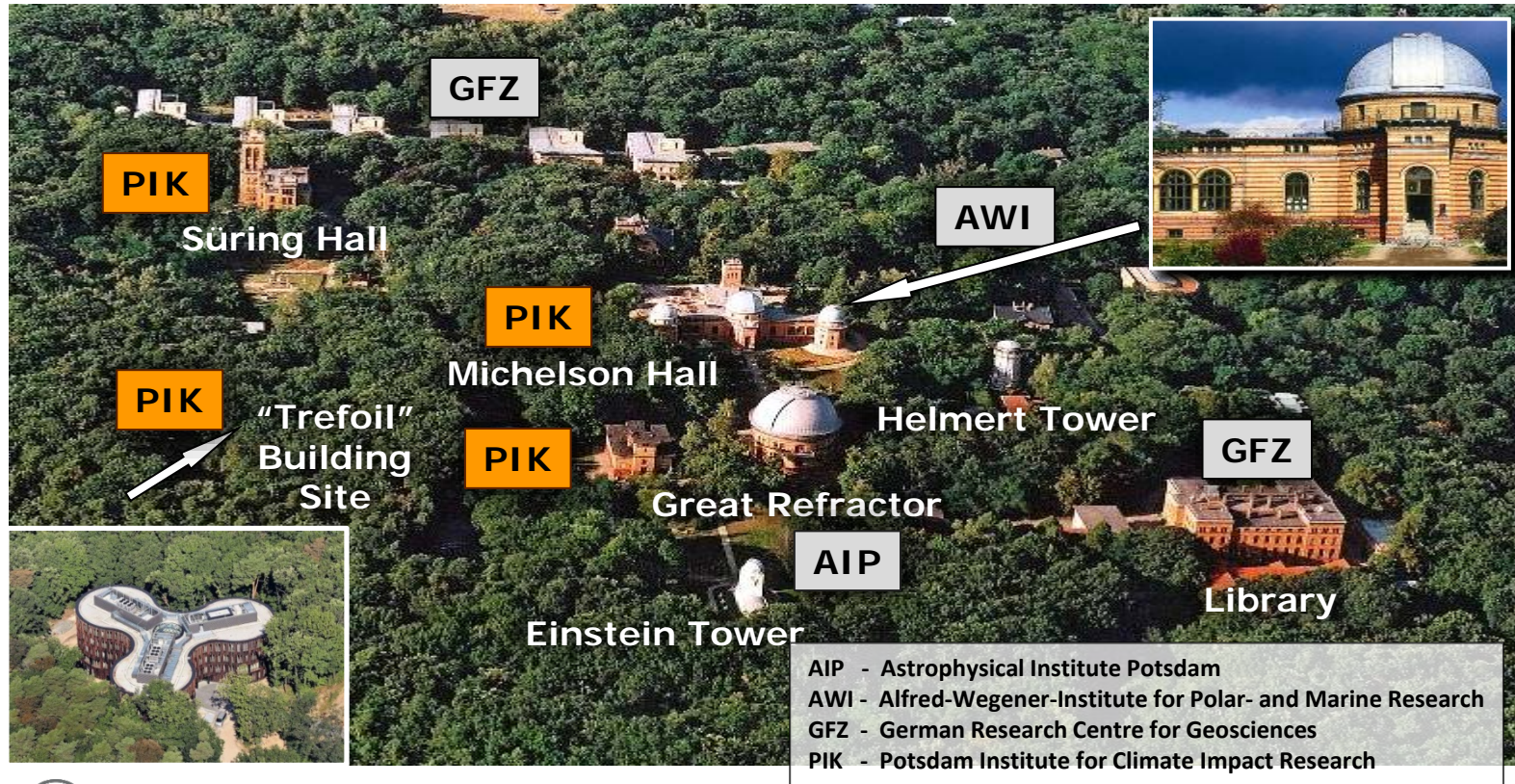


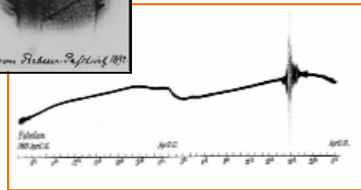
Science Park „Albert Einstein“ at Telegraph Hill



Telegraphenberg: Scientific Breakthroughs



Ernst von Rebeur-Paschwitz
1861-1895



1889 First Record of
Teleseismic Earthquake

Albert Einstein
1879-1955



1832/33 Opto-Mechanical
Telegraph Line Station
No. 4 Potsdam

First Solution of Einstein's Equations



Secular Station Potsdam



Reinhard Süring
1866-1950



Karl Schwarzschild
1873-1916



1904 Interstellar Matter
Large Refractor

Johannes Hartmann
1865-1936



Friedrich Robert Helmert
1843-1917



1870-1950 Potsdam Datum Point
Helmert Tower



1881 Michelson Experiment



Albert Abraham Michelson, 1852-1931

Archetypes of decarbonization pathways and climate policy entry points to raise ambition

Objective of the Symposium and Brief Overview of the PEP1p5 Project

Elmar Kriegler

PIK, 03 September 2018

Objective of the PEP1p5 Project

www.pik-potsdam.de/research/transformation-pathways/projects/pep1p5

Identify near term climate policy requirements of the 1.5°C goal

Bring together political economy considerations, national policy inventories and mitigation pathway modeling in the formulation of near-term policy packages towards the Paris climate goals

Synthesize insights on short-term entry points and 1.5-2°C pathways to get a holistic view on the interplay between the long-term goal and near-term action.

➔ **Provide critical information for the 6th Assessment Cycle of the IPCC and the UNFCCC process**



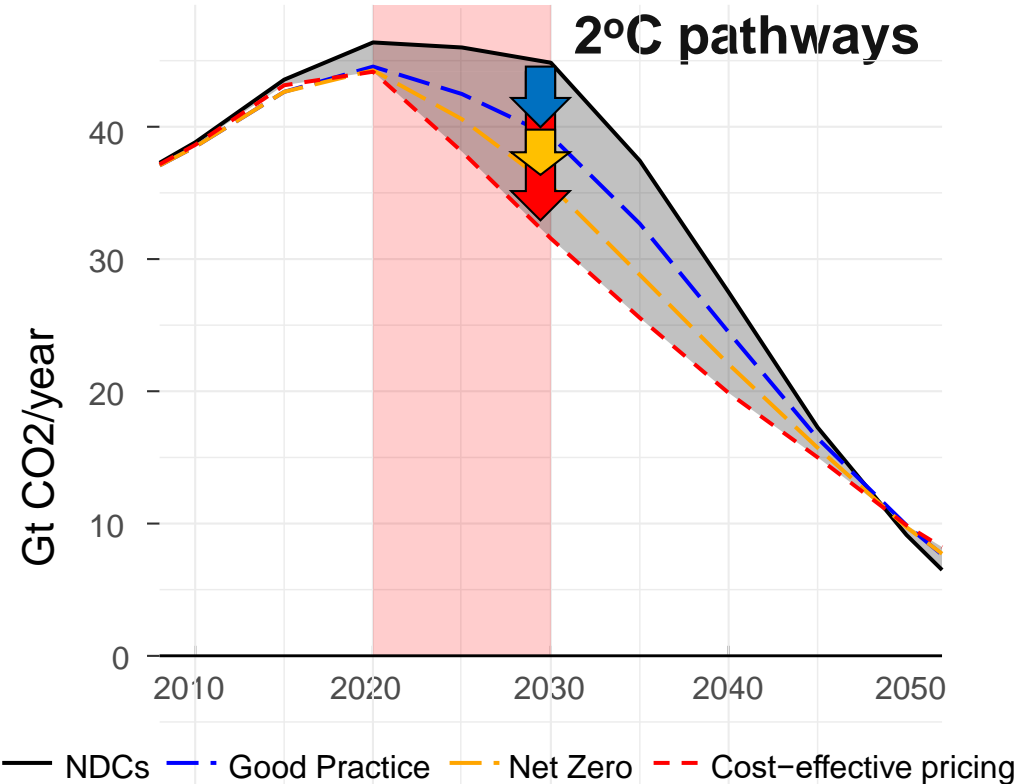
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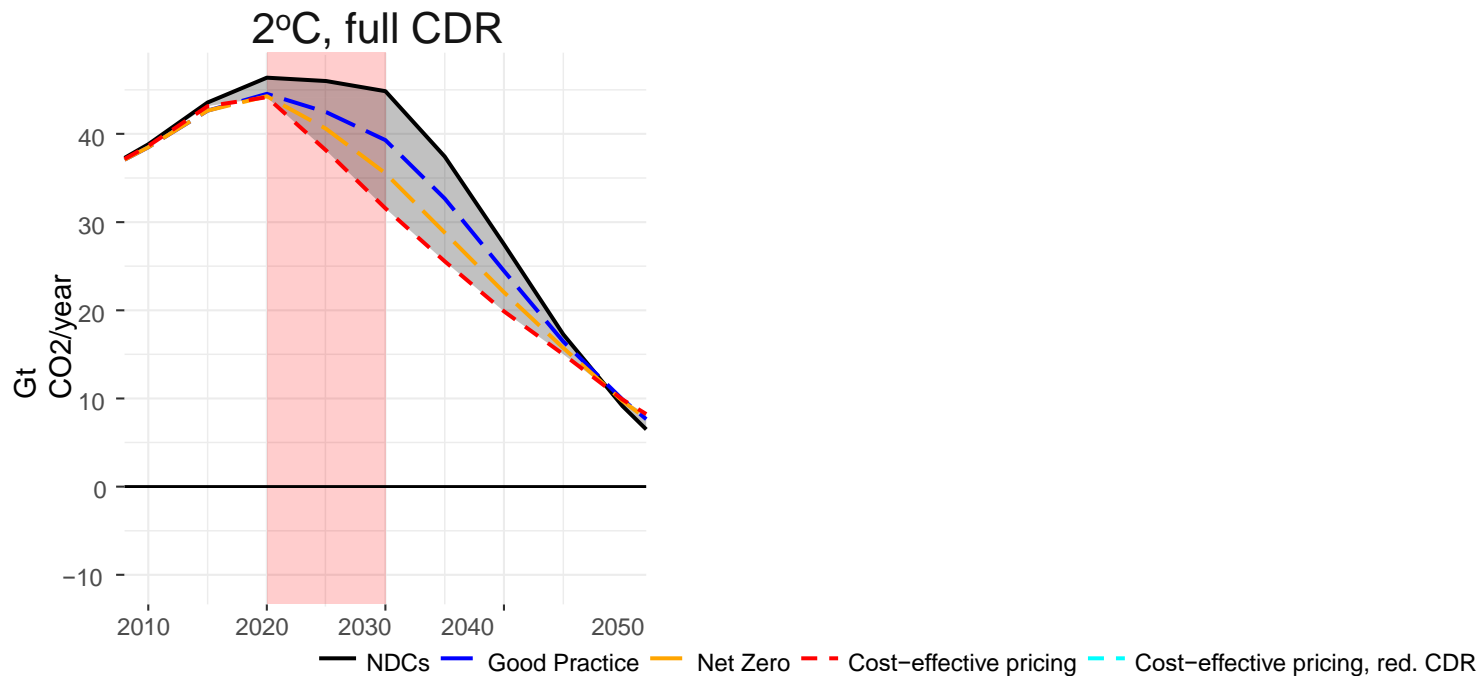


Entry points to 1.5-2°C pathways

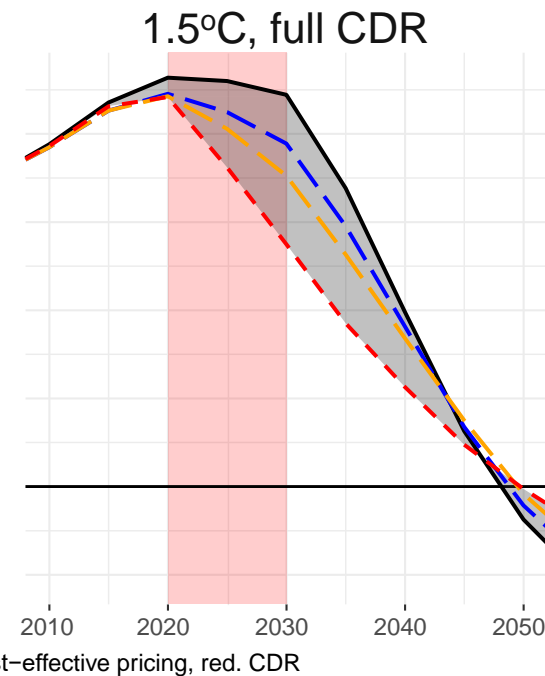
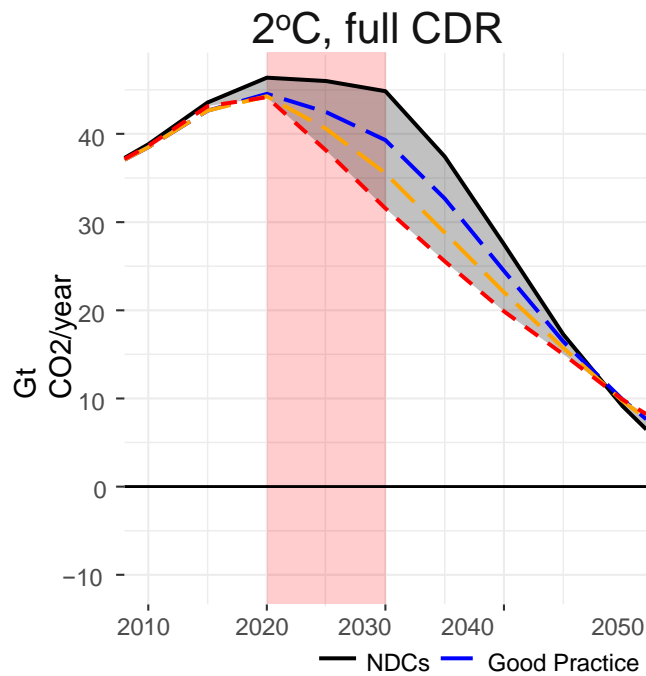
Global roll-out of good practice policies

- Renewable energy quotas
- Restrictions on new coal and gas power plants w/o CCS
- Energy efficiency improvements in industry and buildings
- Upscaling of industry CCS
- Fuel efficiency improvements in road transport and aviation
- Increase of electric vehicle share
- More efficient use of nitrogen in agriculture
- Eliminating deforestation and 10 mio ha/yr afforestation
- Moderate carbon pricing

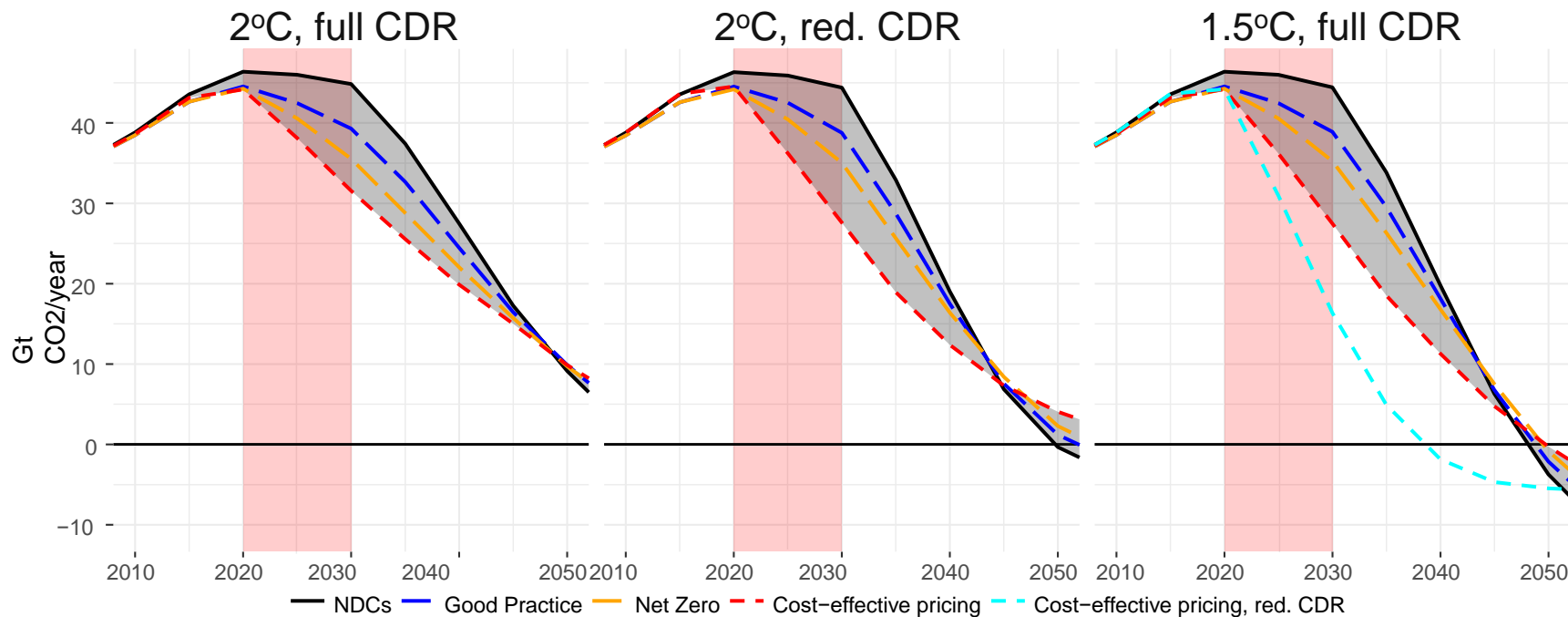




	NDCs	Good practice	Net zero	Cost-effective
2°C full CDR	194	175	162	155



	NDCs	Good practice	Net zero	Cost-effective
2°C full CDR	194	175	162	155
1.5°C full CDR	412	376	327	272



	NDCs	Good practice	Net zero	Cost-effective
2°C full CDR	194	175	162	155
2°C red. CDR	636	501	423	278
1.5°C full CDR	412	376	327	272
1.5°C red. CDR	-	-	-	1056

Implementability dimensions

Disruptiveness

Price hikes, losses to incumbents, short-term employment and growth impacts

Speed

Transition speed may exceed societal and institutional change capacity

Scale

Transition scale may test institutional management capacity

Distributional impacts

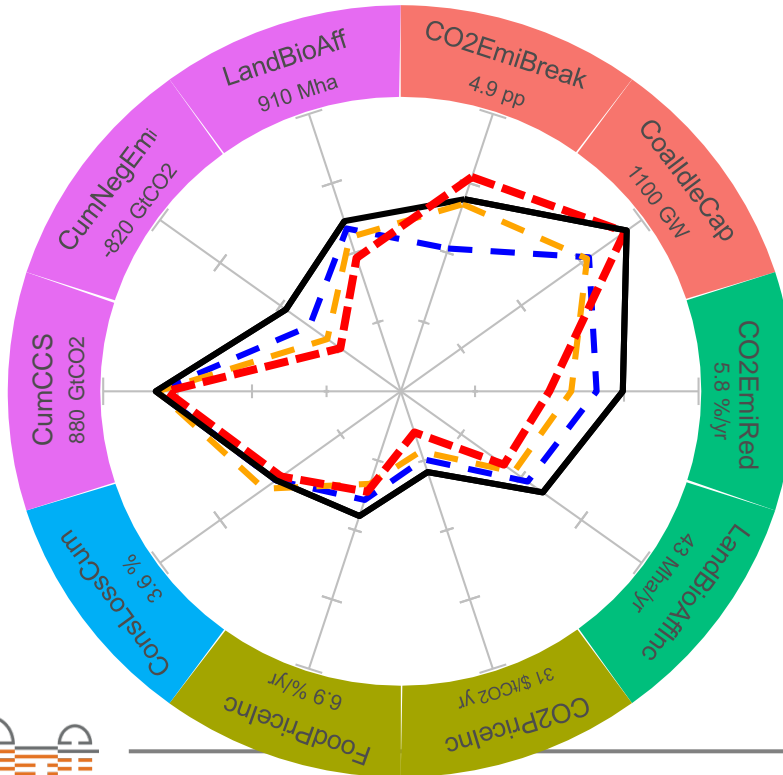
Magnitude of winners and losers may challenge compensation / re-distribution capacity of existing institutions

Efficiency

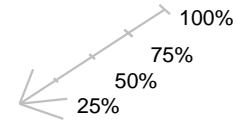
 Perceived high economic costs may dissuade society to undertake transition

Implementability indicators across scenarios

2°C, full CDR

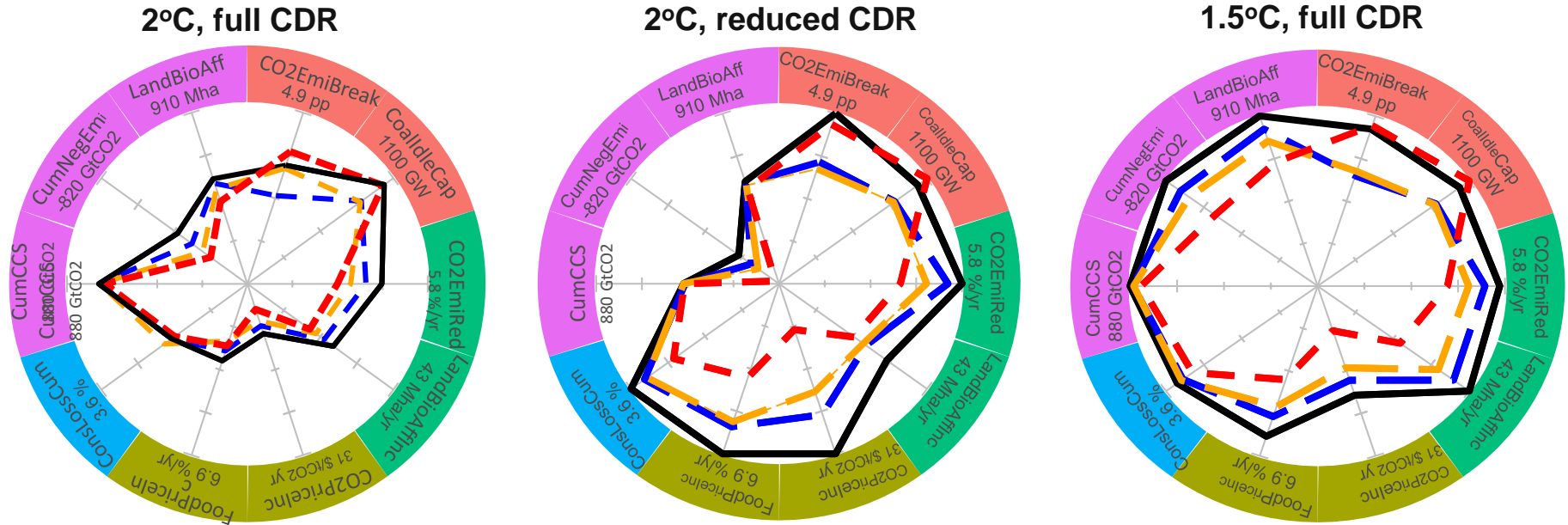


- NDCs
- - Good Practice
- - Net Zero
- - Cost-effective pricing



- Disruption
- Price Increases
- Speed
- Efficiency
- Scale

Implementability indicators across scenarios



Conclusions

- IAMs increasingly describe policy packages, but deep mitigation pathways require „scenarios“ for strengthened near-term packages
- Pathway „feasibility assessment“ can be informed by political economy considerations. More research on good indicators needed.
- The entry point / bridging nature of regulatory policies needs to be further explored. How do they tie to political economy („feasibility“) and sustainable development („desirability considerations“)

Workshop The Political Economy of Climate Change Mitigation Pathways”
organised by PEP1p5 in November 2018

www.pik-potsdam.de/research/transformation-pathways/projects/pep1p5/workshop

Objective of the Symposium

Window of opportunity for climate policy?

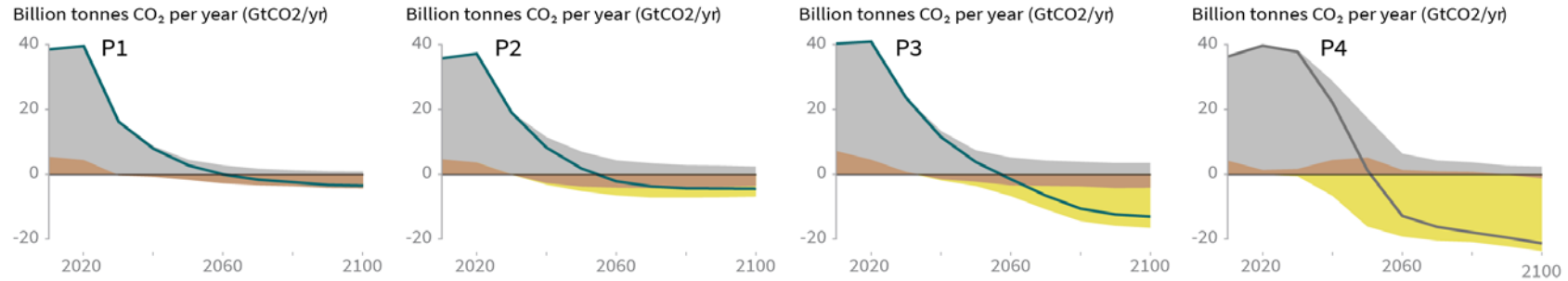
- UN climate action summit (Sep 2019), Update of NDCs for 2020
 - Fridays for Future; Greater awareness about climate change threat in some countries
 - Visible impacts of global warming
 - Countries adopting mid century strategies, some aiming for net zero targets
- ➔ What can we say or write to inform these developments?
- ➔ How can we inform the IPCC AR6?

Elements of entry points

1. **Get going:** Exploiting opportunities, Overcoming barriers, Spurring Innovation
2. **Get coordinated:** Actors, Sectors, Countries and Regions
3. **Scale it up:** Investment, Adoption, Alignment
4. **Take everybody along:** Fair transition, Compensation of Losses,
Offering new perspectives, Reaching multiple goals

Illustrative pathways for assessment and informing decision making (e.g. climate policy makers, finance sector)

● Fossil fuel and industry ● AFOLU ● BECCS












- Feasibility
- Desirability
- Highlight alternative courses of action

Desired outcomes of the Symposium

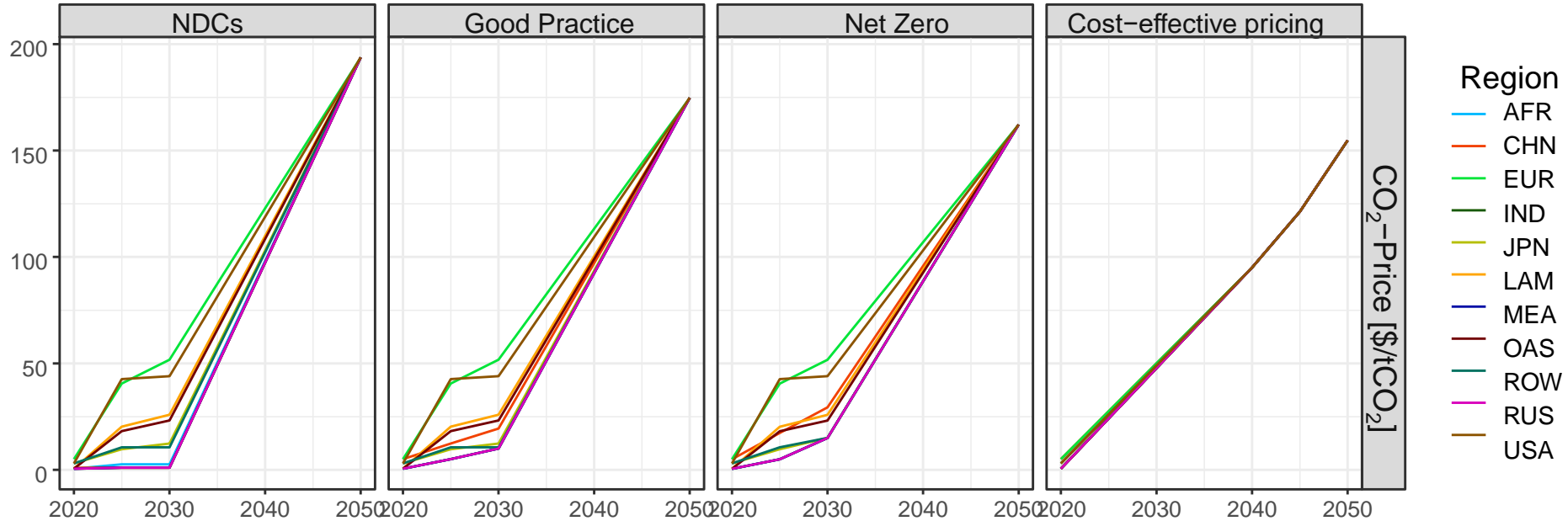
- Minimum: Develop critical insights for AR6 assessment
- Communicate critical insights to climate policy process 2019-2020
- Develop a Perspective Article?

Discussion

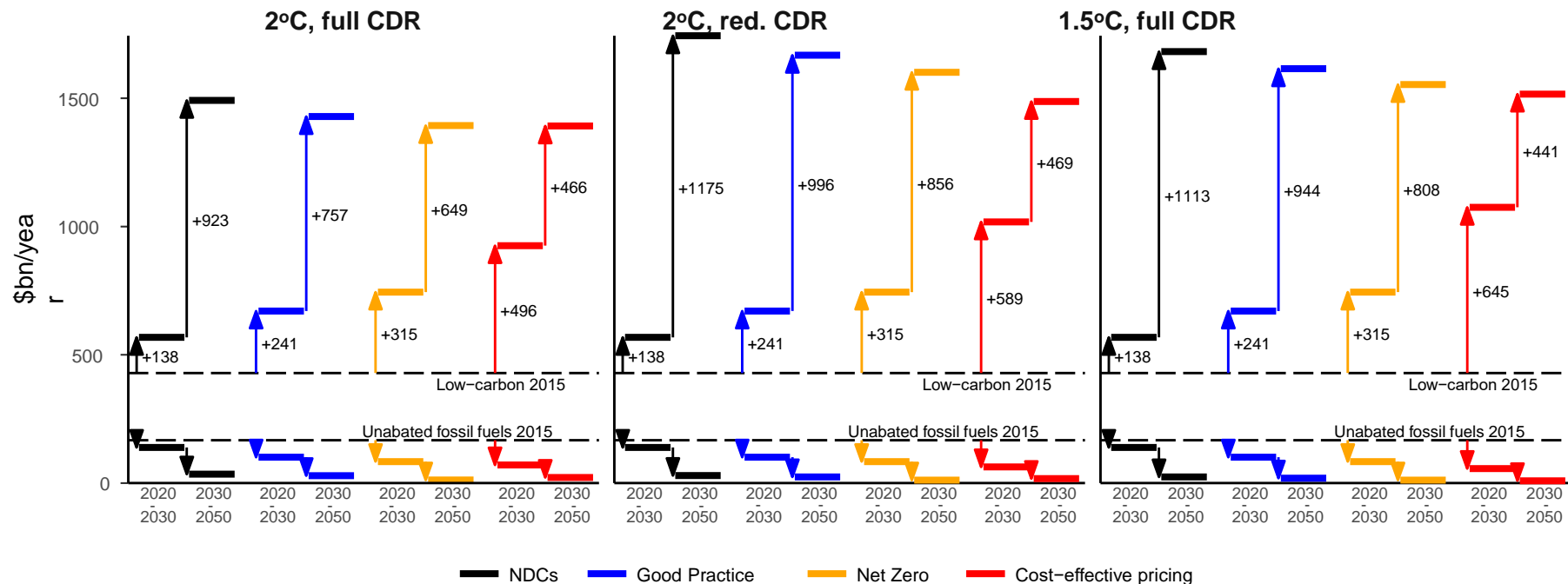
Regulatory Policy Scenarios analyzed in Kriegler et al.

Sector	Current level	Good practice value (-2030)	Net-zero value (-2030)
 Energy supply: renewables	0.45 %-point/yr share increase	1.25-1.45 %-point/yr share increase	same as good practice
 Energy supply: fossil fuel-fired power	270 GW coal power under construction	No new unabated coal power plants after 2022-2032 (→123 GW 2020-2030 new installations)	No new unabated coal after 2017-2022; no new unabated gas after 2022-2032 (→24 GW 2020-2030)
 Industry	Approx. 1%/yr EE improvement; No full scale commercial CCS	0.5%/yr additional EE improvement (→9% reduction); Approx. 200 MtCO ₂ /yr CCS in industry.	0.5%/yr additional EE improvement (→9% reduction in 2030); Approx. 500 MtCO ₂ /yr CCS in industry.
 Buildings	1%/yr retrofit; Approx. 1%/yr EE improvement for appliances and lighting	1.5-2.1%/yr retrofit; new buildings on average near zero energy by 2020-30; 0.5%/yr additional EE for appliances and lighting; (→13% reduction)	3%/yr retrofit; new buildings on average near zero energy by 2020-25; 0.5%/yr additional EE for appliances and lighting; lighting (→20% reduction)
 Passenger transport; freight transport;	EV share in new sales: <1%; LDV fuel economy: 20 km/l (Japan, 2013, test mode);	20-30% EV share in new sales; 38 km/l for new LDVs; strengthened new freight vehicle fuel efficiency;	65-75% EV share in new sales; Fuel efficiency as good practice;
 International shipping and aviation	1.4%/yr increase in bunker CO ₂ emissions	Aviation EE improvement up to 2%/yr by 2020, cap emissions at a max of 2020 values for years >2020 (→13% reduction)	2.6%/yr aviation EE improvement and scale-up of biofuels use (→22% reduction)
 Agriculture	Aerobic digester adoption: 10%; N ₂ use efficiency: 52%	30% adoption of anaerobic digesters; 10%-point increase of N ₂ use efficiency	same as good practice
 Forestry and land use	6 million ha/yr net forest loss	End natural forest loss; 10 million ha/yr afforestation	same as good practice
 Carbon pricing	Low to moderate carbon pricing in a few regions	at least 5\$/t CO ₂ in 2025, increase at 1\$/year (higher for countries with existing carbon pricing) (→average price in 2030 at 22\$)	at least 5\$/tCO ₂ in 2025, increase at 2\$/year (higher for countries with existing carbon pricing) (→average price in 2030 at 27\$)

Regional carbon price convergence



Average annual power generation investments (2020-2030 and 2030-2050)



Average Emission Growth/Reduction Rates

