The Atmosphere as a Global Common: From a Tragedy to a Drama

ARD.ZDF medien akademie

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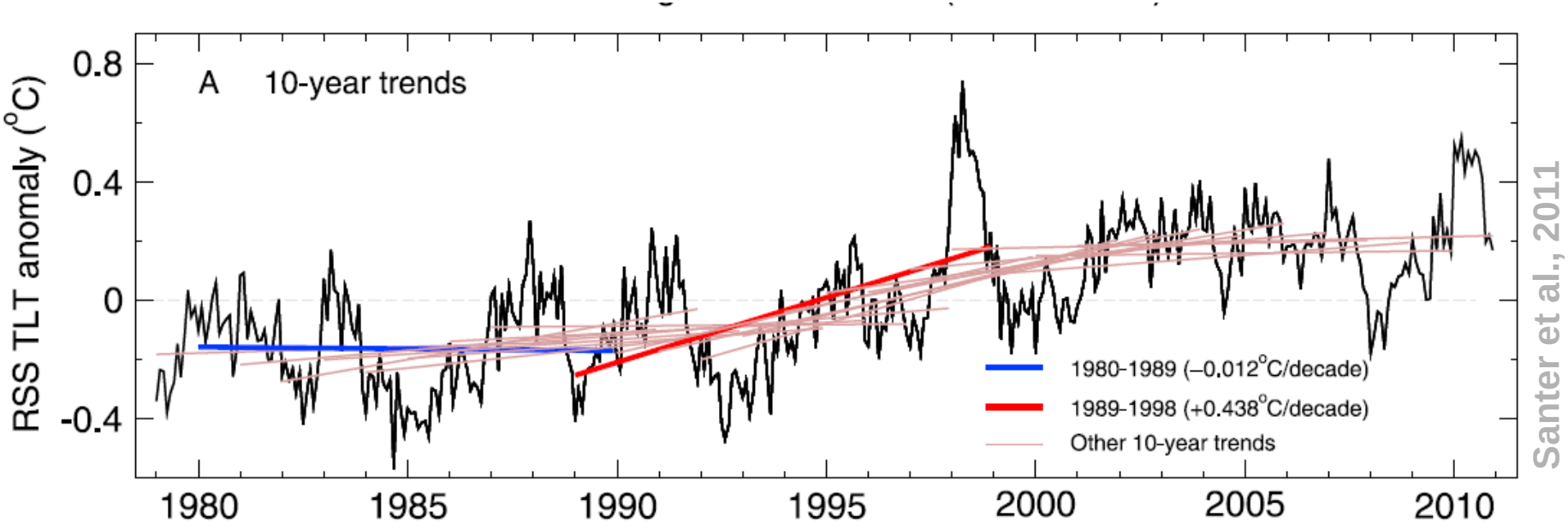
berlin

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP
Working Group III (WG III) – Mitigation of Climate Change

Overview

1. Has global warming stopped?
2. Scope of the challenge
3. Energy transformations in a first best world
4. An assessment of current climate policy
5. Six ideas for tomorrow's climate policy
6. Conclusions

Has global warming stopped?

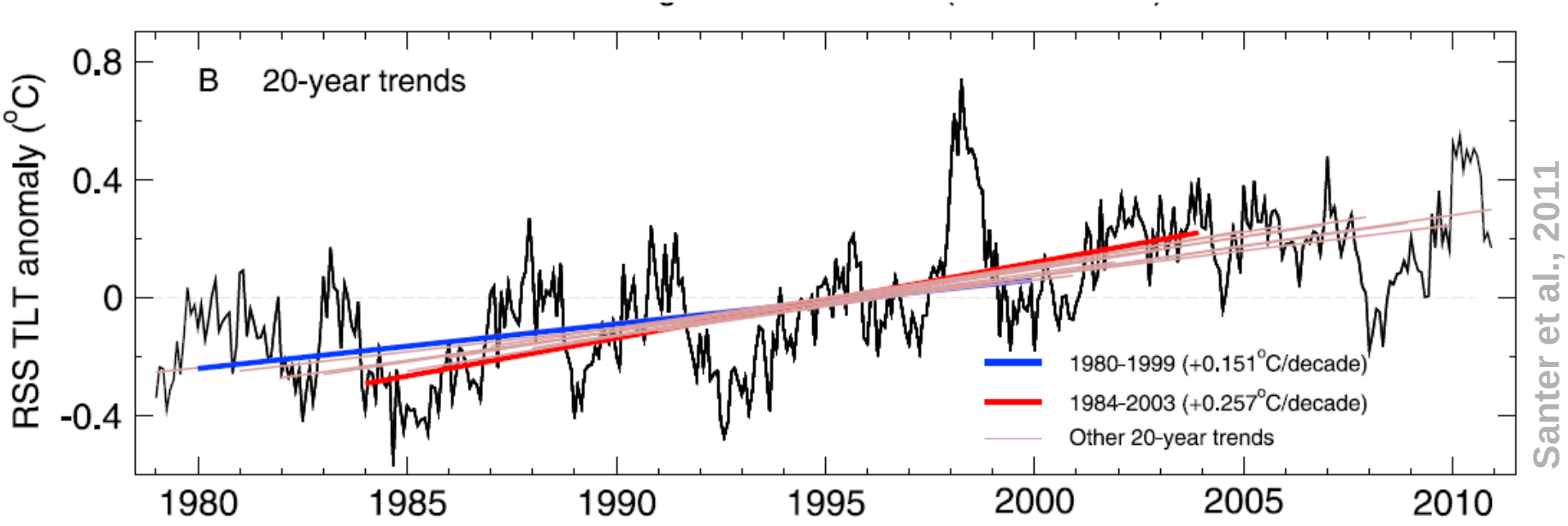


•Looking at last 10 years, global warming seems to have slowed down or even stopped

•Has the IPCC made a major mistake?

•Is global warming real?

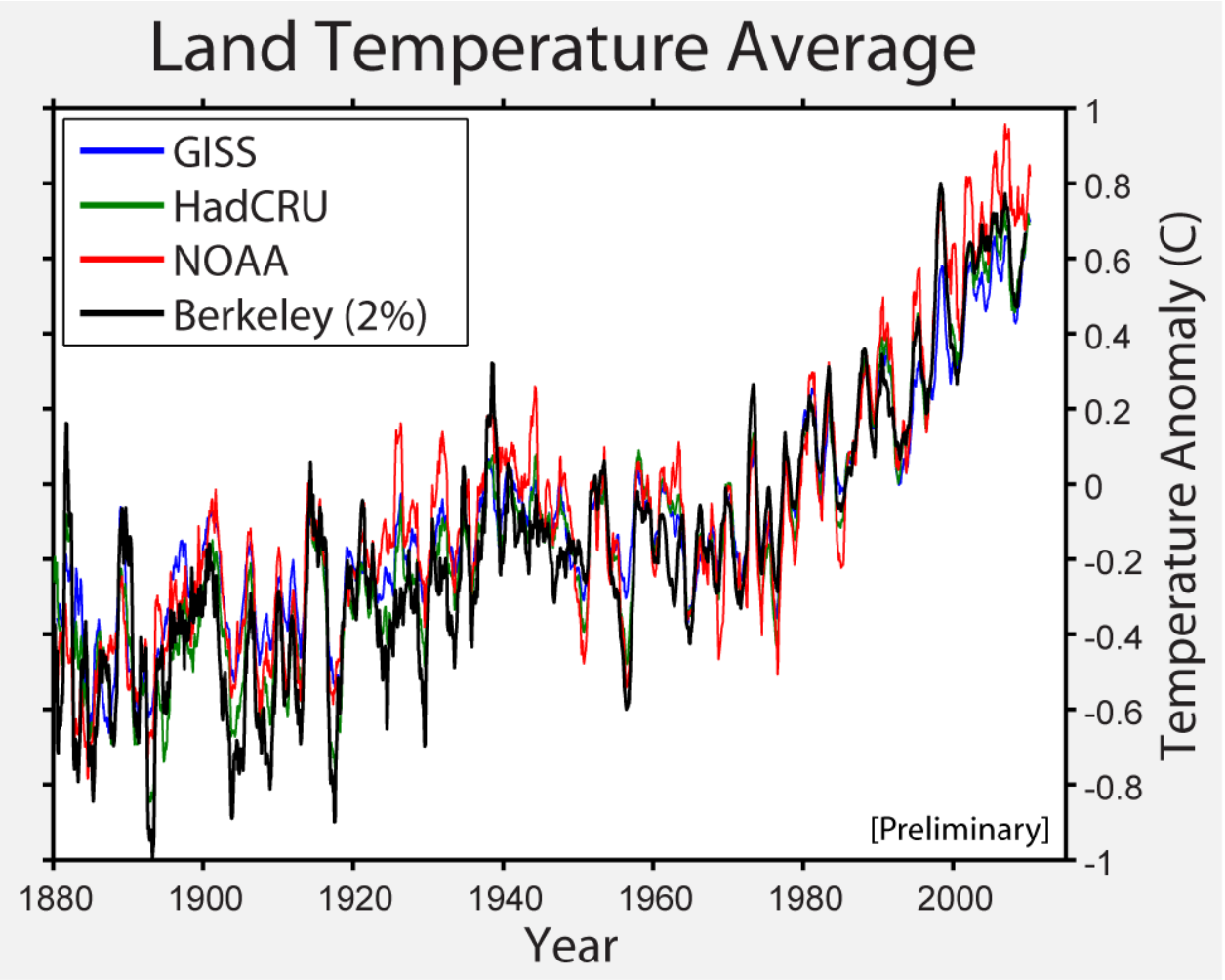
The influence of cutting the data!



- Multiple reasons for stable temperatures last decade:
    - "Slow down" last decades within natural variation
    - 1997/98 exceptionally warm due to El Niño
    - Cooling effect of increasing air pollution, particularly sulphur
        - Temperatures likely to increase once clean air policies are commissioned also in newly industrializing countries

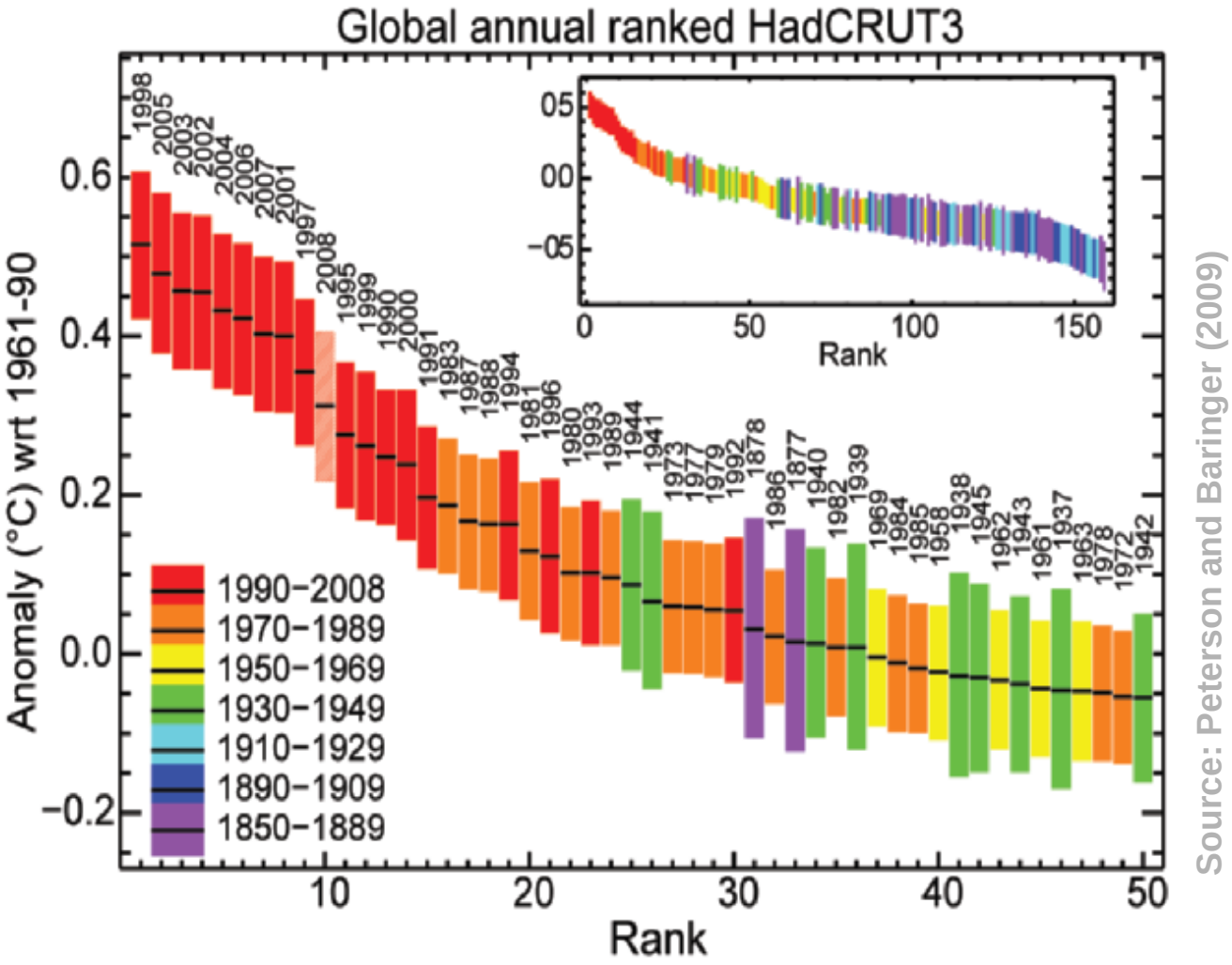
- **Looking at longer trends makes obvious that global warming has not stopped at all**

Long term trends show clear evidence



- Temporal slow downs of global warming have occurred already in the past
- Recent independent examination of IPCC results (Berkeley Earth Surface Temperature Project) has confirmed results

Average temperature anomaly per year



Last decade was the warmest since the beginning of industrialization !

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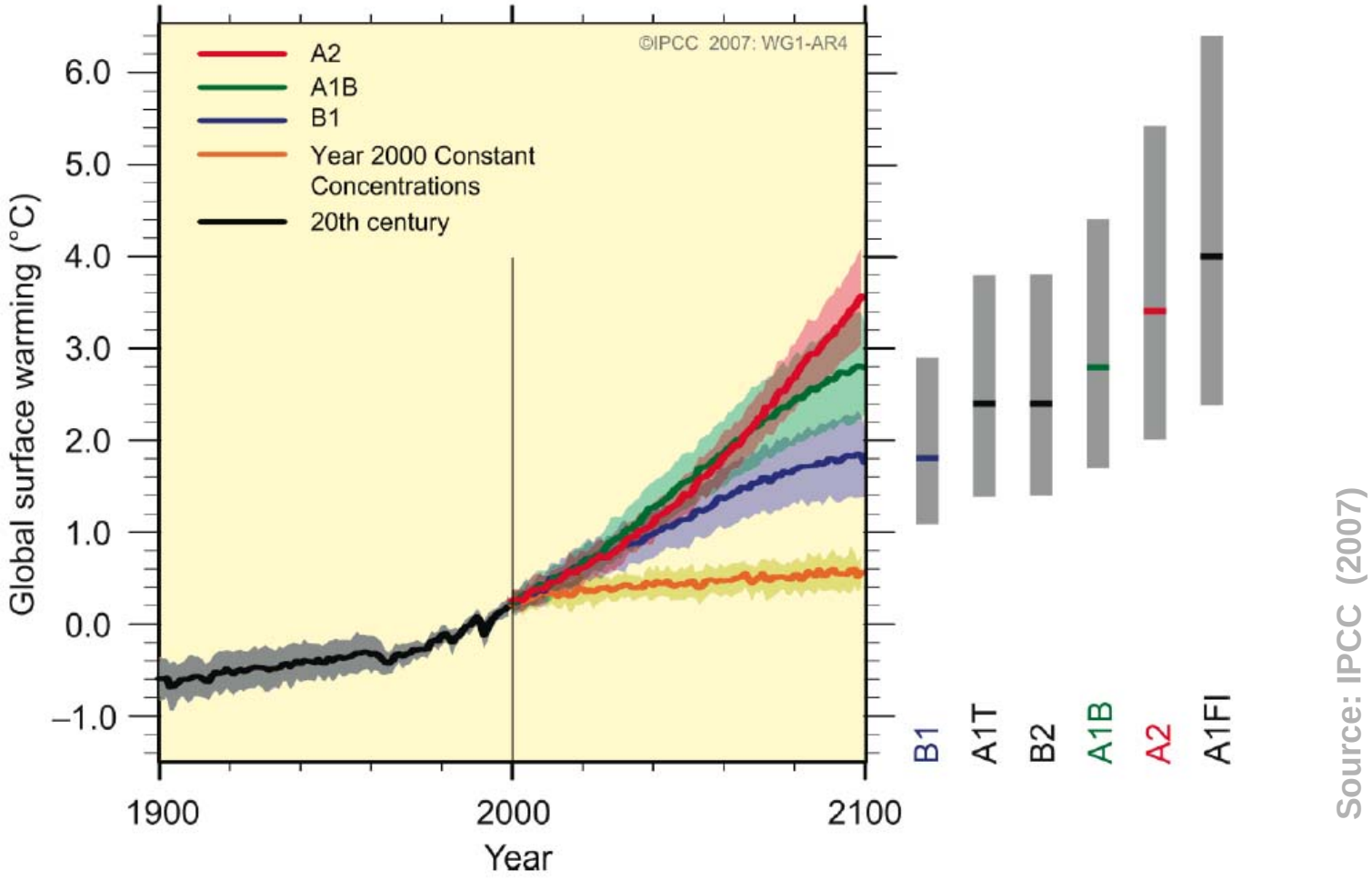
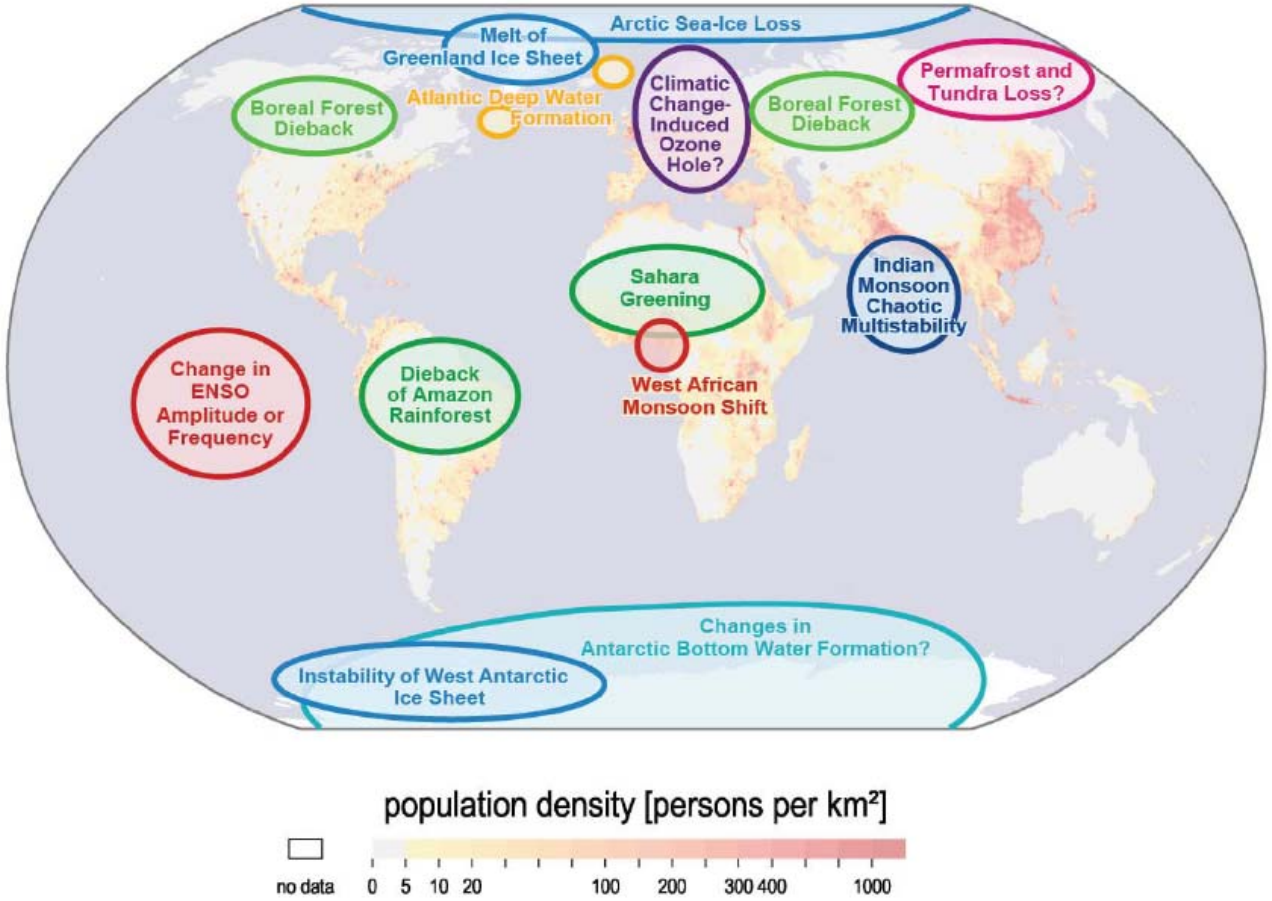
Global warming – what to expect



Depending on different socio-economic assumptions, global surface warming can rise from 1˚C to 4˚C compared to 2000 levels.

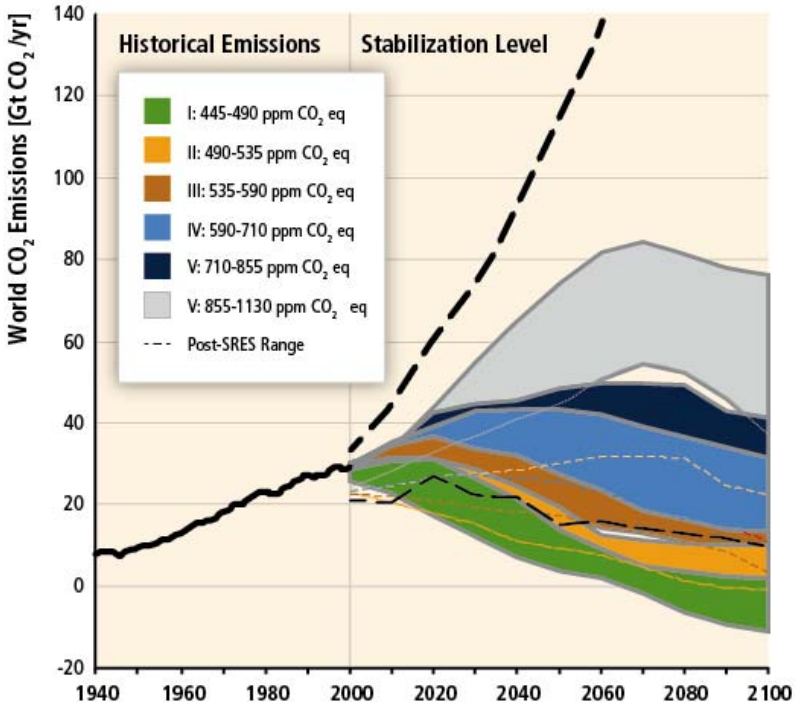
Reasons for concern: Tipping elements

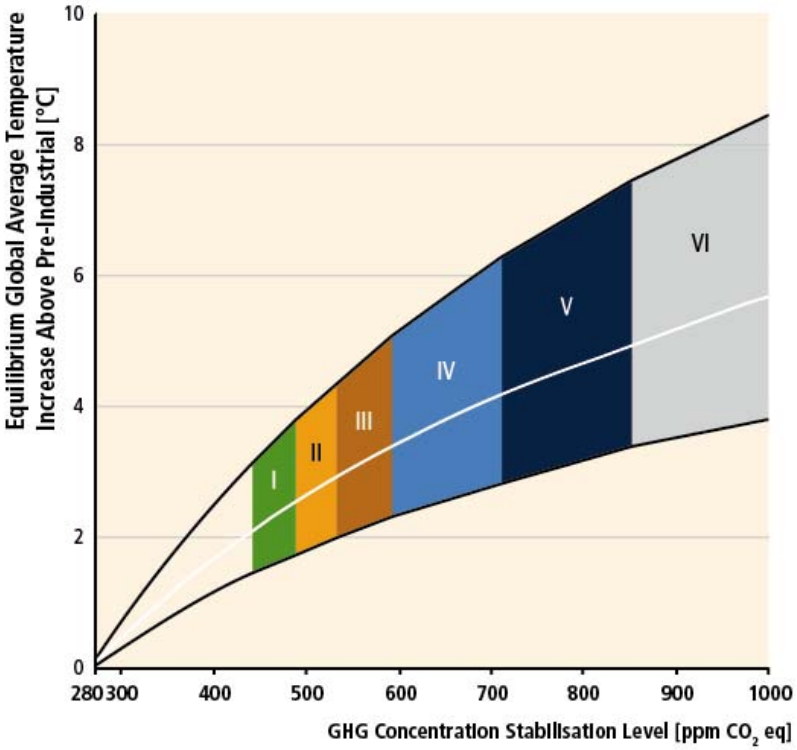


"Tipping processes of the climate system" show a strong reaction already to small climate changes

Schellnhuber, 1996; Lenton et al., 2008

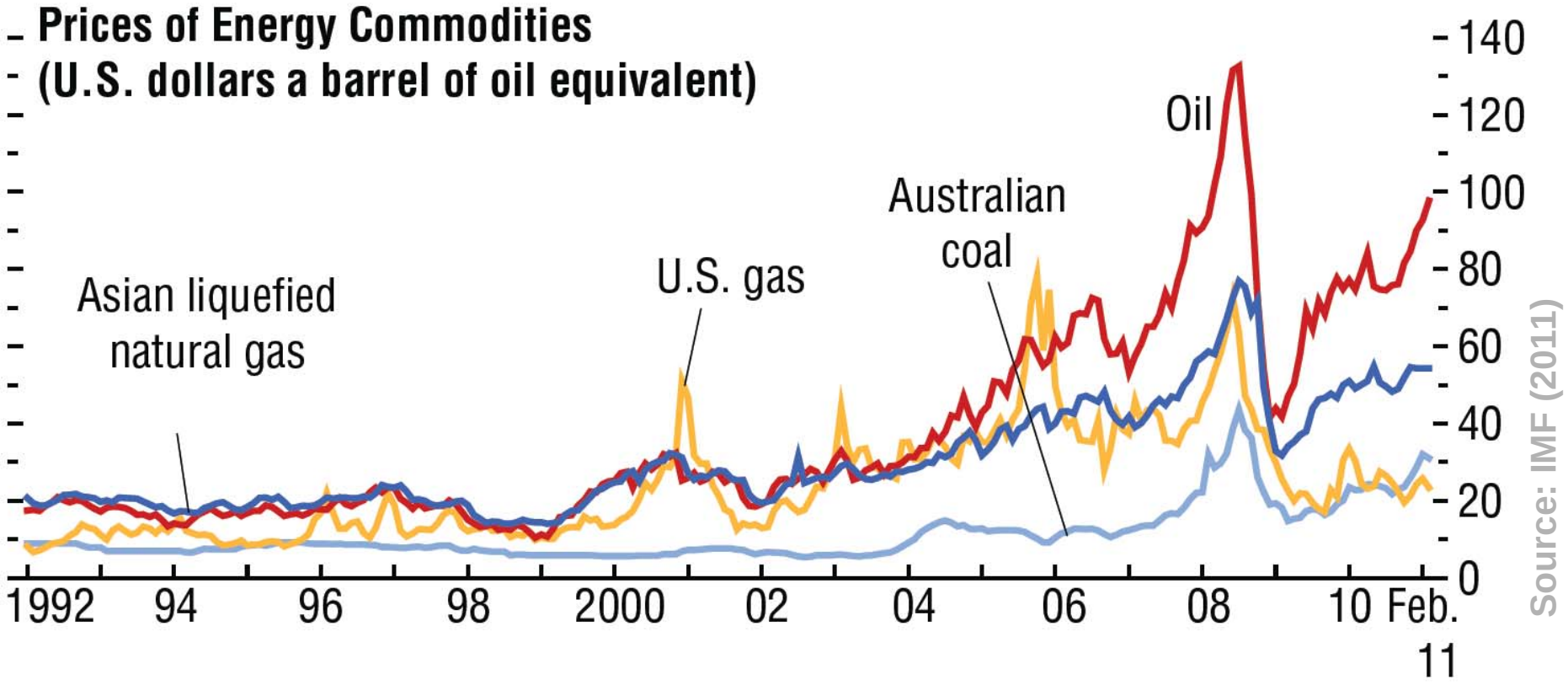
Demand for energy services is increasing



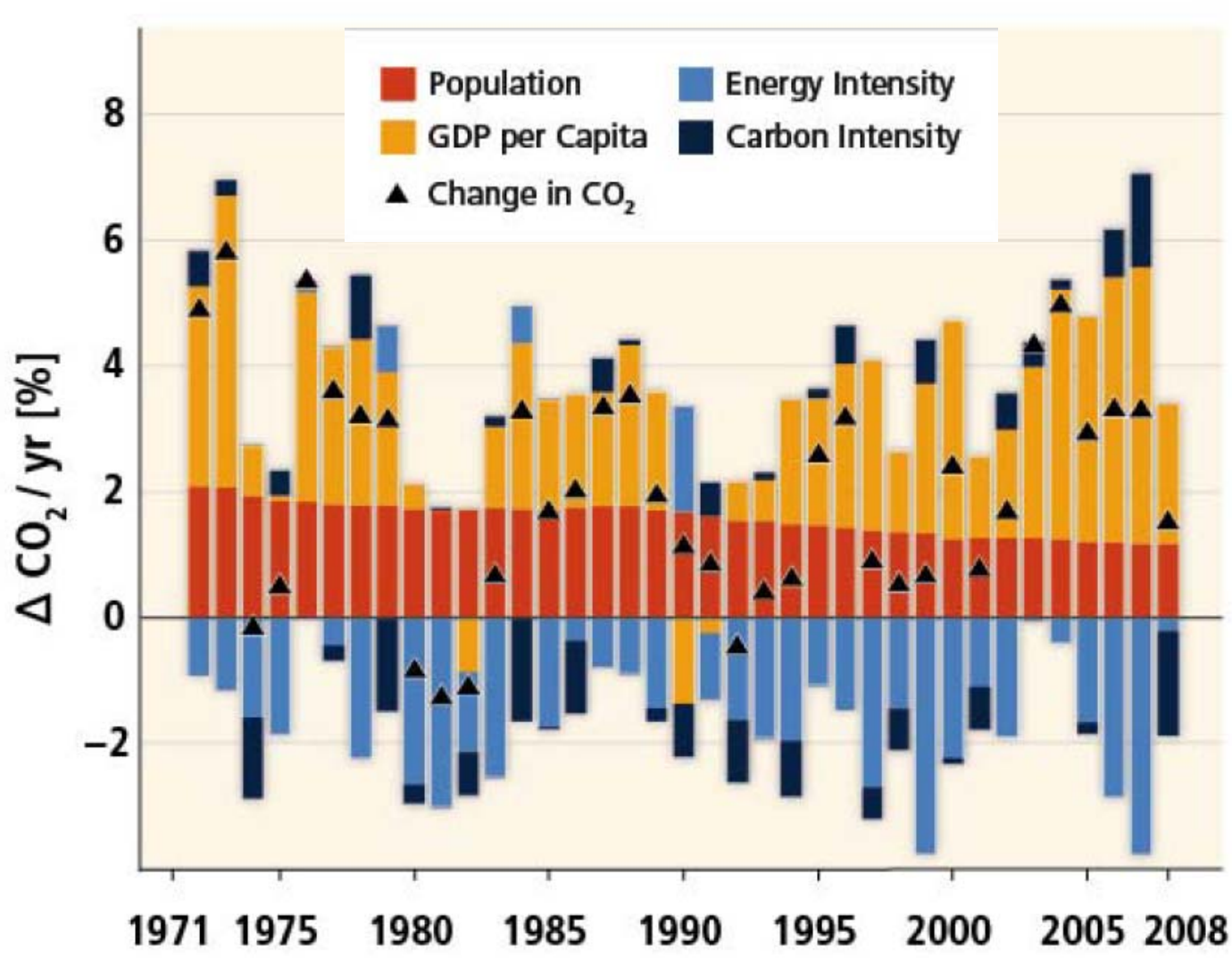


GHG emissions resulting from the provision of energy services contribute significantly to the increase in atmospheric GHG concentrations.

Renaissance of Coal?



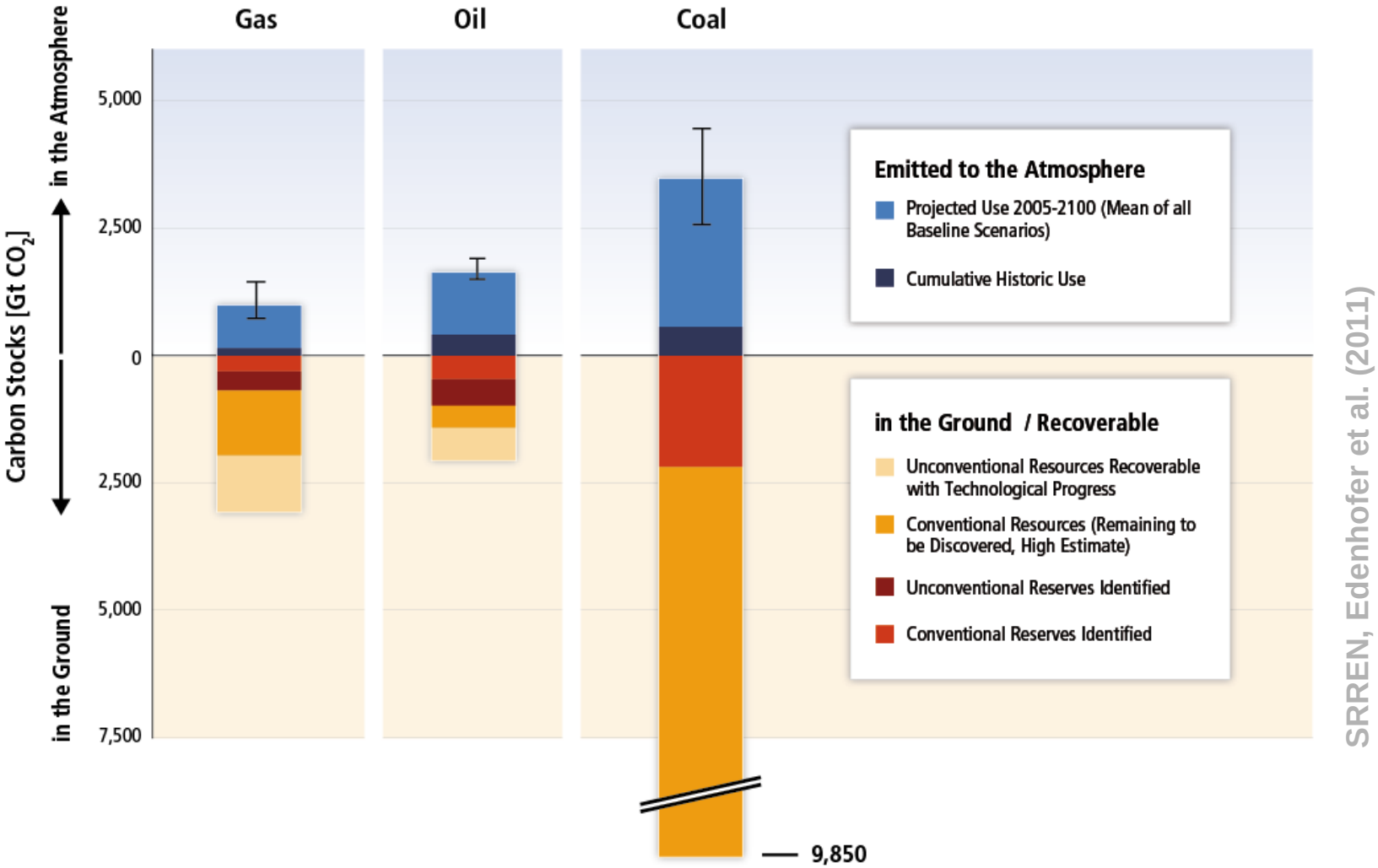
We are not on track !



SRREN, Edenhofer et al. (2011)

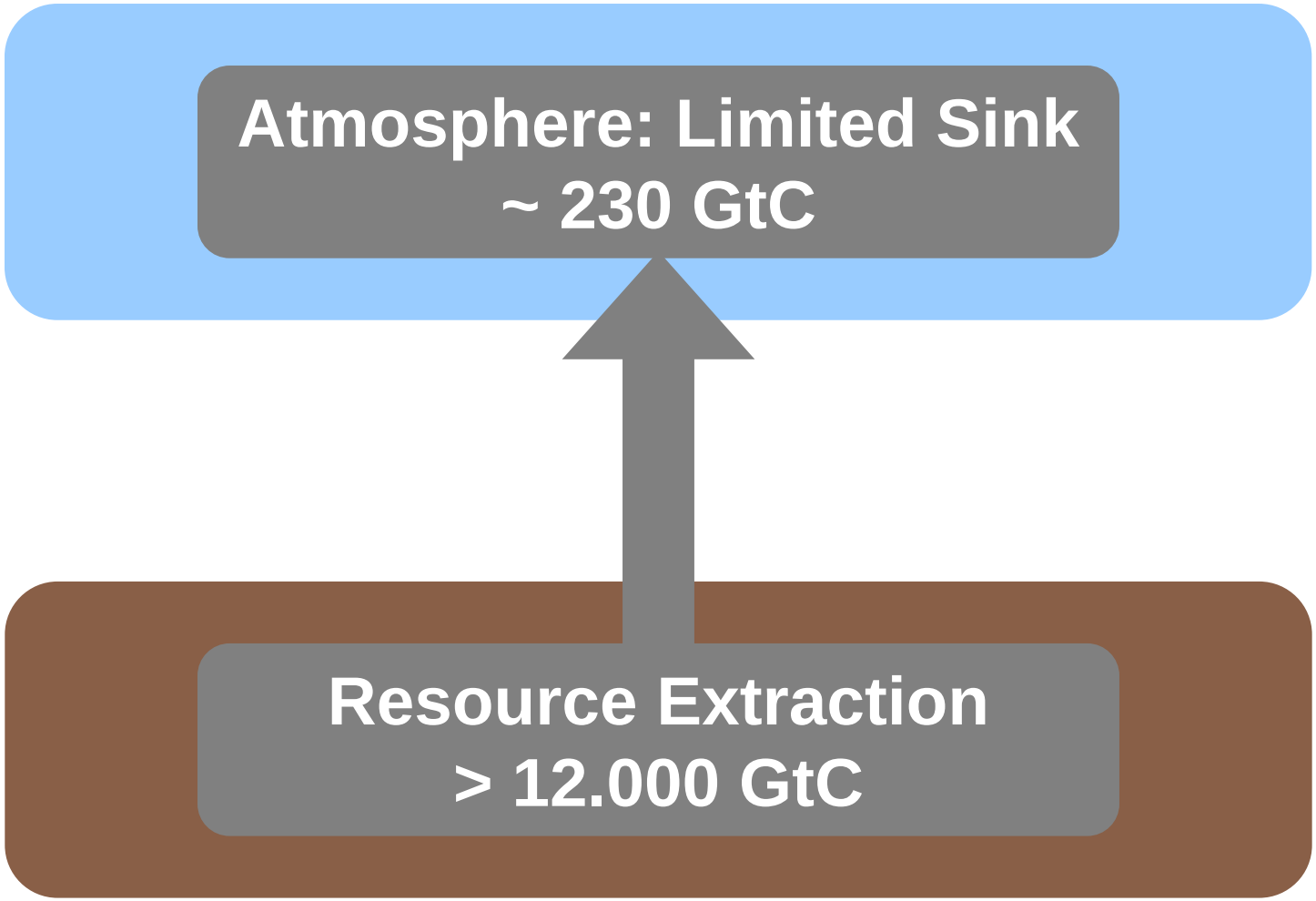
Economic growth – particularly in newly industrializing countries – drives global emissions !

Fossil Fuels are not scarce!



The BAU Scenarios Could Exceed the Level of Greenhouse Gas Concentration of 600ppm (~4˚C Temperature Increase) !

The Atmosphere as a Global Common



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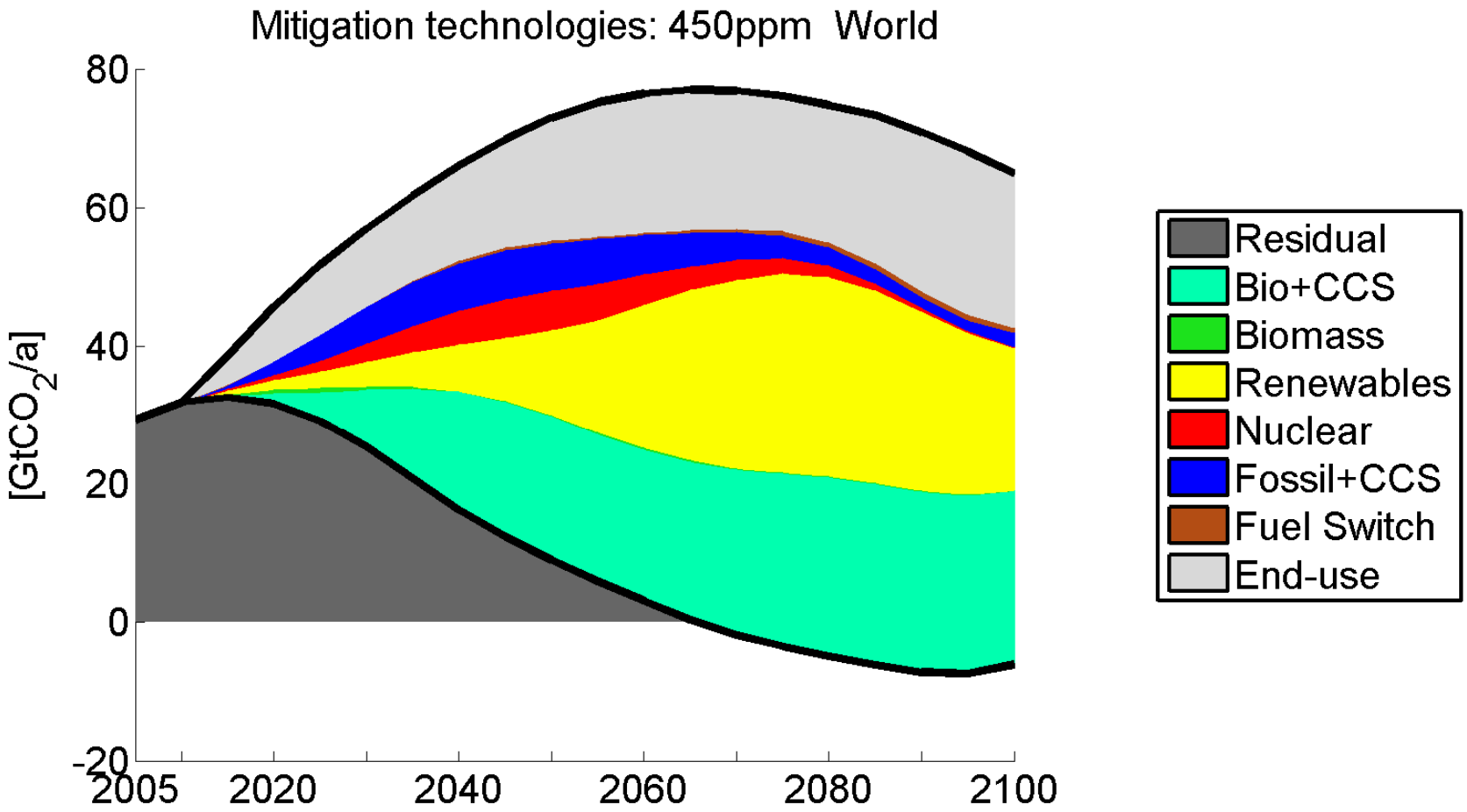
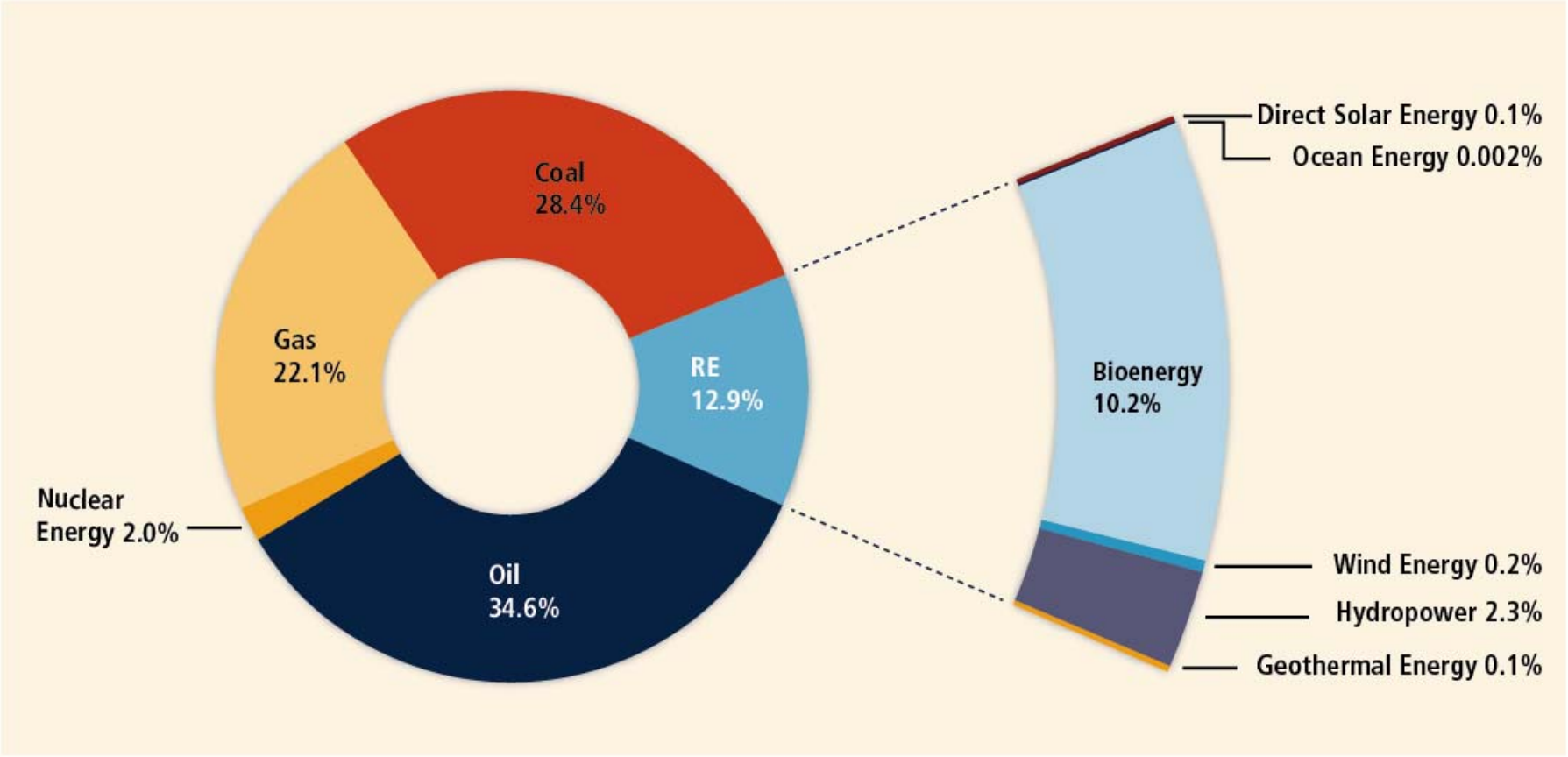
The Great Transformation – Mitigation Shares:



AME Project (Luderer et al., 2011)

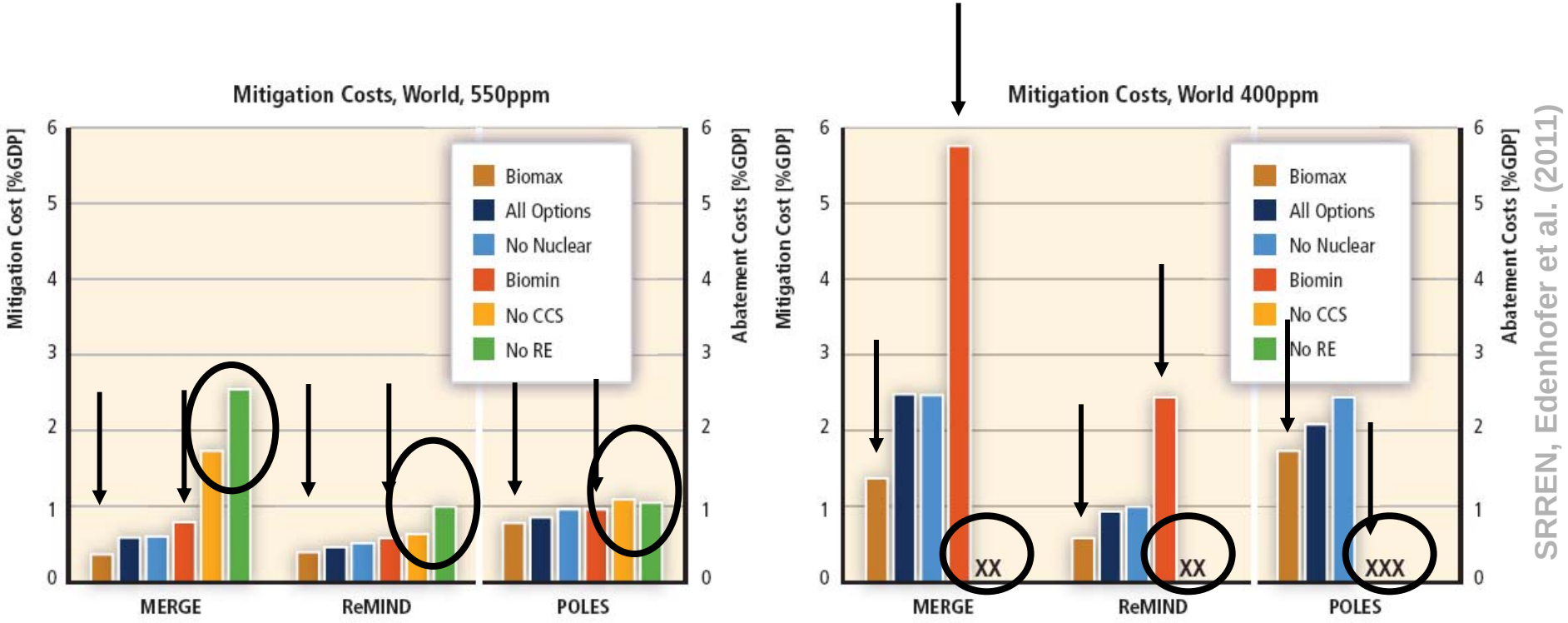
Three pillars: End-use Efficiency / Renewables / Biomass + CCS

The current Global Energy System is dominated by Fossil Fuels



Shares of energy sources in total global primary energy supply in 2008

Costs of mitigation



SRREN, Edenhofer et al. (2011)

Costs hinge critically on:

- The stabilization target
- The biomass potential
- The availability of technologies, RE and CCS in particular

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Copenhagen: Climate policy with “collection box”

Pledged reduction targets for 2020:

- Japan: 25% wrt 1990
- EU: 20-30% wrt 1990
- USA: 17% wrt 2005
- Canada: 17% wrt 2005

➡ Implementation of the minimal Copenhagen targets means that emissions in 2020 will be 10-20% higher than today

➡ Copenhagen implications for 2050: high probability for exceeding 2˚C warming target, 50% chance for exceeding 3˚C

Rogelj et al. 2010, *Nature*

The Durban Outcome

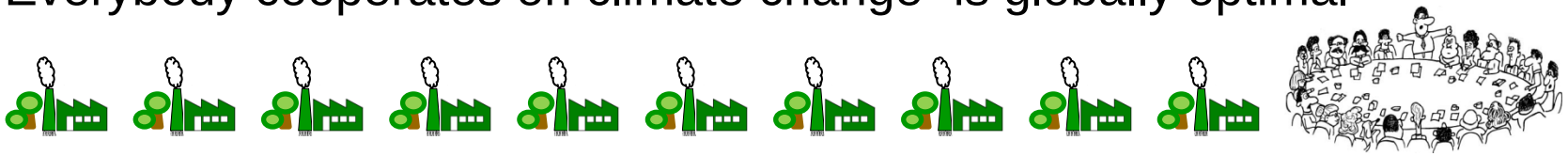
1. Ad Hoc Working Group on the Durban Platform for Enhanced Action (AWG-DPEA)
   - *"develop a Protocol, another legal instrument or an agreed outcome with legal force under the UNFCCC applicable to all Parties"*
   - negotiation until 2015 / COP 21
   - implementation from 2020 onwards

2. Kyoto 2nd commitment period
   - agreement on length (2017 or 2020?) and ambition (targets for signatories) postponed → COP 18 in Qatar

3. "Operationalization" of Cancun Agreements
   - Establishment of Green Climate Fund

Searching for economic explanations: Game theory

- Dilemma: Incentives in the climate game
  - “Everybody cooperates on climate change” is globally optimal



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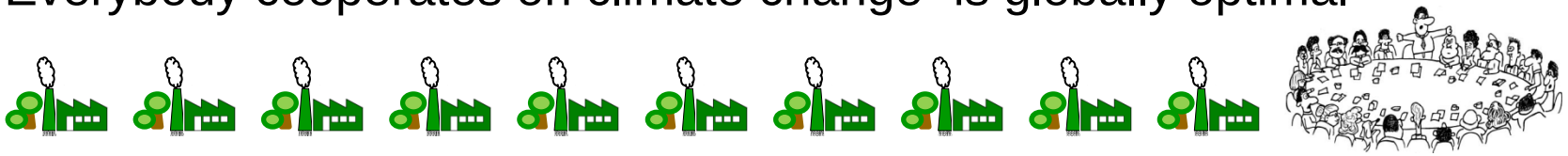
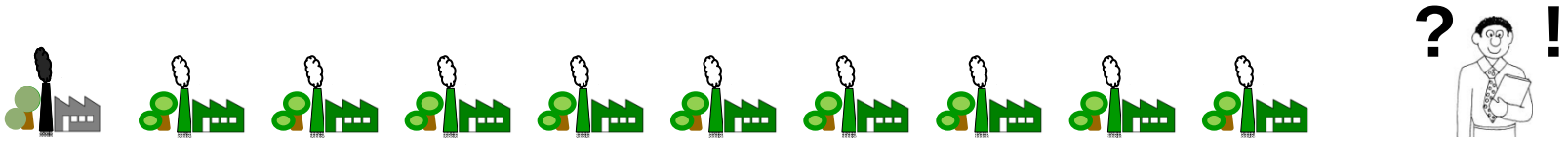


  - Every single country is better off if only the others mitigate



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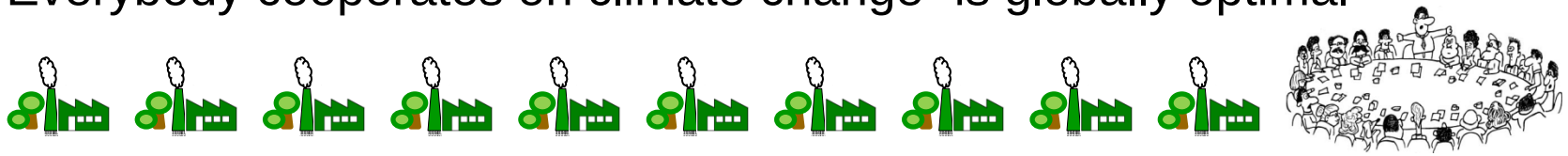

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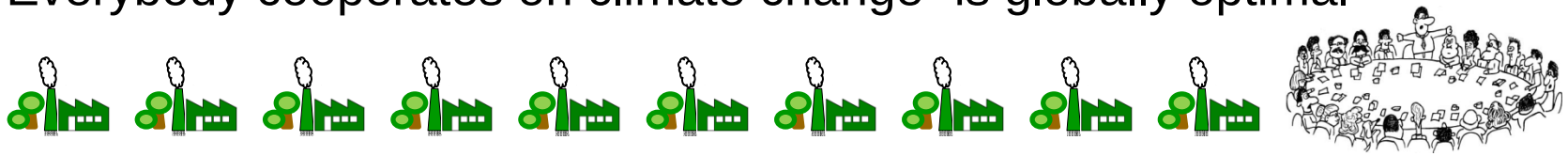

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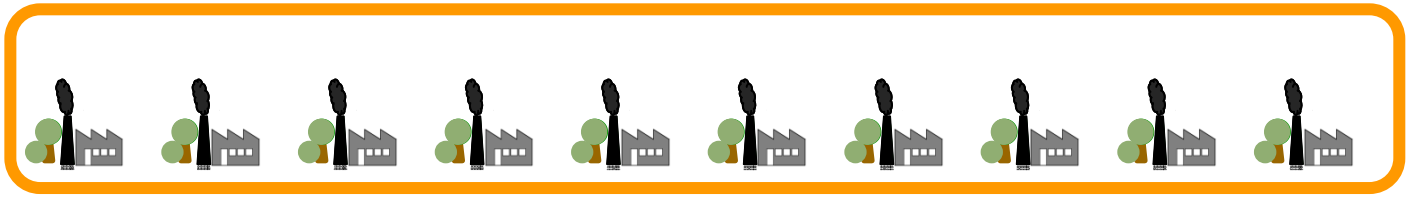

Nash Equi-librium

- **What determines countries' incentives?**

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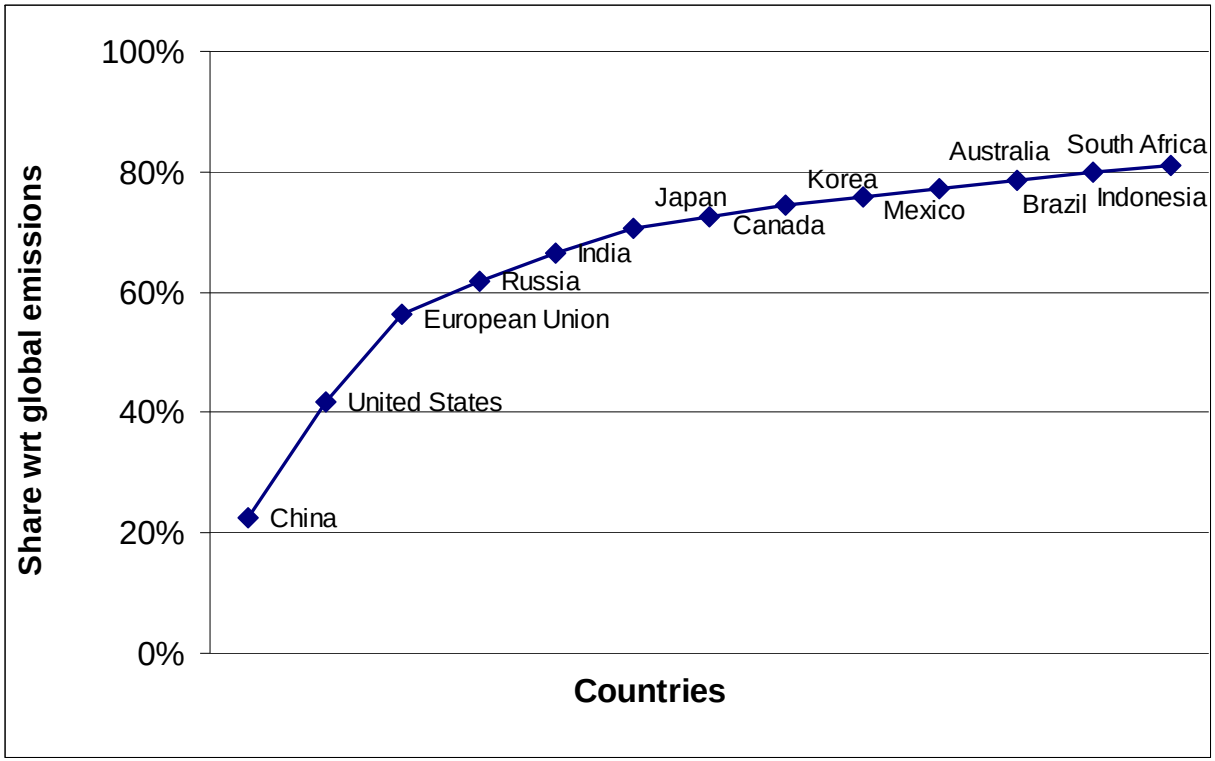
More issues: “Issue-Linking”

Idea: Find mechanism to make cost-benefit ratio of climate mitigation (from individual country perspective) more attractive

- Link climate cooperation with R&D cooperation
- Transfers
- Create and link emission trading markets
- Trade sanctions against climate free-riders
- Stop deforestation
- No-regret policies

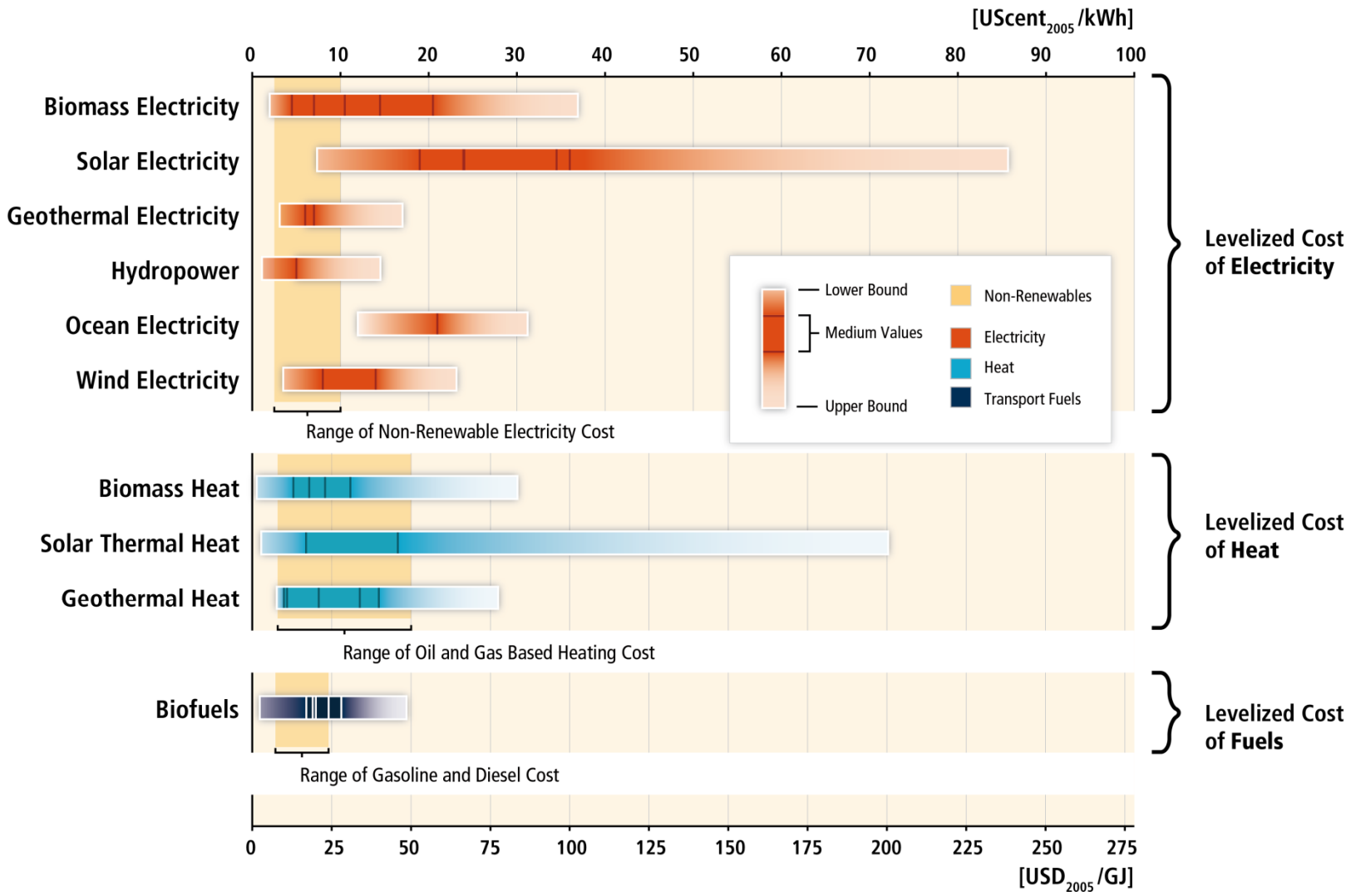
Reducing the coalition size

Cumulative emissions of countries in the *Major Economies Forum on Energy and Climate* (MEF). [Year 2008. Only CO_2, without LULUCF emissions]



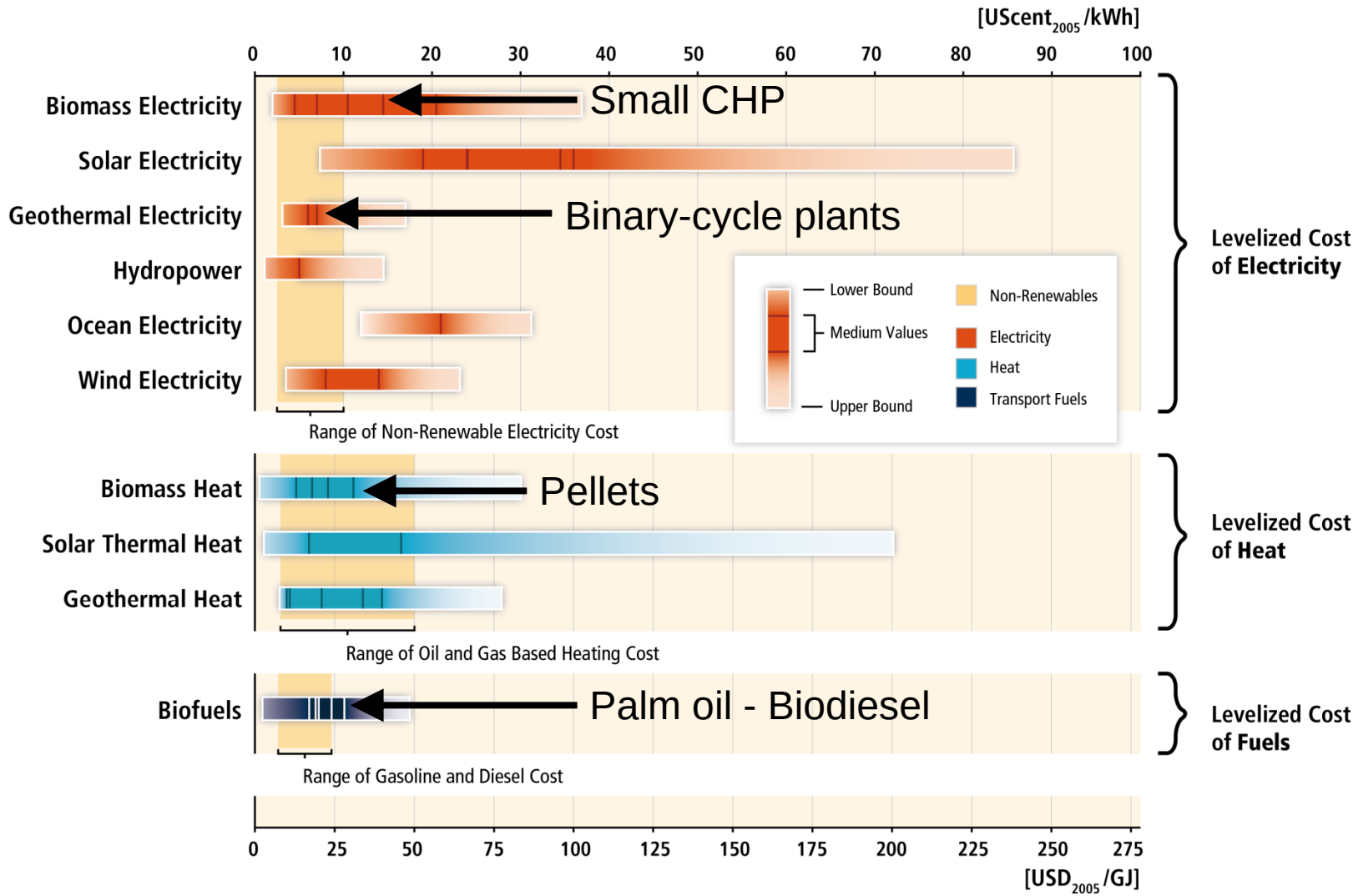
- Reducing the complexity of negotiation process
- ... but at the price of cost-effectiveness

Still, costs are higher than fossil alternatives, but …



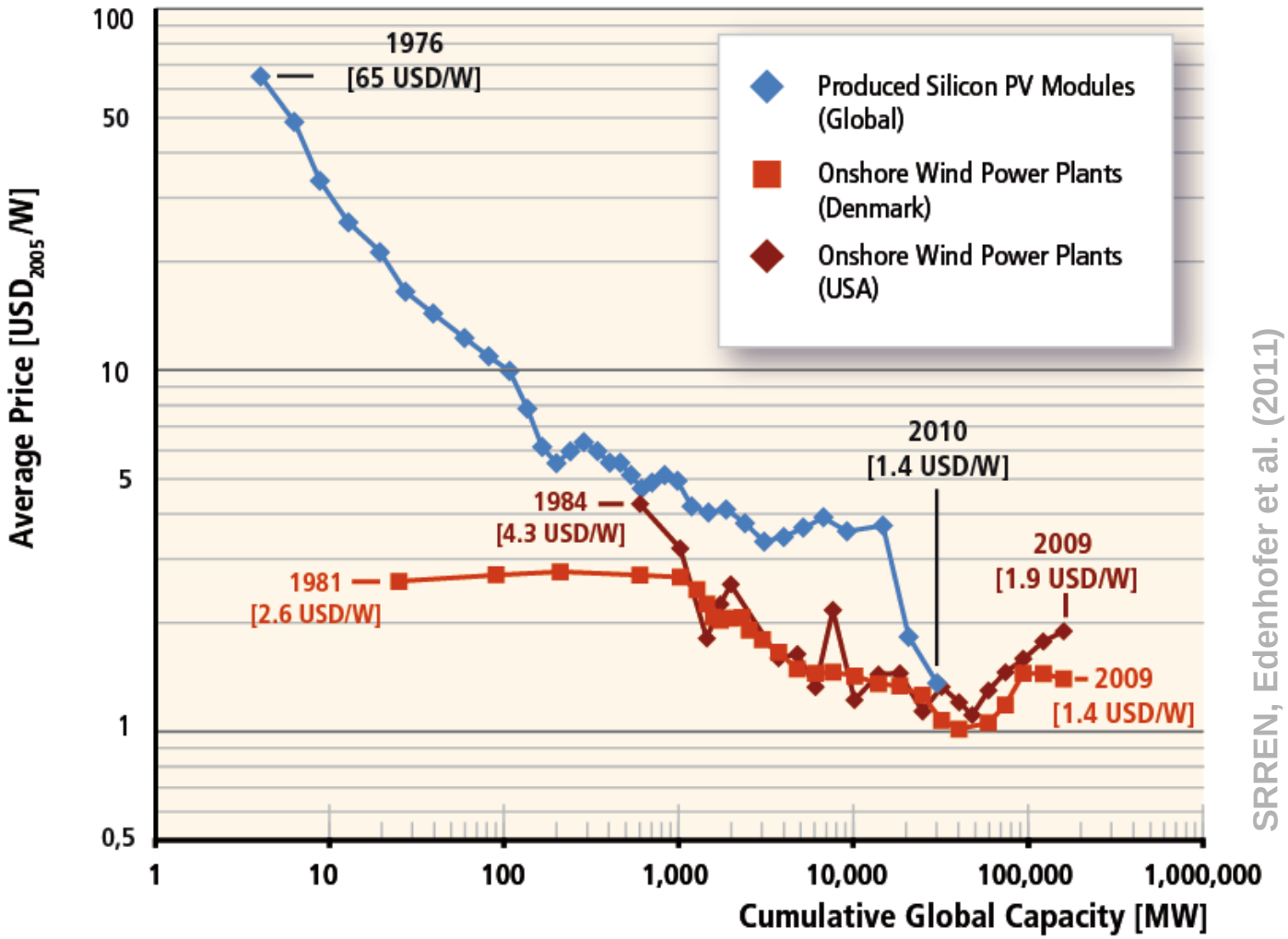
SRREN, Edenhofer et al. (2011)

... some technologies are competitive today!

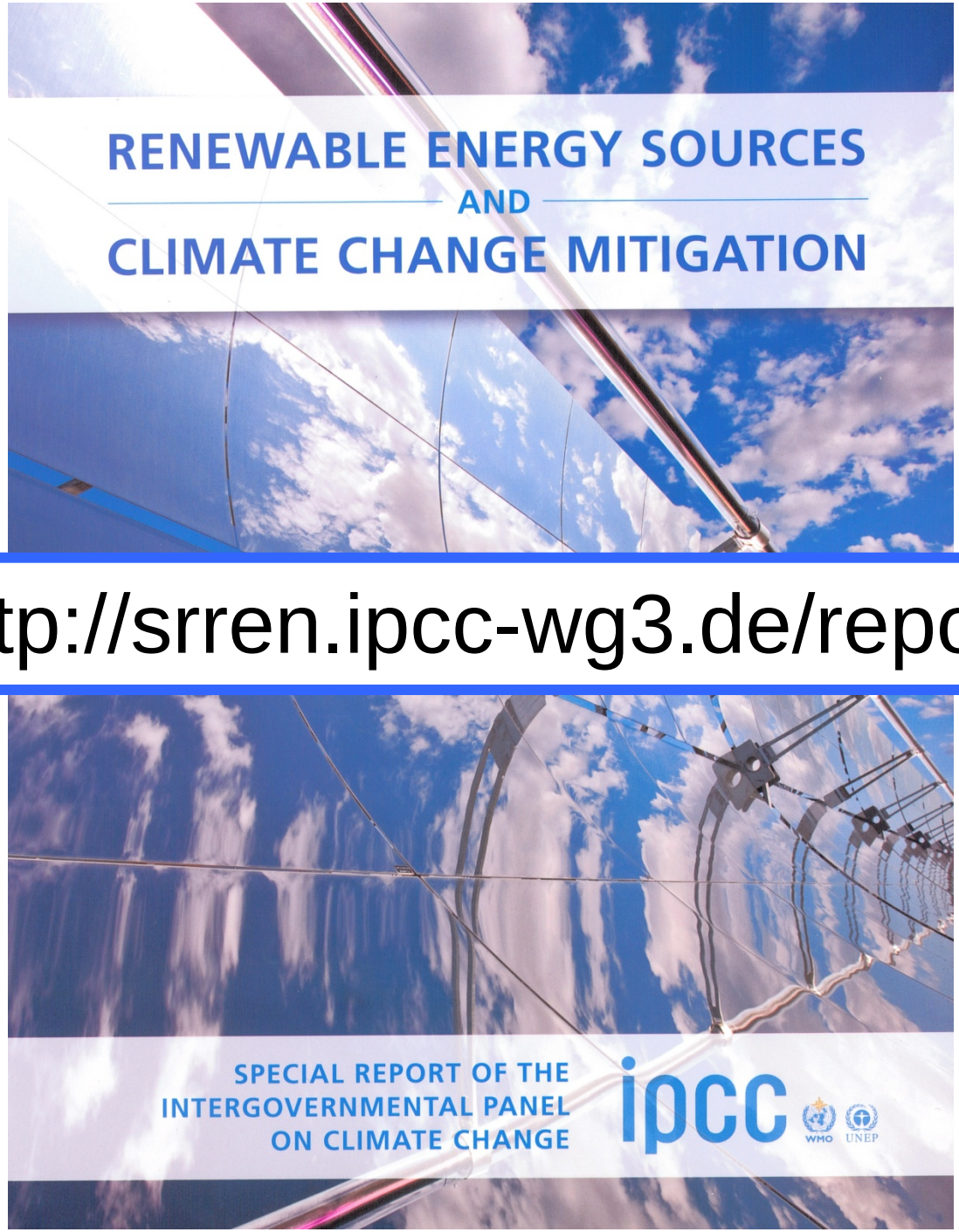


SRREN, Edenhofer et al. (2011)

The role of technologies



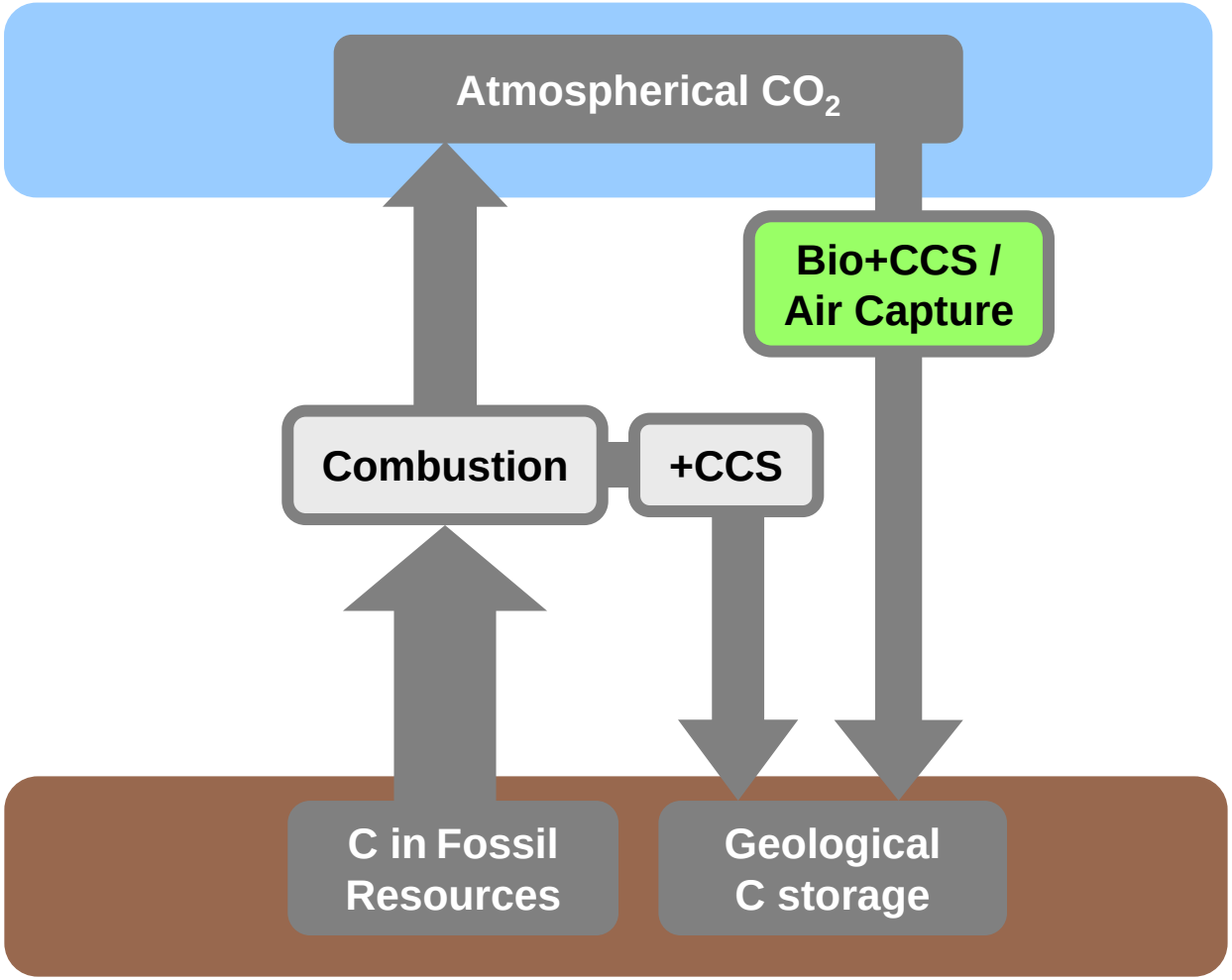
Renewable energy technologies have witnessed tremendous price decreases !



http://srren.ipcc-wg3.de/report

Carbon Capture and …

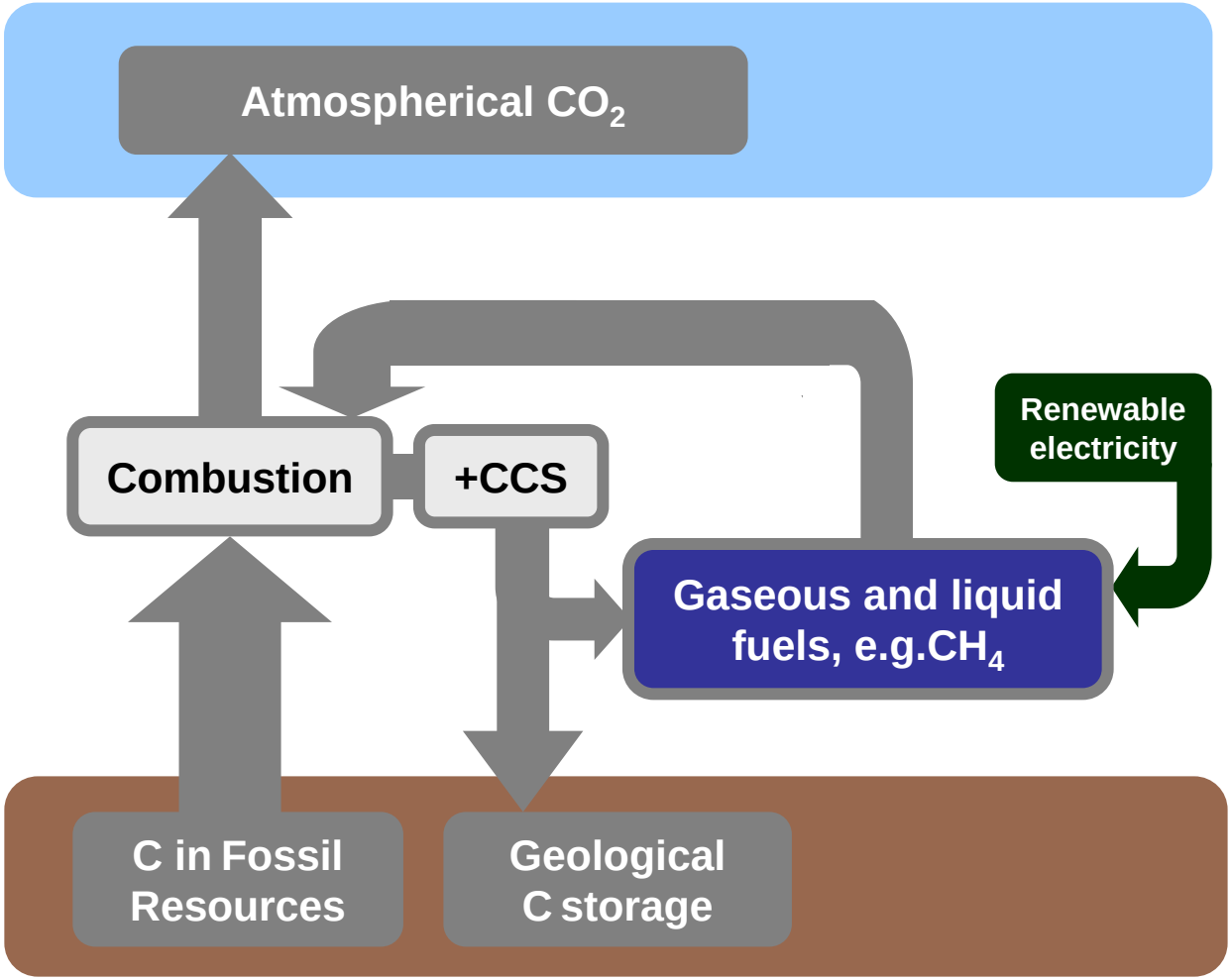
…storage (CCS)



Not fully sustainable

Carbon Capture and …

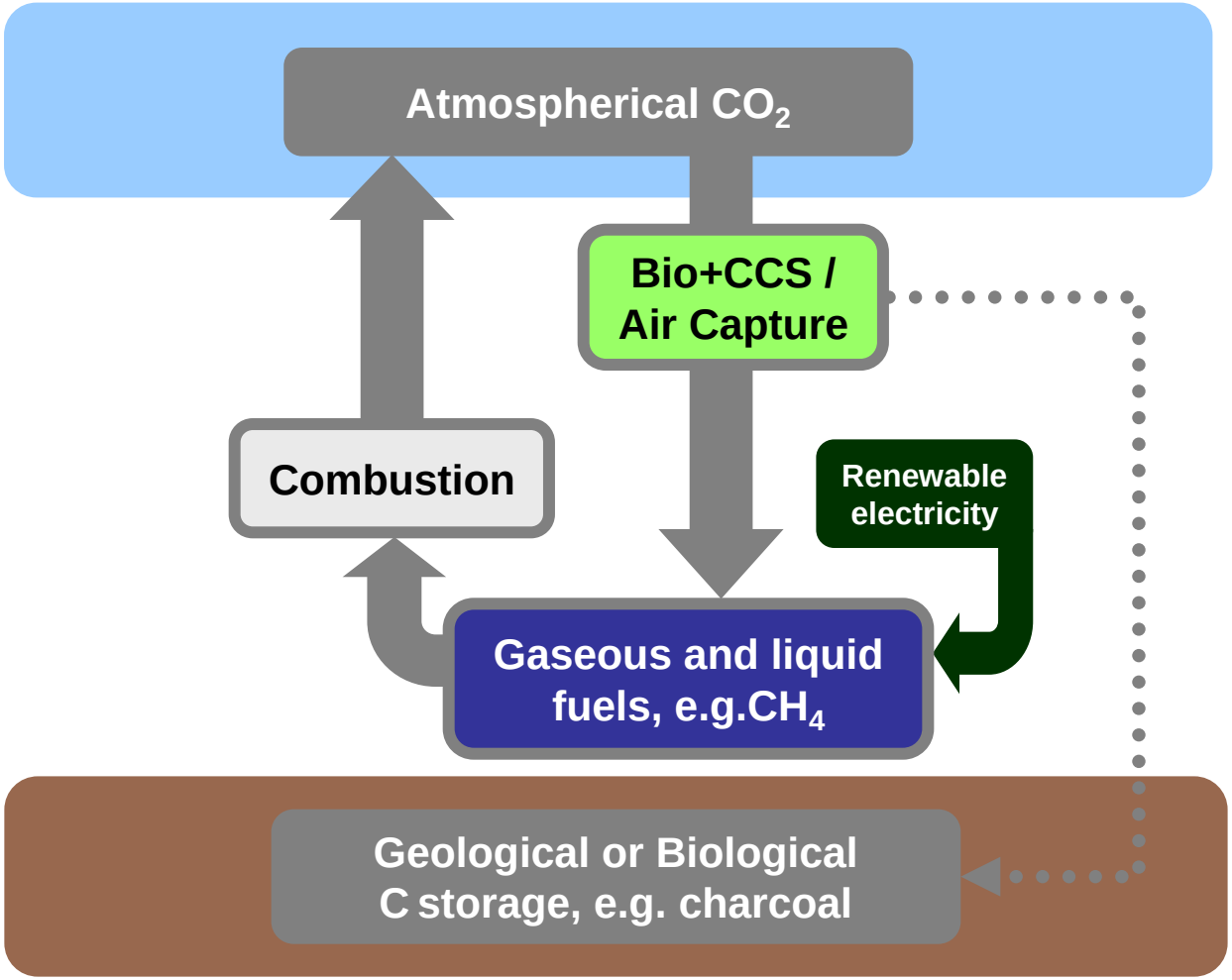
…Use (CCU)



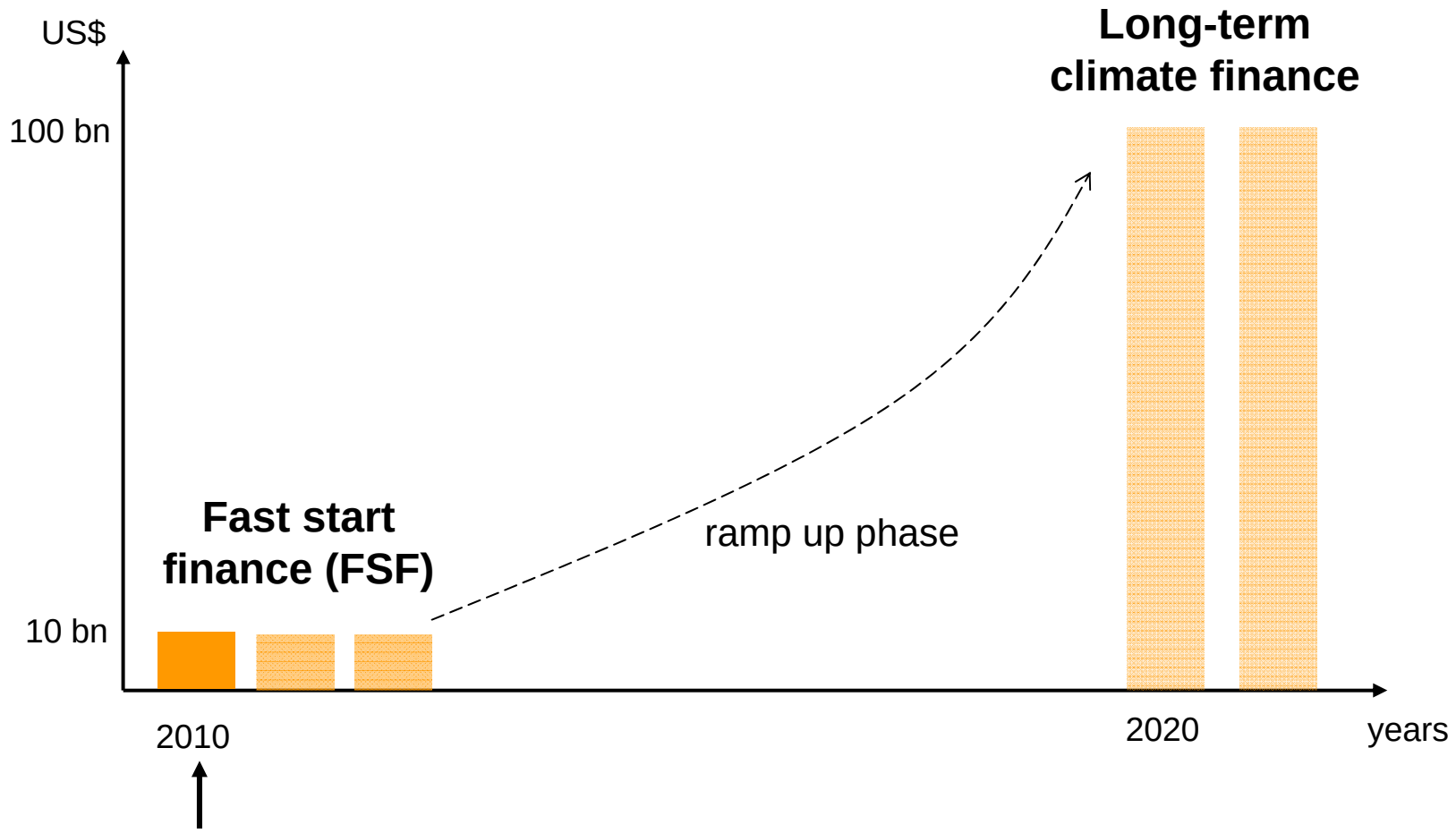
Transitional

Carbon Capture and …

…Cycling(CCC)



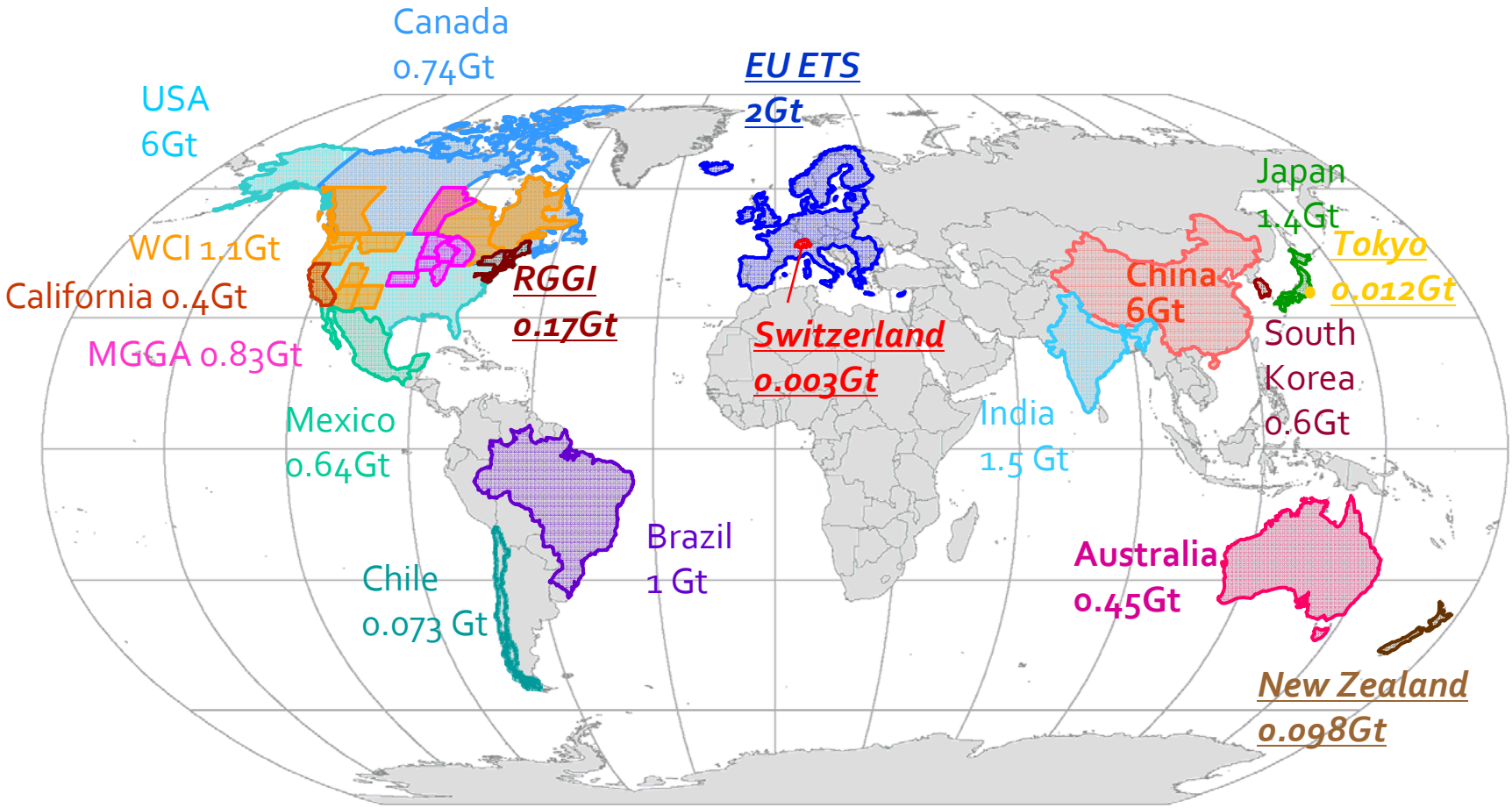
Side Payments: Green Climate Fund



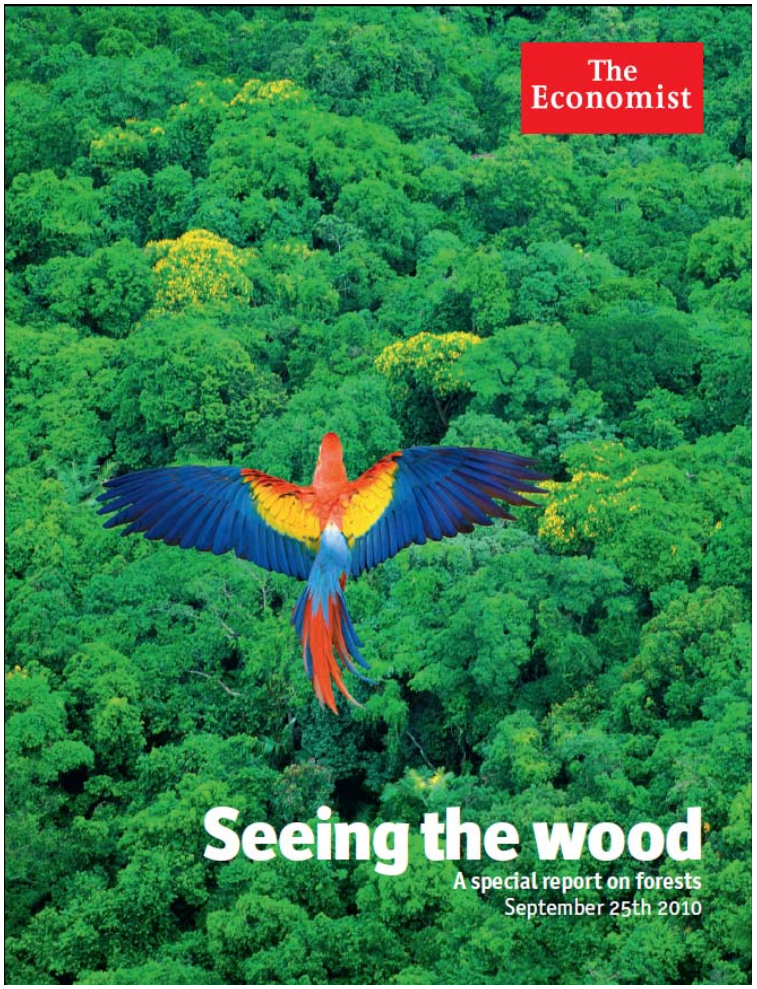
Current standing: For 2010 industrialized countries have earmarked US$ 12 billions

Brunner (2011)

Linking of regional cap-and trade initiatives

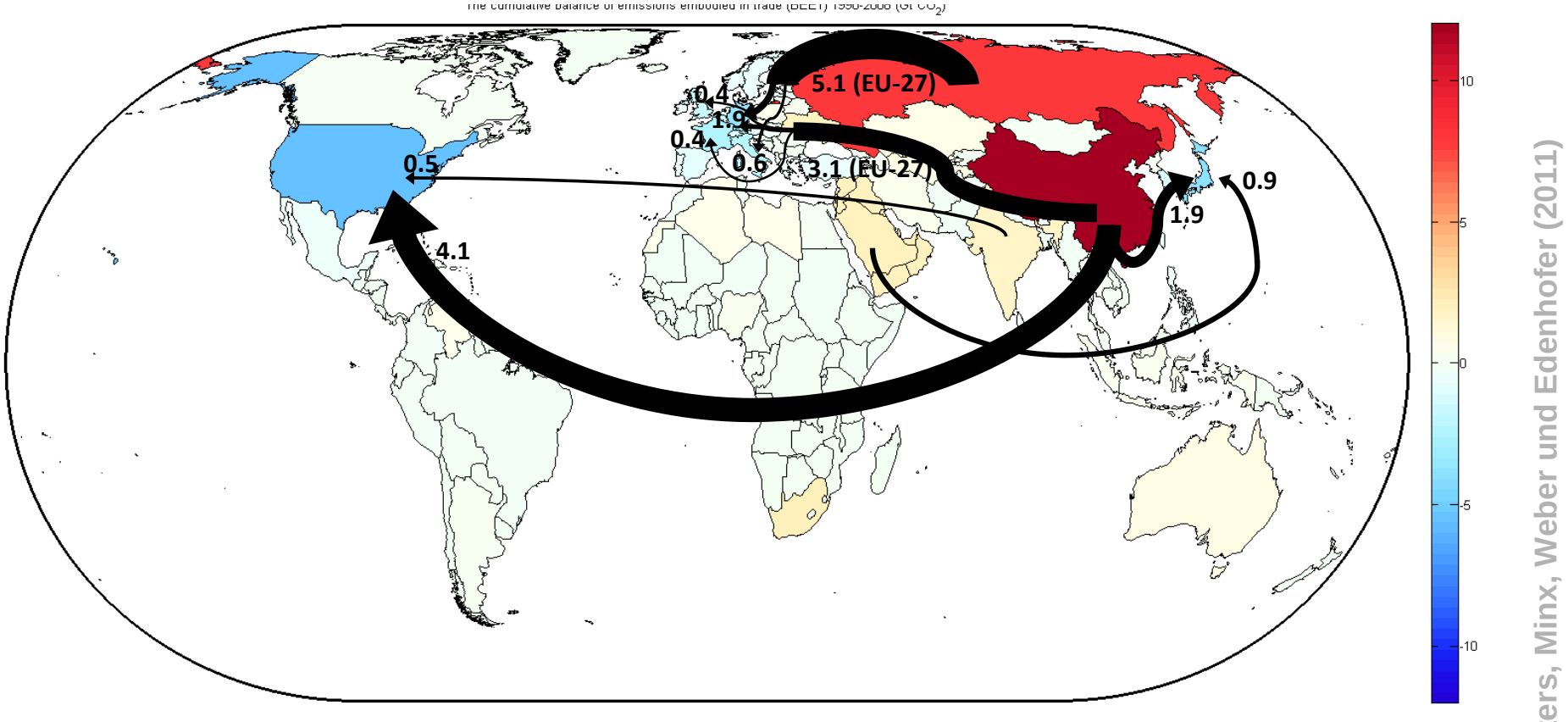


Better REDD than dead?



Justification for trade sanctions?

CO_2-trade balances for different world regions 1990-2008



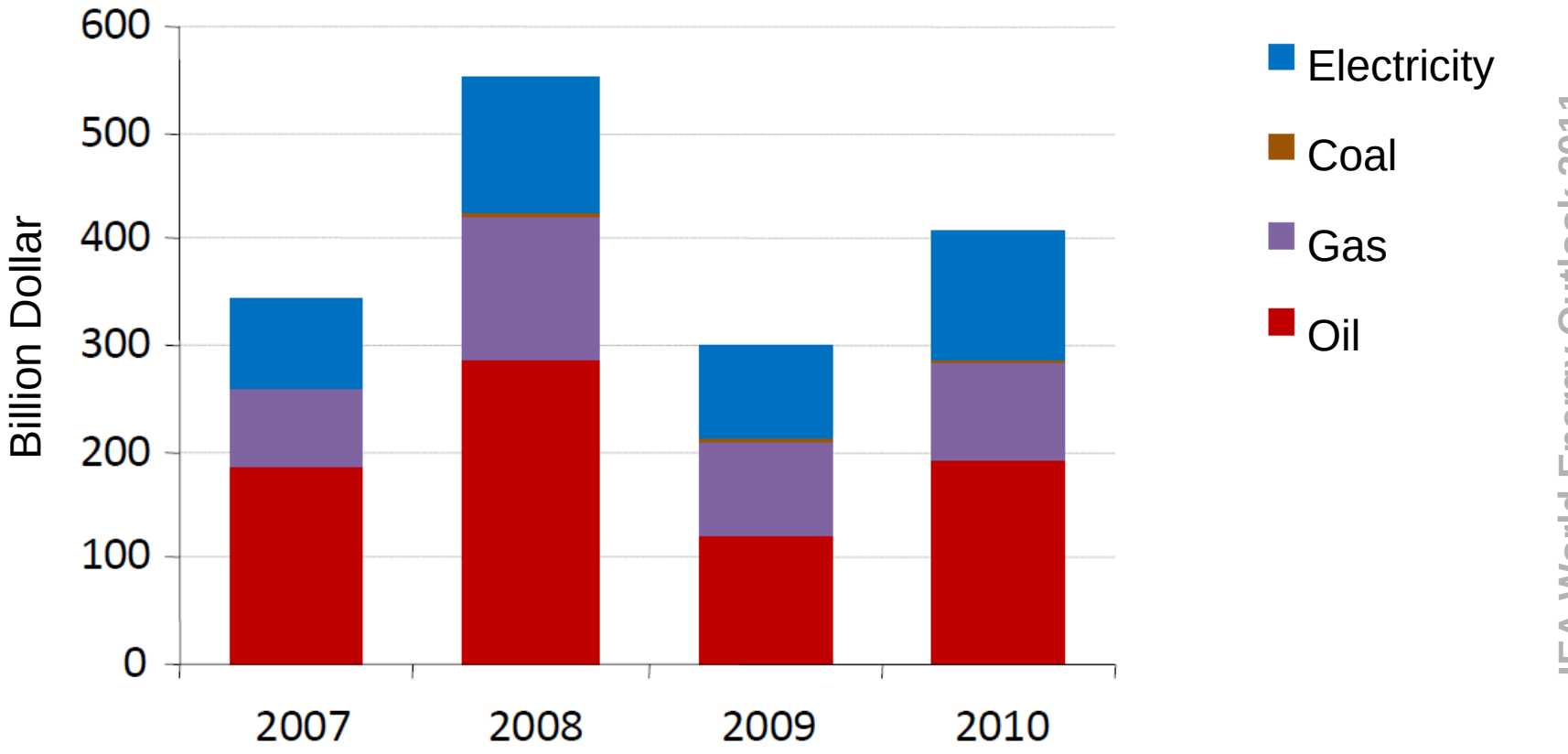
Blue: CO_2-Importing

Red: CO_2-Exporting

Peters, Minx, Weber und Edenhofer (2011)

No regret policies – Reducing fossil fuel subsidies

Global subsidies for fossil energies: 409 Billion $ in 2010, a rise of 35% compared to 2009.



No regret policies – Reducing fossil fuel subsidies

- Current subsidies for fossil energies correspond to a **negative carbon price** of 9US$ per ton CO_2 on average ! [Source: own calculation]

- Without further reforms, subsidies for fossil fuels will reach 660 Billion Dollar in 2020: 0.7% of global GDP

- Phase-out of subsidies until 2020:
  - Energy demand lowered by 4.1%
  - Oil demand reduced by 3.7 Millionen Barrel/day
  - Reduction of CO_2 -emissions by 1.7 Gt

  - Many countries are planning or already implementing reforms:

Most important reason: Pressure on national budgets

IEA World Energy Outlook 2011

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Concluding remarks

- Climate change problem will not be solved by resources becoming scarce
- Climate policy can be seen as an insurance against catastrophic risks
- Reaching a 2°C target is still possible at relatively low costs, but …
- … game-theoretical analysis proves the dilemma of international negotiations
- Issue linking and technology policy could break the negotiation stall

Thank you for your attention!

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