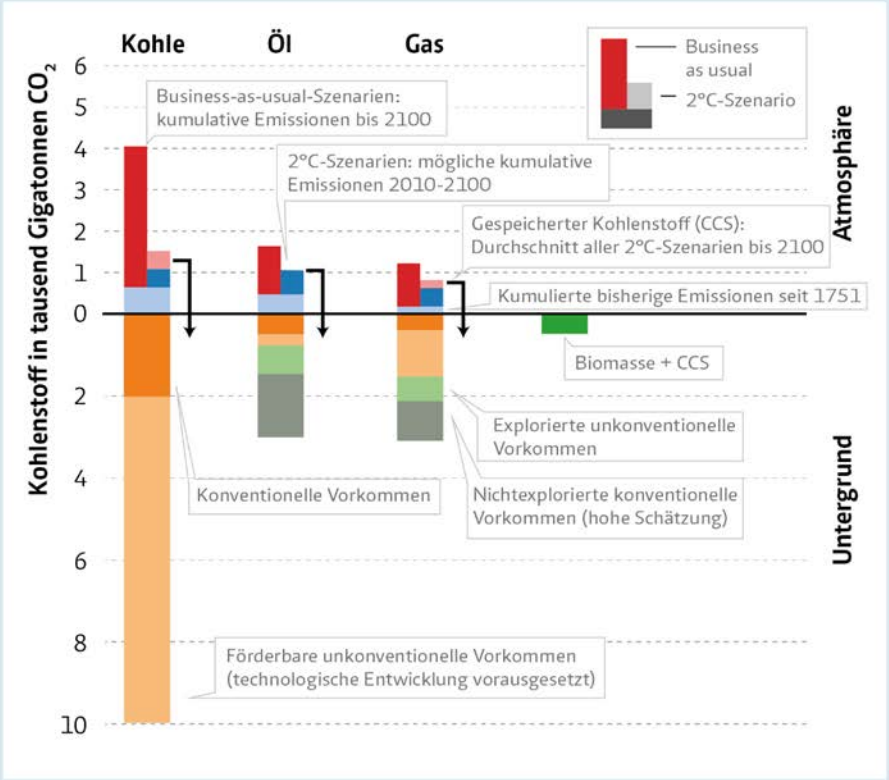
Resources and reserves to remain underground until 2100 (median values compared to BAU, AR5 Database)

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

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

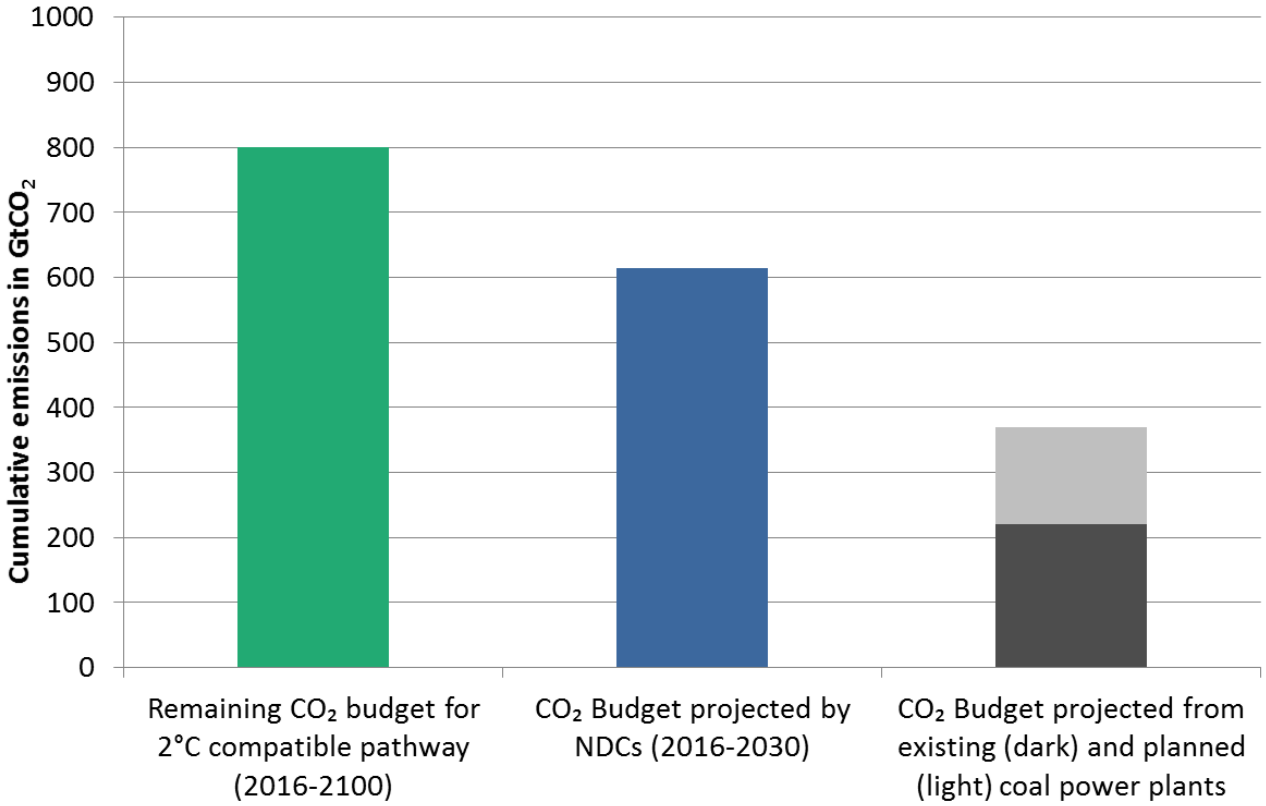
How much fossil energy the atmosphere can put up with

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 are subject to considerable uncertainty, see Edenhofer et al. (2016)

PIK

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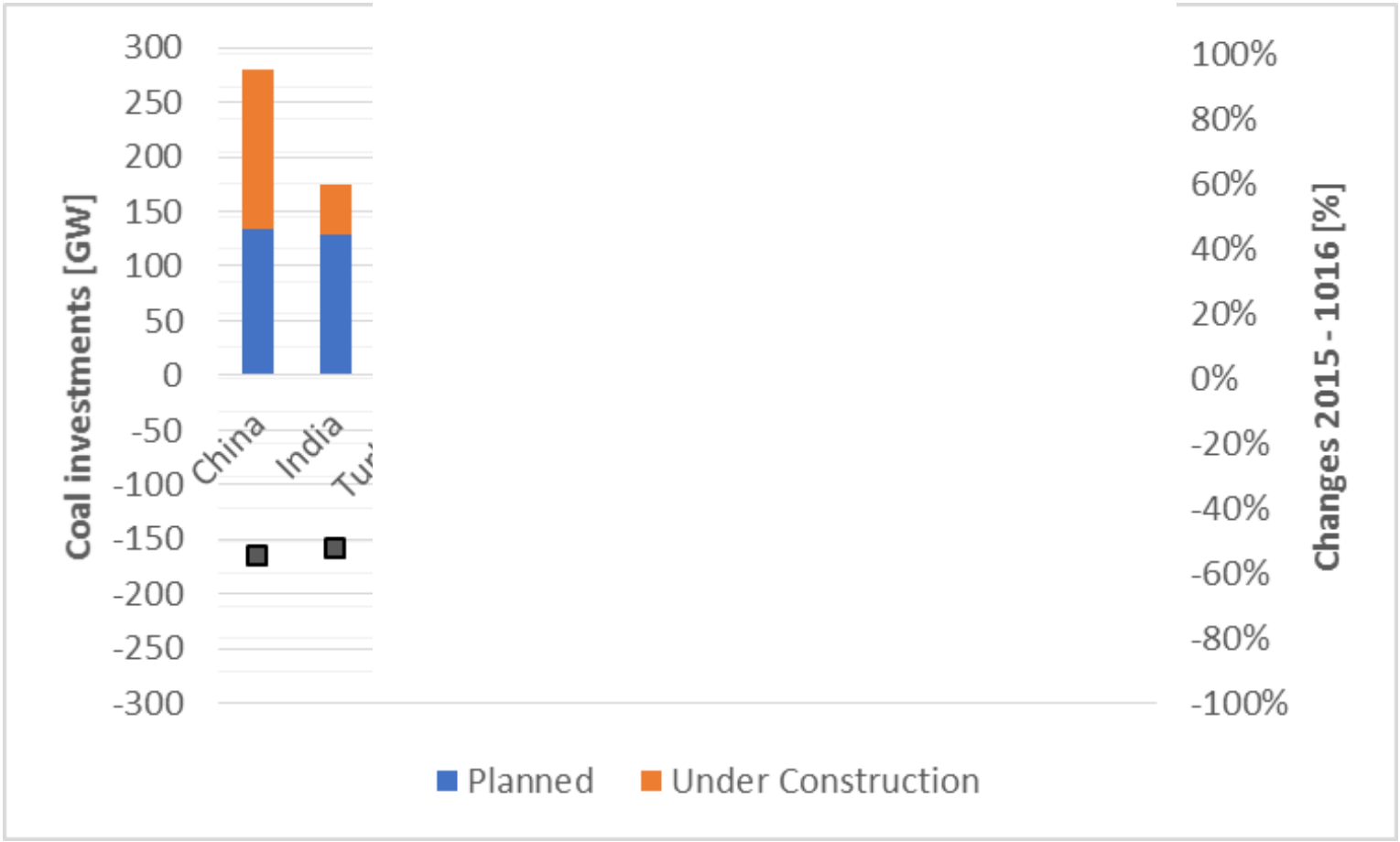
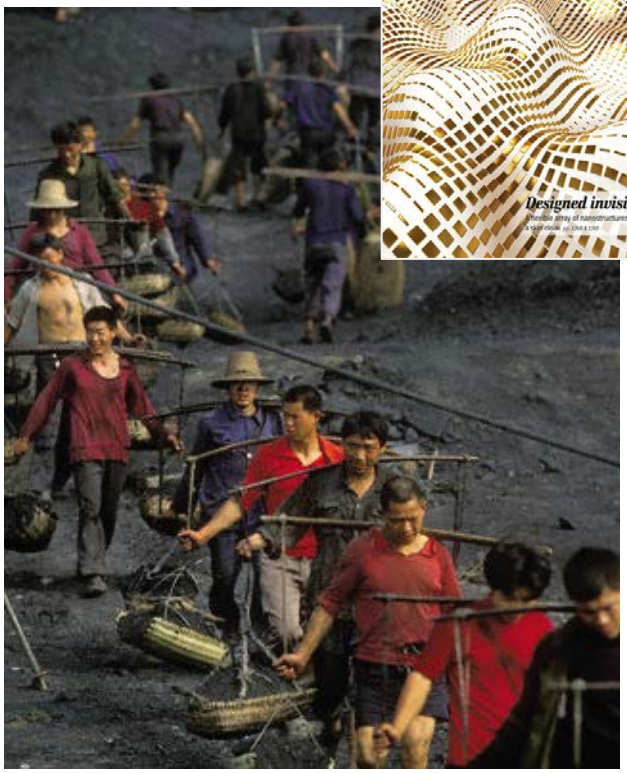
The coal pipeline in 2016



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



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 CO_2 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

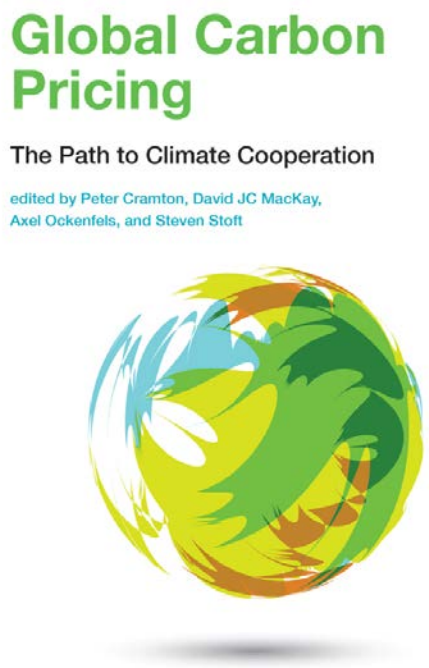
- A carbon price counteracts the oversupply of fossil fuels.
- Due to the fact that fossil fuels are largely subsidized the negative price is at ~150 €/tCO_2 presently.
- A carbon price changes the relative prices:
  - Relative prices of the renewables are often higher in emerging countries. High costs 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

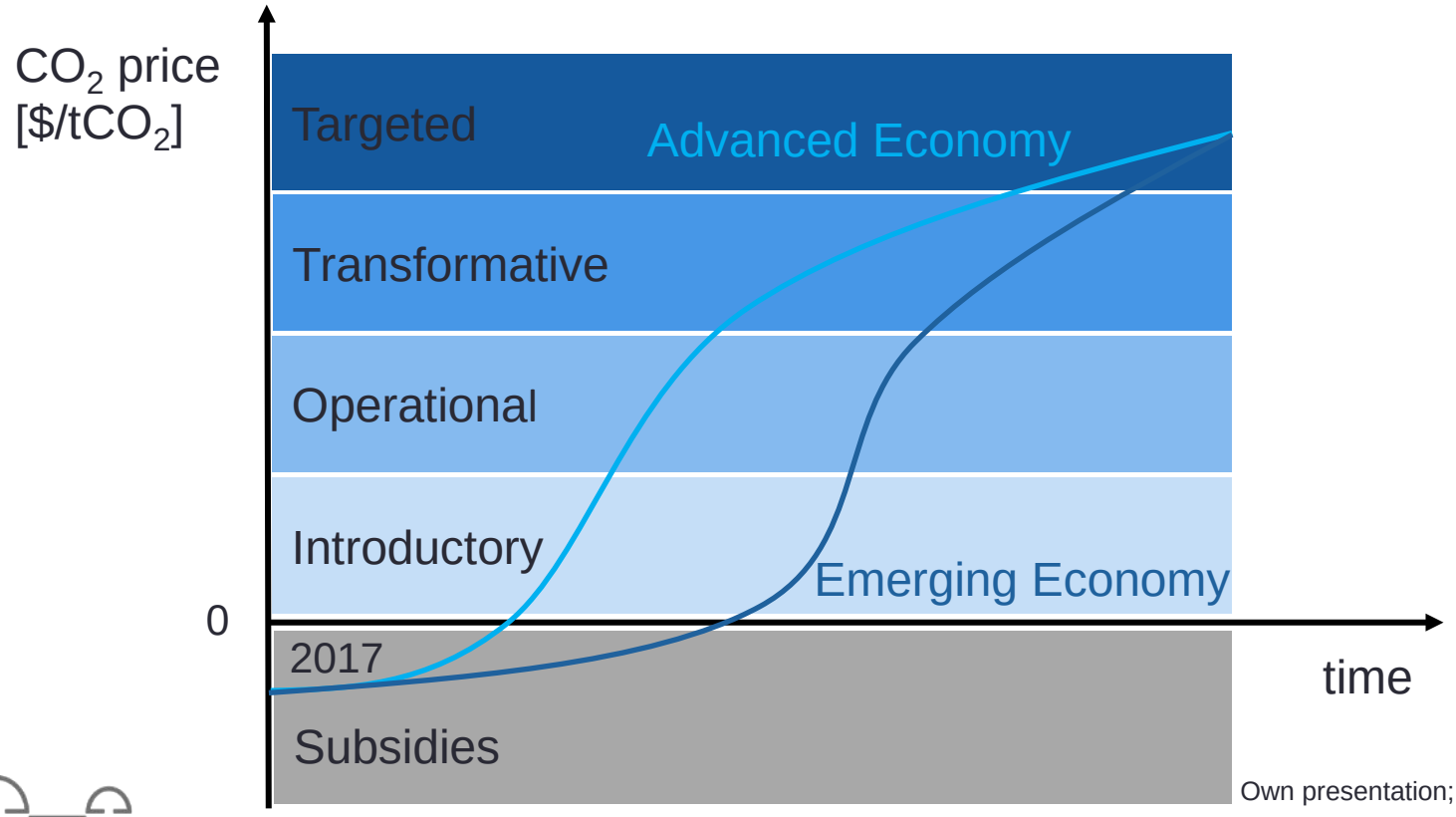
Carbon pricing and international cooperation

- 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**



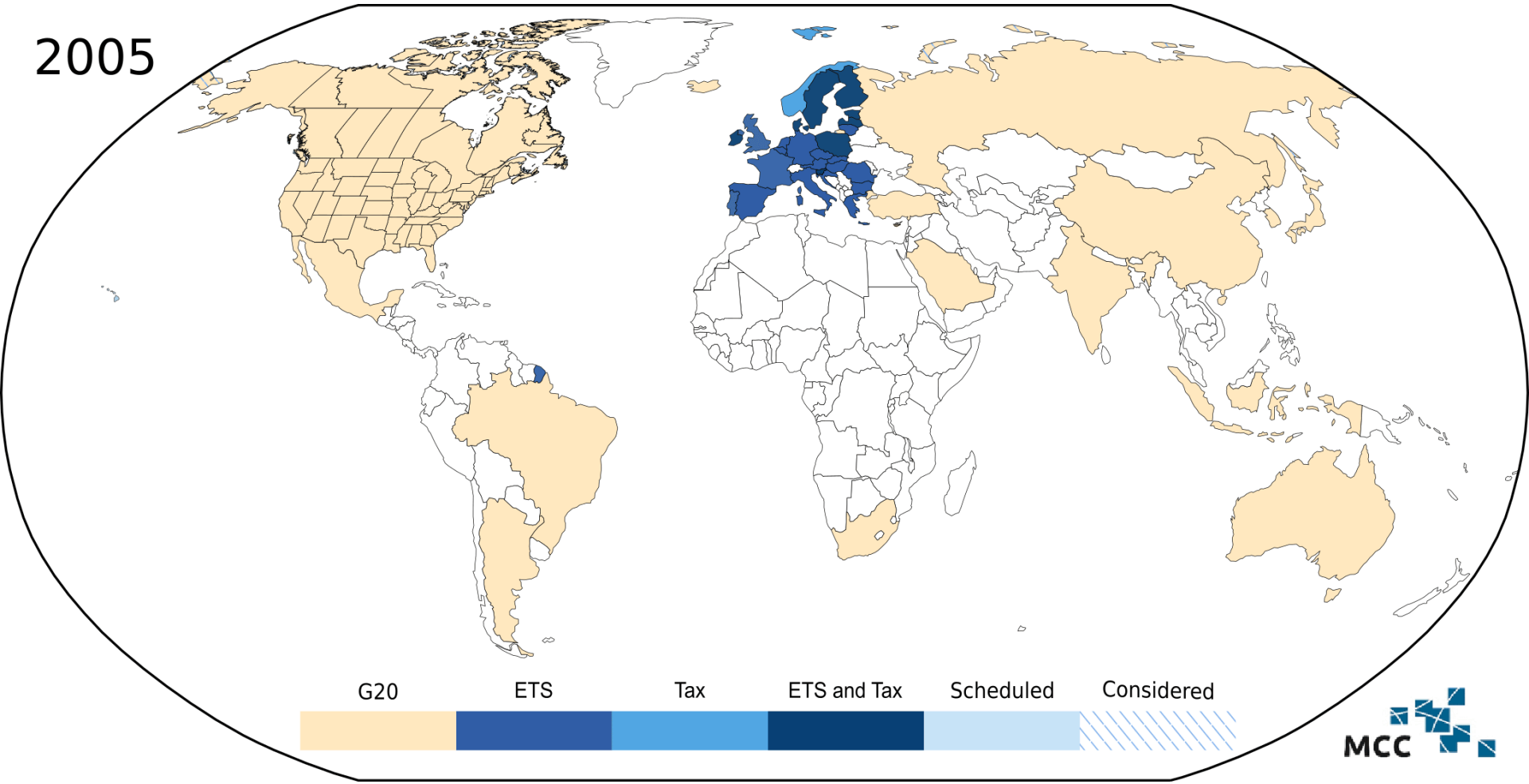
Carbon pricing in the G20 according to the level of development

Phasing out fossil fuel subsidies and carbon pricing (with taxes or emission trading systems) is essential



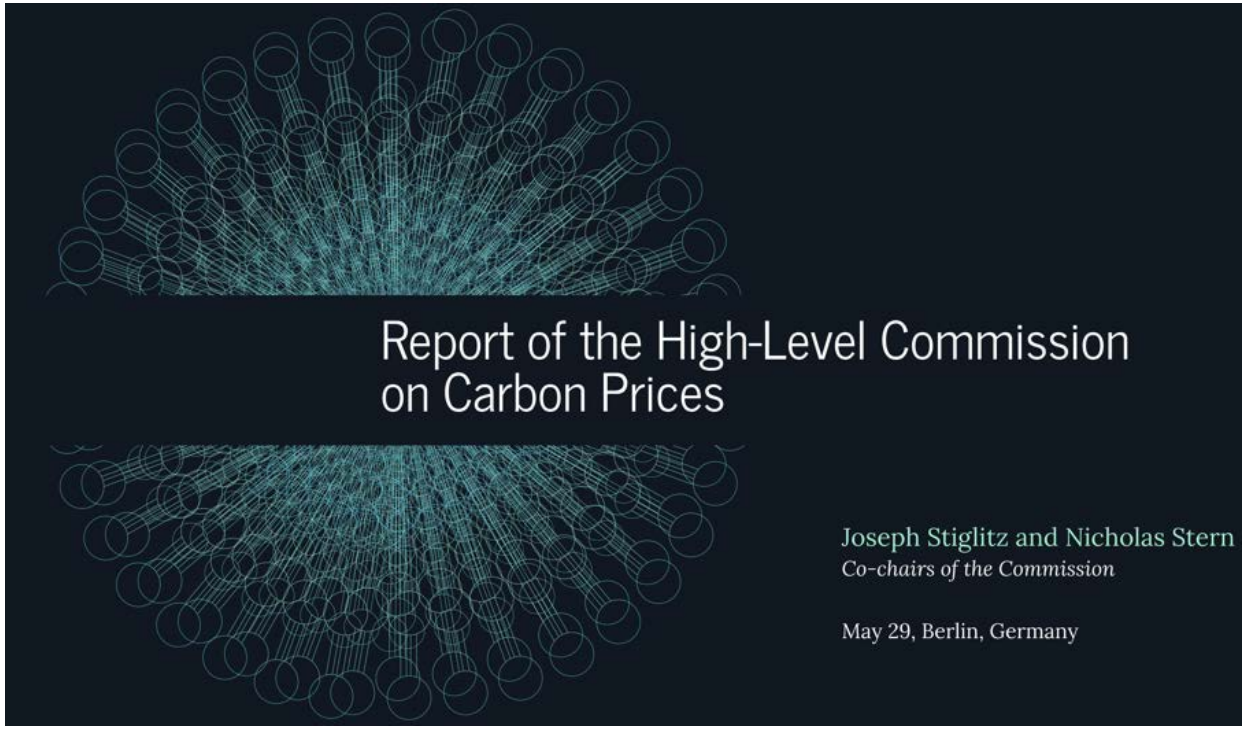
Own presentation; based on @CDP

Carbon Pricing in G20 Countries



Own presentation, based on Worldbank (2016)

Report of the High-Level Commission on Carbon Prices



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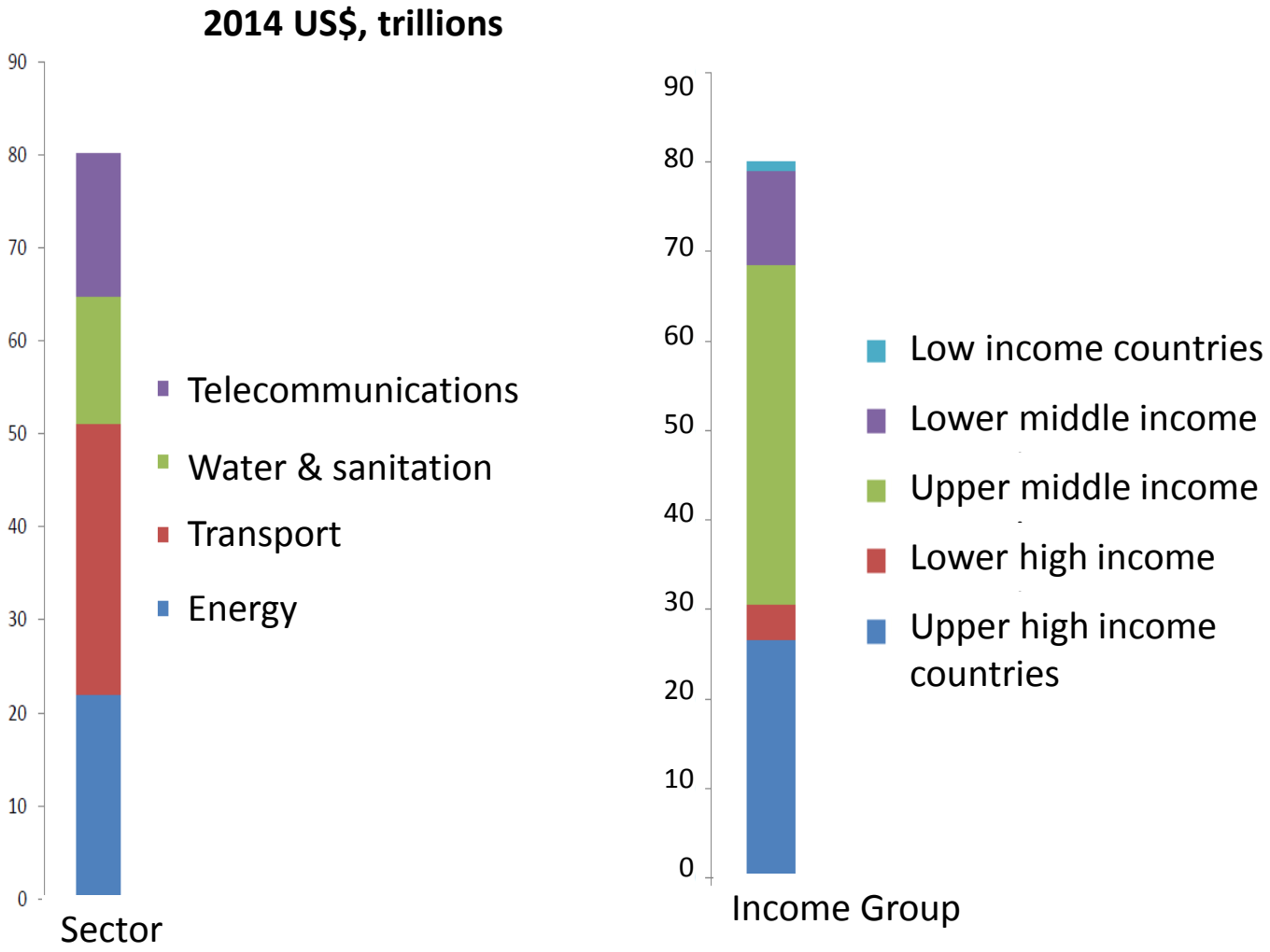
Conclusion of the Stiglitz-Stern Commission

- Based on the analysis of three approaches:
  technical roadmaps, national roadmaps, global models
- Carbon price is nesessary to implement the Paris Agreement:
  40-80 \$/t CO_2 until 2020 and 50-100 \$/t CO_2 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.

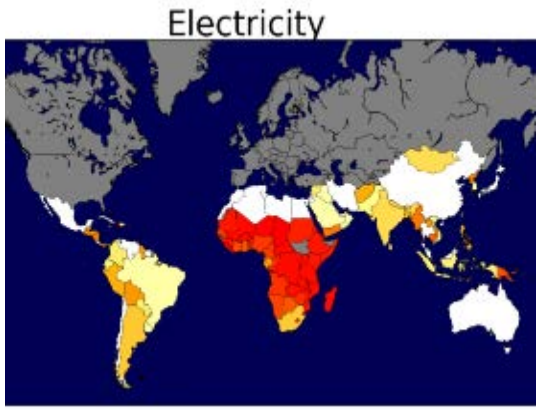
Stiglitz, Stern et al. CPLC (2017)

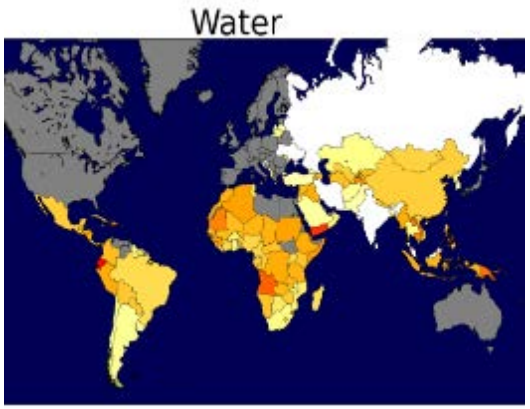
Projected cumulative infrastructure demand, 2015-2030

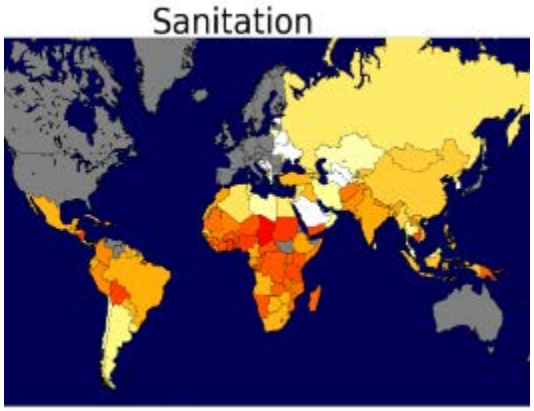


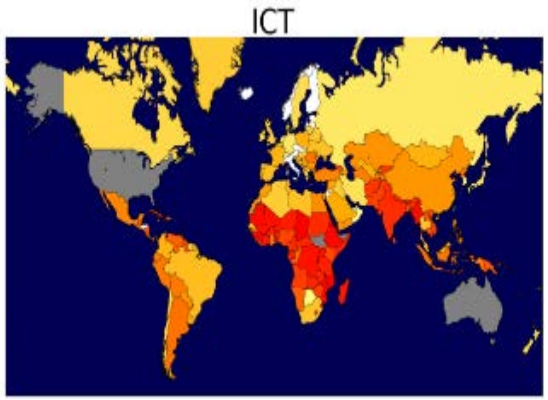
Source: Bhattacharya, Chattopadhyay, and Nagrah (forthcoming)

Carbon pricing revenues are sufficient to finance universal access to infrastructure

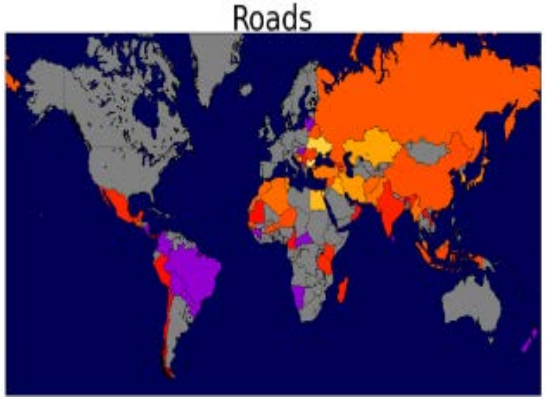


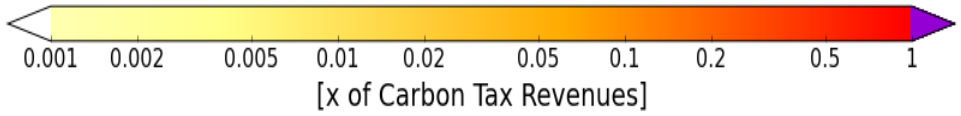






Except for roads where Africa's & Latin America's costs still partially exceed revenues

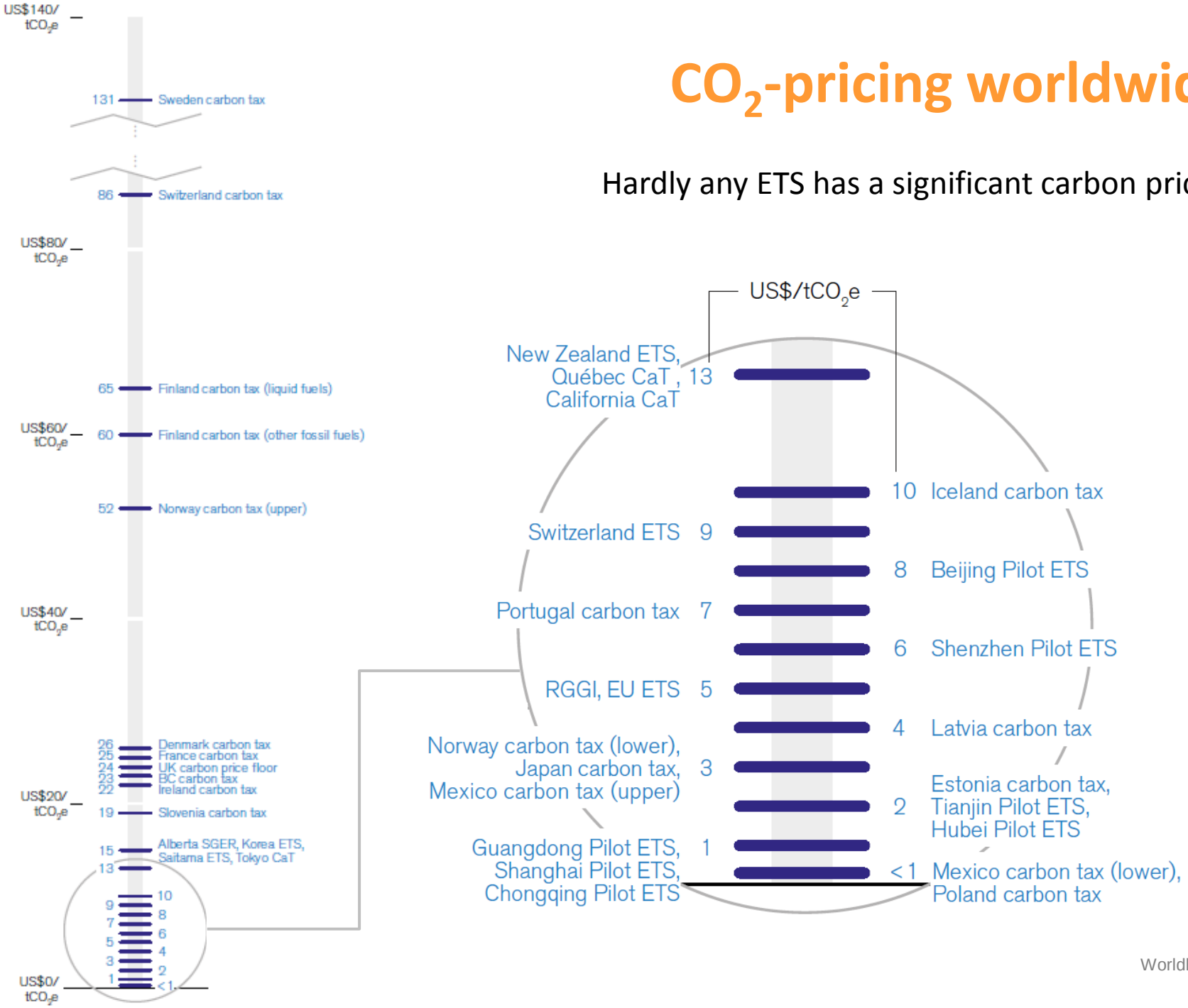




Jakob et al. (2016)

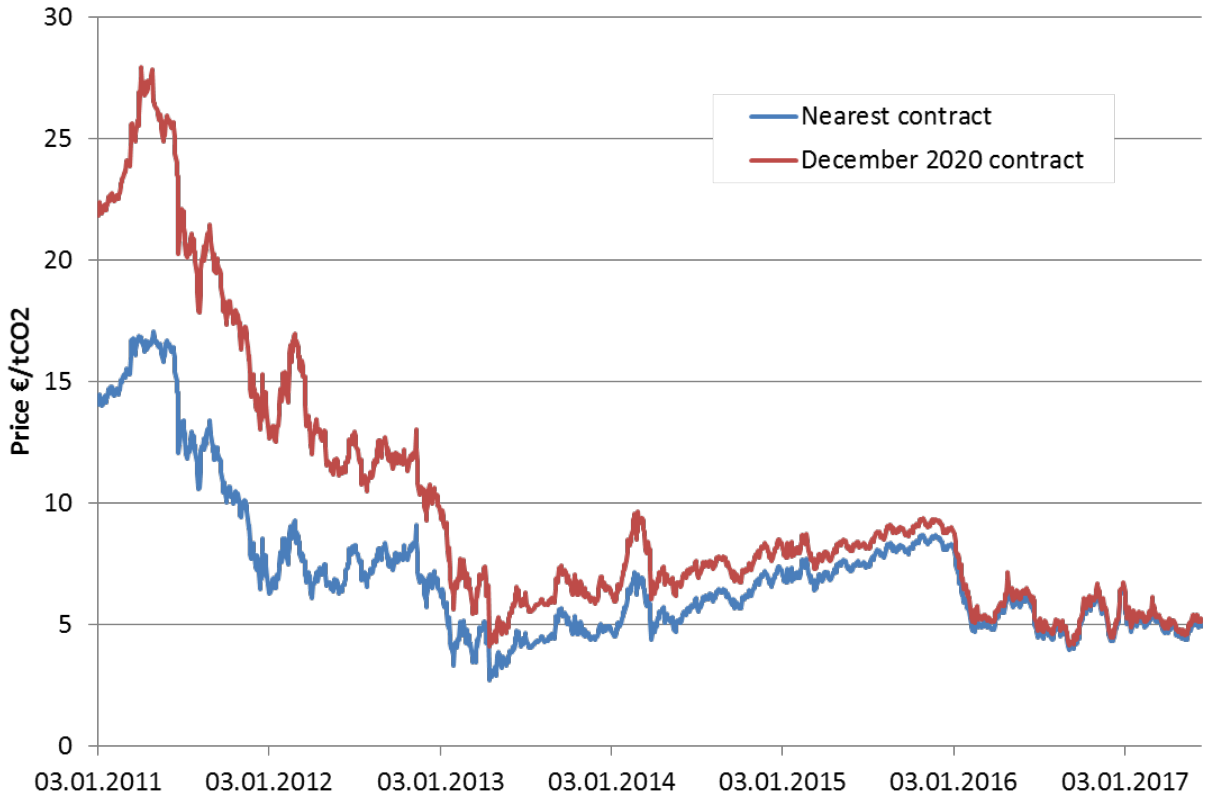
CO_2-pricing worldwide

Hardly any ETS has a significant carbon price.



Worldbank 2016

ETS lacks dynamic cost efficiency.

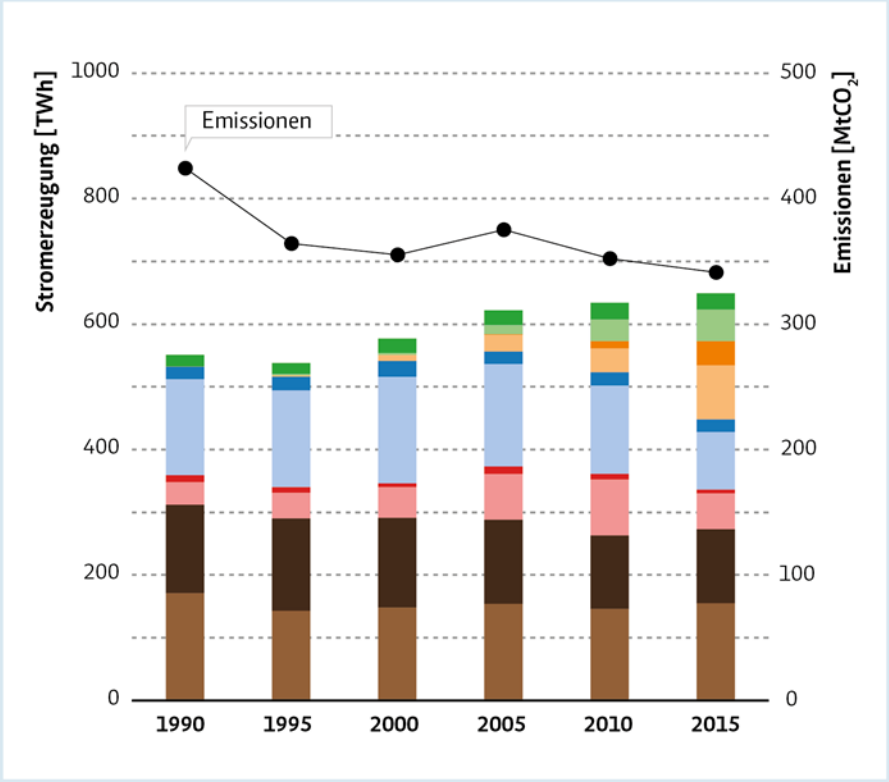


Source: ICE Futures Europe

- Falling CO_2 price
- No increase expected before 2020
- Market Stability Reserve will be implemented, but effect might be limited

Why coal is experiencing a renaissance

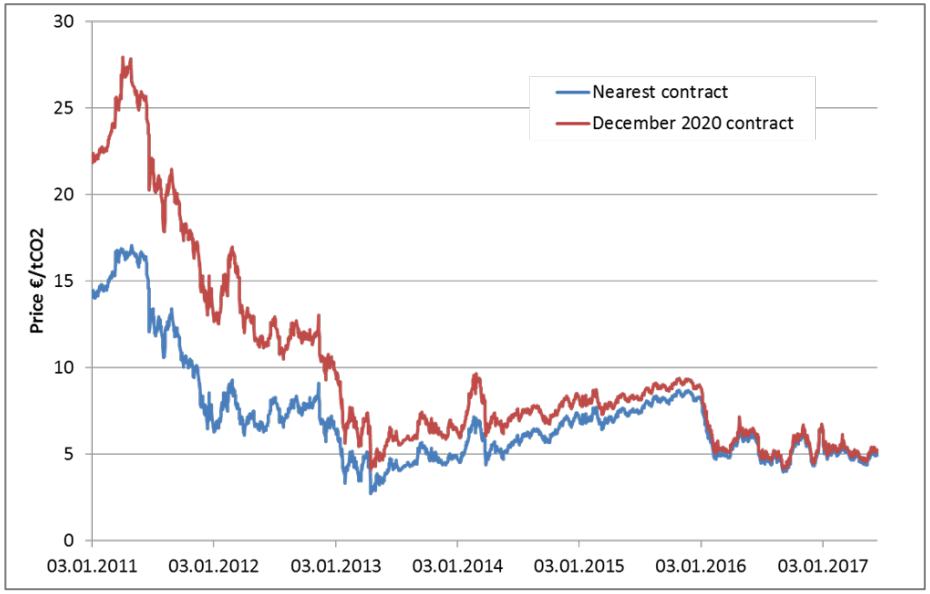
Stromerzeugung und daraus resultierende CO_2-Emissionen in Deutschland



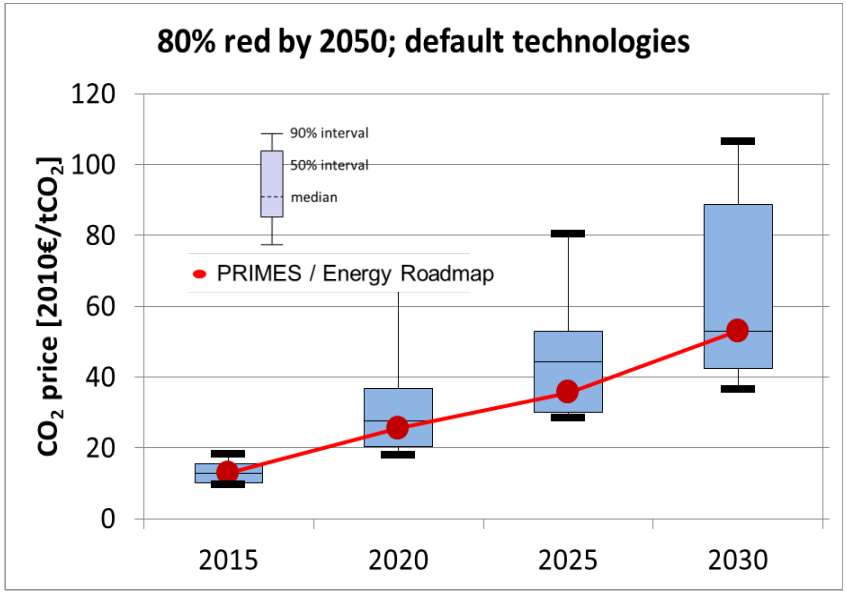
ETS lacks dynamic cost efficiency.

- 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 CO_2 in 2020

EUA Nearest Contract and Futures



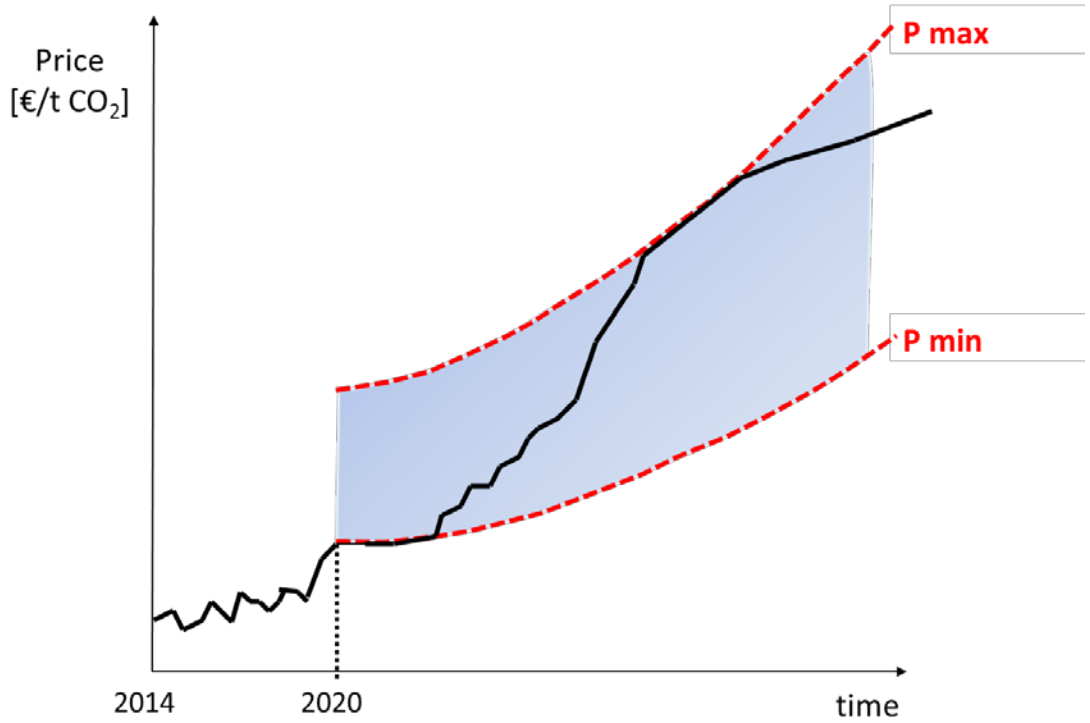
Cost-efficient CO_2 price from models



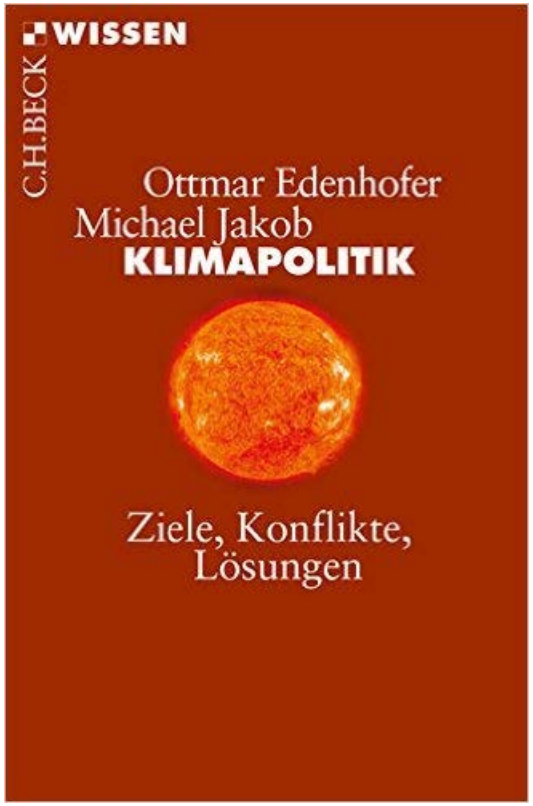
Knopf et al. (2013)

Introduction of a price corridor

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



Available now



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