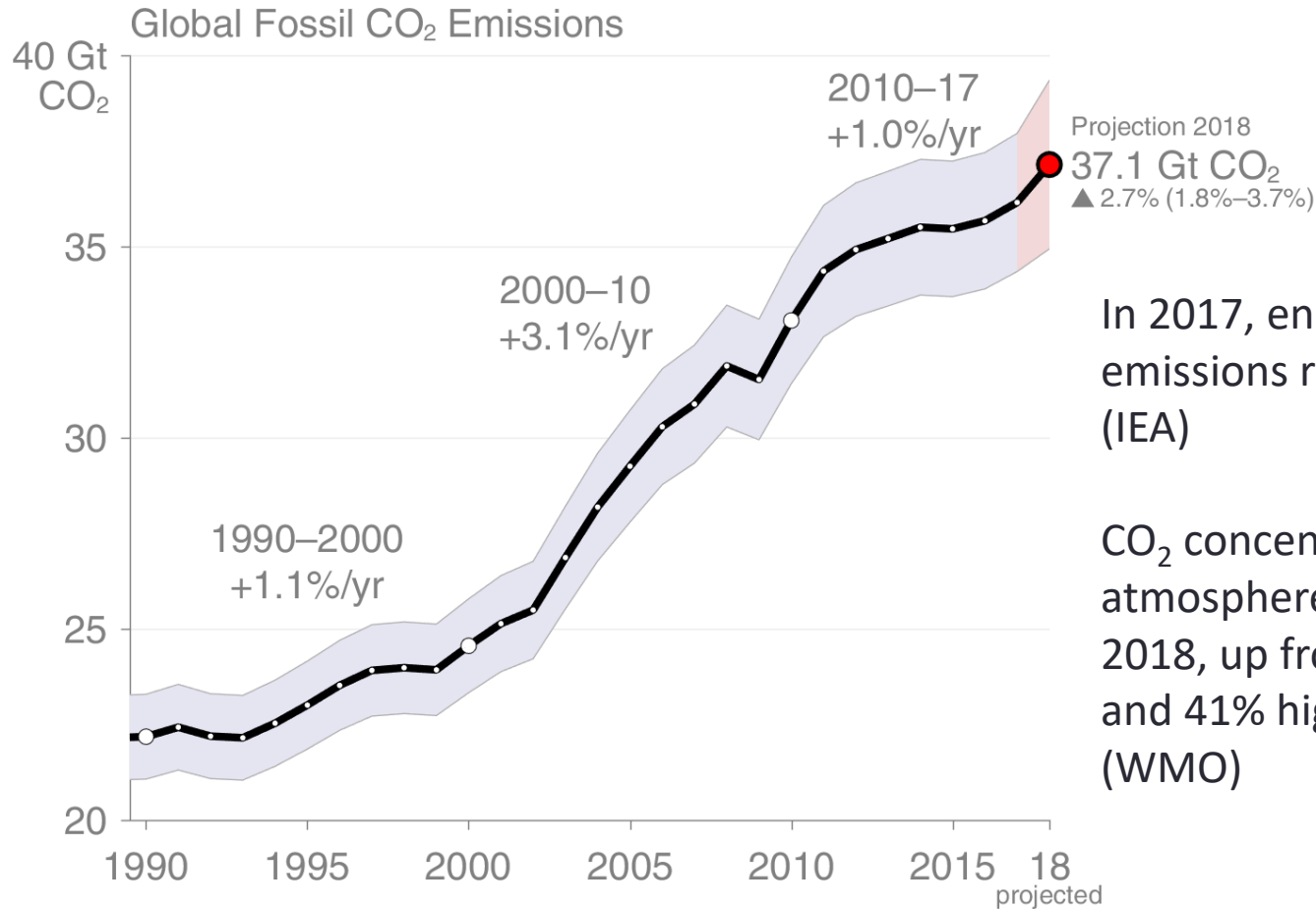# Demand Side, Coal and Sustainable Development

Prof. Dr. Ottmar Edenhofer

GCA SDG 12: Impacts for a more sustainable and
responsible consumption
UNFCCC Marrakech Partnership

Katowice, 8 December 2018

Emissions are rising!

Global Fossil CO_2 Emissions

1990–2000
+1.1%/yr

2000–10
+3.1%/yr

2010–17
+1.0%/yr

Projection 2018
37.1 Gt CO_2
▲ 2.7% (1.8%–3.7%)

In 2017, energy-related emissions reached a record-high (IEA)

CO_2 concentrations in the atmosphere reached 405 ppm in 2018, up from 400 ppm in 2015, and 41% higher than 1990 (WMO)

Estimates for 2015, 2016 and 2017 are preliminary; 2018 is a projection based on partial data.
Source: CDIAC; Le Quéré et al 2018; Global Carbon Budget 2018

The climate problem at a glance

Atmosphere

≤ 800 Gt CO_2

Fossil resources
15,000 Gt CO_2
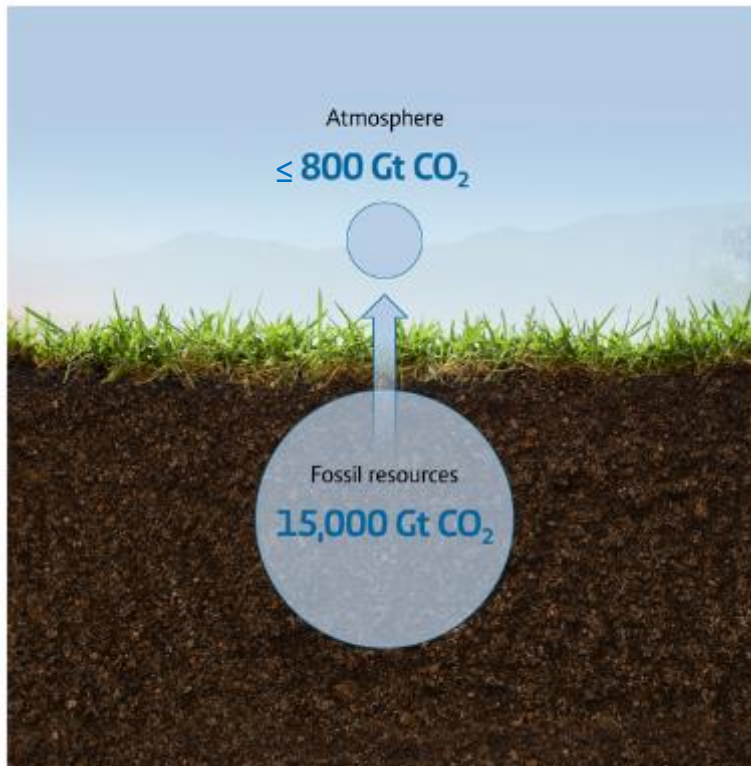
Source: Bauer et al. (2014); Jakob/Hilaire (2015)

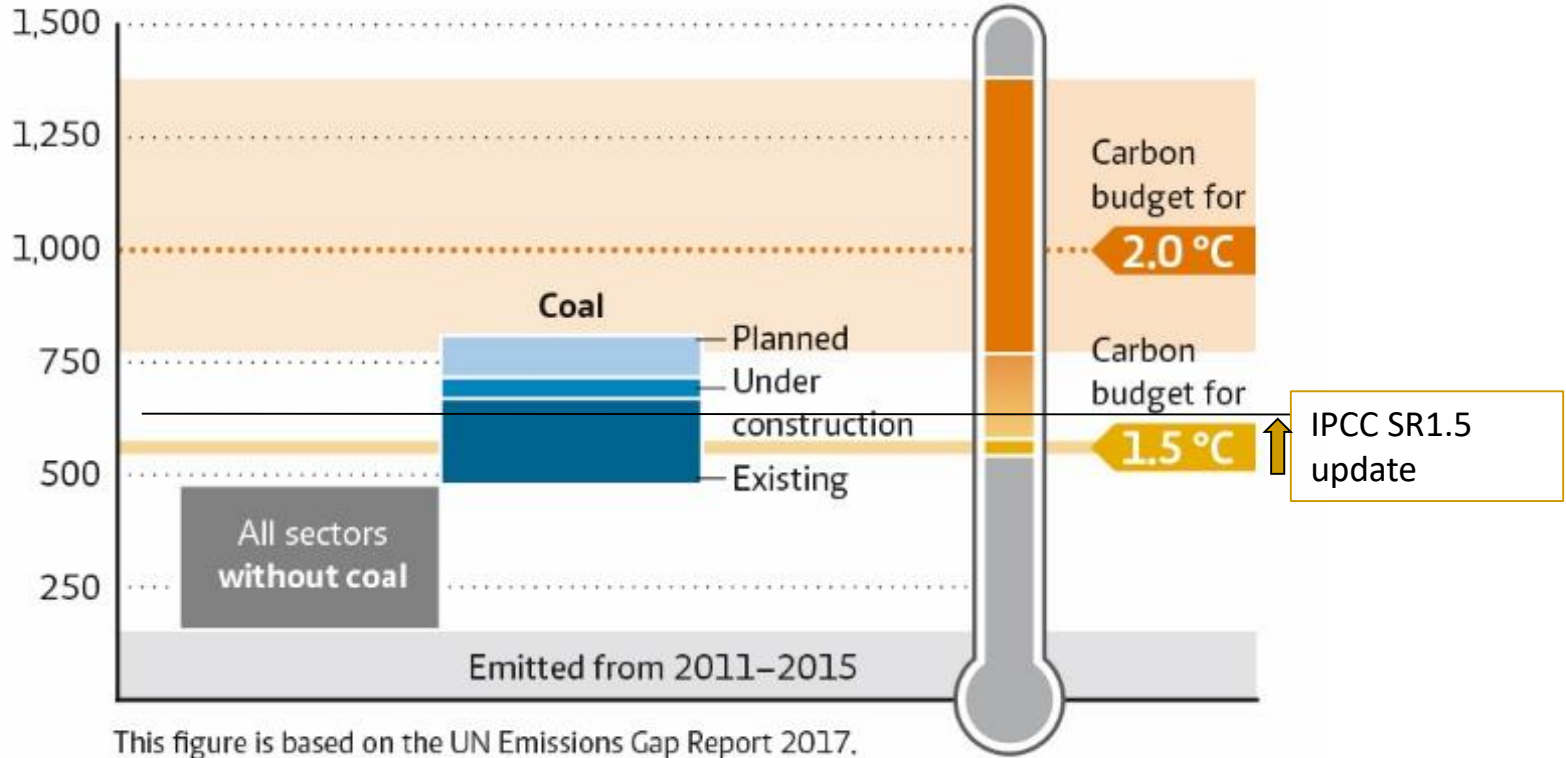| Resources and reserves to remain underground until 2100 (median values compared to BAU, AR5 Database)		
Until 2100	**With CCS [%]**	**No CCS [%]**
Coal	70	89
Oil	35	63
Gas	32	64

70 – 90% of available coal reserves and resources will need to stay in the ground if climate targets are to be achieved.
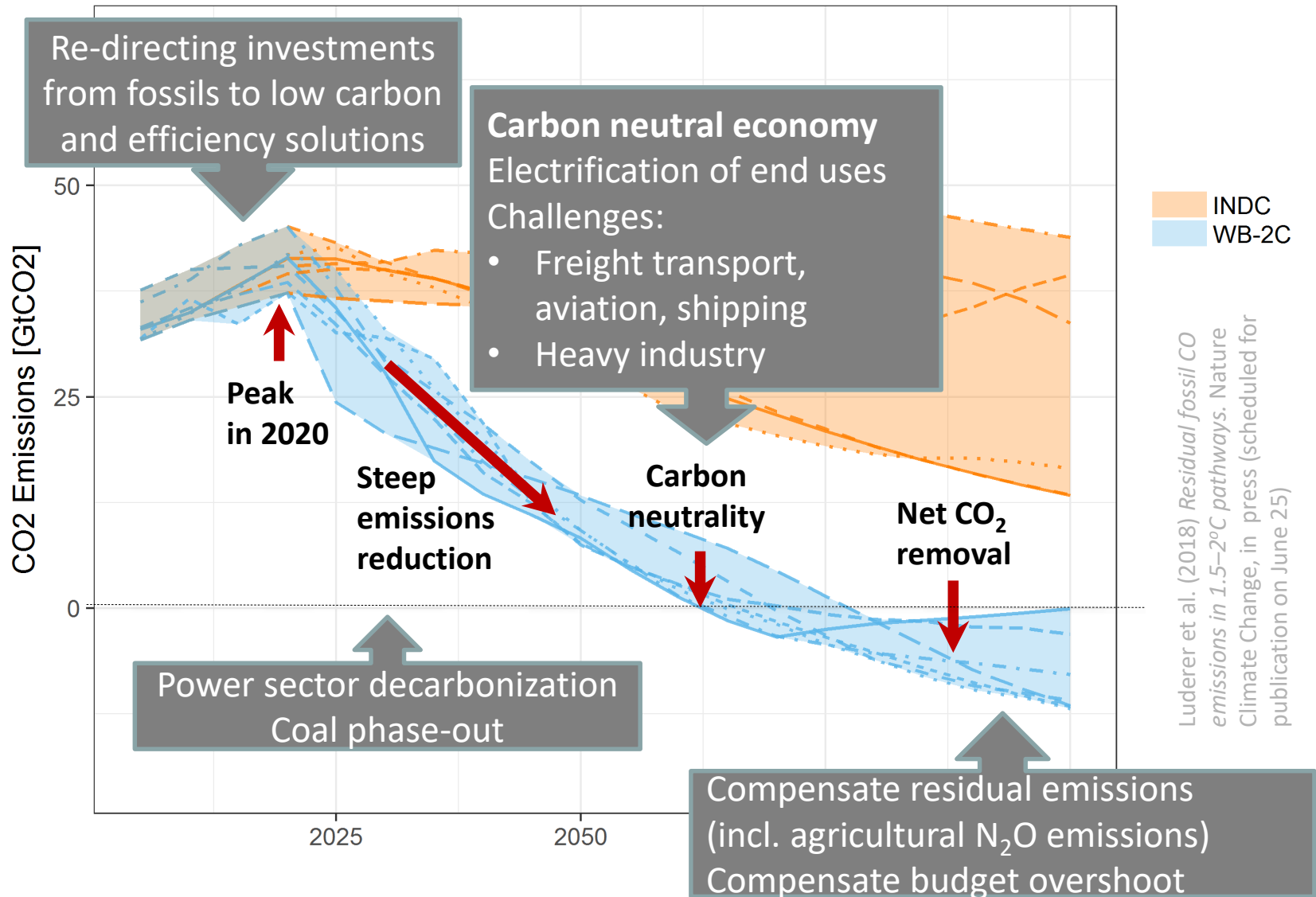
Coal consumes the CO$_2$-Budget

Coal eating up carbon budget

Committed global emissions (Gt CO$_2$)

IPCC SR1.5 update

This figure is based on the UN Emissions Gap Report 2017.

General Structure of Deep 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

INDC
WB-2C

CO2 Emissions [GtCO2]

50

25

0

Peak in 2020

Steep emissions reduction

Carbon neutrality

Net CO$_2$ removal

Power sector decarbonization
Coal phase-out

Compensate residual emissions (incl. agricultural N$_2$O emissions)
Compensate budget overshoot

2025   2050

Luderer et al. (2018) *Residual fossil CO emissions in 1.5–2°C pathways*. Nature Climate Change, in press (scheduled for publication on June 25)

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Berlin

Why demand-side climate solutions?

- So far the demand-side is generically treated in scenarios

- Large-scale demand change may avoid NET dependence (Mousavi and Blesi 2018, van Vuuren et al 2018, Grubler et al 2018)

- Disparate social sciences suggest bits and pieces on demand, consumption, lifestyles, services, and other social aspects of mitigation.
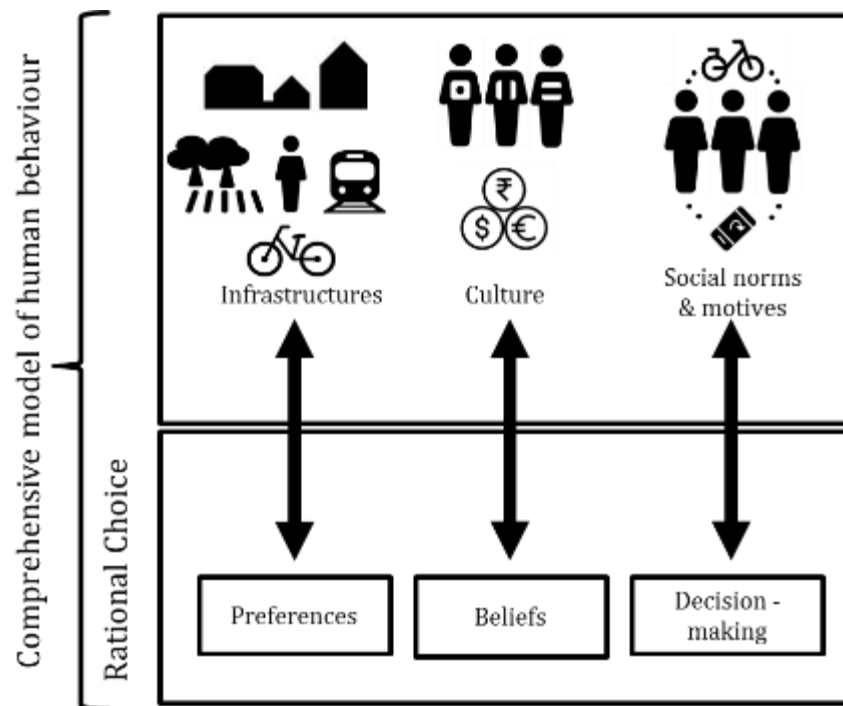
→ The demand-side, and services deserve detailed characterization and comprehensive assessment.
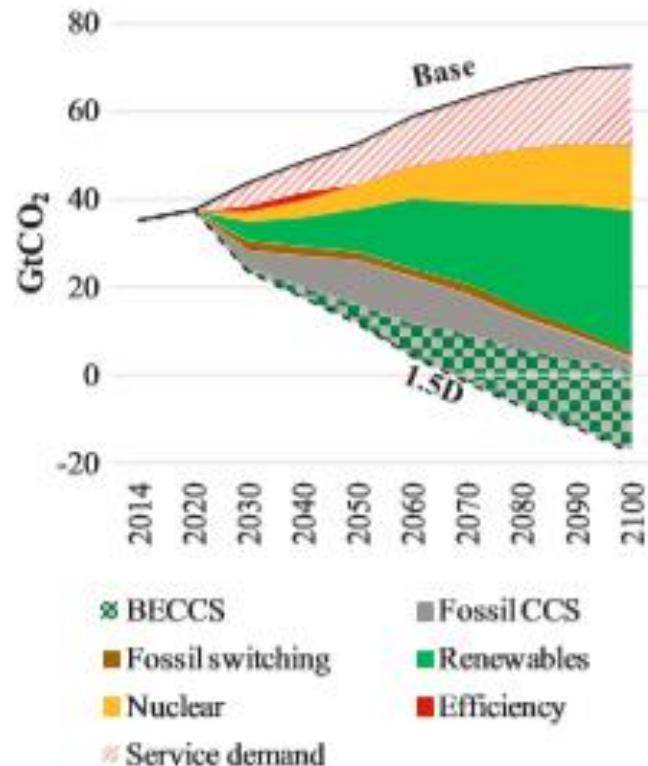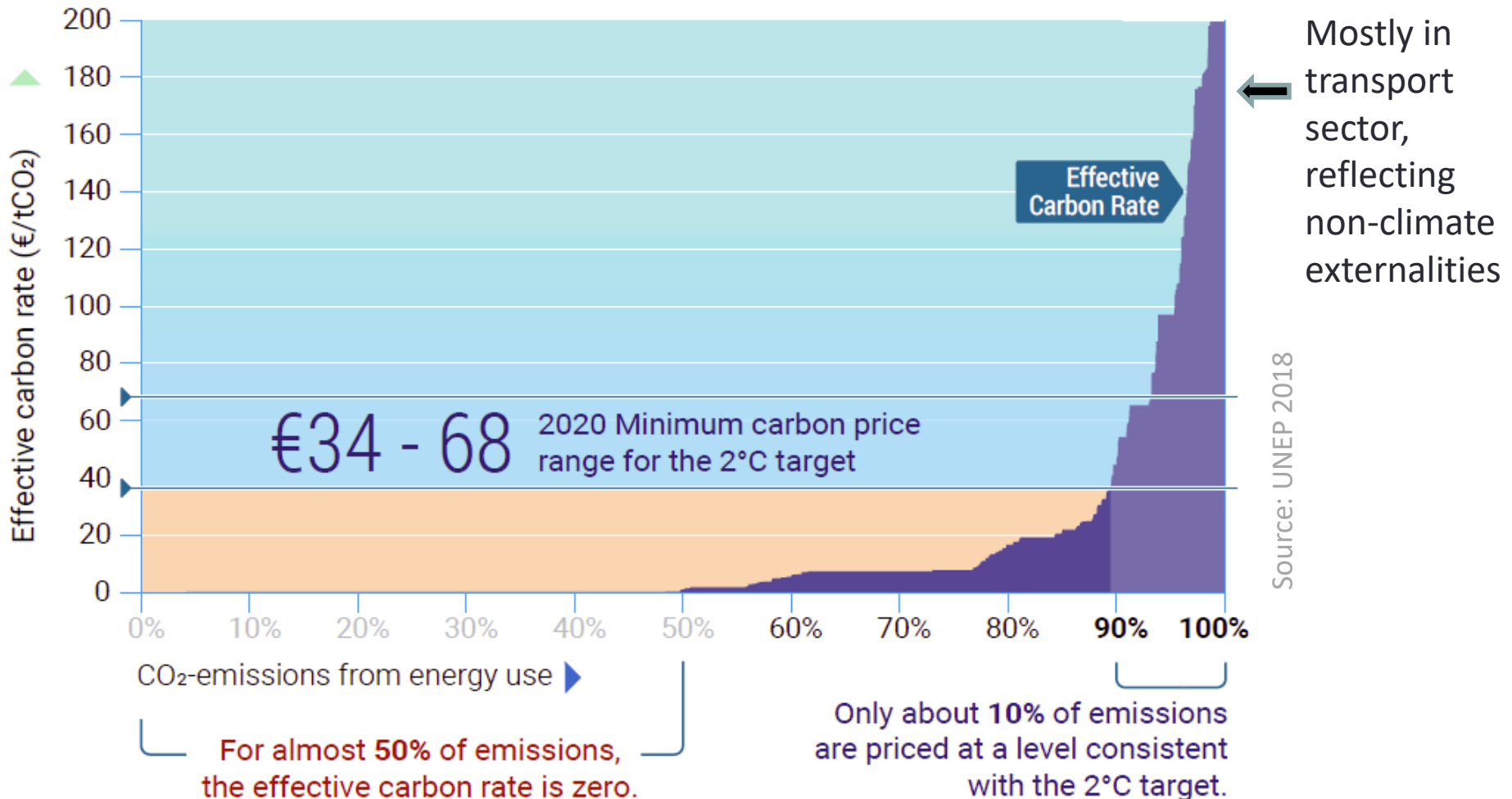
Behavioral economics for climate change mitigation

- Consumers often deviate from rational choice

- Time inconsistent preferences, e.g. in residential location choice

- Spatial setting forms preferences endogenously

- Policy solutions, such as infrastructure investments, differ with choice model and normative viewpoint

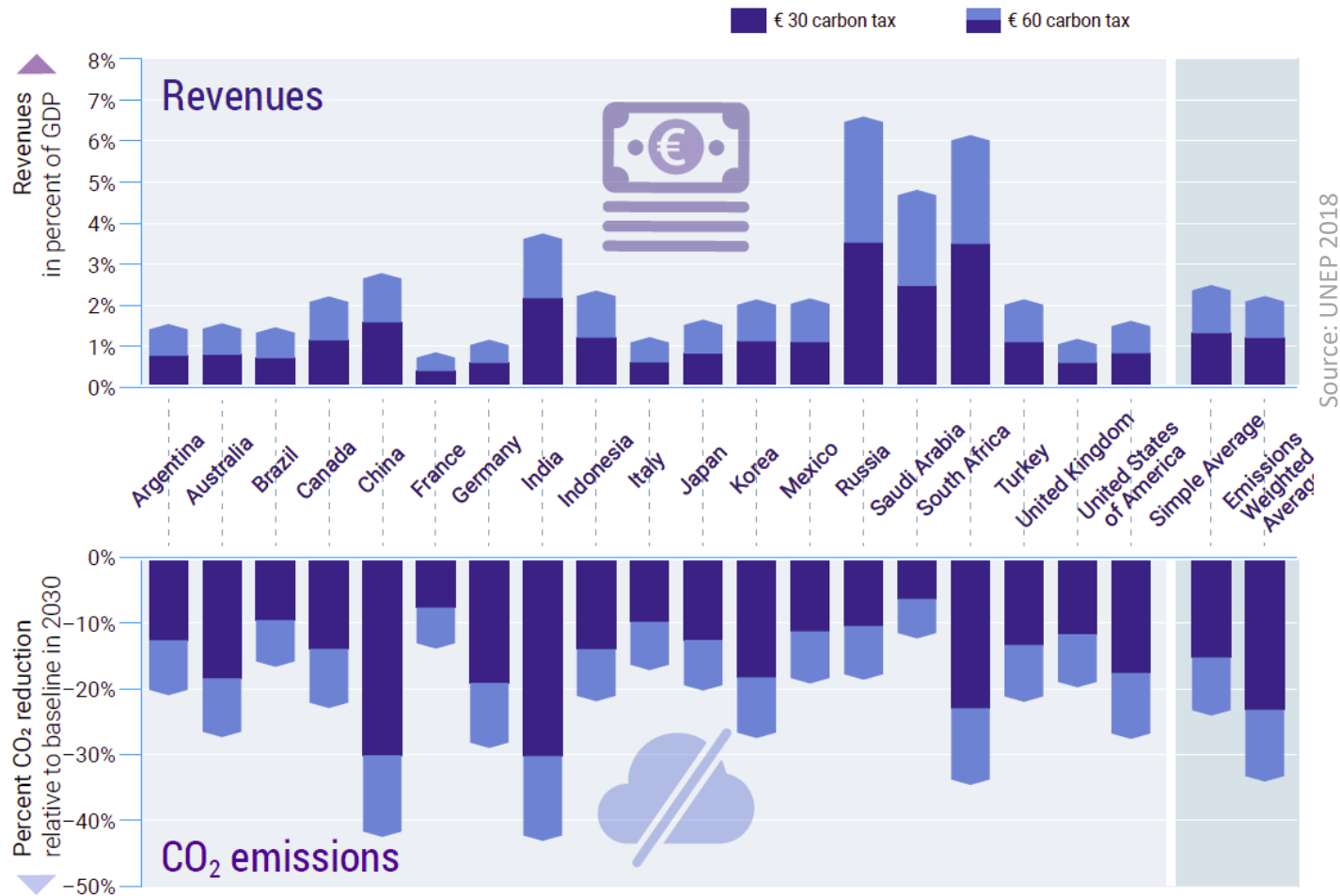- (→ cyclical understanding between facts and values)

Mattauch et al, 2015 / Creutzig et al, 2016

Most emissions are not covered by a price

Mostly in transport sector, reflecting non-climate externalities

Source: UNEP 2018

Effective Carbon Rate

€34 - 68 2020 Minimum carbon price range for the 2°C target

CO_2-emissions from energy use ▶

For almost **50%** of emissions, the effective carbon rate is zero.

Only about **10%** of emissions are priced at a level consistent with the 2°C target.

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CO$_2$ taxes lead to significant revenues

Source: UNEP 2018

Thank you!