

Comments to the World Bank Decarbonizing Development Report

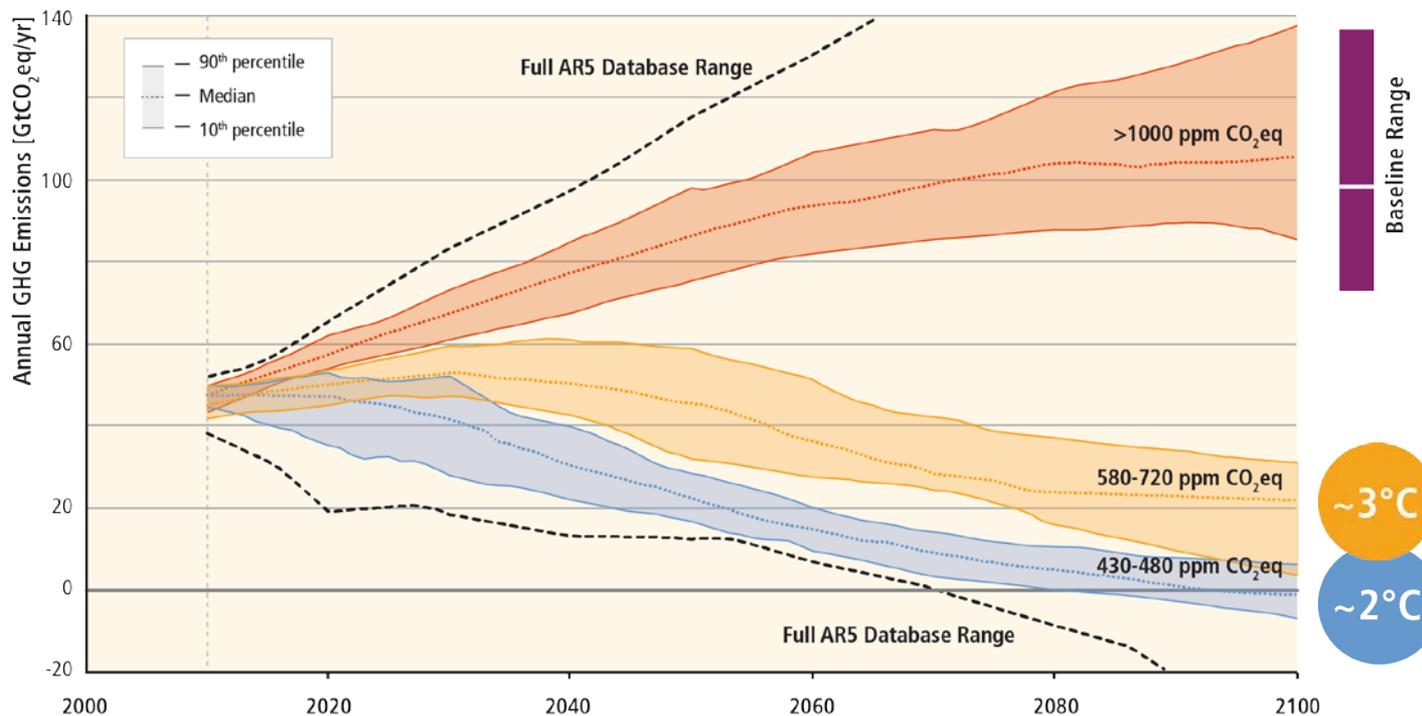
Annual Conference of the European Association of
Environmental and Resource Economists,
26 June 2015, Helsinki, Finland

Prof. Dr. Ottmar Edenhofer



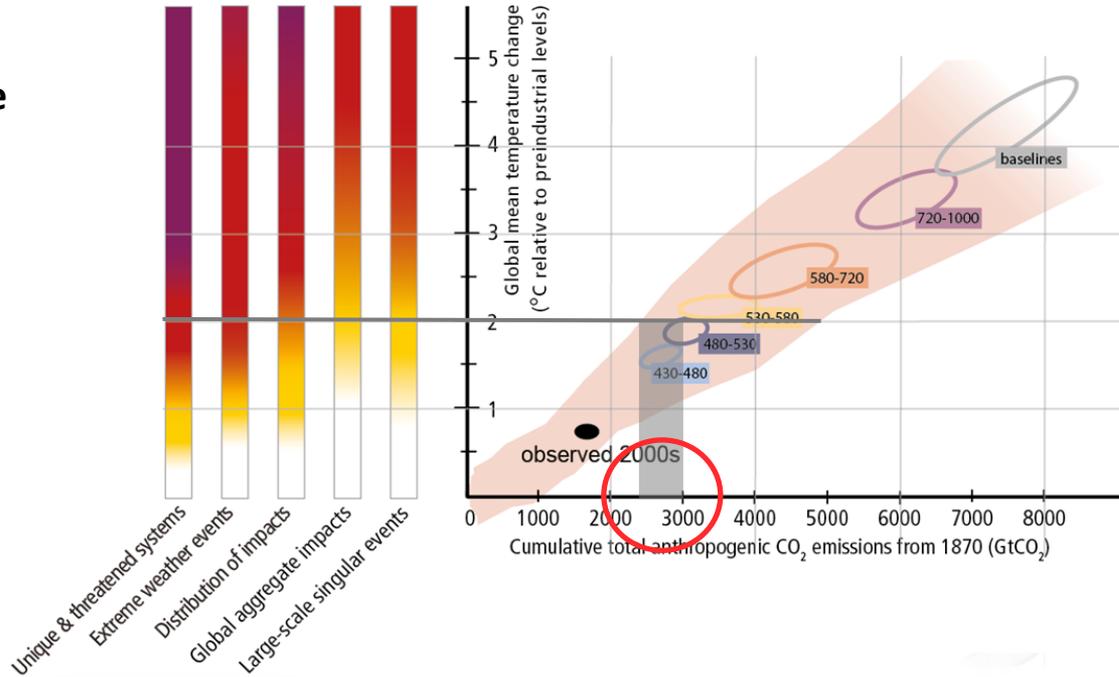
The 2°C target is politically challenging.

- But it is feasible. The IPCC has identified the requirements of limiting temperature increase.
- What is needed is a short-term and effective entry point to mitigation. We do not need to discuss long-term goals.



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

Risks from climate change

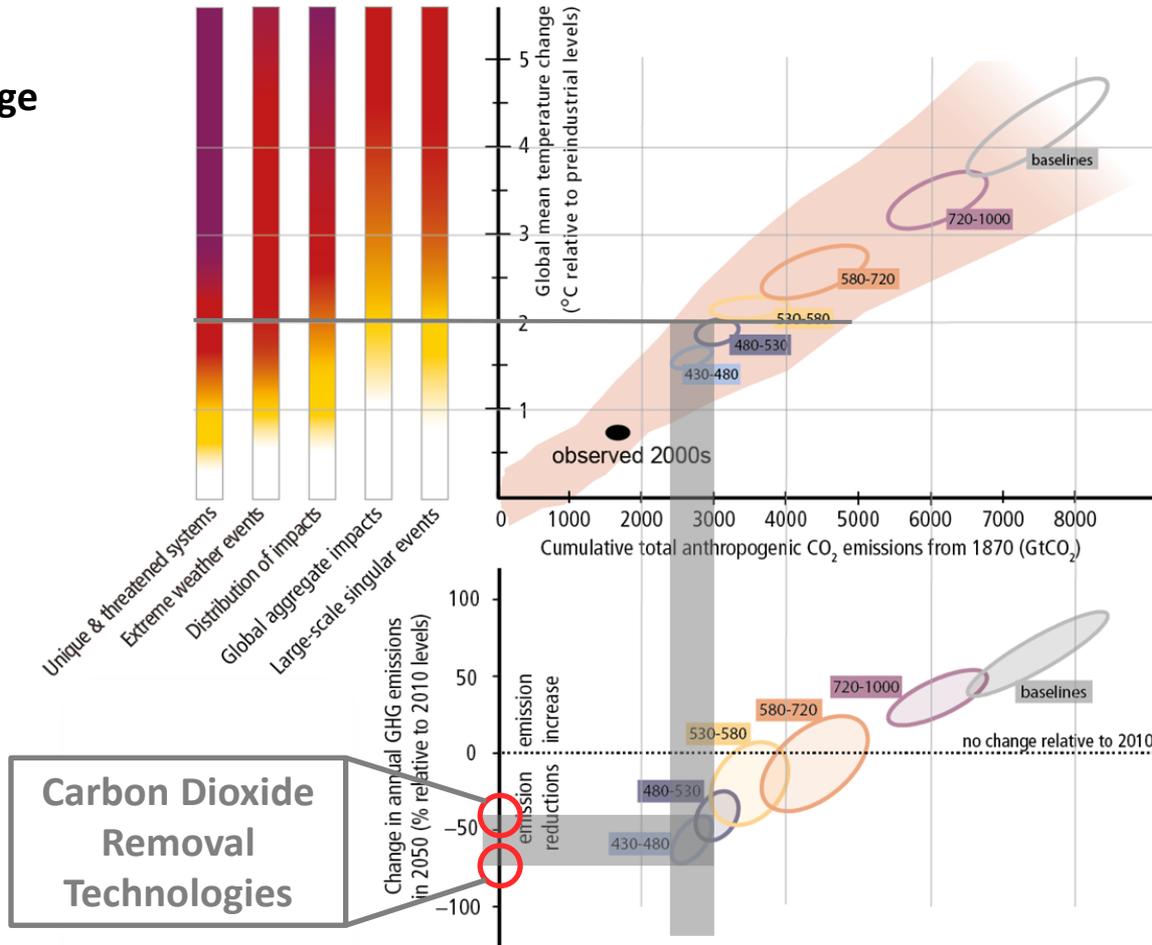


Cumulative CO₂ emissions

IPCC, SYR, SPM.10

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

Risks from climate change



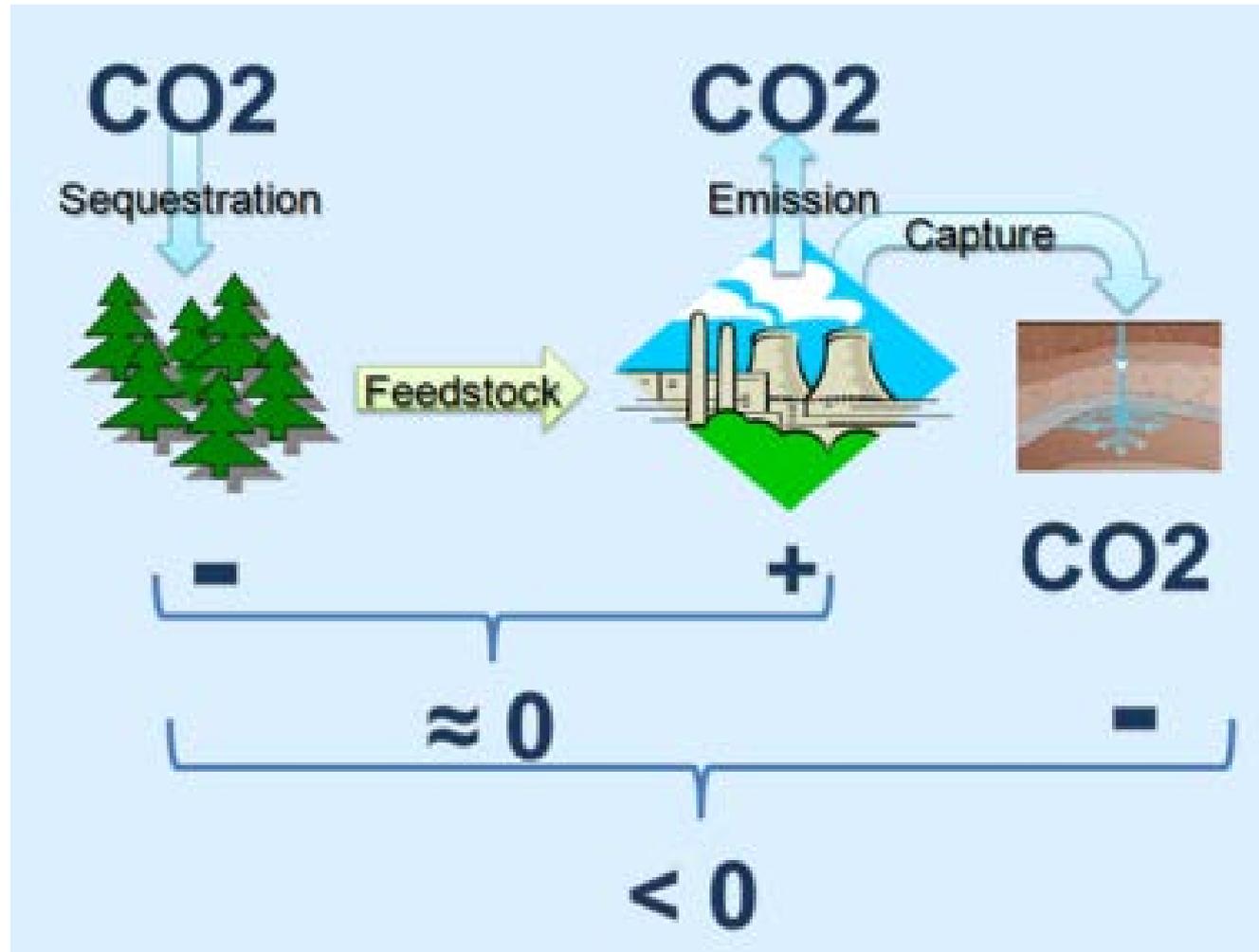
Cumulative CO₂ emissions

Annual GHG emissions over the next decades

Carbon Dioxide Removal Technologies

IPCC, SYR, SPM10

To reach the 2°C goal, 85 percent of the scenarios assessed by IPCC venture into the unknown territory of negative emissions.



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Options to achieve negative emissions	2020-2100 low vs. high potential (GtCO ₂)
BECCS	178 – 453
Biochar	143
Agricultural carbon sequestration	104 – 130
Direct Air Capture	108 – 260*
Ocean Liming	84 – 260*
Afforestation and forestry	80 – 100
Total	~700 – ~1,300*

Further Options to achieve negative emissions:

- Afforestation (limited in AR5 scenarios)
- Not used in AR5 scenarios:
 - Direct Air Capture
 - Carbon sequestration in soils (biochar...)
 - Ocean liming and fertilization
 - Enhanced weathering

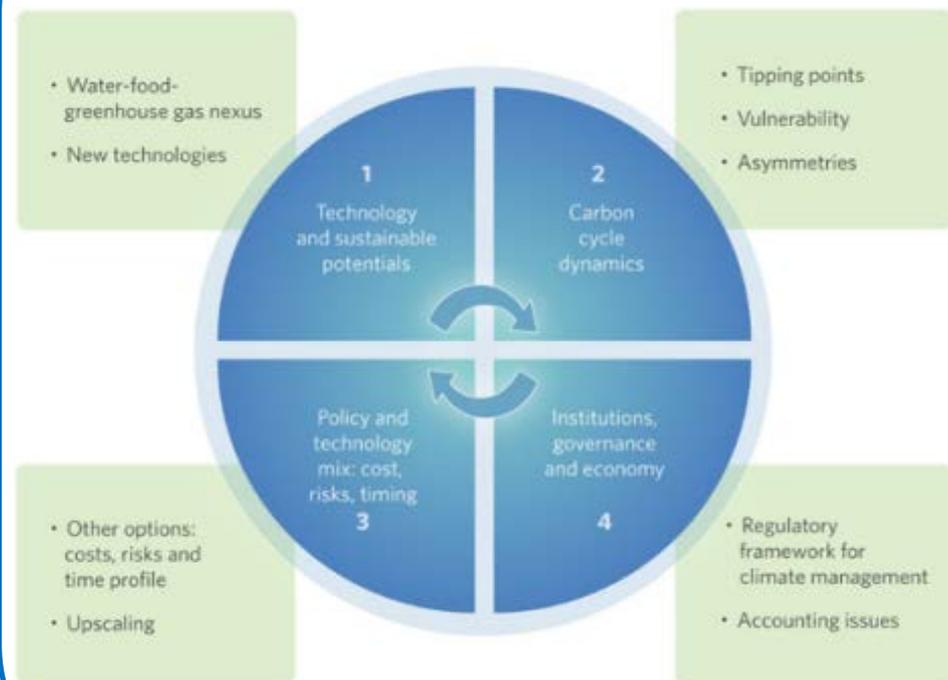
How negative emissions affect land use

Four uncertain factors:

1. How much space on Earth for negative emissions?
2. How do soils and oceans react to negative emissions?
3. How can negative emissions be financed?
4. Which social and institutional barriers need to be overcome to achieve negative emissions?

<http://www.cger.nies.go.jp/gcp/magnet>

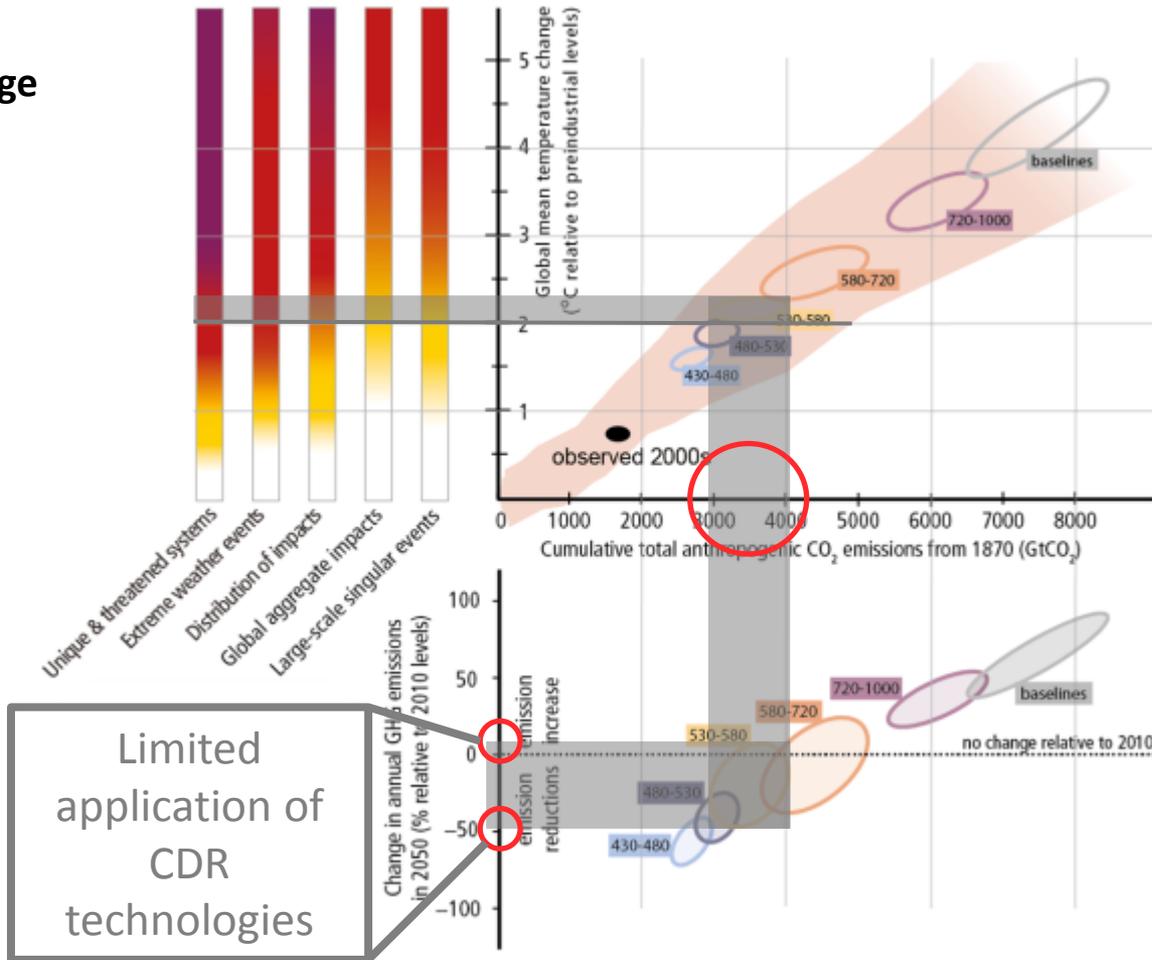
Dimensions of negative emissions



Source: Fuss et al. (2014), NCC

Ends, means and implications for climate policy

Risks from climate change

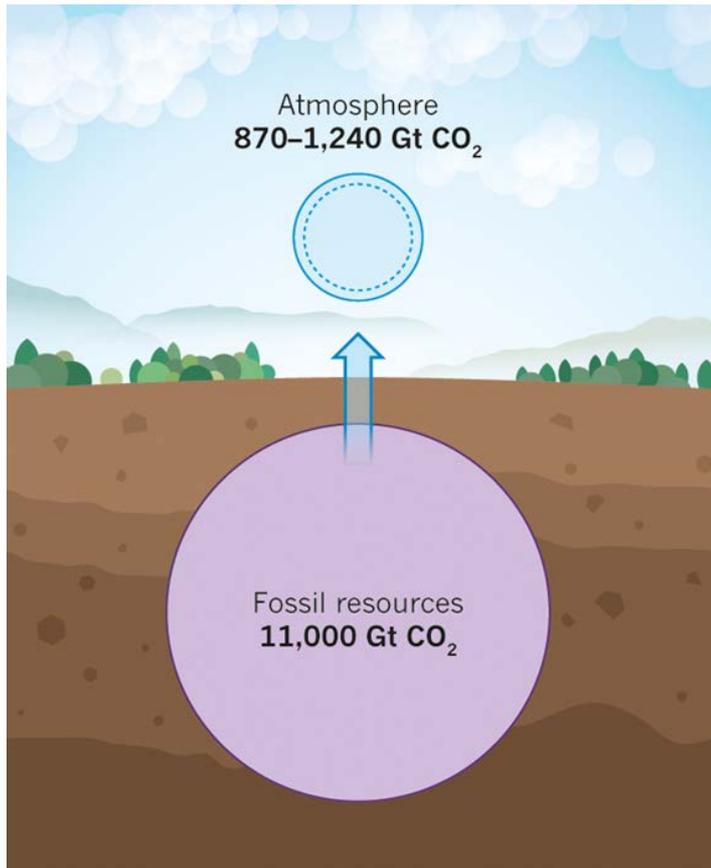


Cumulative CO₂ emissions

Annual GHG emissions over the next decades

IPCC, SYR, SPM.10

The climate problem at a glance



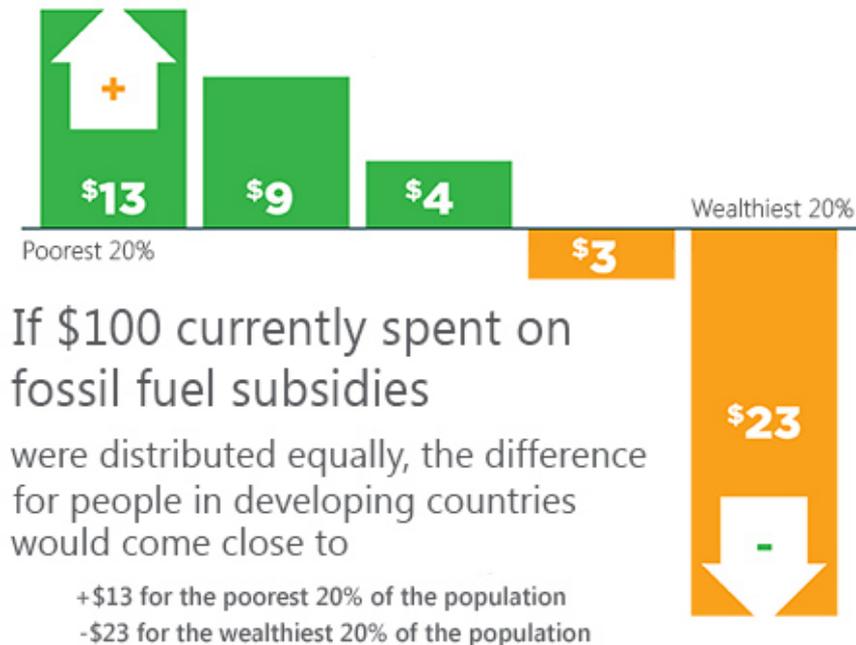
Resources and reserves to remain underground until 2100 (median values compared to BAU, AR5 Database)

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

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

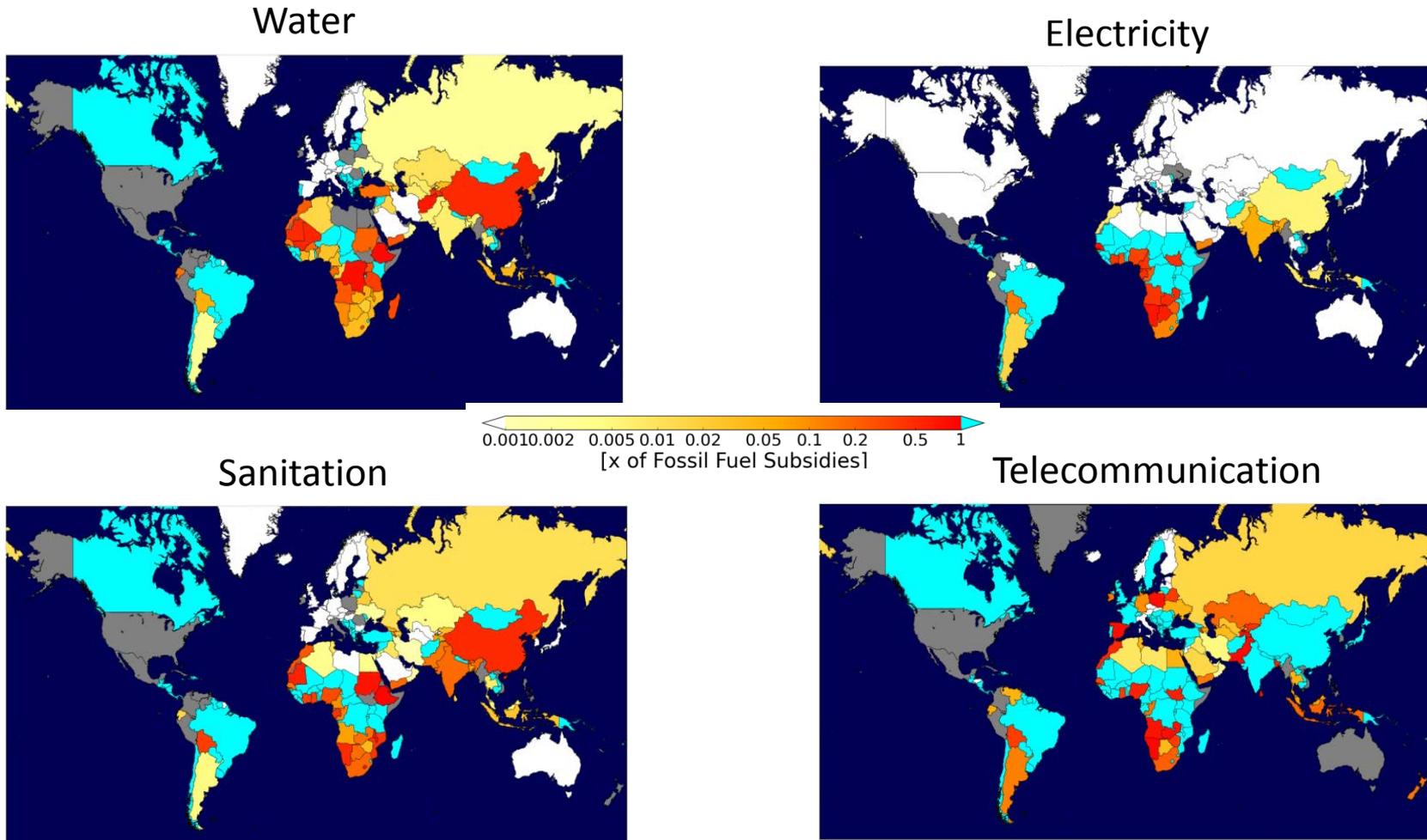
New World Bank Report *Decarbonizing Development*

- Fossil fuel subsidies amount to \$548 billion
- Cutting subsidies can have positive effects for poorer households



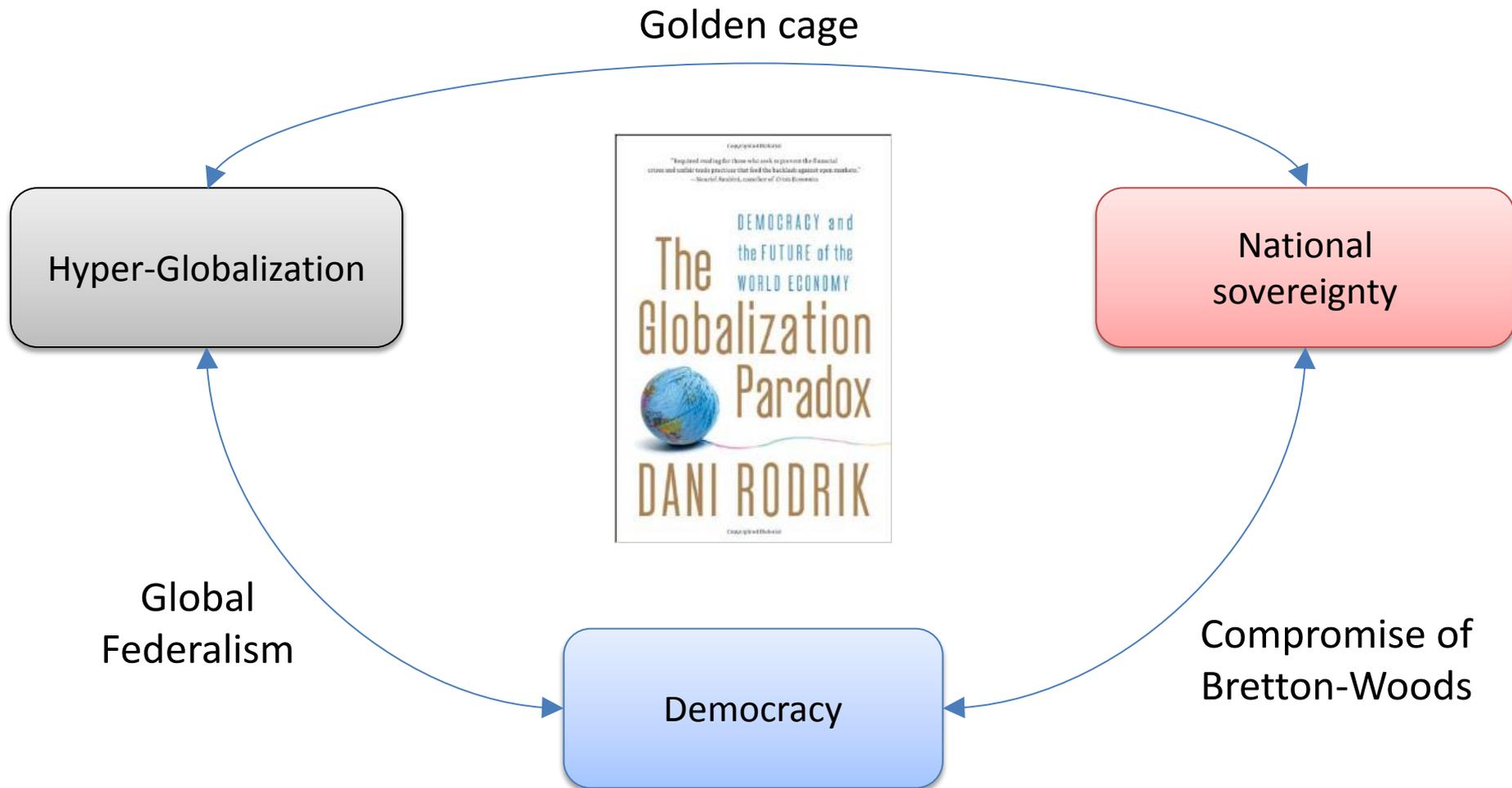
Source: World Bank (2015)

Cutting fossil fuel subsidies to finance infrastructure

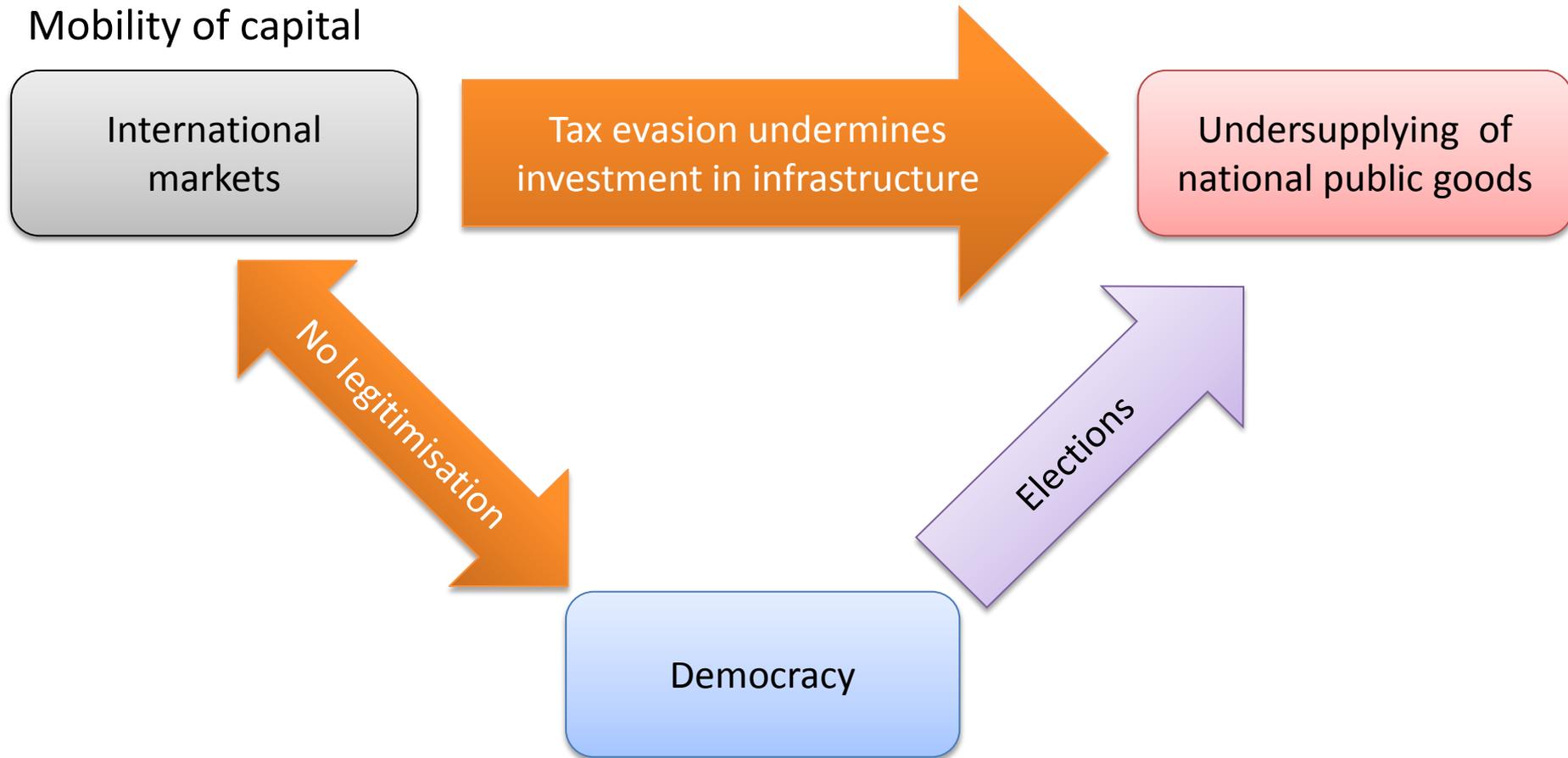


Jakob et al. (submitted)

The Globalization Paradox: A trilemma

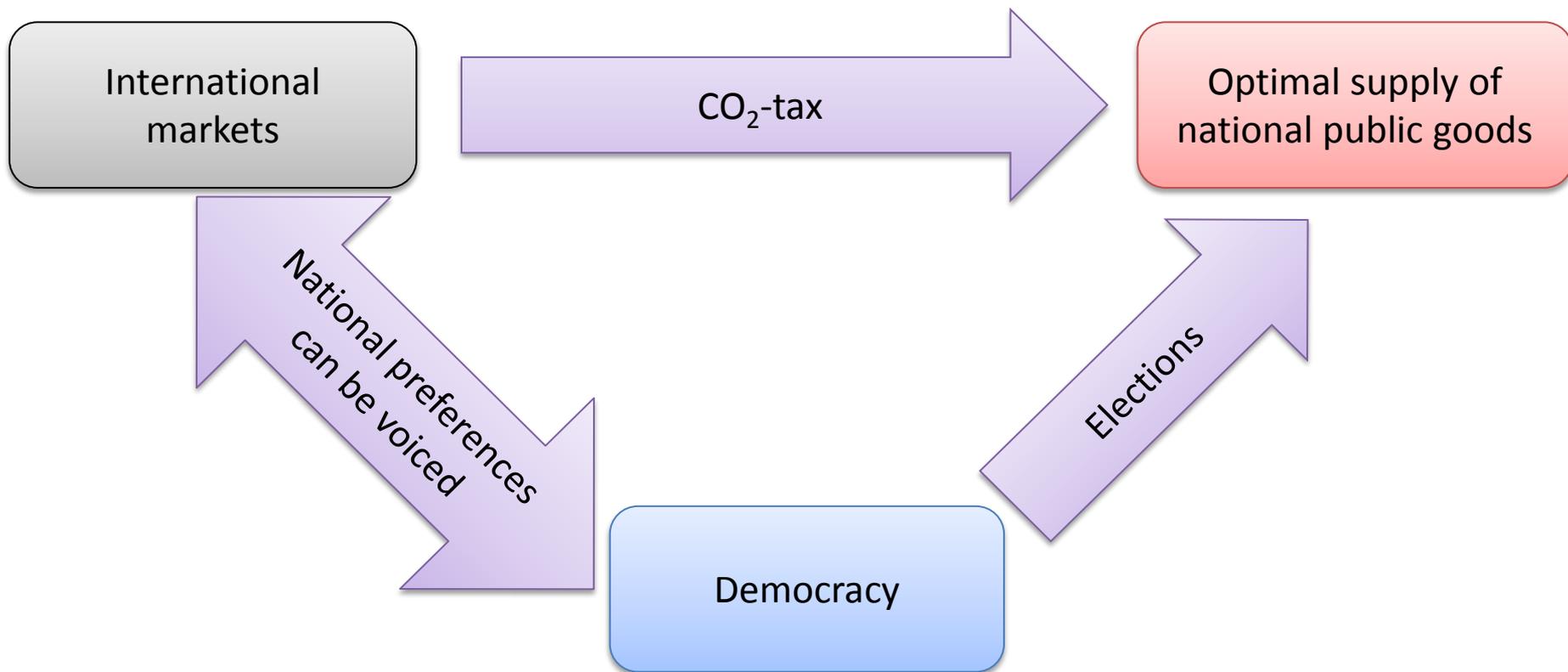


Tax evasion limits national options.



CO₂-taxation could free up economic potential

Mobility of capital
and resource trade



Infrastructures need huge investments, globally.



Water availability



Sanitation

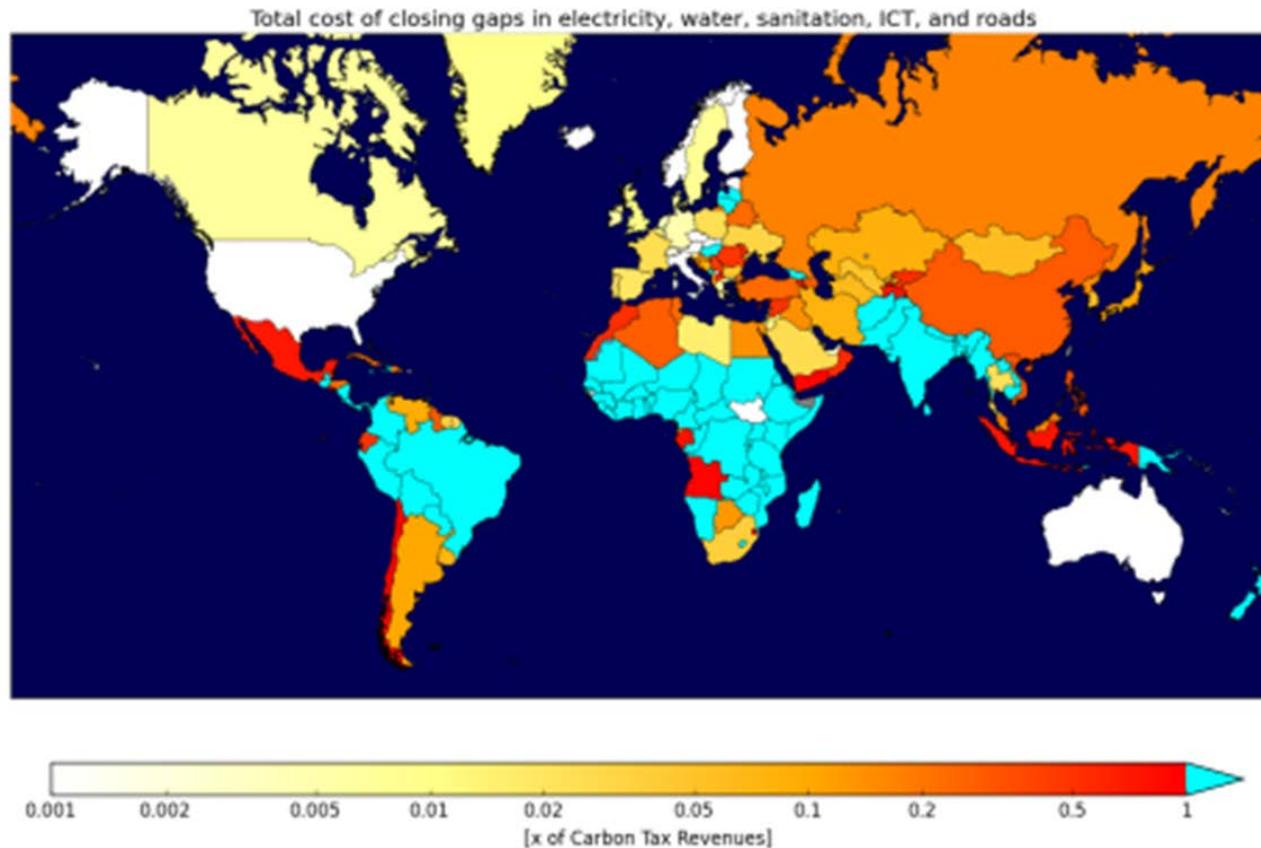


Telecommunication

Access to electricity



CO₂-taxation to finance infrastructure



Source: Jakob et al., 2015