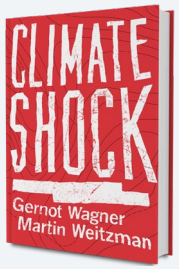
Climate Risks, Uncertainties, and Opportunities



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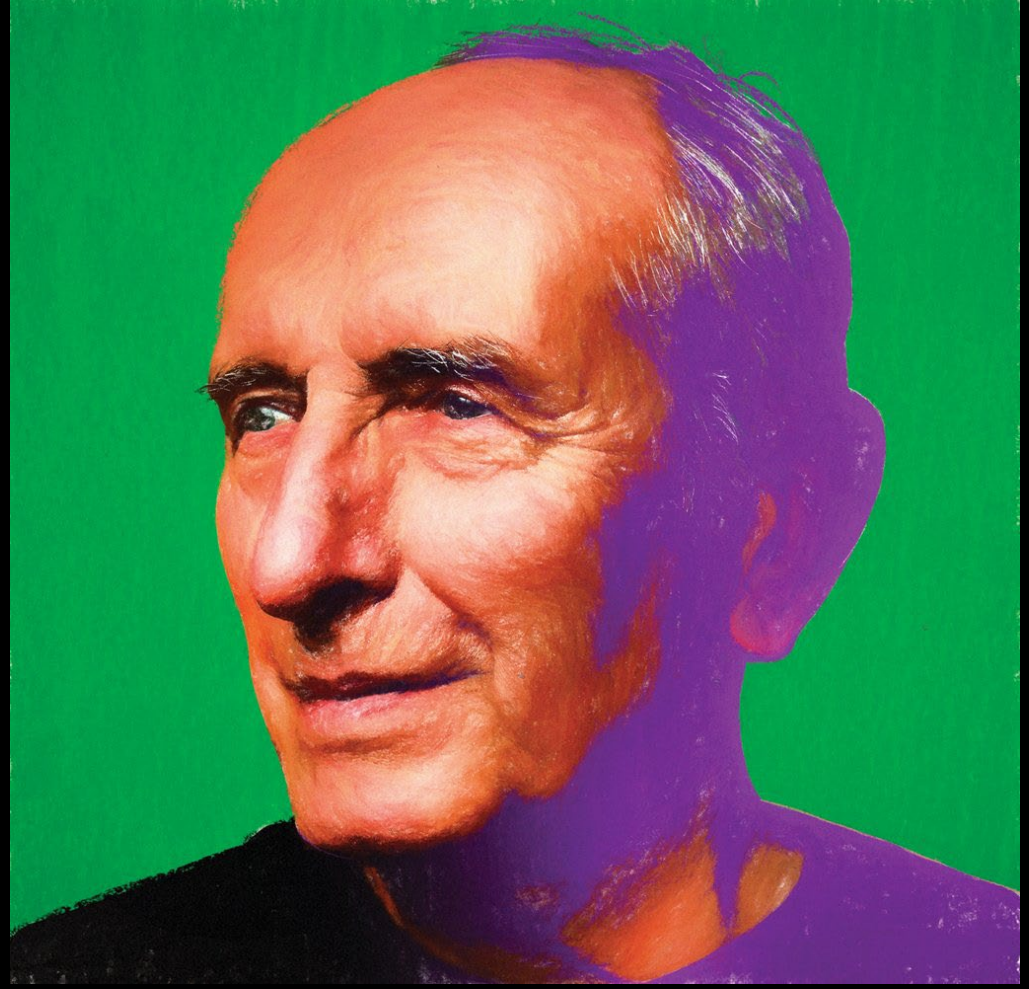
NYT Magazine (2020), nyti.ms/38oA9hX



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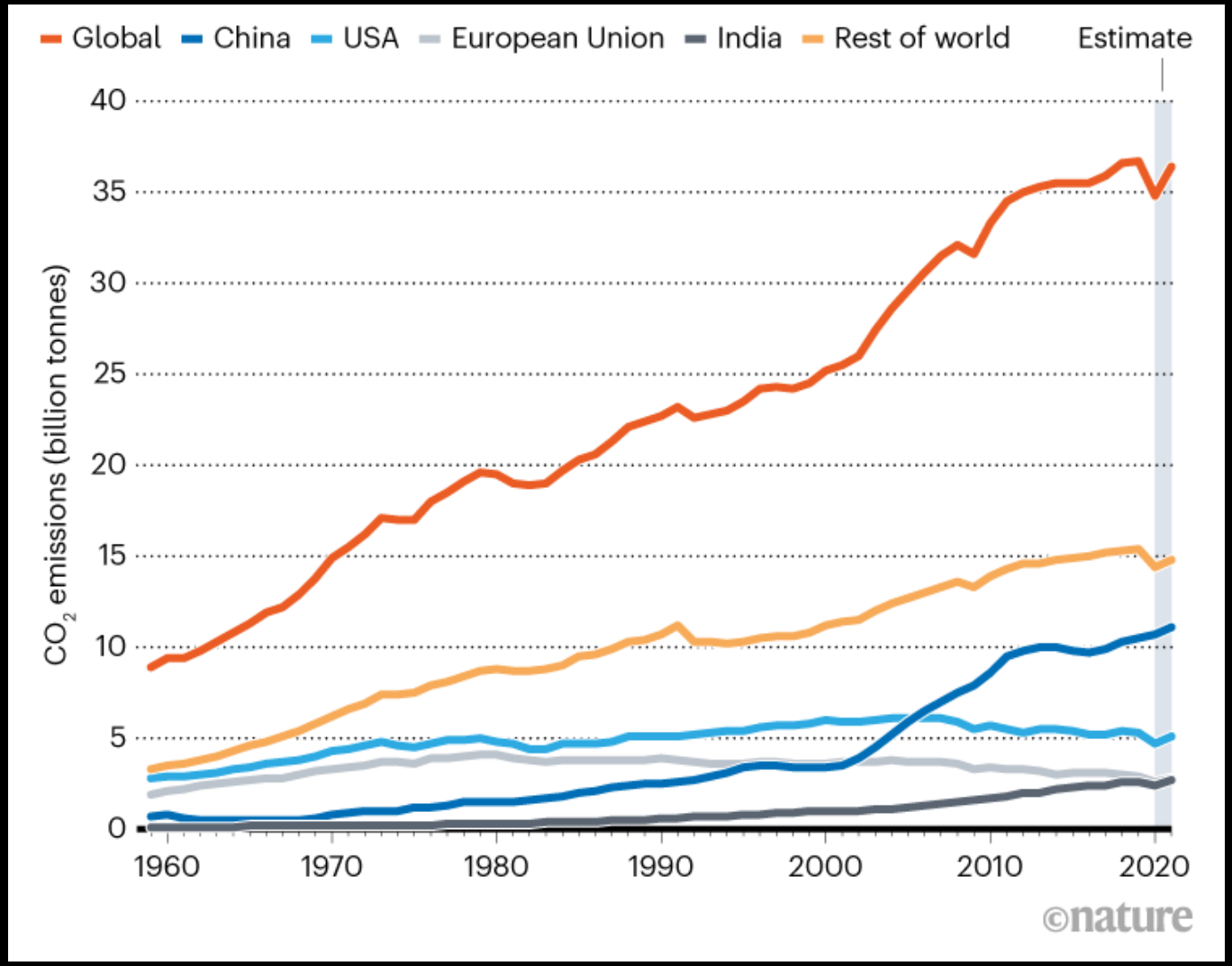
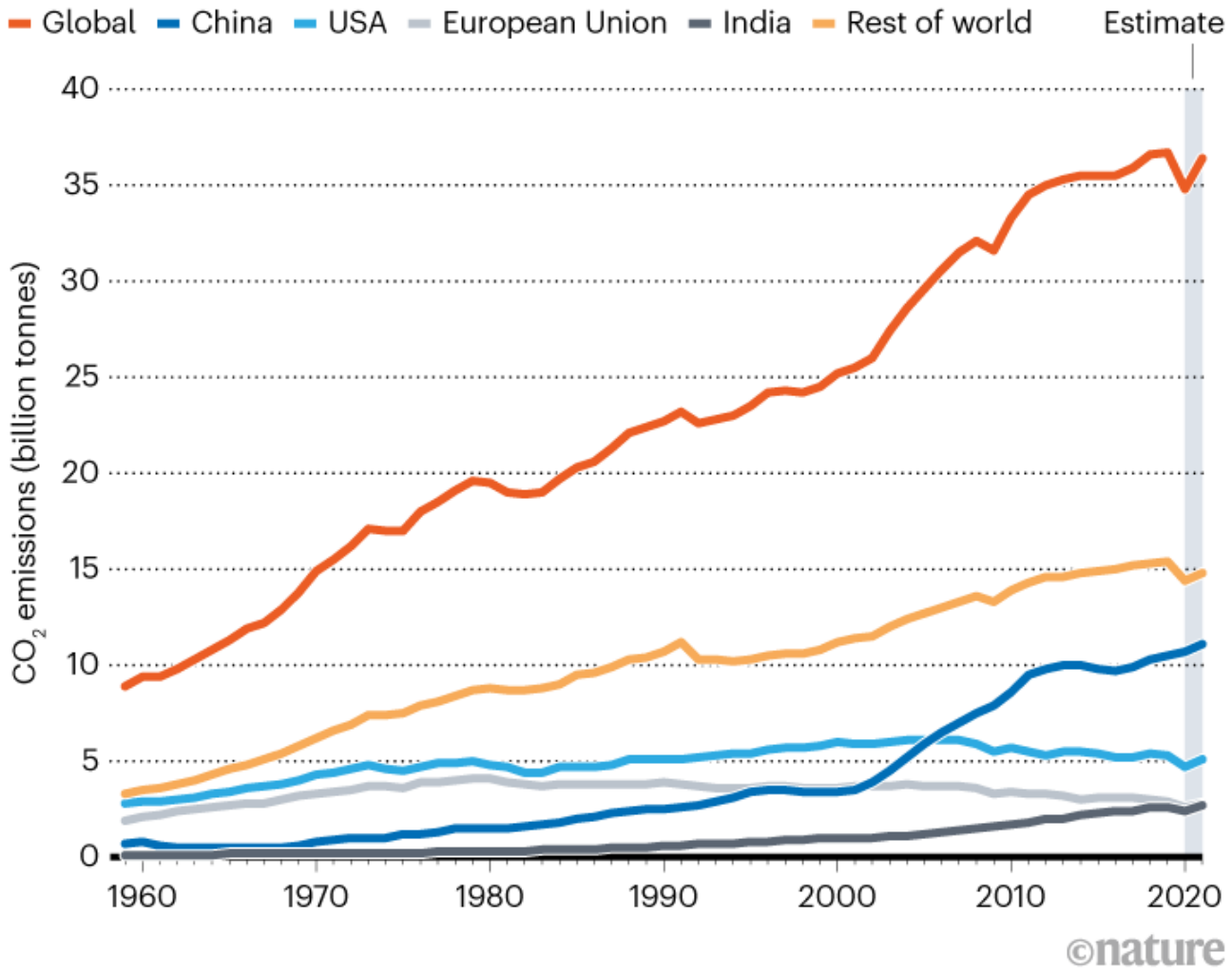


Source: Global Carbon Project



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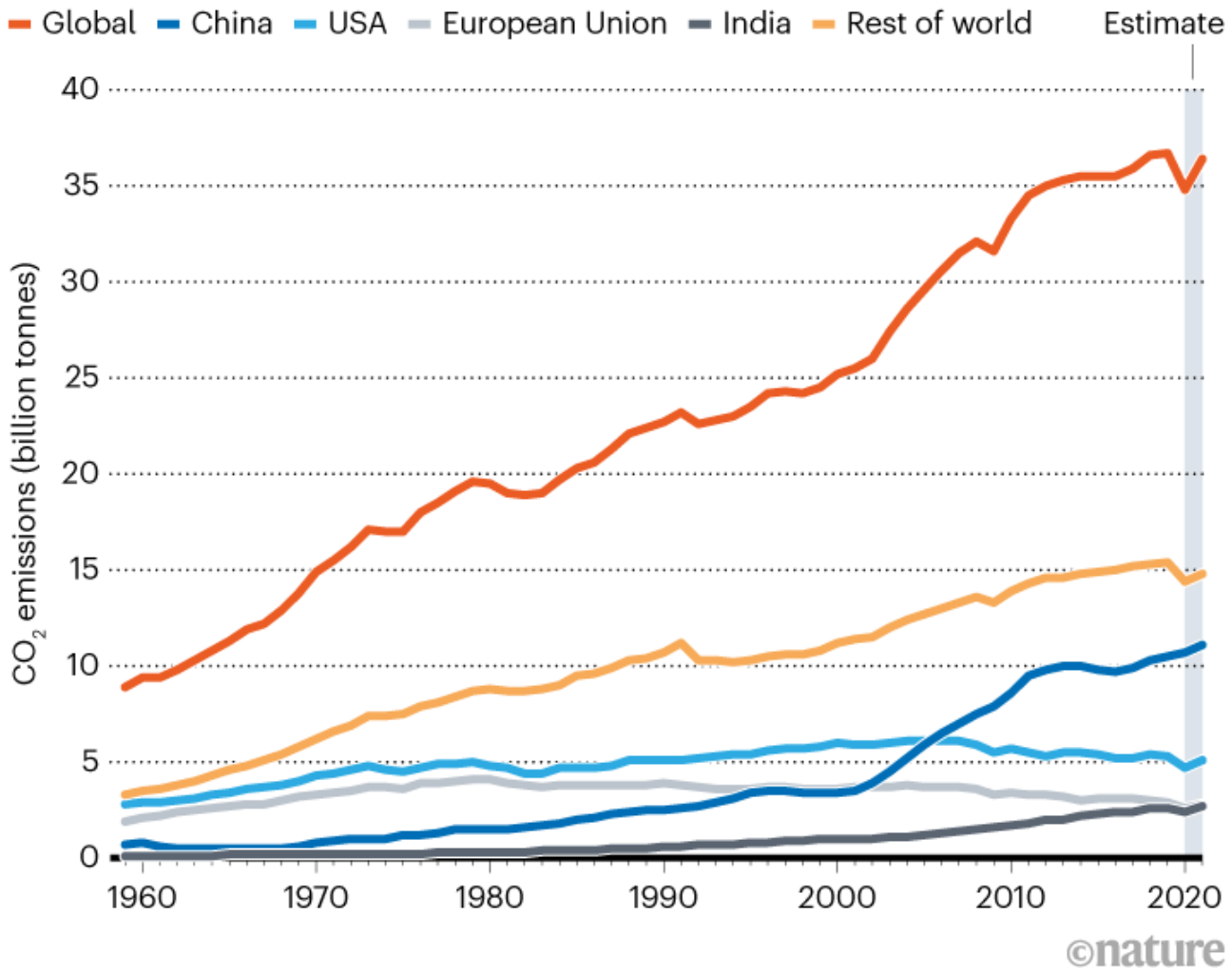


Source: Global Carbon Project + umpteen climate-economic model runs

Known knowns are bad

Unknowns, unknowables, risks & uncertainties make it worse

Social costs
= $50 / tCO_2

~$50 Social Cost of CO_2

Based on 3% constant discount rate, and an average of 3 climate-economy models

Table ES-1: Social Cost of CO_2, 2020 – 2050 (in 2020 dollars per metric ton of CO_2)[3]

	Discount Rate and Statistic			
Emissions Year	5% Average	3% Average	2.5% Average	3% 95th Percentile
2020	14	51	76	152
2025	17	56	83	169
2030	19	62	89	187
2035	22	67	96	206
2040	25	73	103	225
2045	28	79	110	242
2050	32	85	116	260

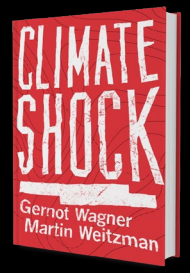
~$50 'interim' Biden SC-$CO_2$,
NPV of damages, not 'optimal' price

Source: "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990" (February 2021).

>$100 / tCO_2 :

Climate damage quantification

including tipping points



Tail risks

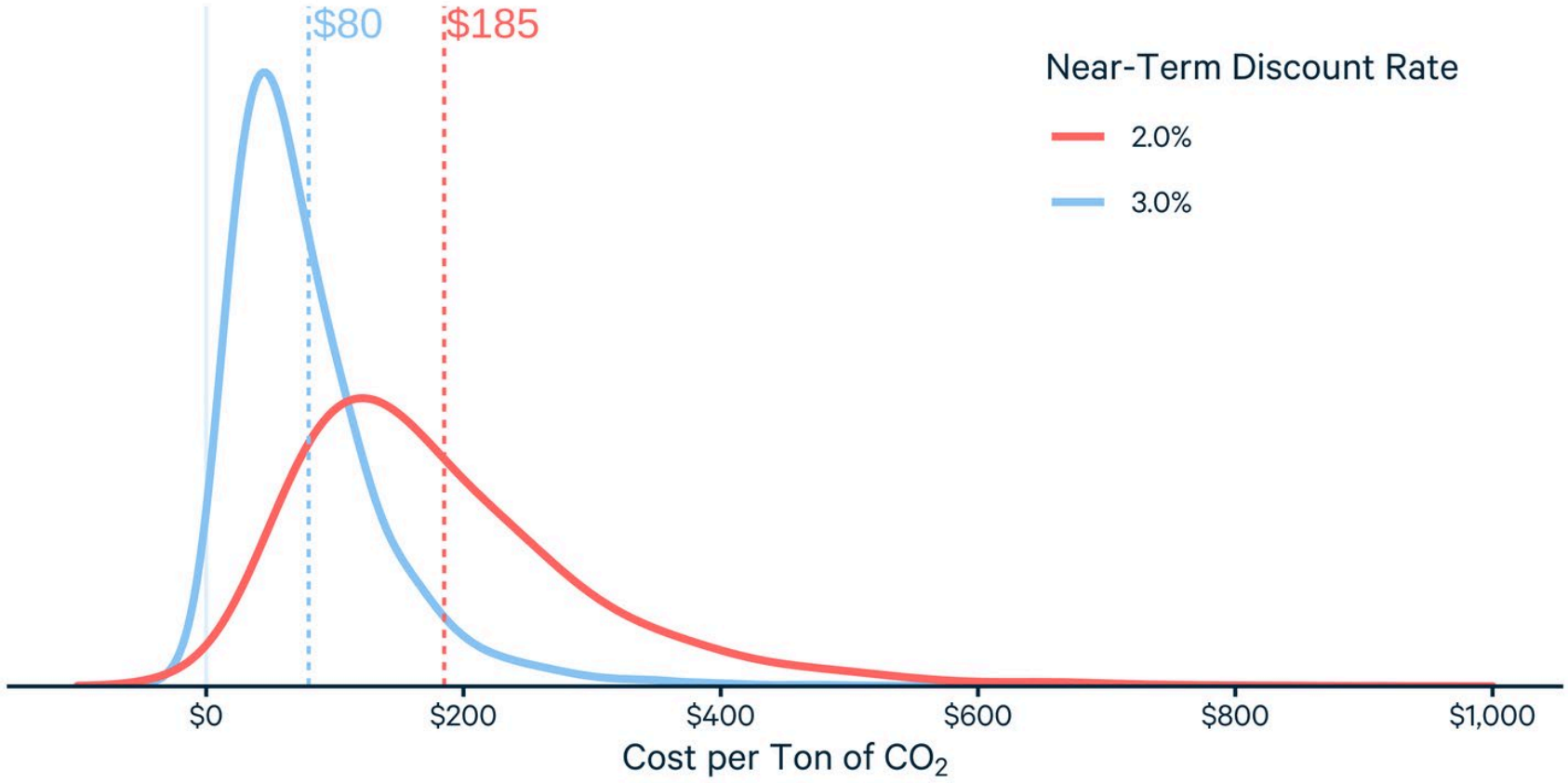
Discounting

Risk calibration, equity, etc.

~$185 / tCO_2

~$185 Social Cost of CO_2

Based on 2% constant discount rate, with most of the increase due to discounting



~$50 to ~$80 from updated damages,
~$80 to ~$185 from discounting

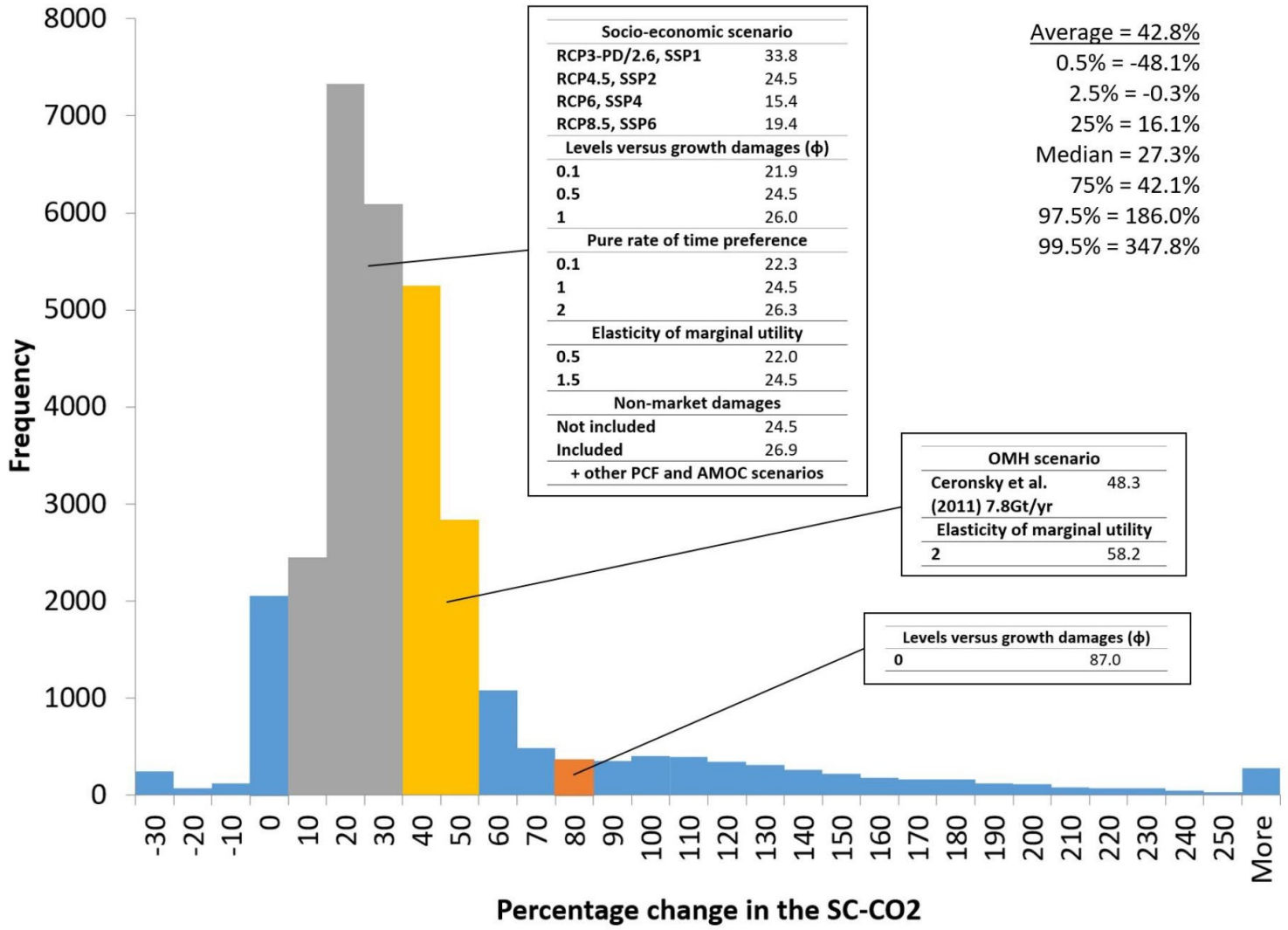
Source: Rennert *et al* "Comprehensive Evidence Implies a Higher Social Cost of CO_2" (*Nature*, September 2022).

>>$100 / tCO_2 :

- Climate damage quantification
  - including tipping points
- Tail risks
- Discounting
- Risk calibration, equity, etc.

Economic impacts of tipping points in the climate system

Tipping points increase SCC by between ~27-43%, with large, right-skewed distribution



Source: Dietz, Rising, Stoerk & Wagner (*PNAS* 2021), gwagner.com/tipping-economics

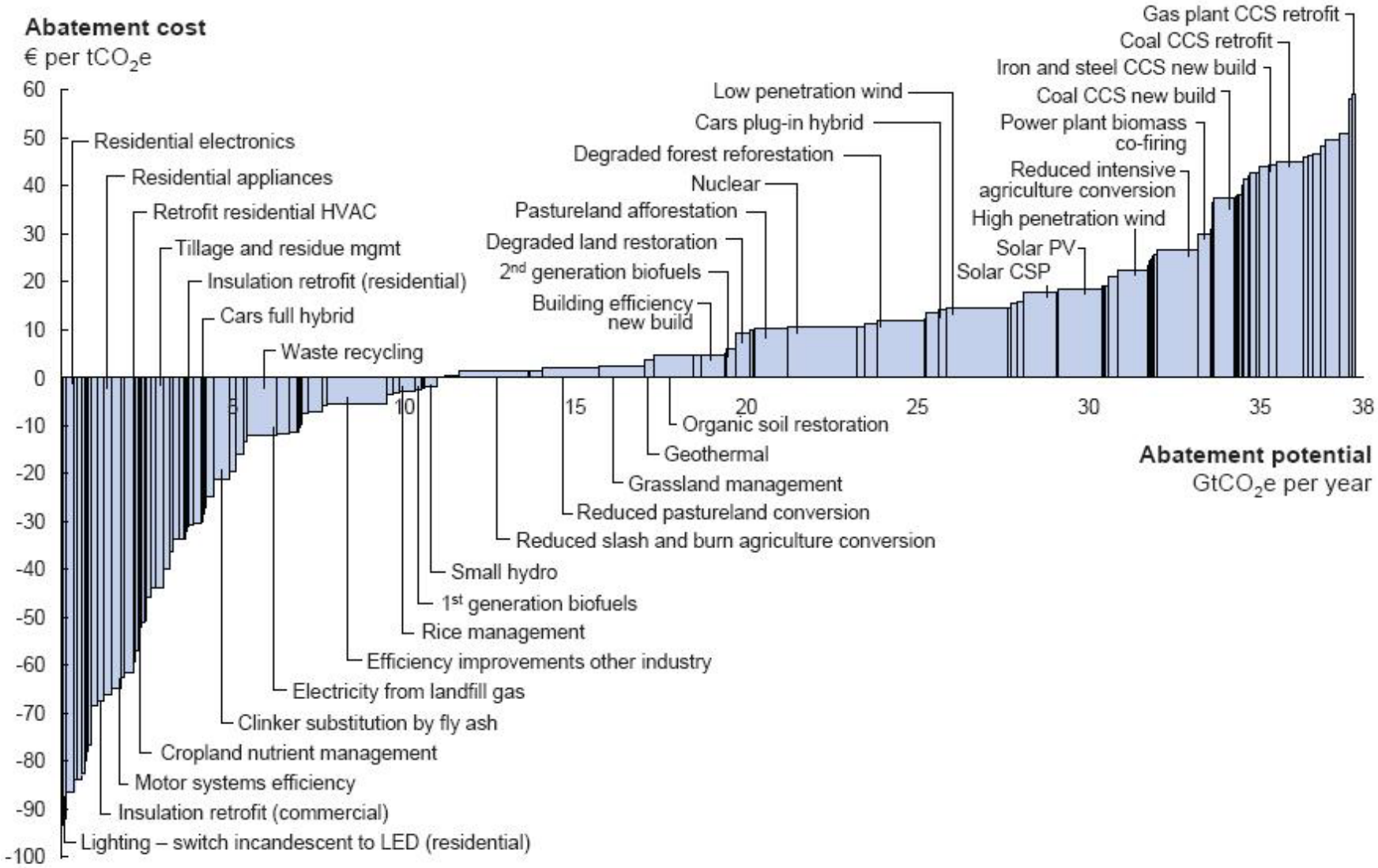
Tail risks dwarf all else

Climate policy = insurance

Climate policy = opportunity

Large abatement opportunities available at low or no cost

McKinsey Global v2.0 effort in 2009 identified 38 $GtCO_2e$ abatement potential in 2030



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.

Source: Global GHG Abatement Cost Curve v2.0

Many options available now in all sectors are estimated to offer substantial potential to reduce net emissions by 2030. Relative potentials and costs will vary across countries and in the longer term compared to 2030.

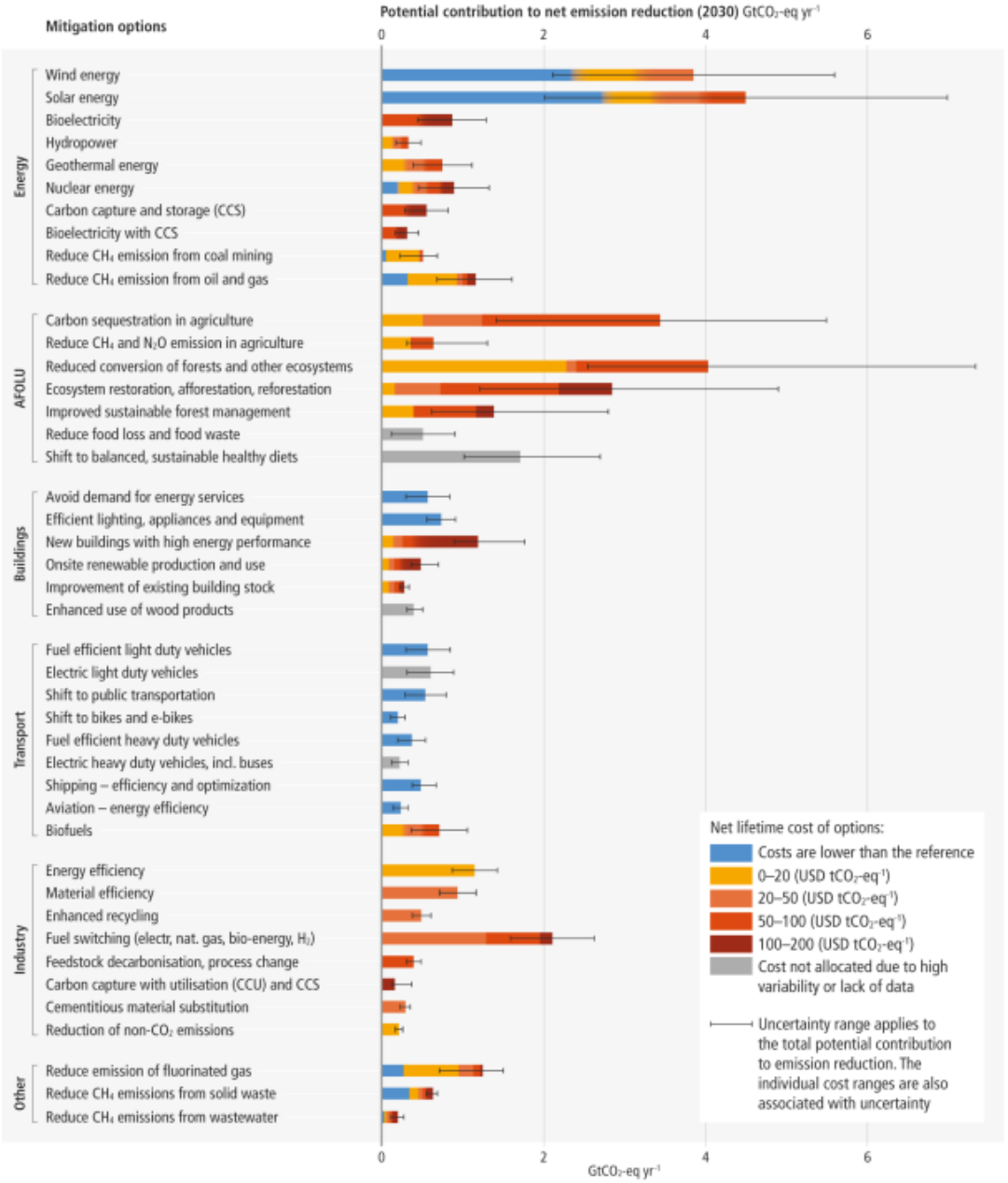
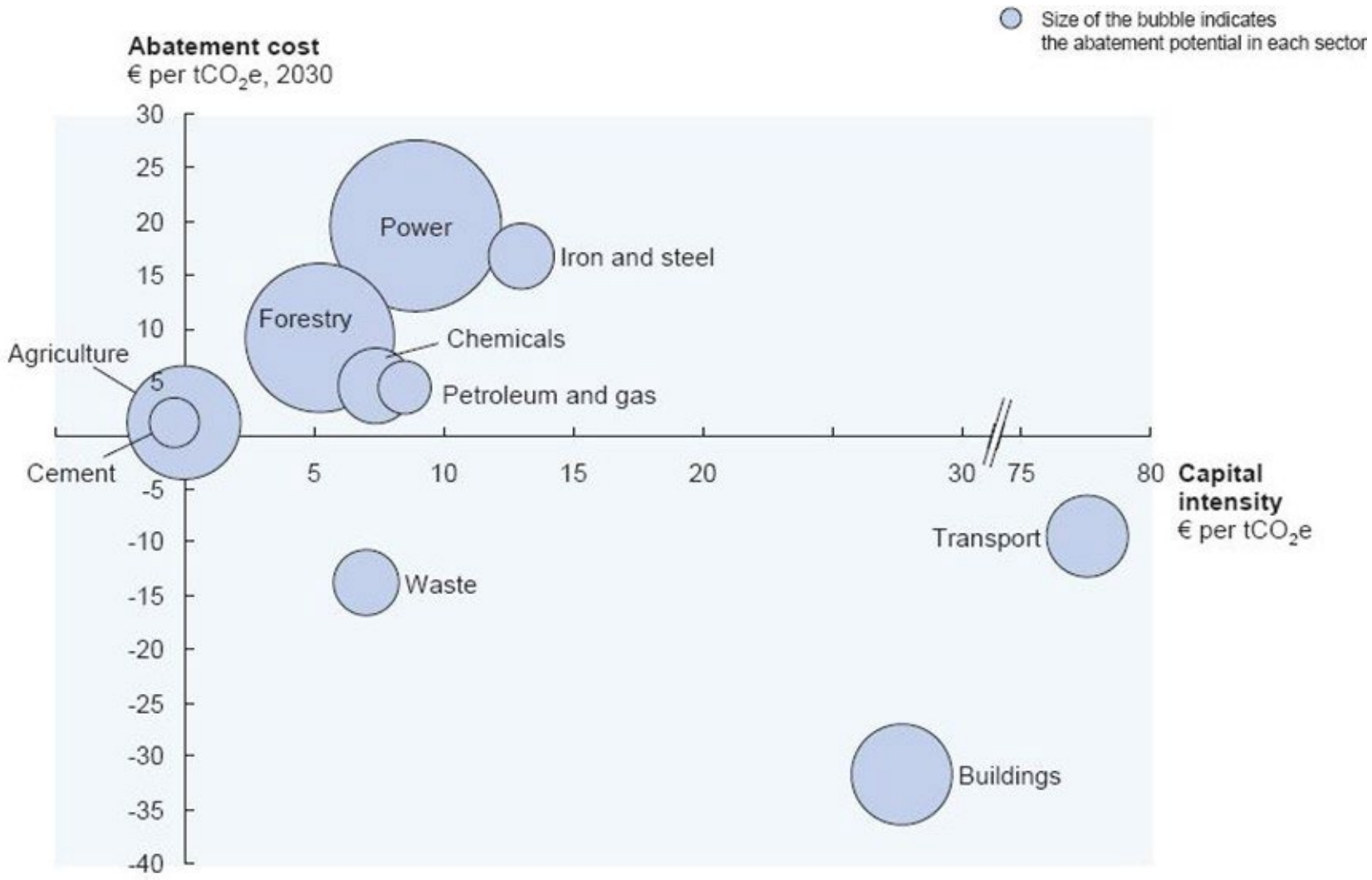


Figure SPM.7: Overview of mitigation options and their estimated ranges of costs and potentials in 2030.

IPCC AR6 WGIII, ipcc.ch/report/ar6/wg3

Capital intensity varies widely across sectors

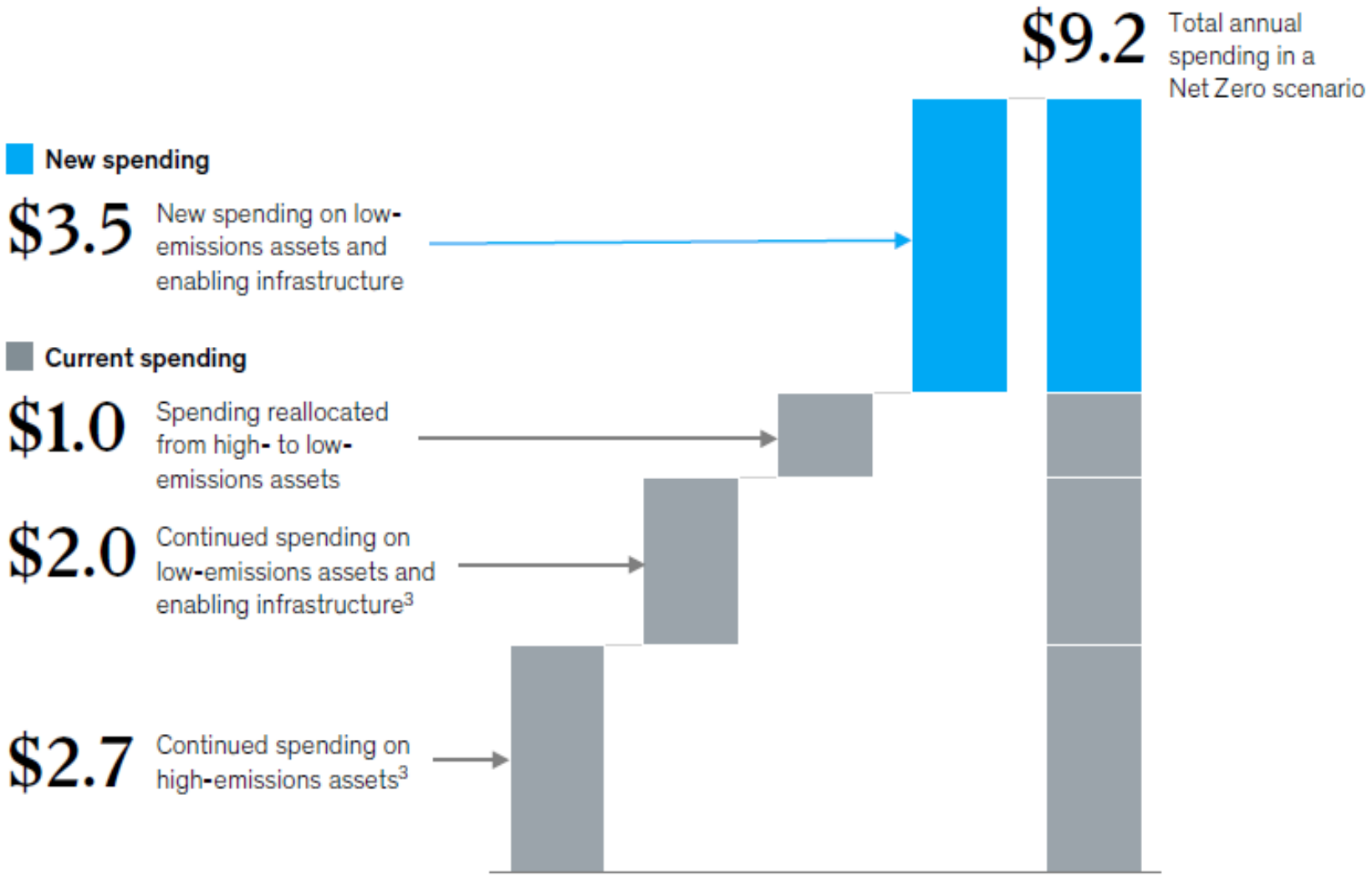
Transport and buildings with largest up-front capital expenditure requirements



Source: Global GHG Abatement Cost Curve v2.0

Spending on physical assets for energy and land-use systems in the NGFS Net Zero 2050 scenario would rise to about $9.2 trillion annually, or about $3.5 trillion more than today.

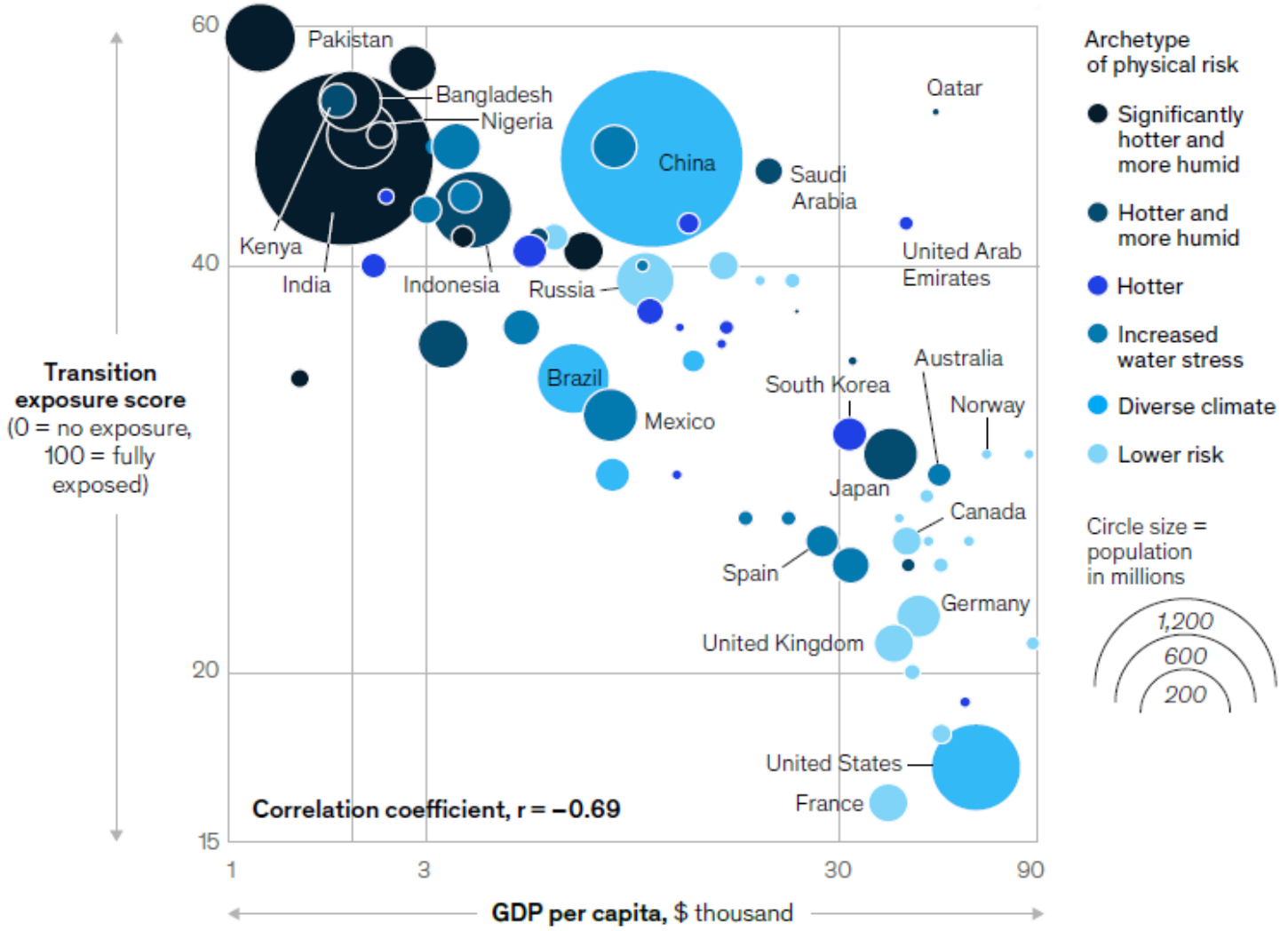
Annual spending on physical assets for energy and land-use systems[1] in a Net Zero 2050 scenario,[2] average 2021–50, $ trillion



McKinsey's 2022 *The Net-Zero Transition* report

Countries with lower GDP per capita and fossil-fuel resource producers have higher transition exposures.

Archetype of physical risk[1] through transition exposure vs GDP per capita by country[2] (logarithmic scale)



1. For further details, see *Climate risk and response: Physical hazards and socioeconomic impacts*, McKinsey Global Institute, January 2020.
2. Based on average share of jobs, GDP, and capital stock in exposed sectors. These sectors are identified based on their scope 1, 2, and 3 emissions intensity. For further details, see technical appendix.

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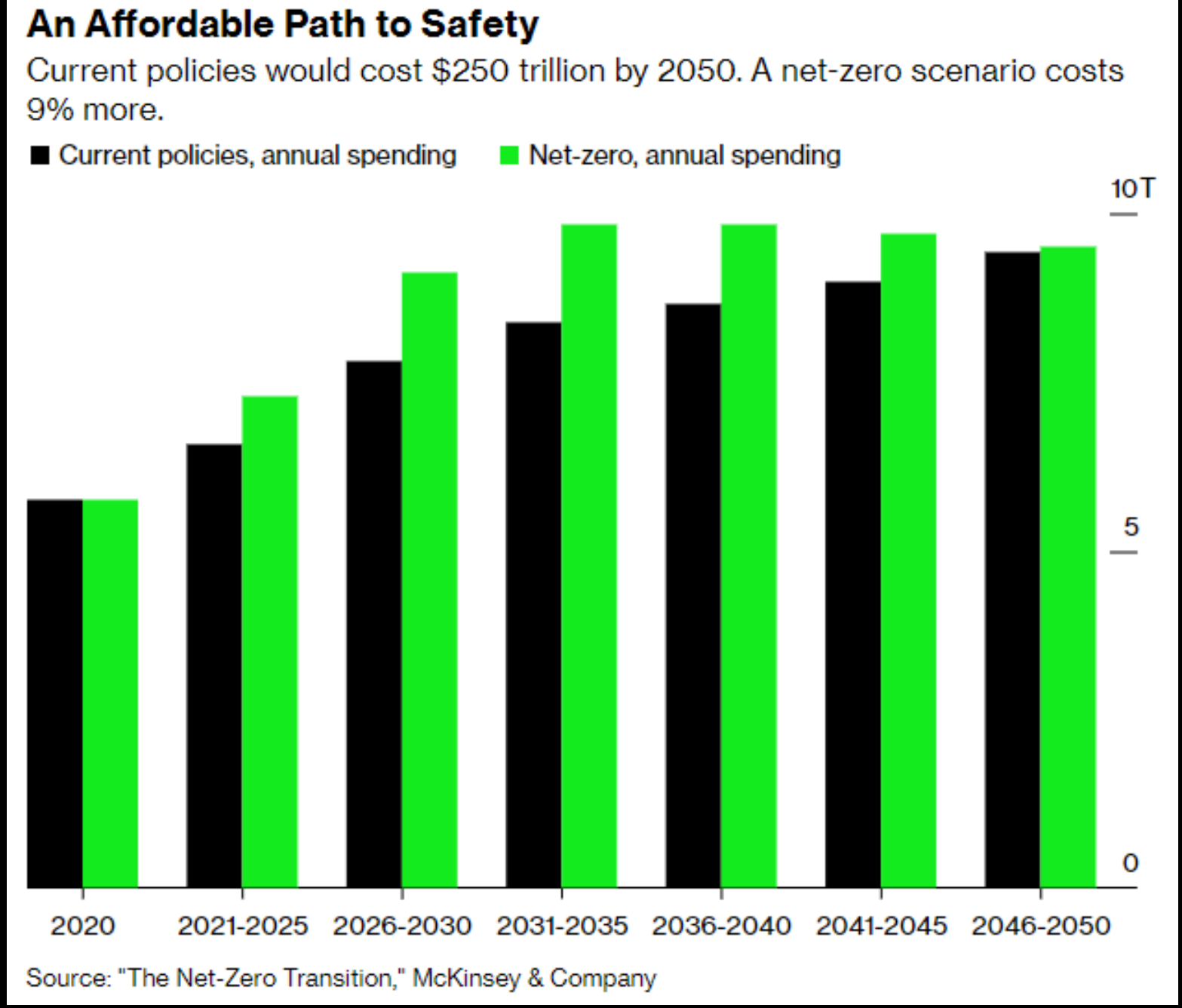


Wagner, "The Cost to Reach Net Zero By 2050 Is Actually a Bargain," *Bloomberg Green* Risky Climate (28 January 2022)

Transition costs ~$3.5T / yr, shifting ~$10T / yr

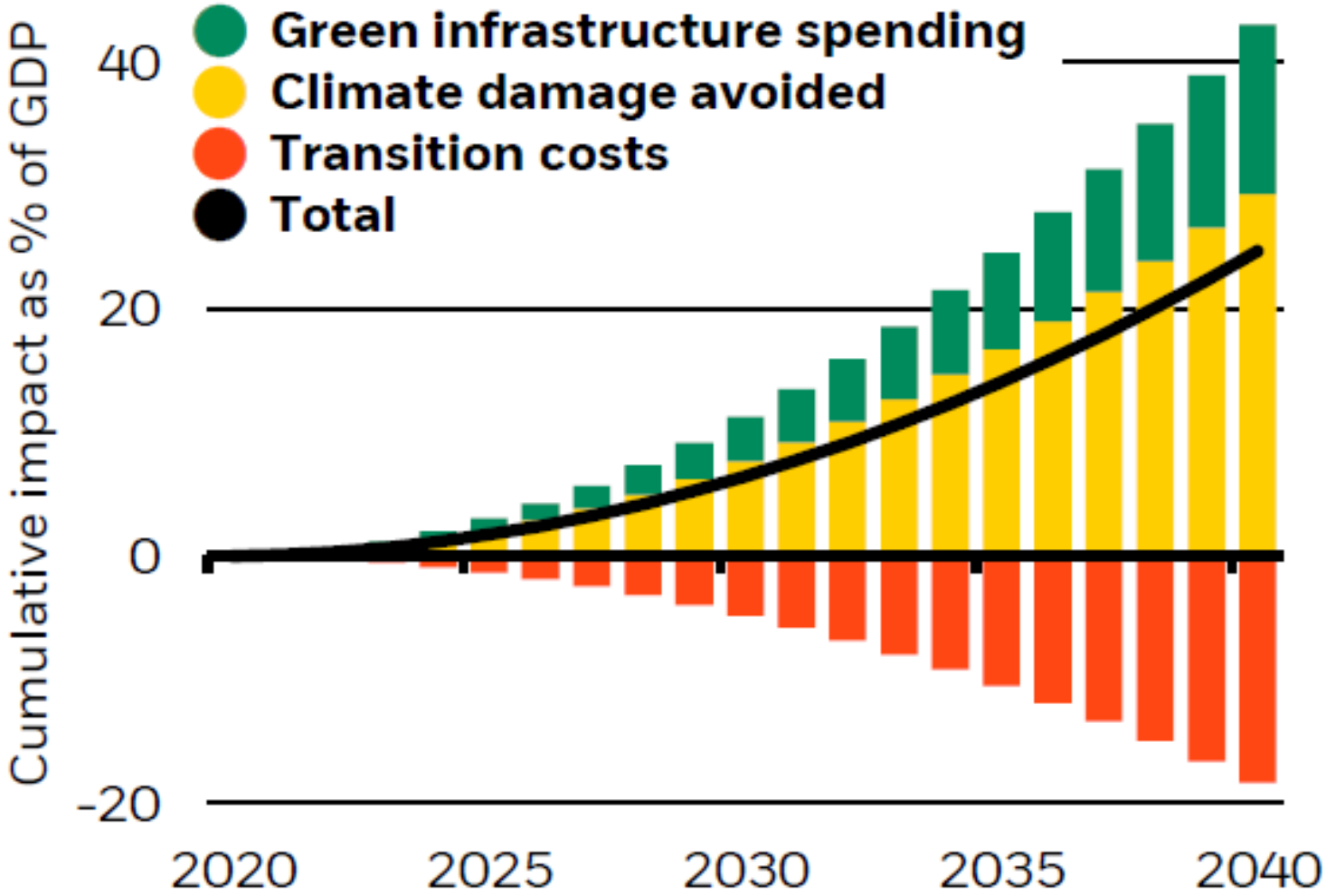
3 U.S. laws alone ~$1T / 10 yr, leveraging >$1T in private capital

BlackRock®

Managing the net-zero transition

Transition results in net economic gain

Estimated cumulative GDP impact of transition, 2020-40



BlackRock

Rich Lesser, Global Chair, Boston Consulting Group, at Columbia Business School, 2022

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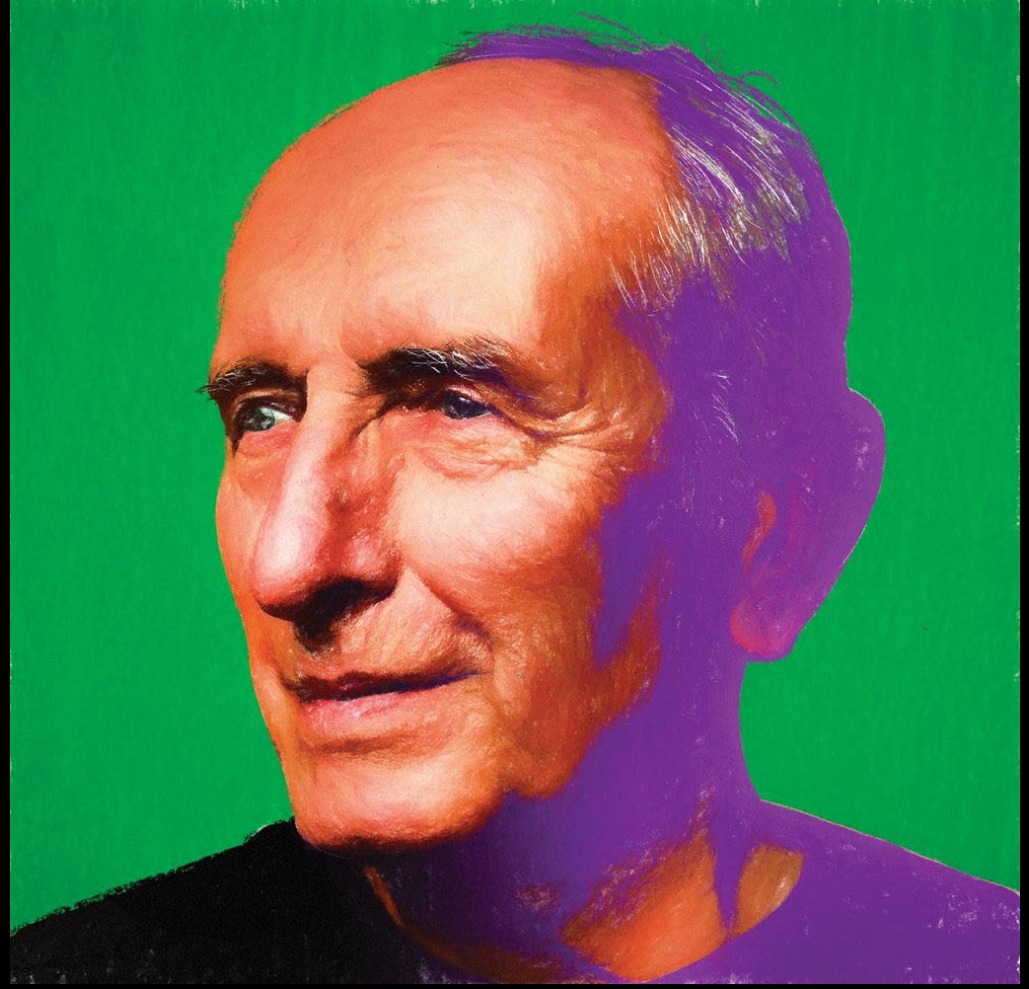

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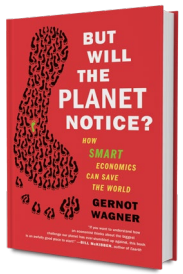

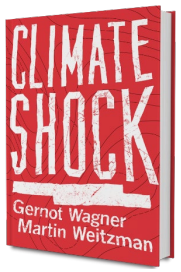

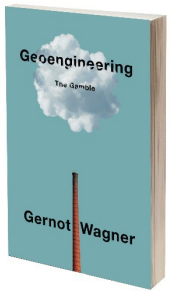

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