CLIMATE ANALYTICS

Reducing climate risk
Paris Agreement implications for decarbonization

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Content

- Update on climate-change impacts & risks
- Global emissions pathways compatible with Paris Agreement
- NDC comparison across countries globally
- EU and Member State pathways

Significant differences in impacts between 1.5°C and 2°C

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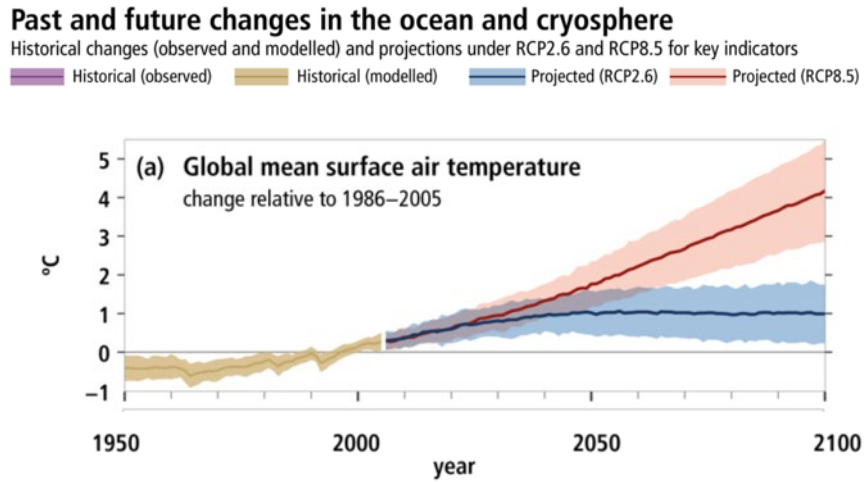
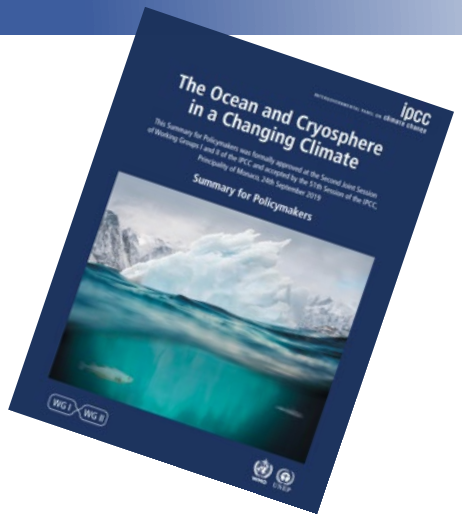
	1.5° C WORLD	2° C WORLD
HEATWAVES		
Tropics	~ 2 months	~ 3 months
ANNUAL WATER AVAILABILITY		
Central America	20% reduction	30% reduction
EXTREME PRECIPITATION		
South East Asia	7% increase	10% increase
SEA LEVEL RISE BY 2100		
Small Islands in the South Pacific and Caribbean and South East Asia	40 cm	50 cm

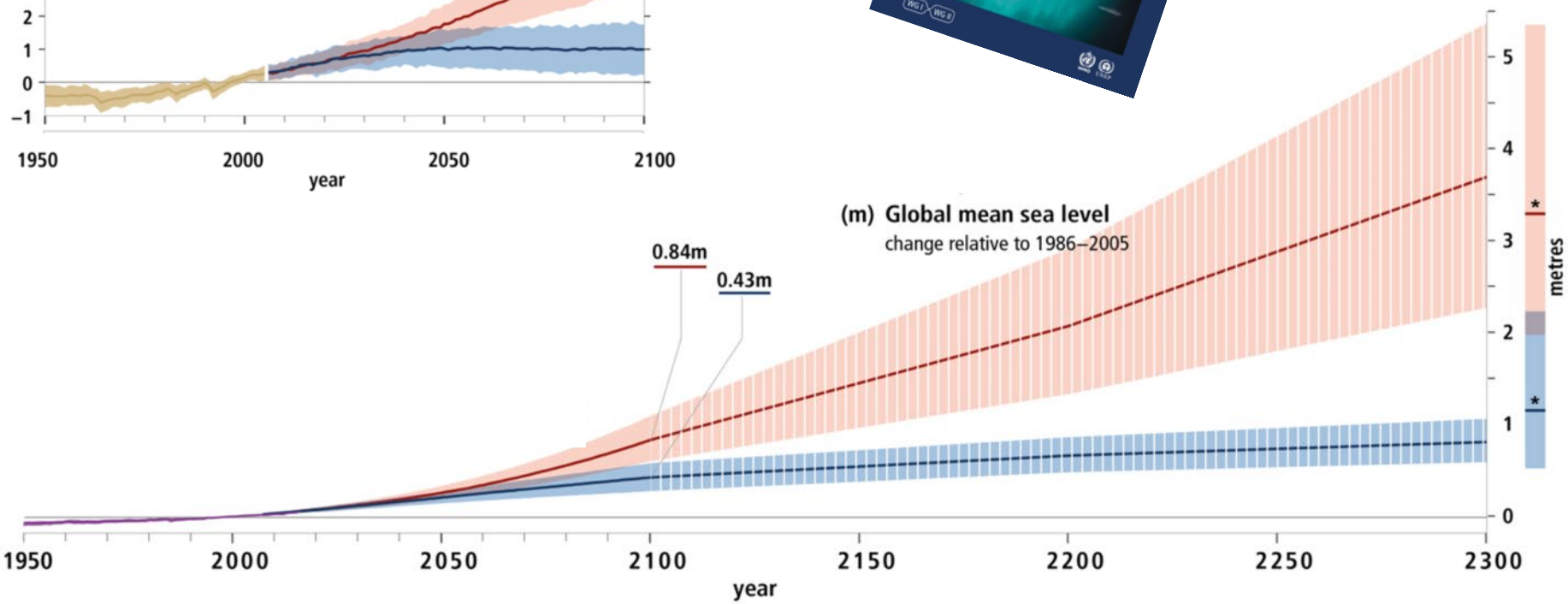
	1.5° C WORLD	2° C WORLD
WHEAT YIELDS - RISK OF REDUCTIONS UP TO		
West Africa	45% reduction	60% reduction
East Africa	25% reduction	35% reduction
Central America	25% reduction	40% reduction
OCEAN ACIDIFICATION AND CORAL REEF LOSS		
Small Islands in the South Pacific and Caribbean and South East Asia	90% reduction [50;99]	98% reduction [86;100]

Schleussner et al (2016)

Sea level rise – Multiple meters is plausible

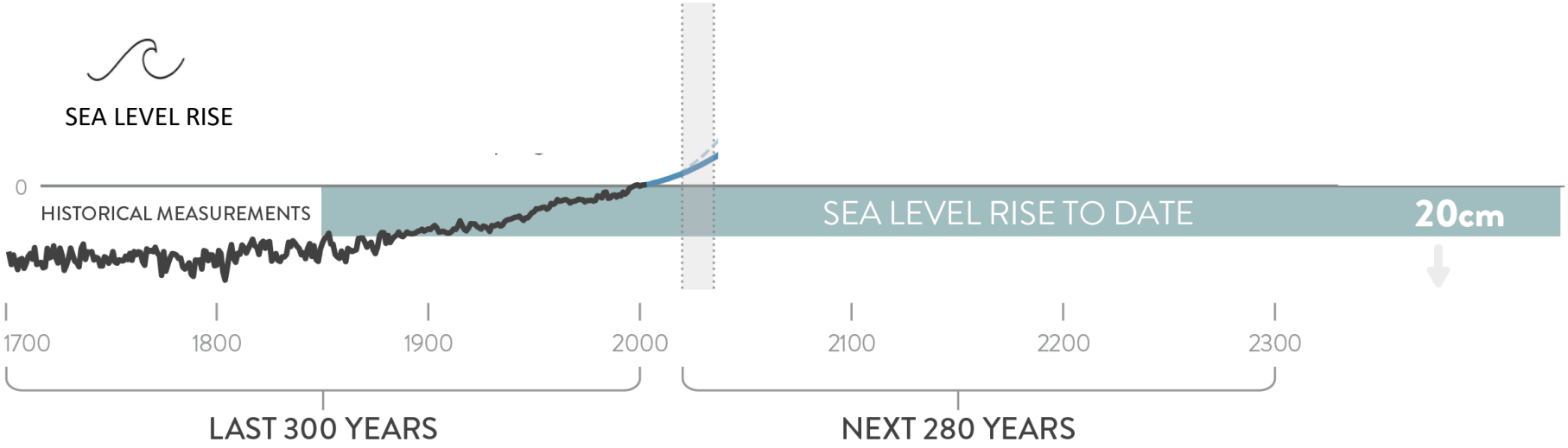






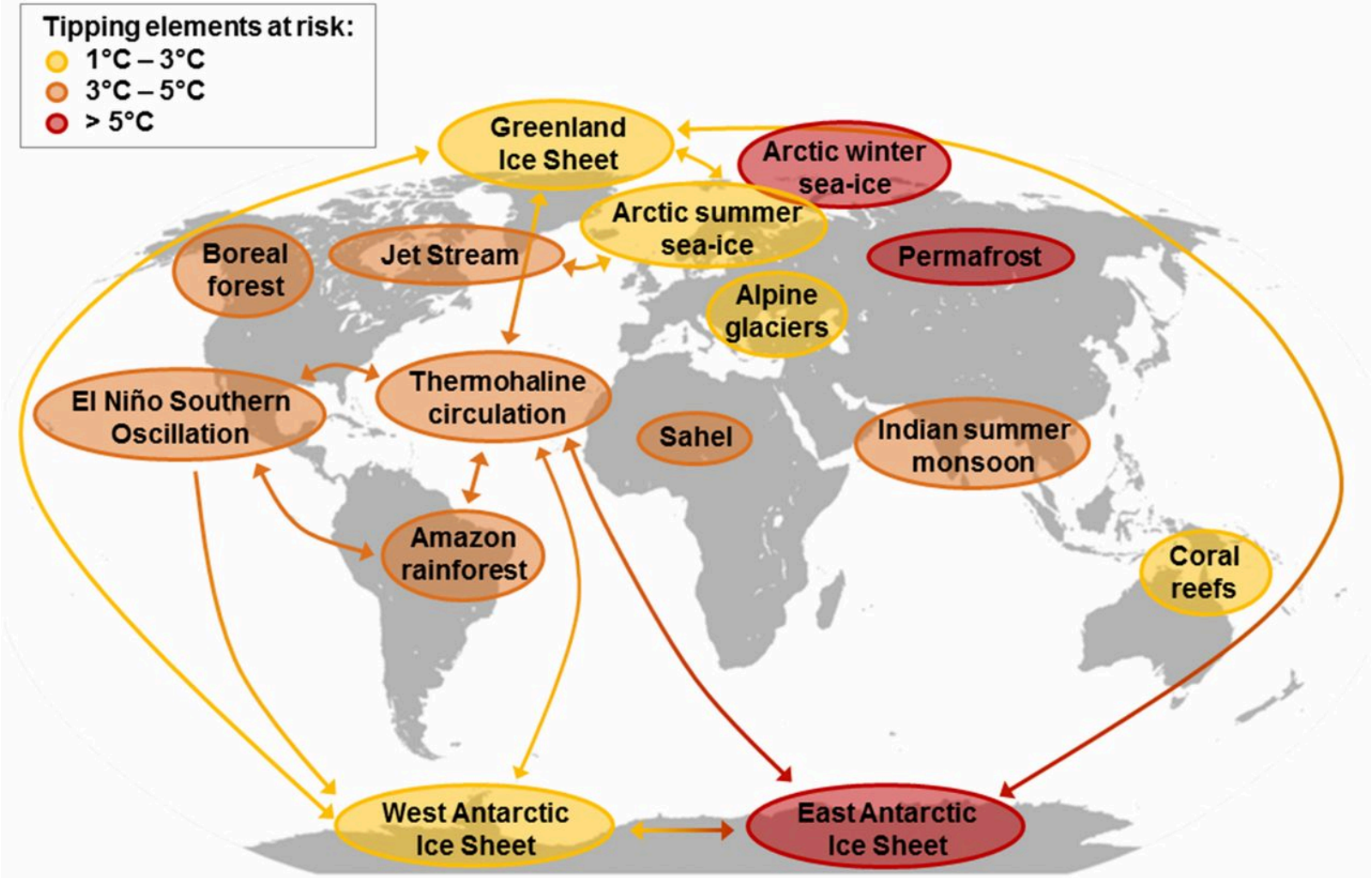
IPCC SROCC

Sea level rise – our legacy for future generations



SOURCE Committed sea-level rise under the Paris Agreement and the legacy of delayed mitigation action - *Mengel et. al. 2018* - Nature Communications

Tipping elements in the Earth system – the big unknowns that matter a lot



- Tipping elements have the potential to trigger self-reinforcing feedbacks once a specific threshold is crossed, bringing unstoppable additional warming
- Where these thresholds lie, however, is not well known

Steffen et al. (2018)

Ocean acidification key threat for "calcifying" organisms (like corals, clams, mussels, sea urchins, barnacles and certain microscopic plankton)

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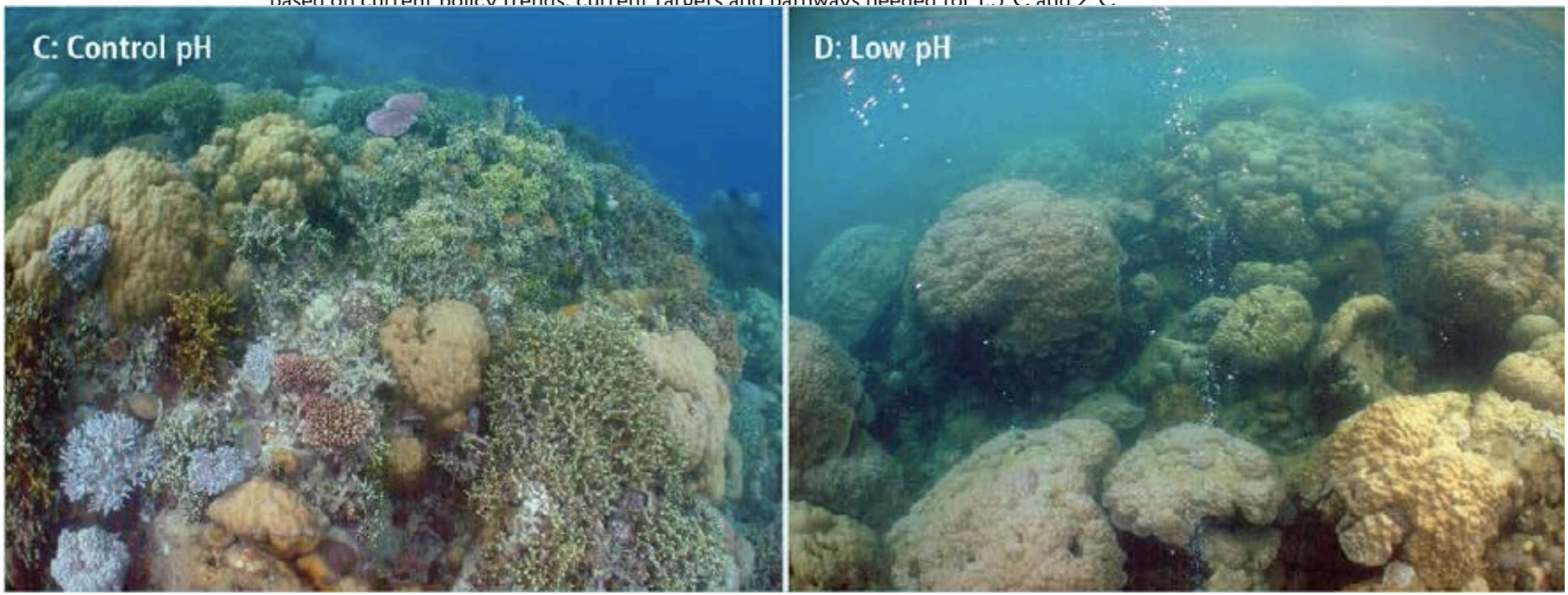
GLOBAL MEAN OCEAN ACIDIFICATION PROJECTIONS TO 2100

based on current policy trends, current targets and pathways needed for 1.5°C and 2°C



7.80

2010 2020 2030 2040 2050 2060 2070 2080 2090 2100

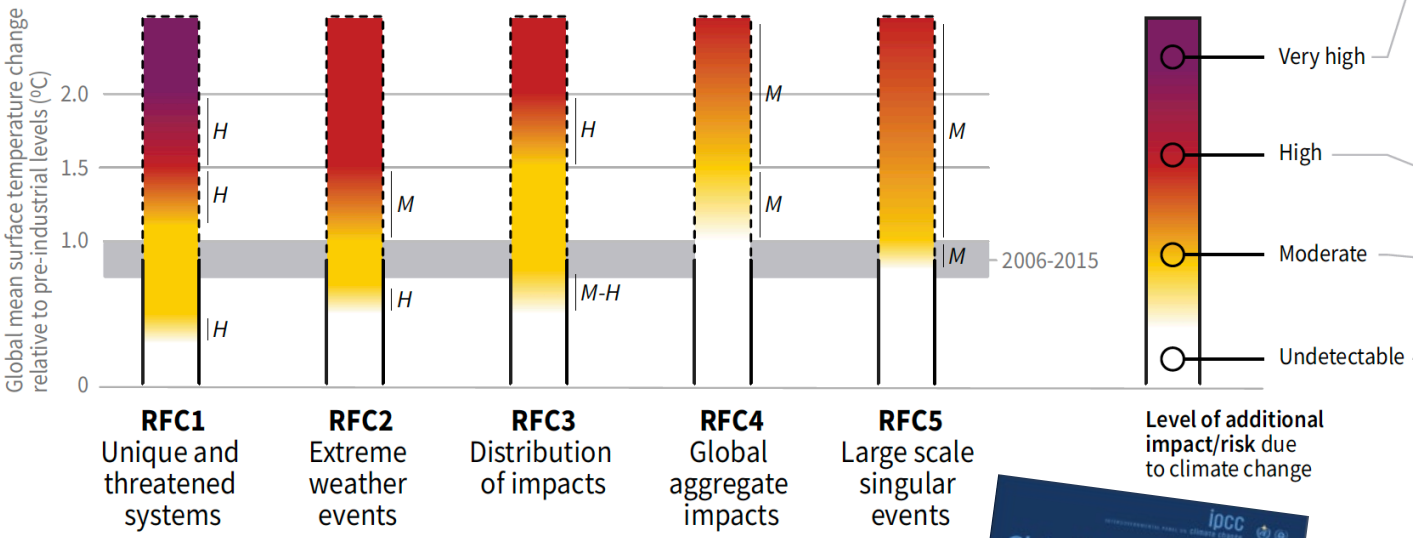
- Ocean acidification is a key threat for "calcifying" organisms, such as corals, clams, mussels, sea urchins, barnacles and certain microscopic plankton
- Absorption of CO_2 from the atmosphere in the oceans leads to acidification (lower pH) and to growth inhibition, deteriorating health and at some point dissolving
- Reductions in CO_2 emissions required to limit warming to 1.5°C will lead to ocean acidification peaking and declining

Climate Analytics (2019)

Reasons For Concern (RFC) – rapid increase with warming

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)



Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.

Red indicates severe and widespread impacts/risks.

Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.

White indicates that no impacts are detectable and attributable to climate change.

IPCC SR1.5

Reasons For Concern (RFC)
IPCC AR5 (2014) compared to SR1.5 (2018)

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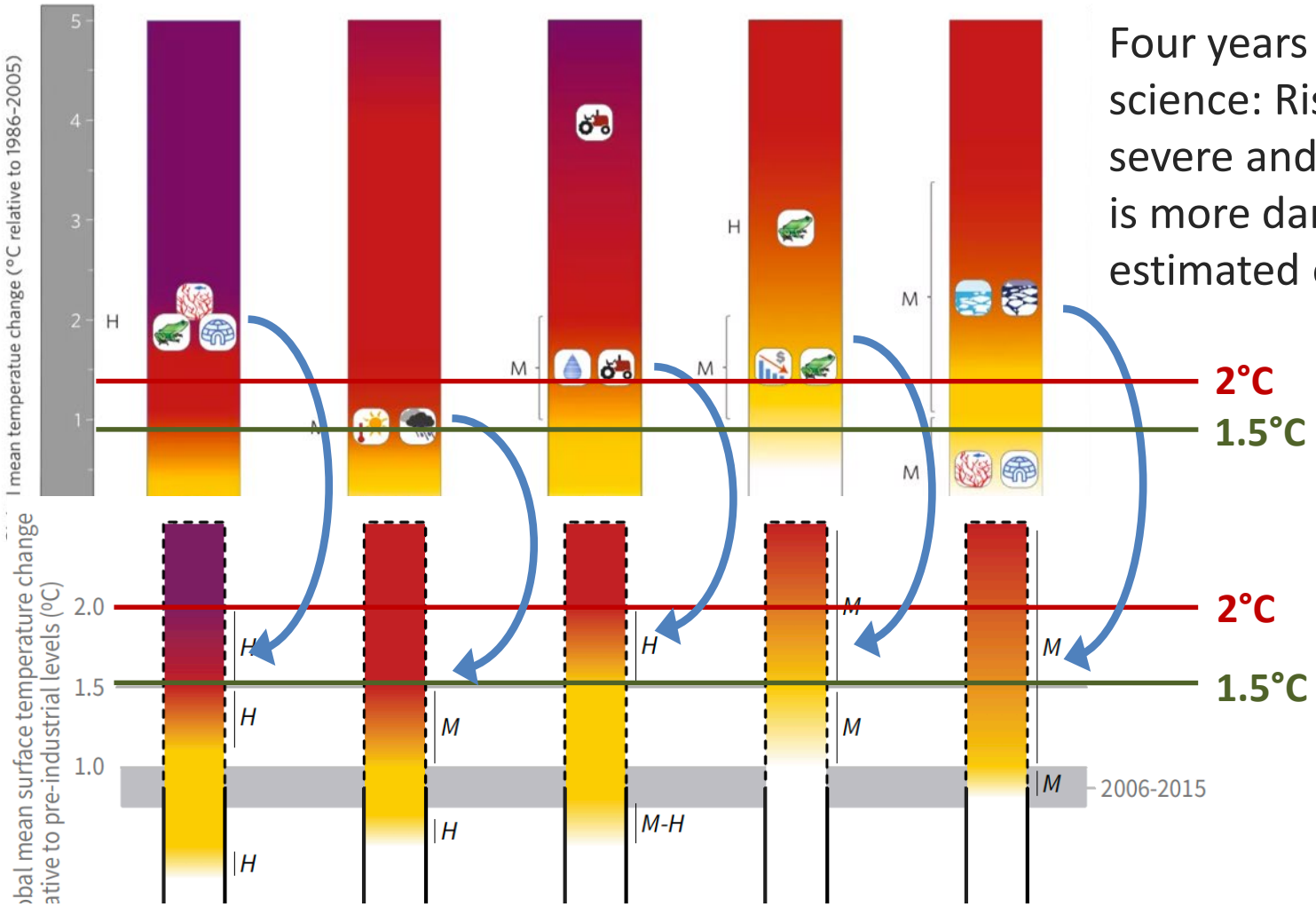

Four years of additional science: Risks are more severe and climate change is more dangerous than estimated earlier

In "Unique and Threatened Systems" (RFC1) the transition from high to very high risk is located between 1.5°C and 2°C global warming as opposed to at 2.6°C global warming in AR5, owing to new and multiple lines of evidence for changing risks for coral reefs, the Arctic, and biodiversity in general (*high confidence*) {3.5}.

IPCC AR5 & SR1.5

IMPACTS – vulnerable populations – very big difference between 1.5ºC and 2ºC

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B5.1. Populations at disproportionately higher risk of adverse consequences of global warming of 1.5°C and beyond include disadvantaged and vulnerable populations, some indigenous peoples, and local comm
disproporti
states, and
increase in
compared
susceptible
3.4.11, Bo
Chapter Box 12 in Chapter 5, 4.2.2.2, 5.2.1, 5.2.2, 5.2.3, 5.6.3}

Limiting global warming to 1.5°C, compared with 2°C, could reduce the number of people both exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050 (medium confidence).

SIDS and communities dependent on **coastal livelihoods** at **disproportionately higher risk**

IPCC SR1.5

Paris Agreement Pathway Benchmarks in context of 1.5°C pathways in IPCC SR1.5

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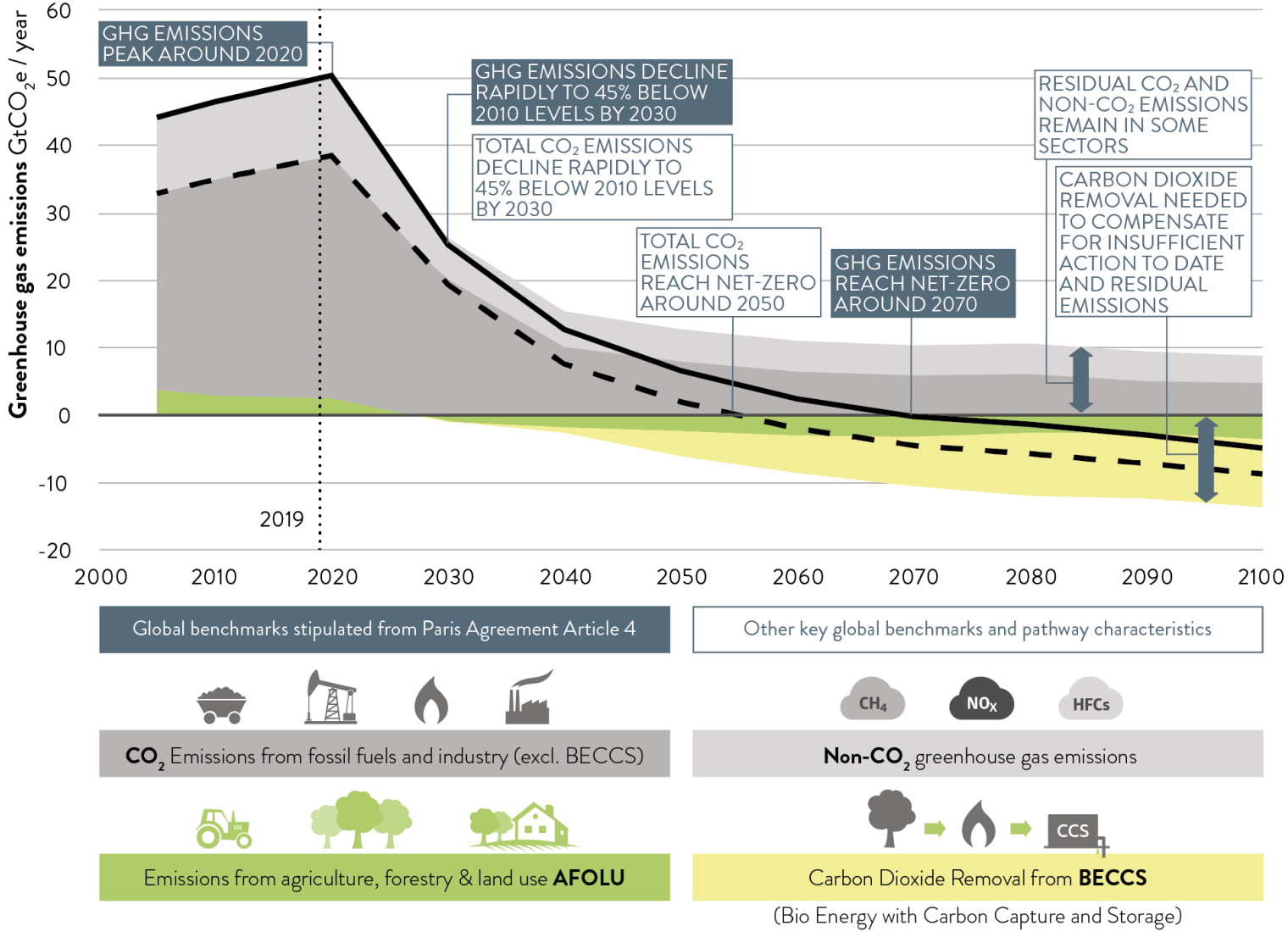
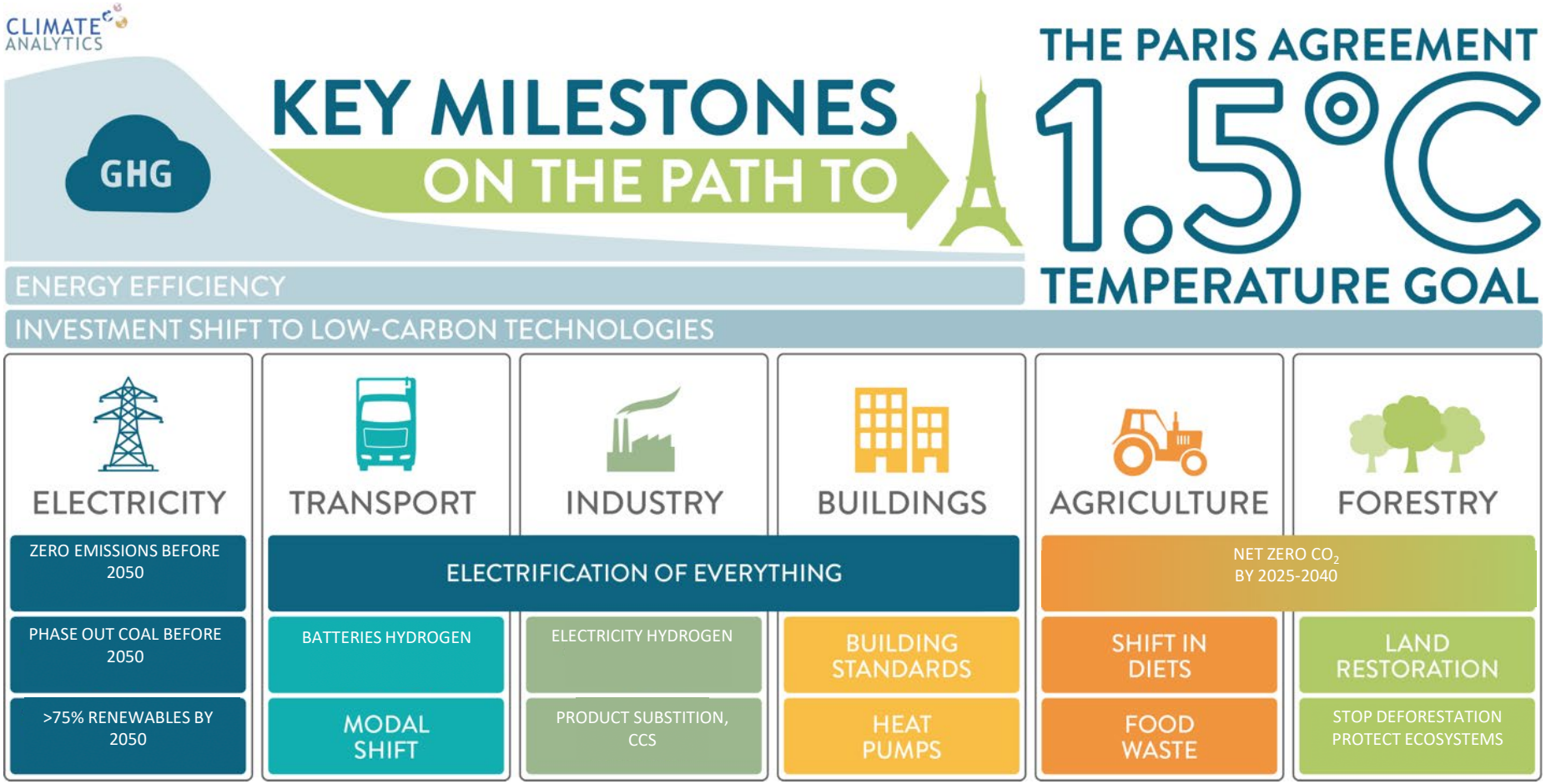
PEAK AND RAPID DECLINE TO BELOW NET-ZERO

What the UN Intergovernmental Panel on Climate Change Special Report on 1.5°C tells us about global pathways to achieve Paris Agreement 1.5°C temperature goal that take into account sustainability goals



Source: Climate Analytics (2019); IPCC (2018)

1.5°C transformation requires action in all sectors

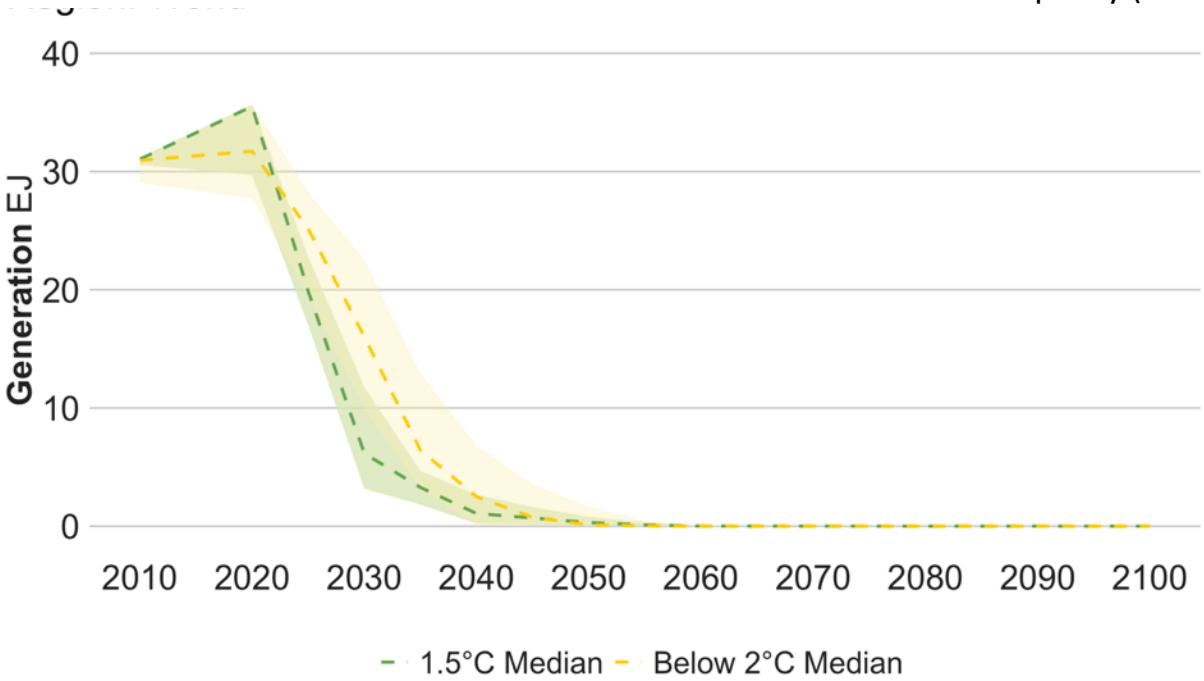


- With full transformation of energy-related sectors still strong push needed in land sectors
- **Investment** in low-carbon energy technologies and energy efficiency needs to be **increased by factor 6** by 2050 – Global annual investments in low-carbon energy technologies **overtake fossil investments already by around 2025**

Source: Climate Analytics (2019); IPCC (2018)

Unabated coal in power sector needs to disappear globally by 2040

Global Electricity Generation from Coal (w/o CCS) in IPCC SR1.5 scenarios



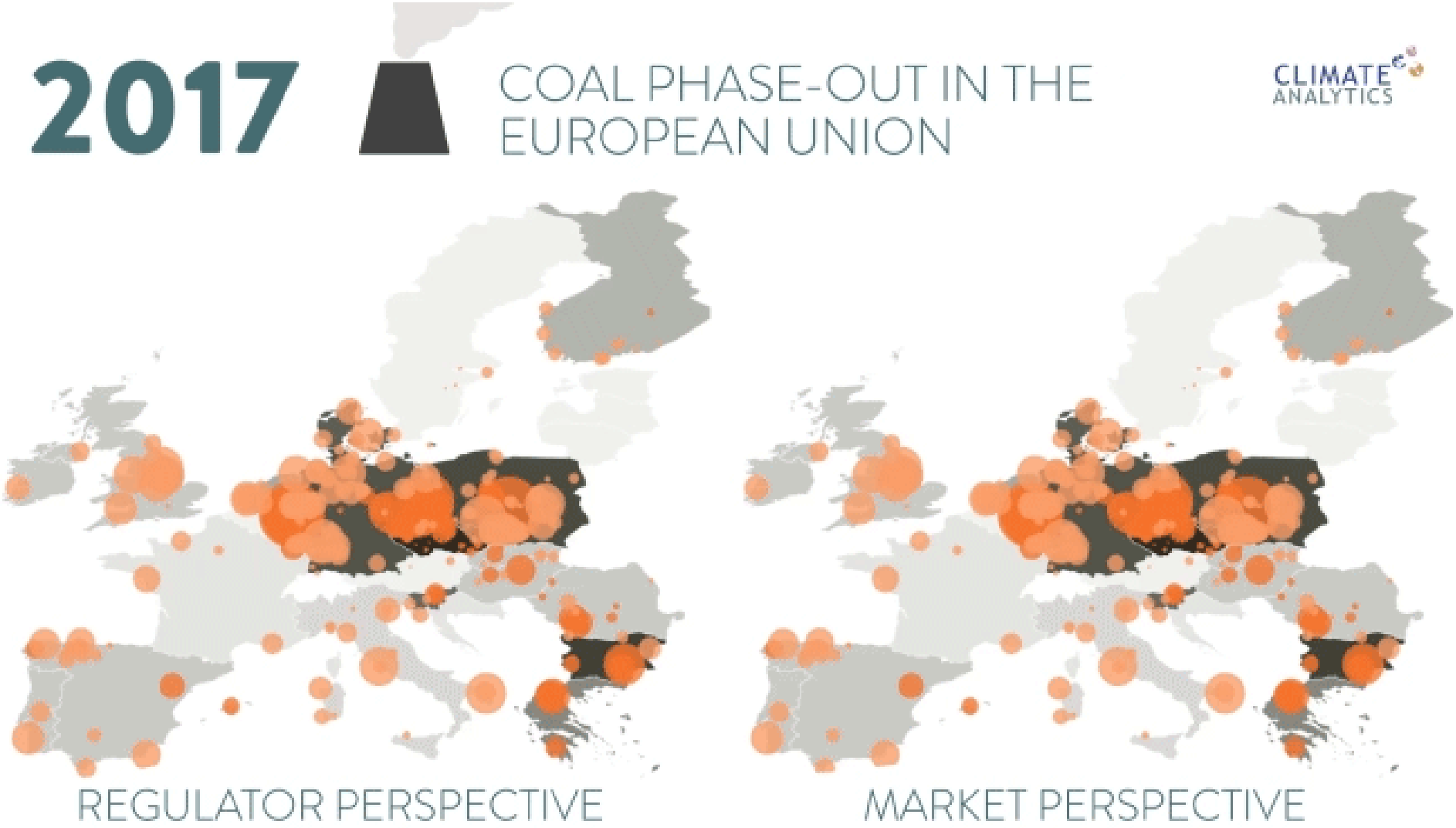
Source: Pathways from Huppmann et al.(2019) filtered with sustainability criteria

Climate Analytics: Science-Based Policy to Prevent Dangerous Climate Change

Planned additional coal capacity (MW)

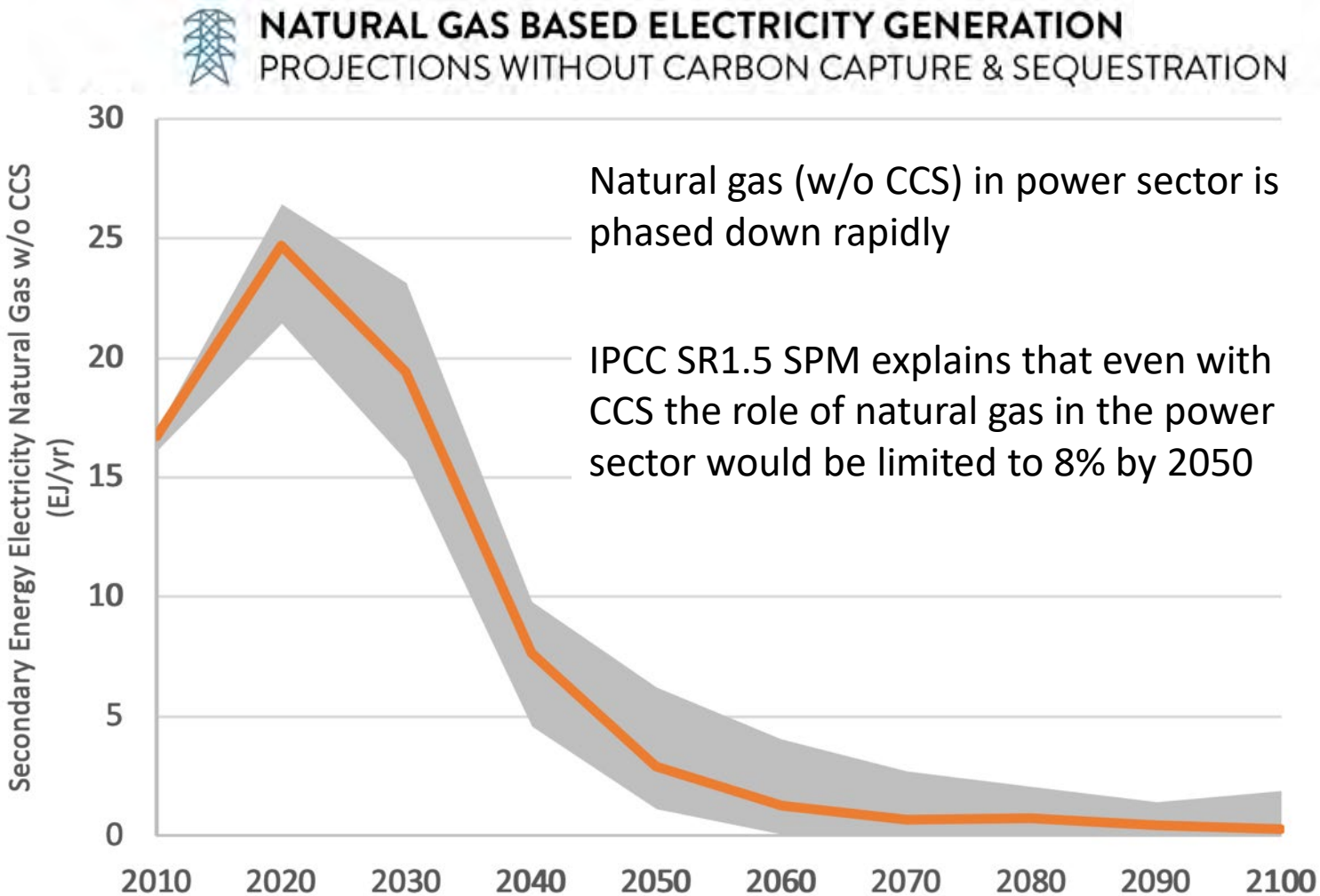
Country	Sum of Total current	Sum of Total planned	Expansion (%)
China	1,108,709	74,229	7%
Turkey	19,673	28,045	143%
Vietnam	27,237	11,670	43%
Indonesia	42,084	11,610	28%
South Africa	46,205	7,180	16%
Mongolia	1,666	6,930	416%
Russia	47,833	4,525	9%
Philippines	11,165	4,504	40%
Japan	54,226	4,412	8%
Bosnia & Her	2,073	4,080	197%
Poland	33,240	3,600	11%
Zimbabwe	1,620	3,590	222%
Brazil	3,149	2,268	72%
Serbia	4,405	2,100	48%
South Korea	42,760	2,100	5%
Cambodia	655	2,000	305%
Botswana	732	1,950	266%
Colombia	1,643	1,575	96%
Thailand	6,226	1,255	20%
Zambia	330	940	285%

Movie: possible EU coal phase-out schedules



Source: Climate Analytics (2017)

1.5°C pathways: natural gas for electricity generation will also need to be phased out



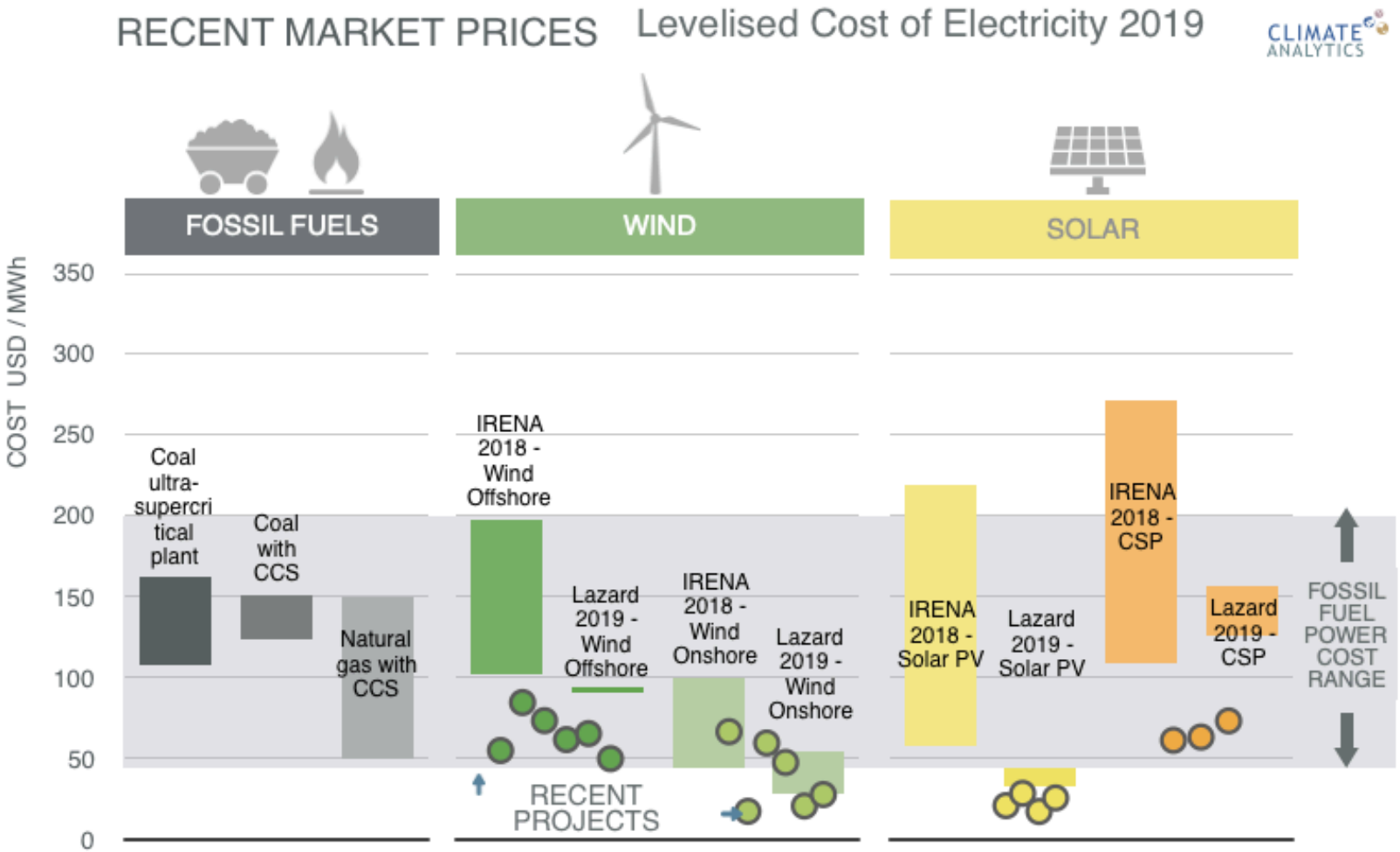
Natural gas (w/o CCS) in power sector is phased down rapidly

IPCC SR1.5 SPM explains that even with CCS the role of natural gas in the power sector would be limited to 8% by 2050

Median and 50% range of no- and limited OS 1.5°C pathways from public IPCC SR1.5 scenario database

Source: Climate Analytics (2019)

Large potential to speed up action in the power sector



Renewable energy technologies are **cost-competitive** with **new fossil fuel plants** and large parts of the **operating fleet** in many places

Source: Climate Analytics compilation based on Lazard's Levelized Cost of Energy Analysis, Version 12, IRENA's Renewable Power Generation Costs in 2018, and numerous sources for individual recent projects

Individual countries: vast majority of countries has targets insufficient to achieve PA goals

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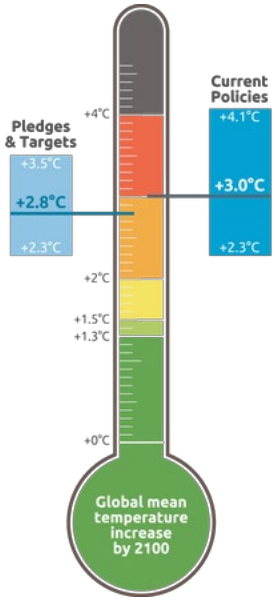
CRITICALLY INSUFFICIENT	HIGHLY INSUFFICIENT	INSUFFICIENT	2°C COMPATIBLE	1.5°C PARIS AGREEMENT COMPATIBLE
4°C+ WORLD	*< 4°C WORLD*	*< 3°C WORLD*	*< 2°C WORLD*	*< 1.5°C WORLD*
RUSSIAN FEDERATION	ARGENTINA	AUSTRALIA	BHUTAN	MOROCCO
SAUDI ARABIA	CHILE	BRAZIL	COSTA RICA	THE GAMBIA
TURKEY	CHINA	CANADA	ETHIOPIA	
USA	INDONESIA	EU	INDIA	
UKRAINE	JAPAN	KAZAKHSTAN	KENYA	
VIET NAM	SINGAPORE	MEXICO	PHILIPPINES	
	SOUTH AFRICA	NEW ZEALAND		
	SOUTH KOREA	NORWAY		
	UAE	PERU		
		SWITZERLAND		



Climate Action Tracker projection: 2.8°C warming by 2100

(Analysis December 2019)

Paris Agreement Pathways for the EU
Climate Action Tracker Assessment (equity ranges)

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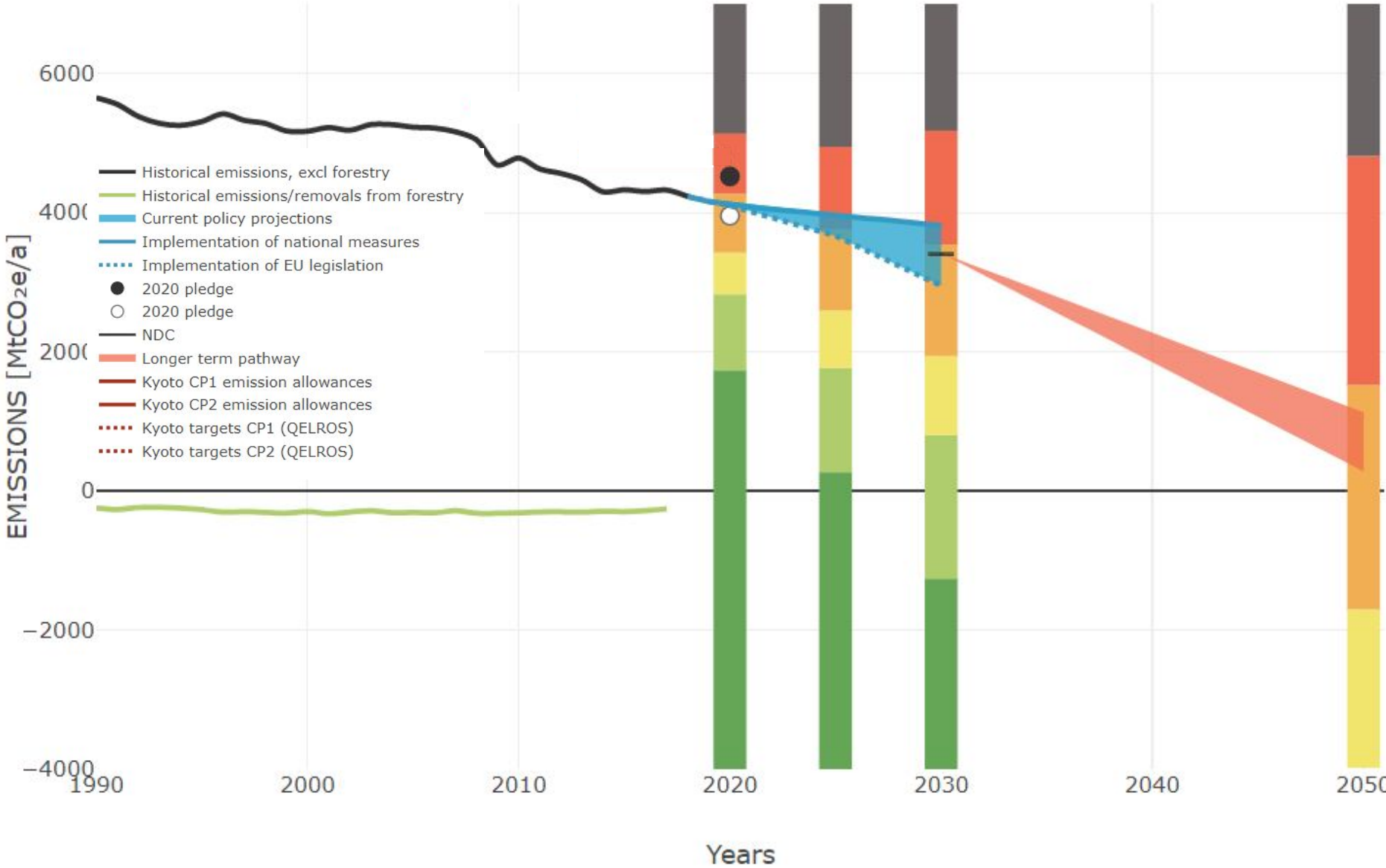

Source: Climate Action Tracker (2019), Climate Analytics (2019)

Paris Agreement Pathways for the EU
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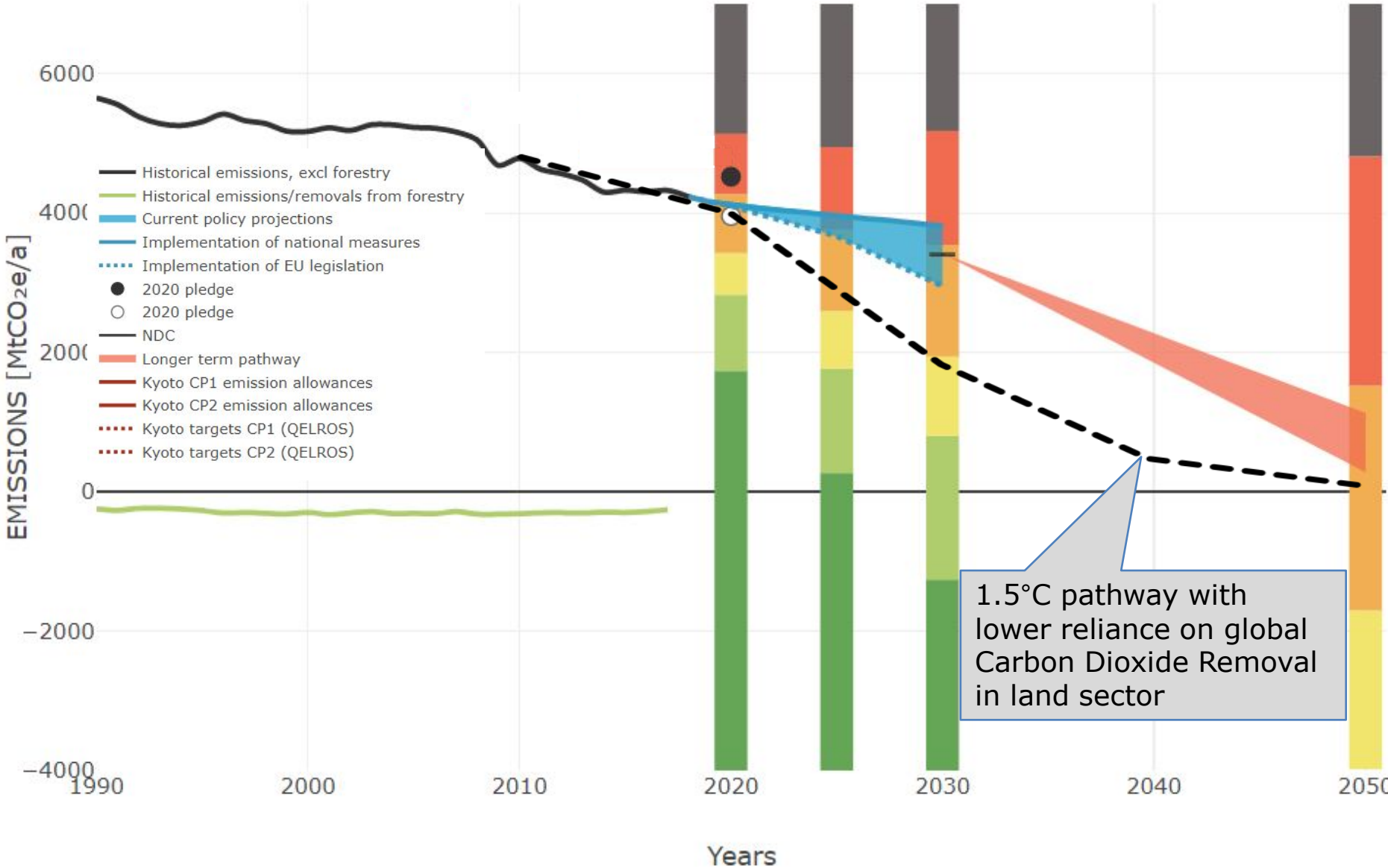

Source: Climate Action Tracker (2019), Climate Analytics (2019)

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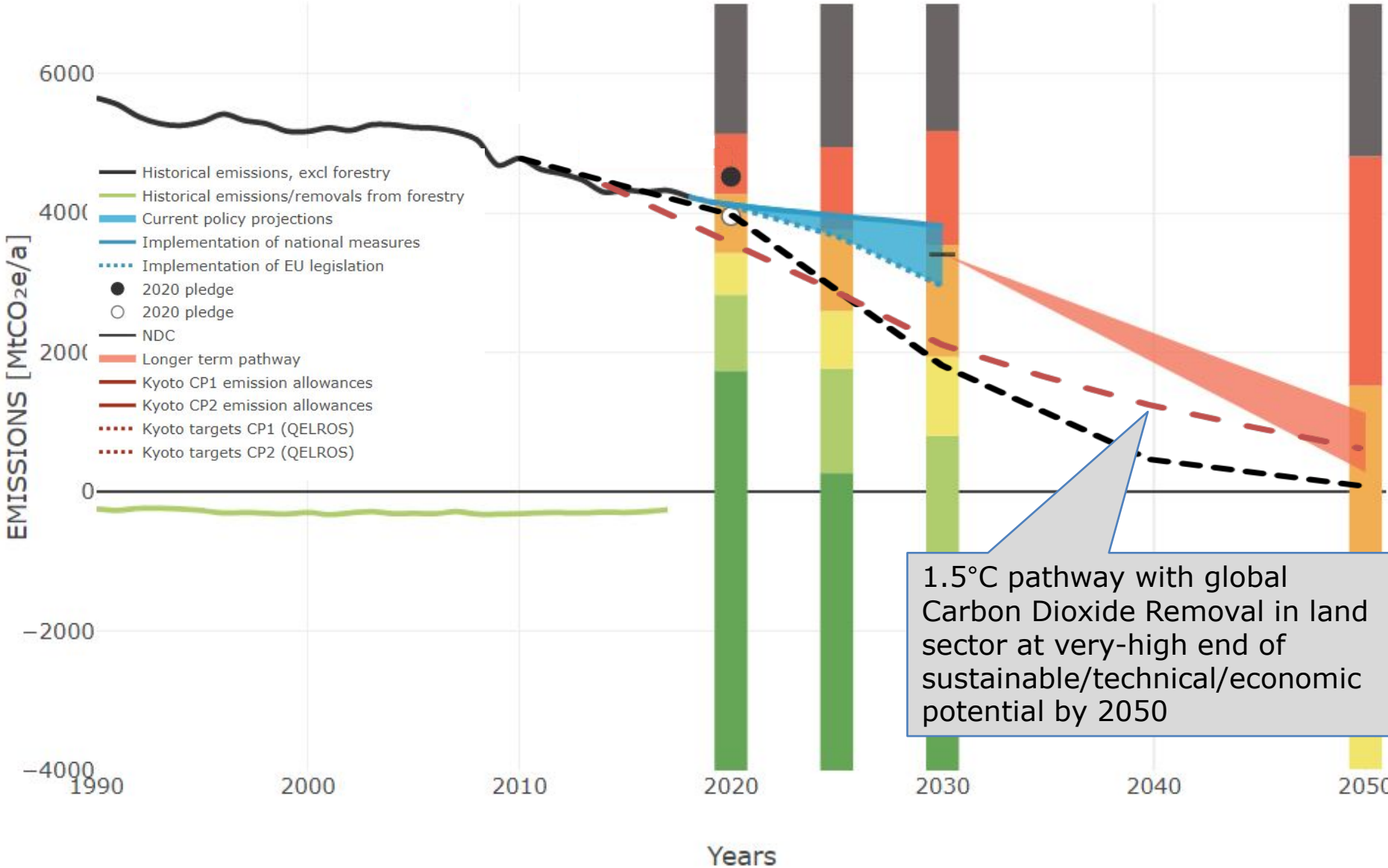
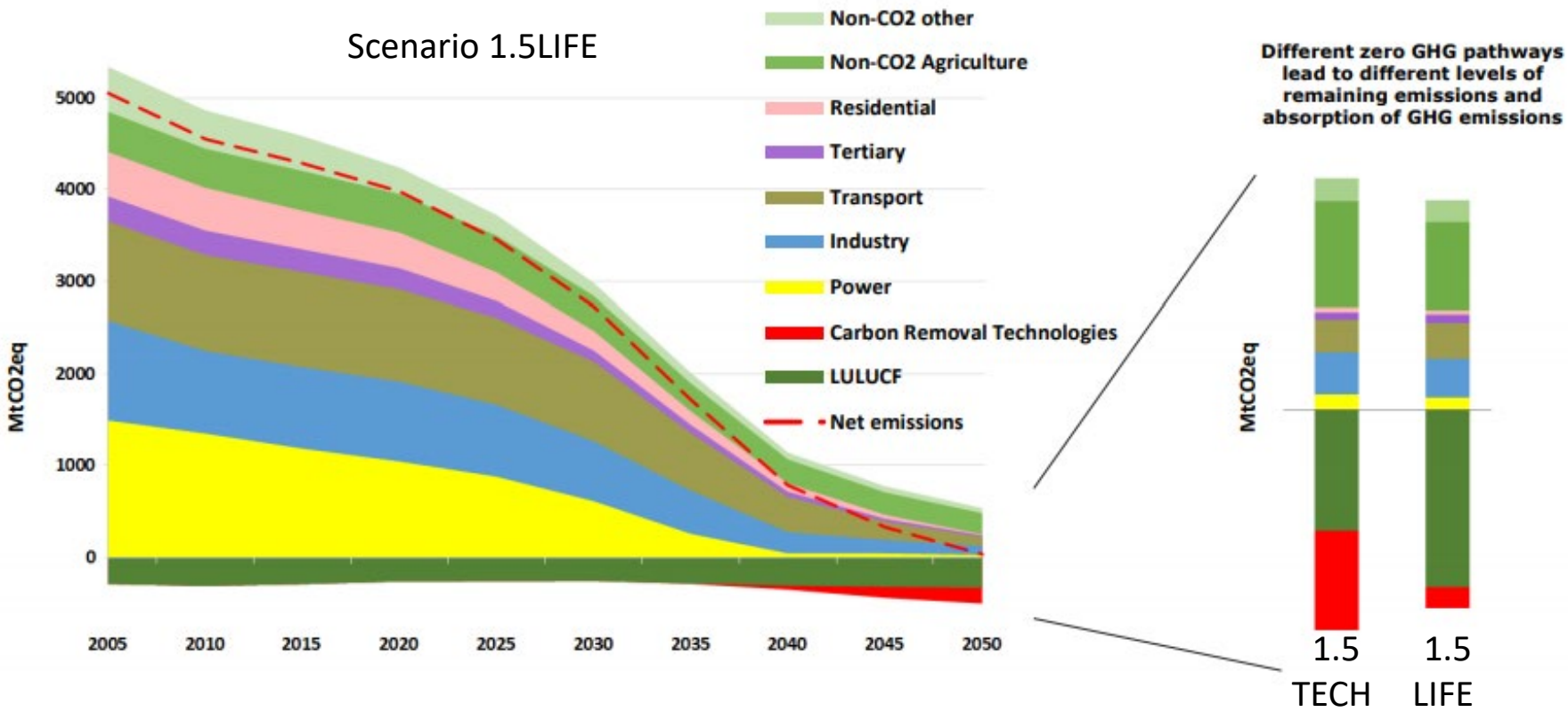


Source: Climate Action Tracker (2019); Climate Analytics (2019)

How the EU gets to zero emissions matters… (red dotted line includes LULUCF)



Source: European Commission's Communication

Paris Agreement Pathways for the EU
Climate Action Tracker Assessment (equity ranges)

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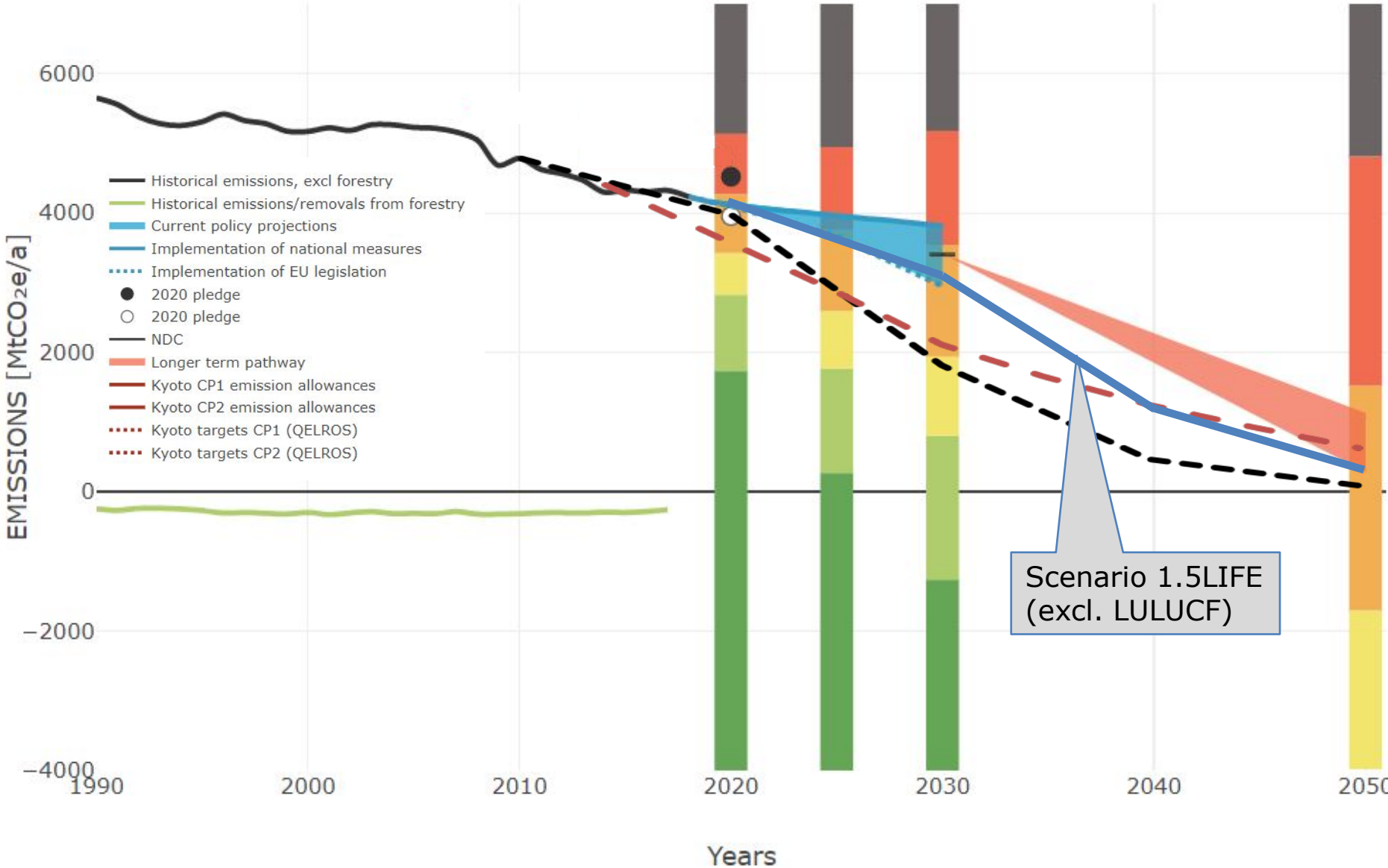
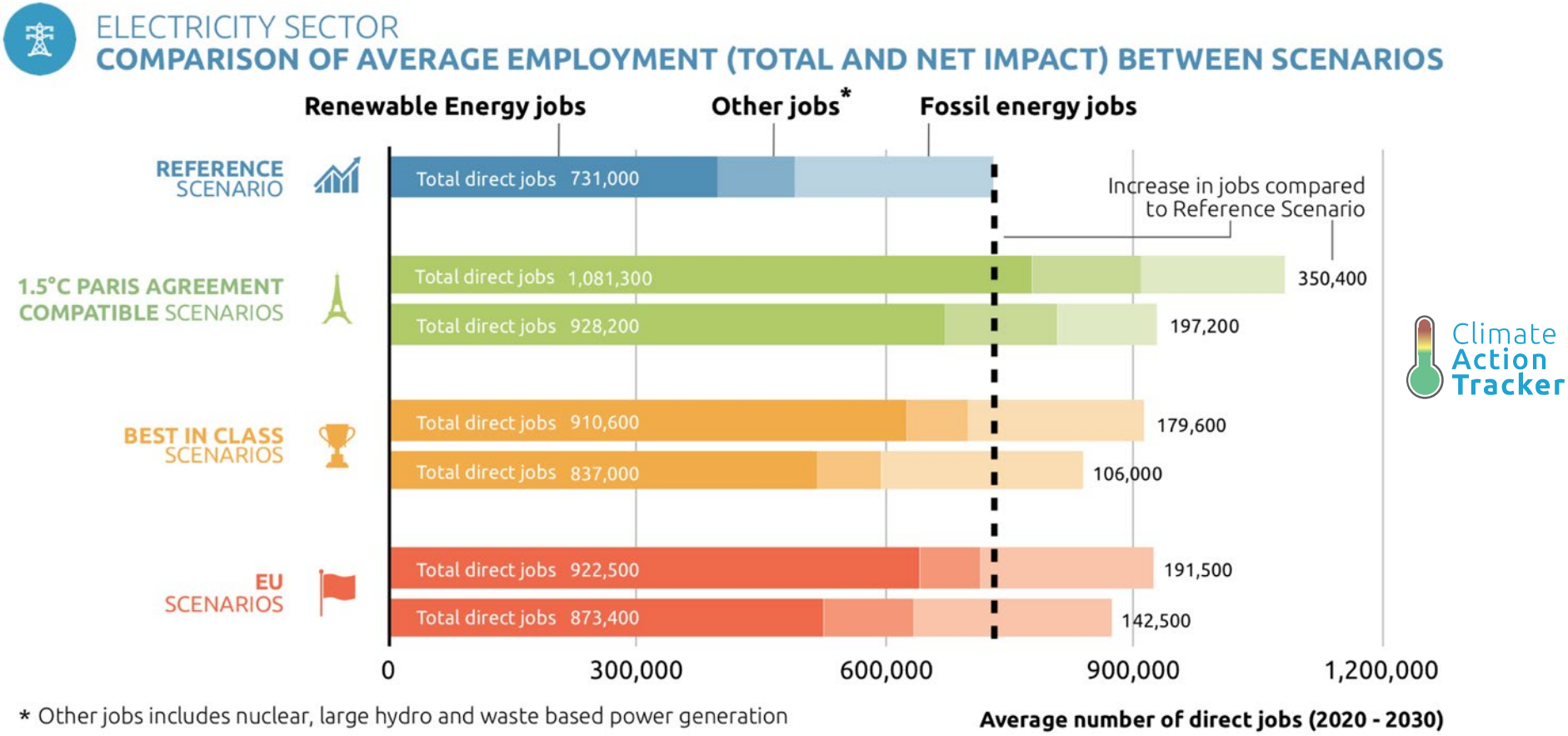


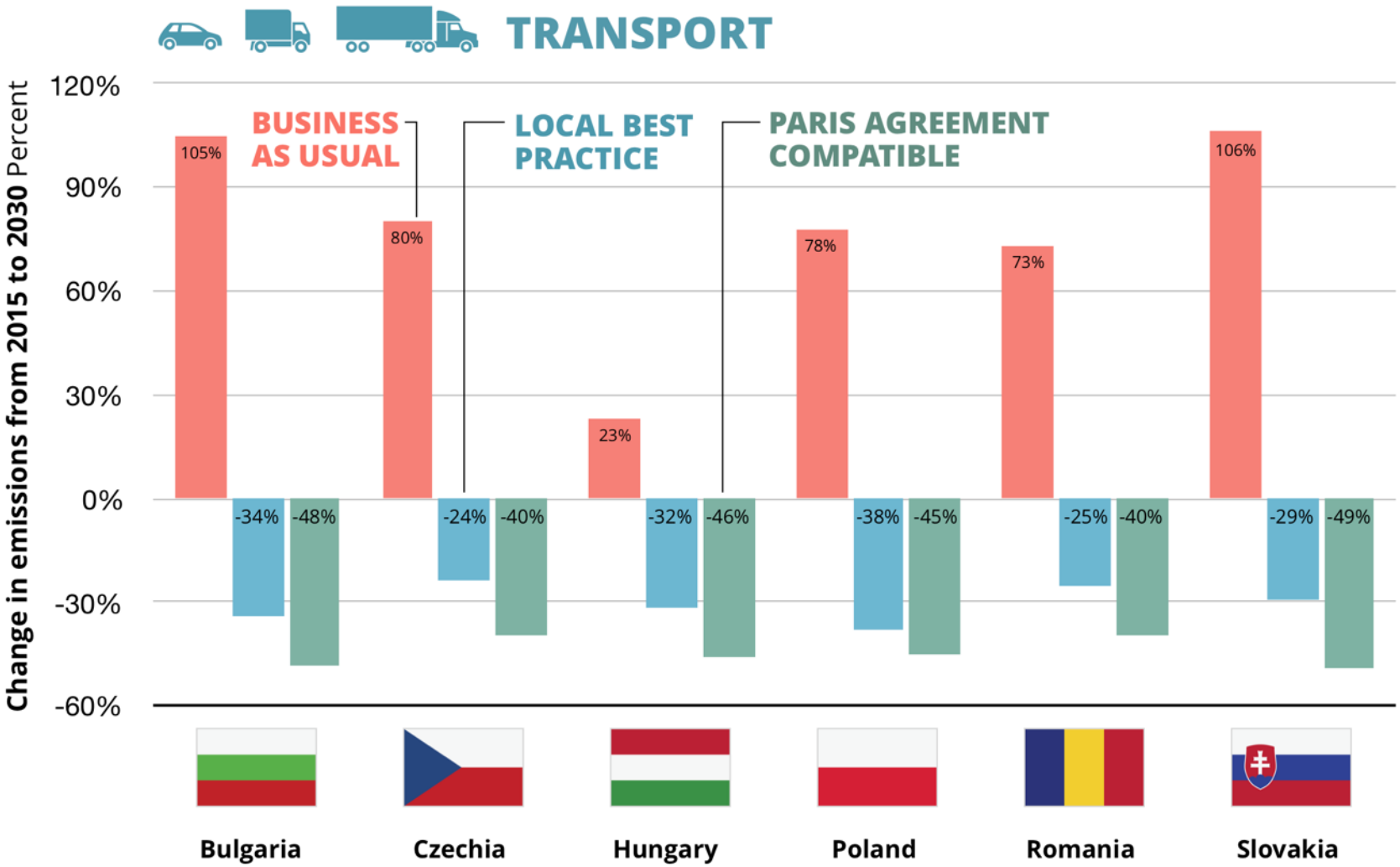
Source: Climate Action Tracker (2019); Climate Analytics (2019)

EU opportunities in renewable energy sector



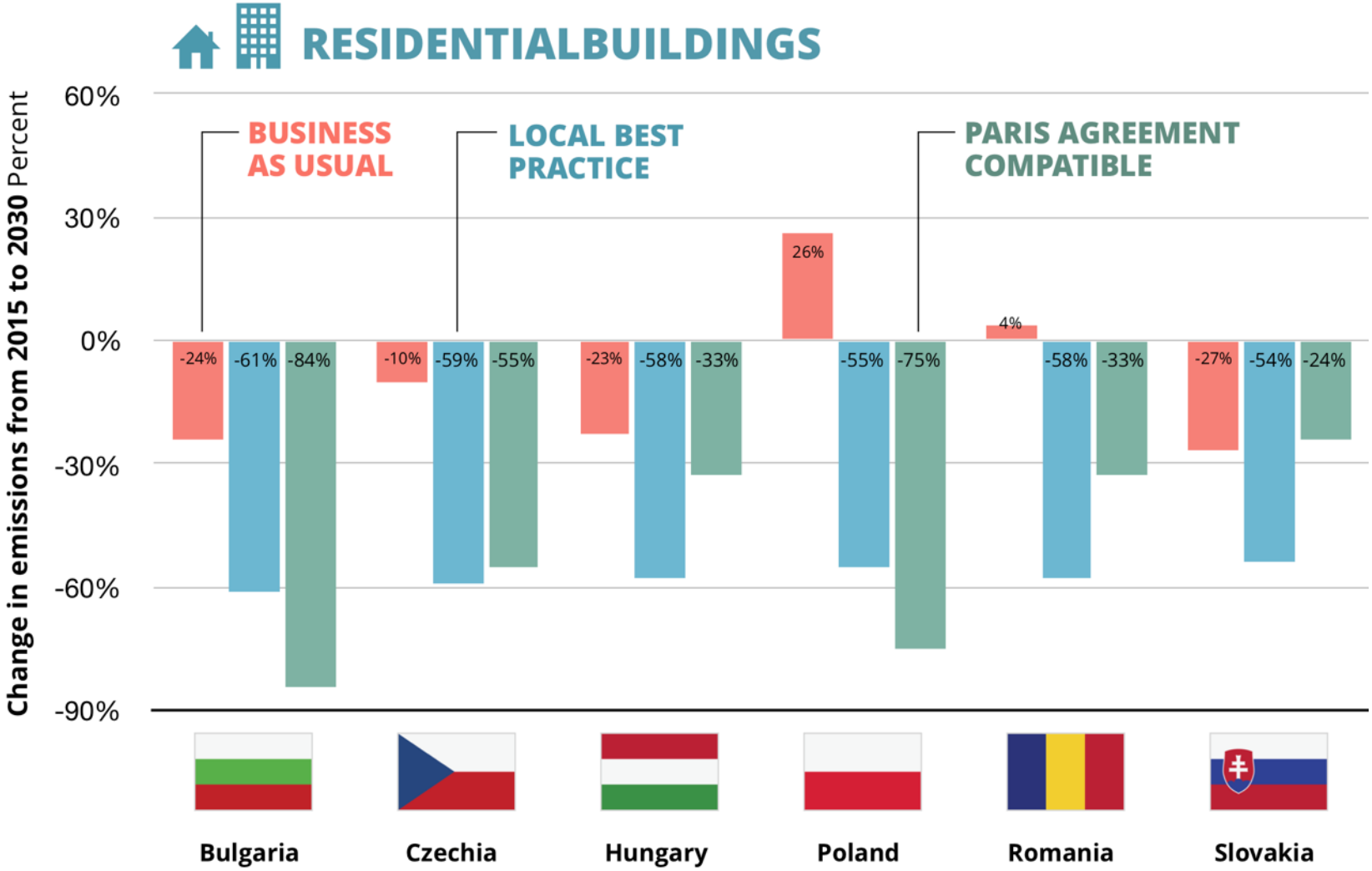
* Other jobs includes nuclear, large hydro and waste based power generation

Emissions reductions in transport



Climate Analytics‘ report „Between Best Practices in the transport sector and Paris Agreement compatibility“ published in the framework of Project „CEE Climate Policy Frontier“ funded by GIZ‘s European Climate initiative – publication pending

Emissions reductions in the buildings sector



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Thank you. Questions?

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