G20 Global Financial Stability Conference 2023

Meeting the global climate challenge: The role of financial incentives

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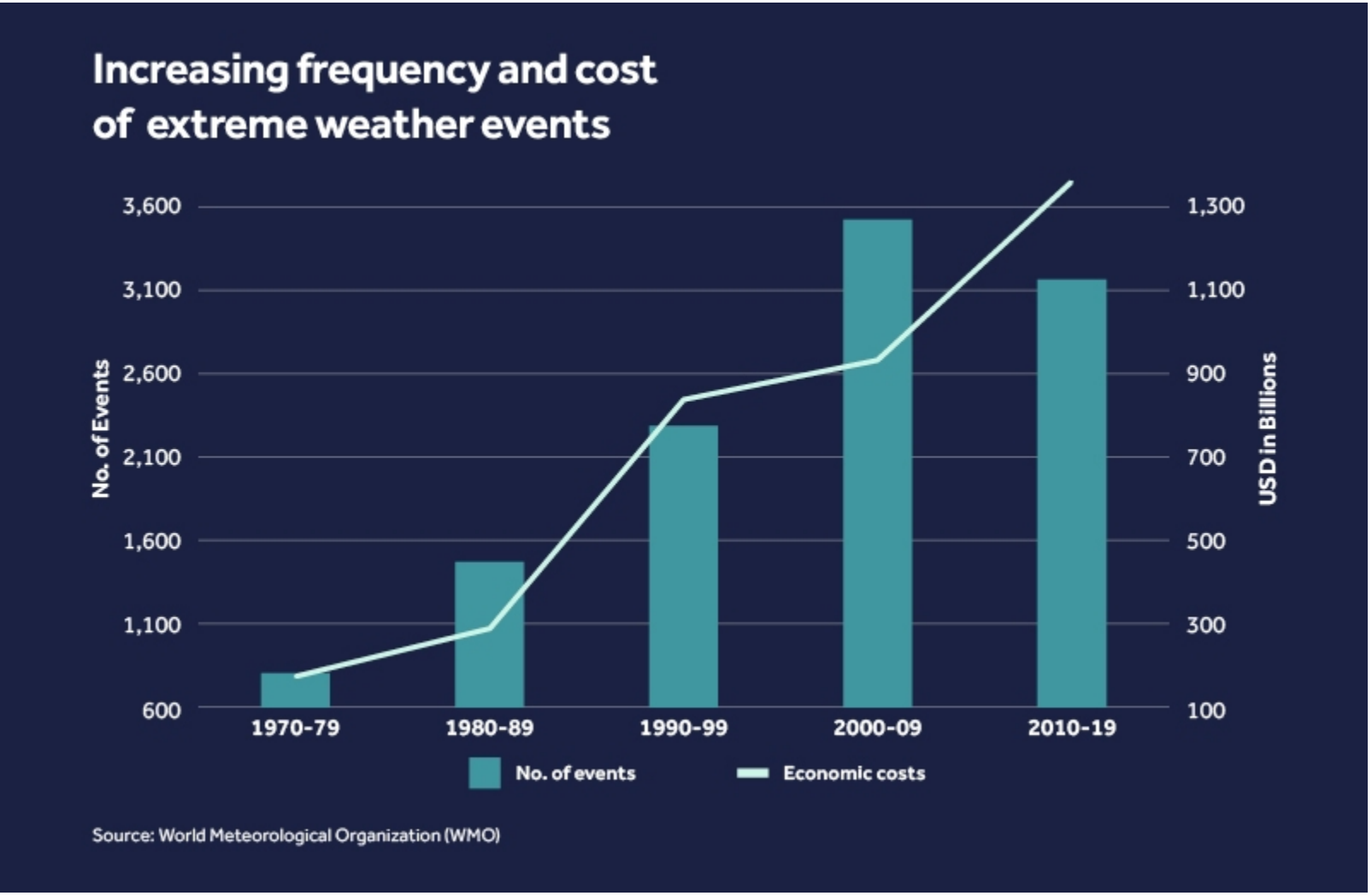
Climate policy landscape: a tale of gaps and opportunities

- Gaps
  - Ambition gap
  - Finance gap
  - Clean energy cost gap
  - R&D support gap
  - Fossil energy pricing gap
- Opportunities
  - for mitigation and adaptation to enhance growth
  - for better-aligned pricing of emissions and energy to enhance public finance and crowd in private finance

Growing macroeconomic challenges of physical climate change

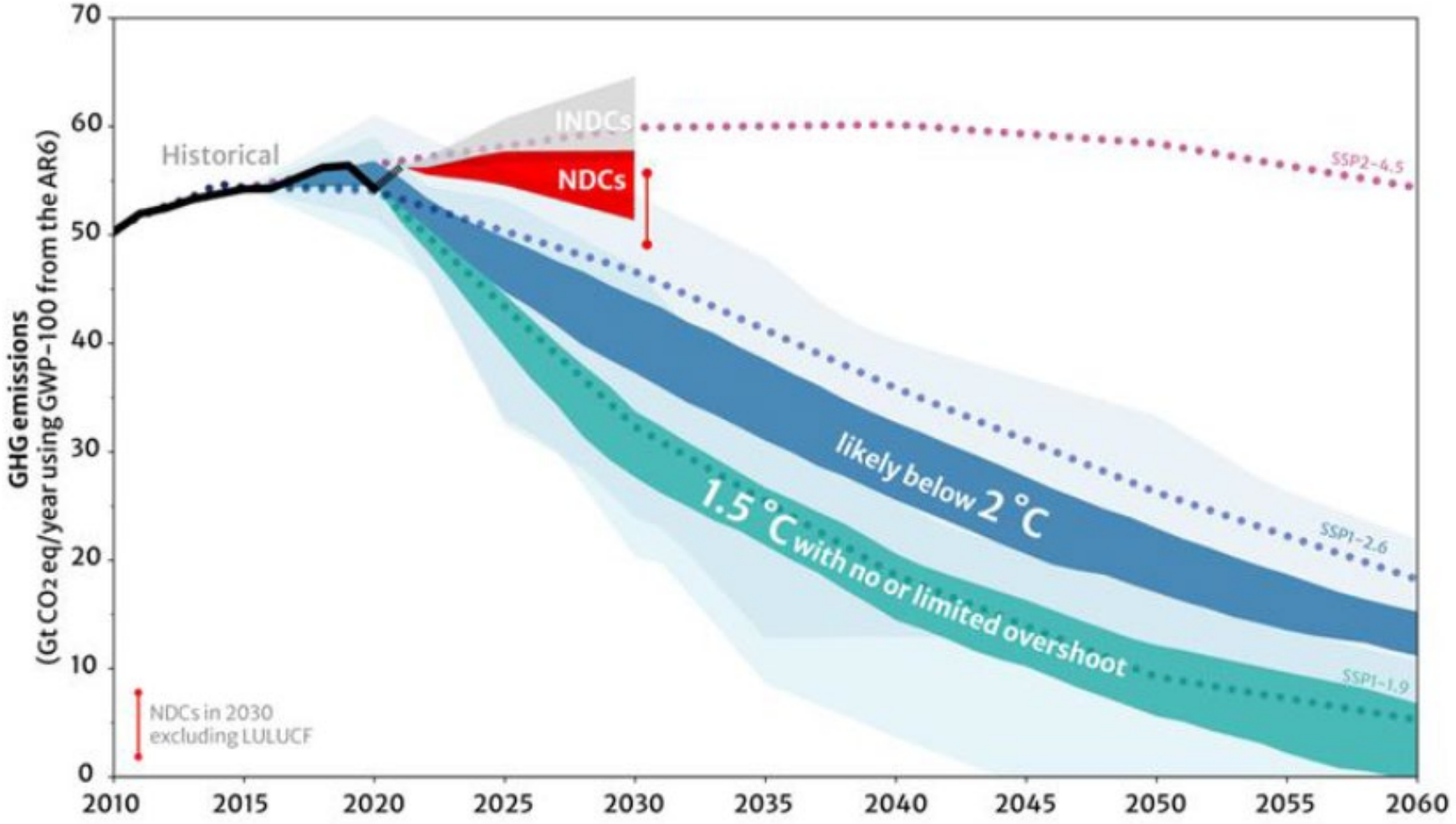


- Investment risks
- Damage to physical capital
- Trade and supply chain disruptions
- Lost hours worked, output
- Diversion of resources to reconstruction and replacement
- Public debt pressures of disaster response
- Migration

Ambition gap

To keep larger impacts of climate change in check, we need to decarbonize more rapidly and more completely

Comparison of scenarios assessed in the Intergovernmental Panel on Climate Change Sixth Assessment Report with projected total and per capita global emissions according to nationally determined contributions



Source: Nationally Determined Contributions Synthesis Report
by the Secretariat of the United Nations Framework Convention on Climate Change.

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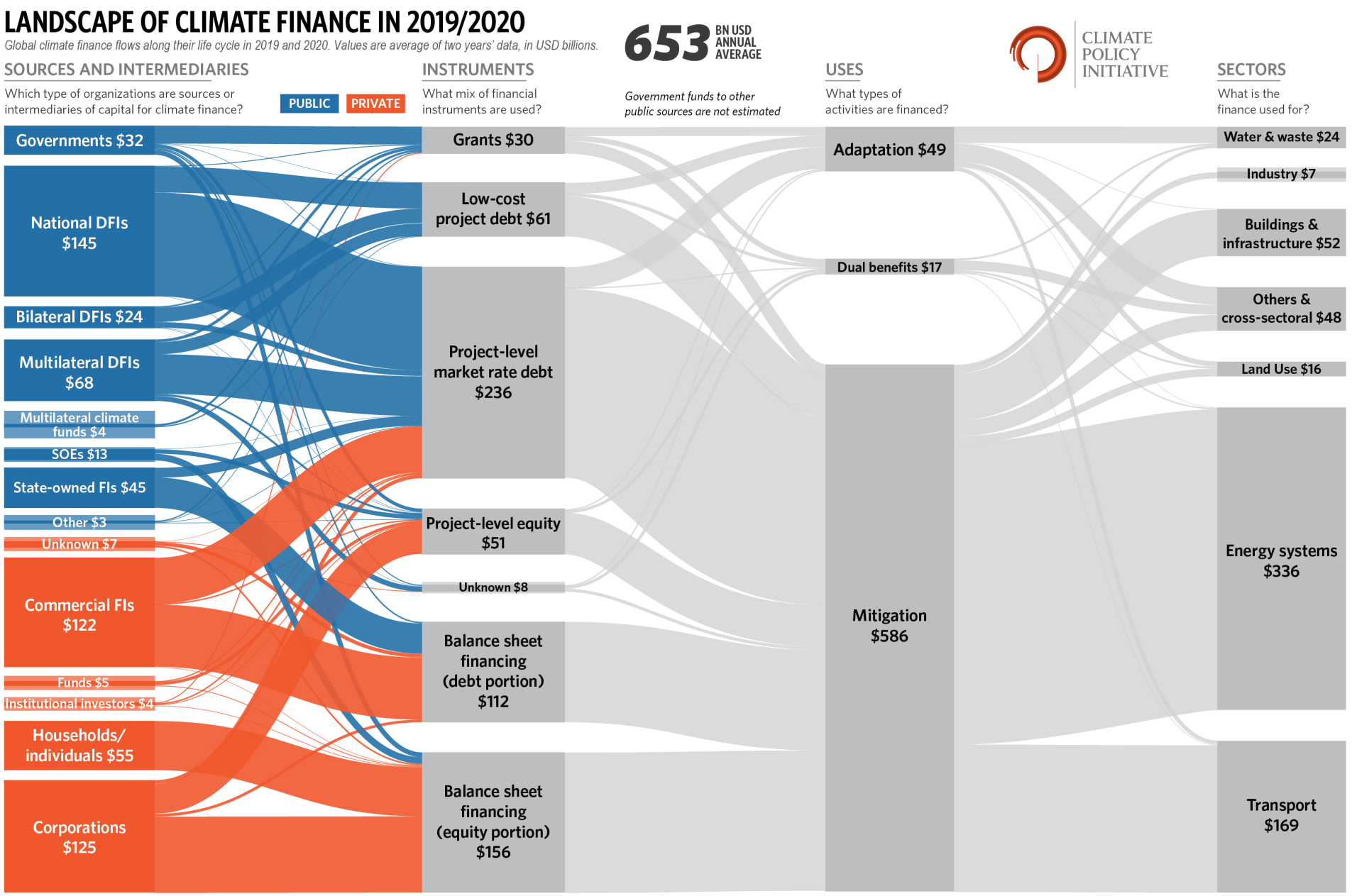
Finance gap

"… reaching climate objectives will require climate investment to increase at least seven times by the end of this decade…"



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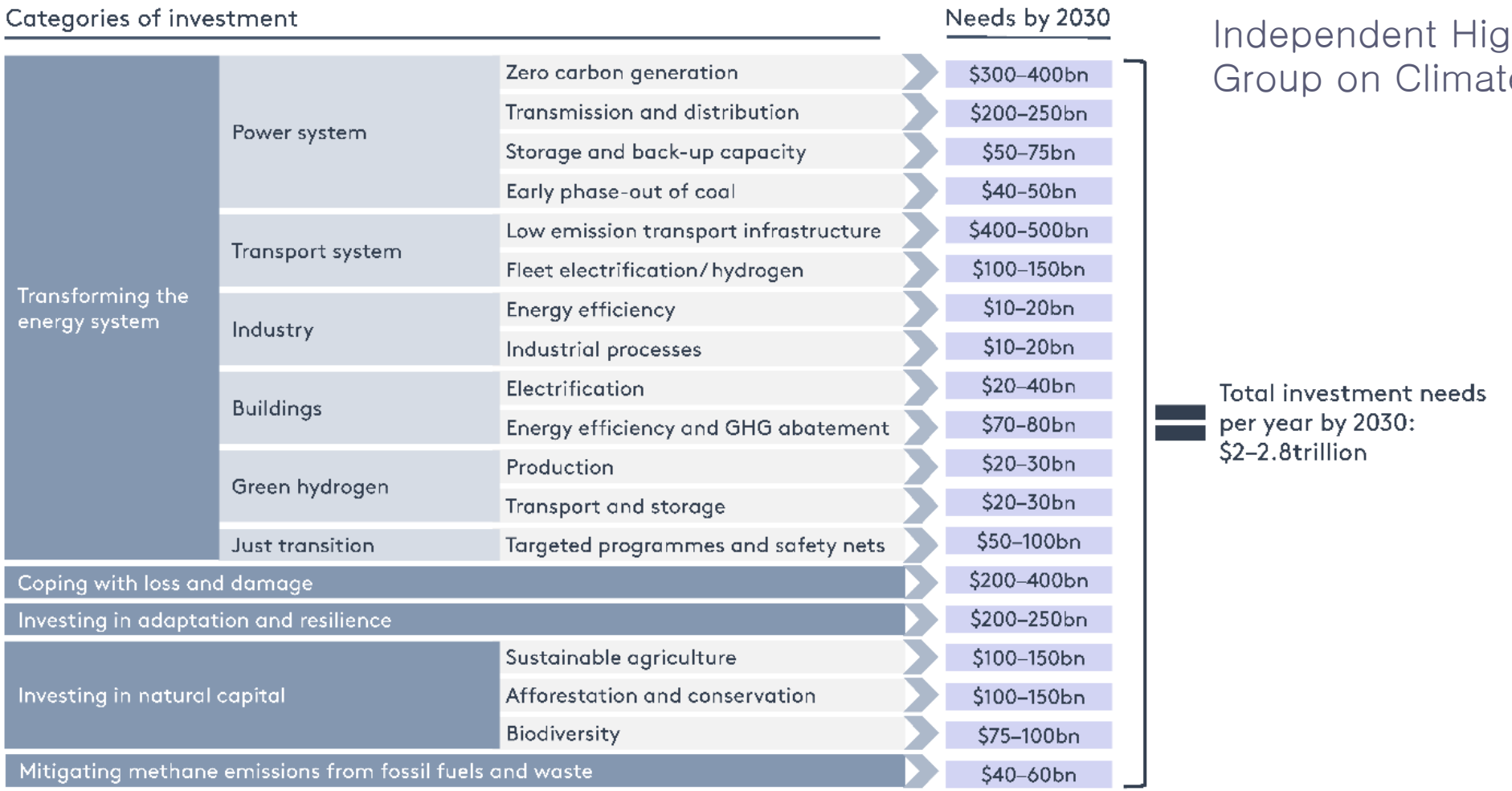
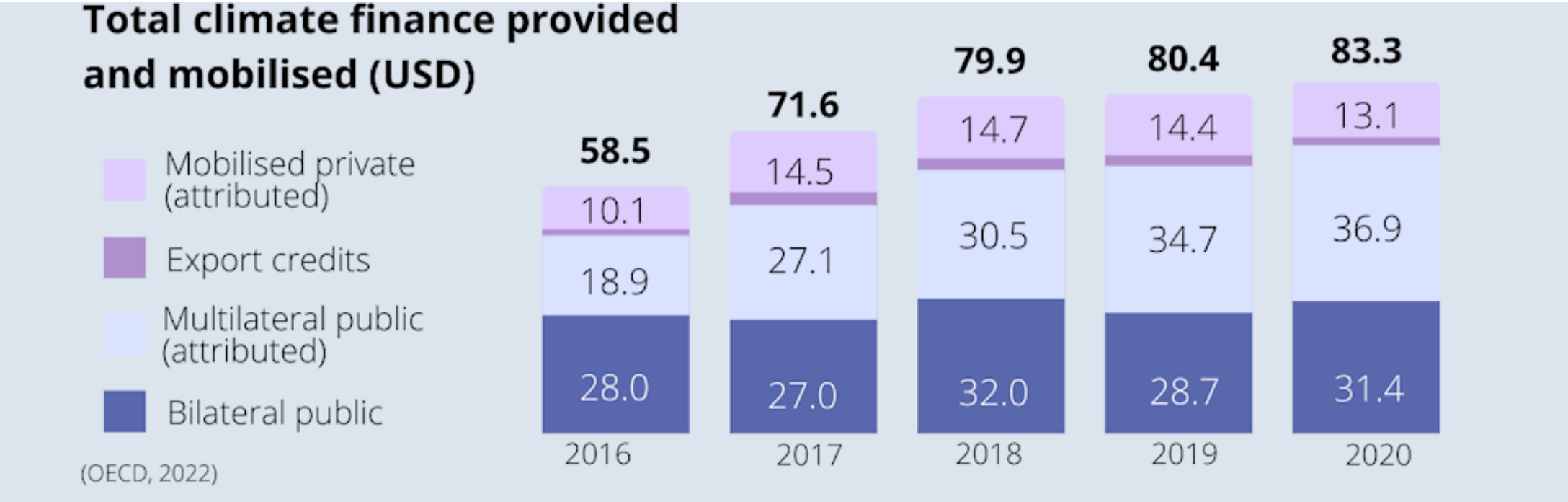
Investment/spending needs for climate action per year by 2030



Independent High-Level Expert Group on Climate Finance

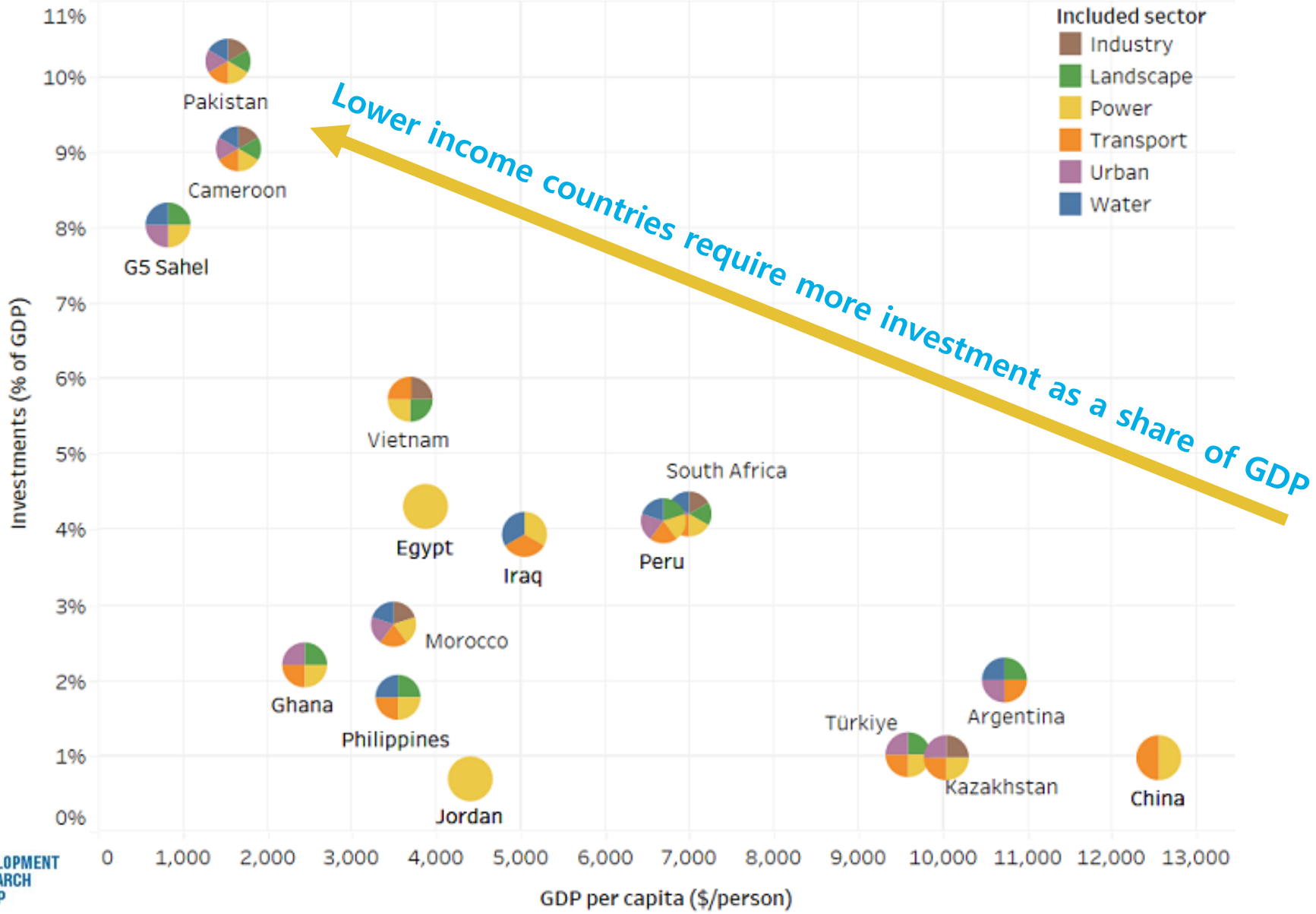
Source: Songwe V, Stern N, Bhattacharya A (2022) *Finance for climate action: Scaling up investment for climate and development*

2009 climate finance commitment: mobilize $100 billion per year for developing countries by 2020



- Not met, and $100bn is still far short of what is needed

Additional investment needs for resilient and low-carbon development



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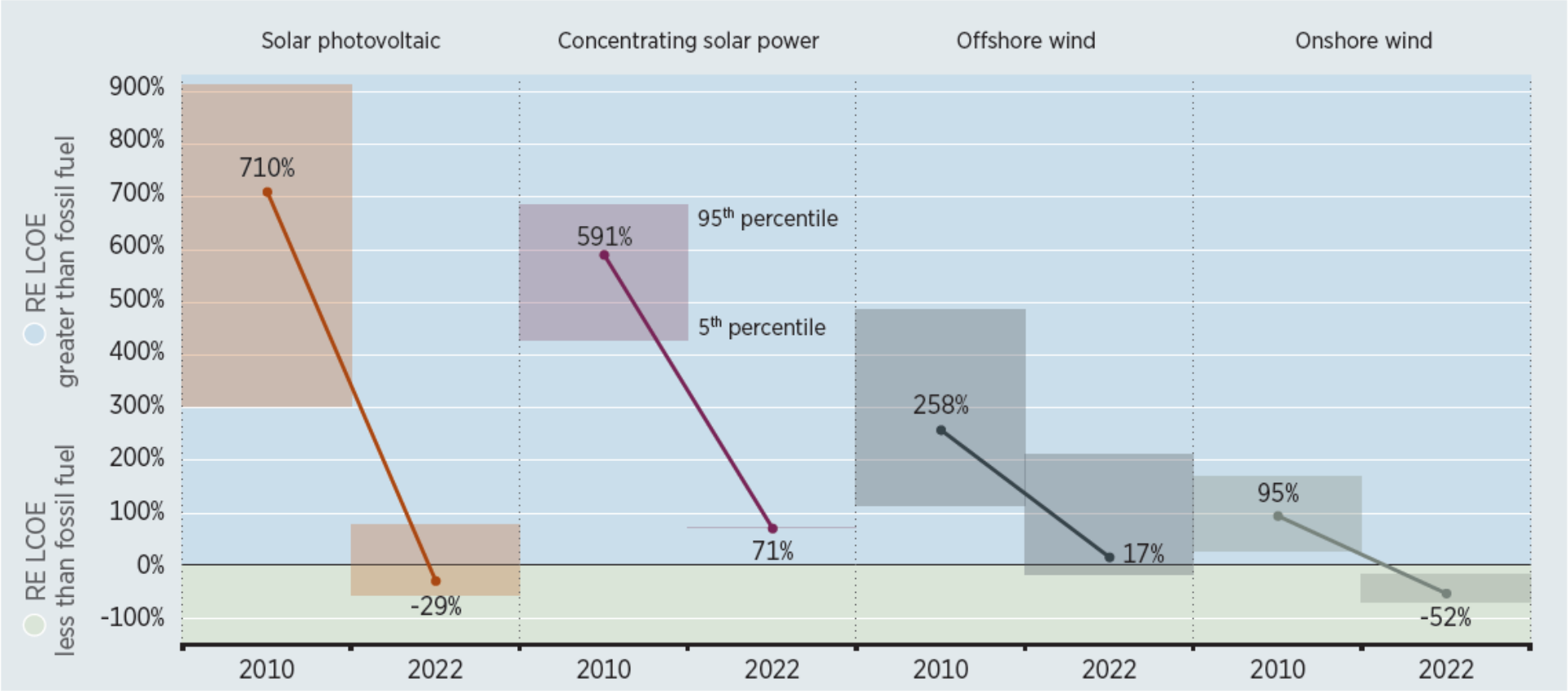
https://www.worldbank.org/en/news/feature/2023/03/13/what-you-need-to-know-about-how-ccdrs-estimate-climate-finance-needs

Low-carbon energy cost gap

Figure S.1 Change in competitiveness of solar and wind by country based on global weighted average LCOE, 2010-2022

Good news: Renewable energy has become cost-competitive, but work still needed on storage, integration, and system balancing

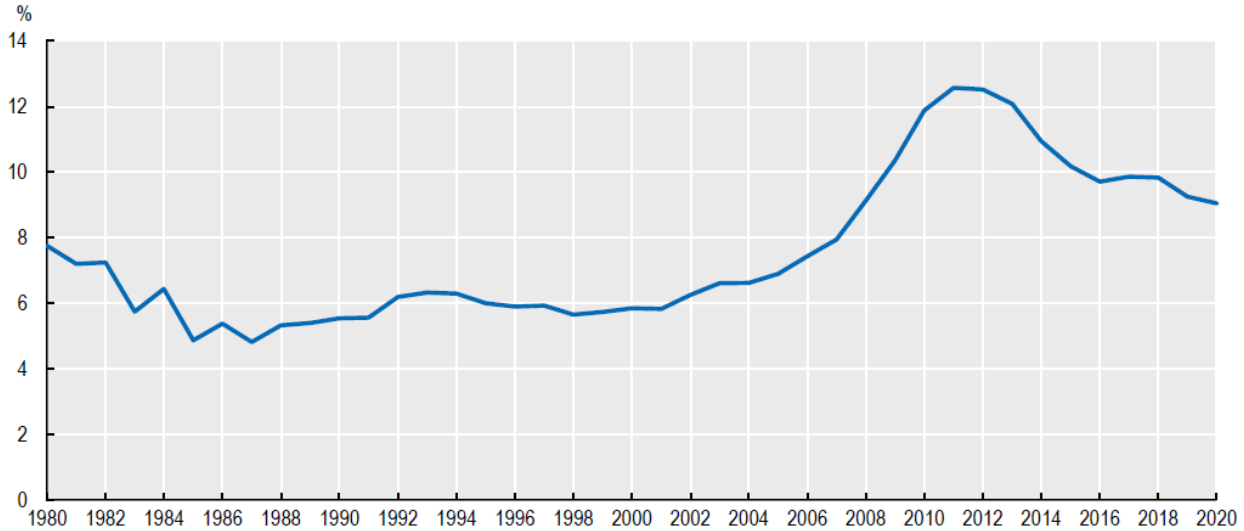


Note: The global weighted average LCOE data by technology and the fossil fuel LCOE data used to derive this chart is presented in detail in Chapter 1; RE = renewable energy.

Source: IRENA (2023). The analysis excludes government incentives and system balancing costs.

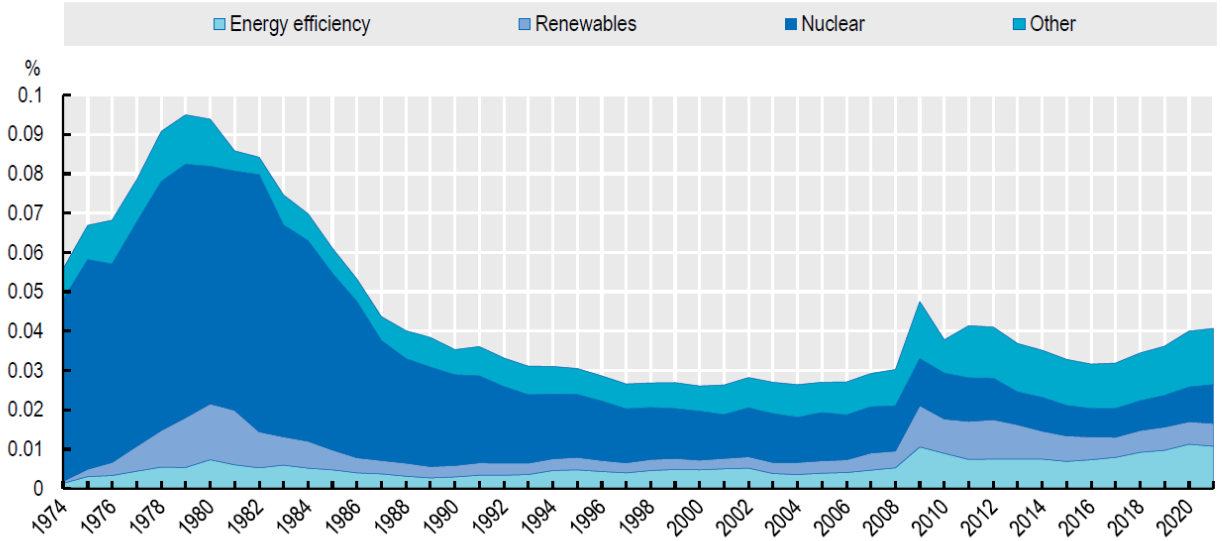
R&D gap

Figure 5. Global low-carbon patenting efforts have declined recently



Note: Data refer to families of patent applications fil
are identified using the "Y02" classification code dev
included are climate change mitigation technologies
production or processing of goods (Y02P), in transp
greenhouse gas emissions related to energy genera
greenhouse gases (Y02C).
Source: OECD, STI Micro-data Lab: Intellectual Pro

Figure 12. Low-carbon public RD&D expenditures in GDP across IEA countries, 1974-2020



Not to mention a tech-transfer gap

Note: The "Others" category includes Carbon capture and storage, Hydrogen and fuel cells, Other power and storage technologies, and Other cross-cutting technologies and research. See https://www.iea.org/data-and-statistics/data-product/energy-technology-rd-and-d-budget-database-2
Source: IEA Energy Technology RD&D Budgets database, December 2022.

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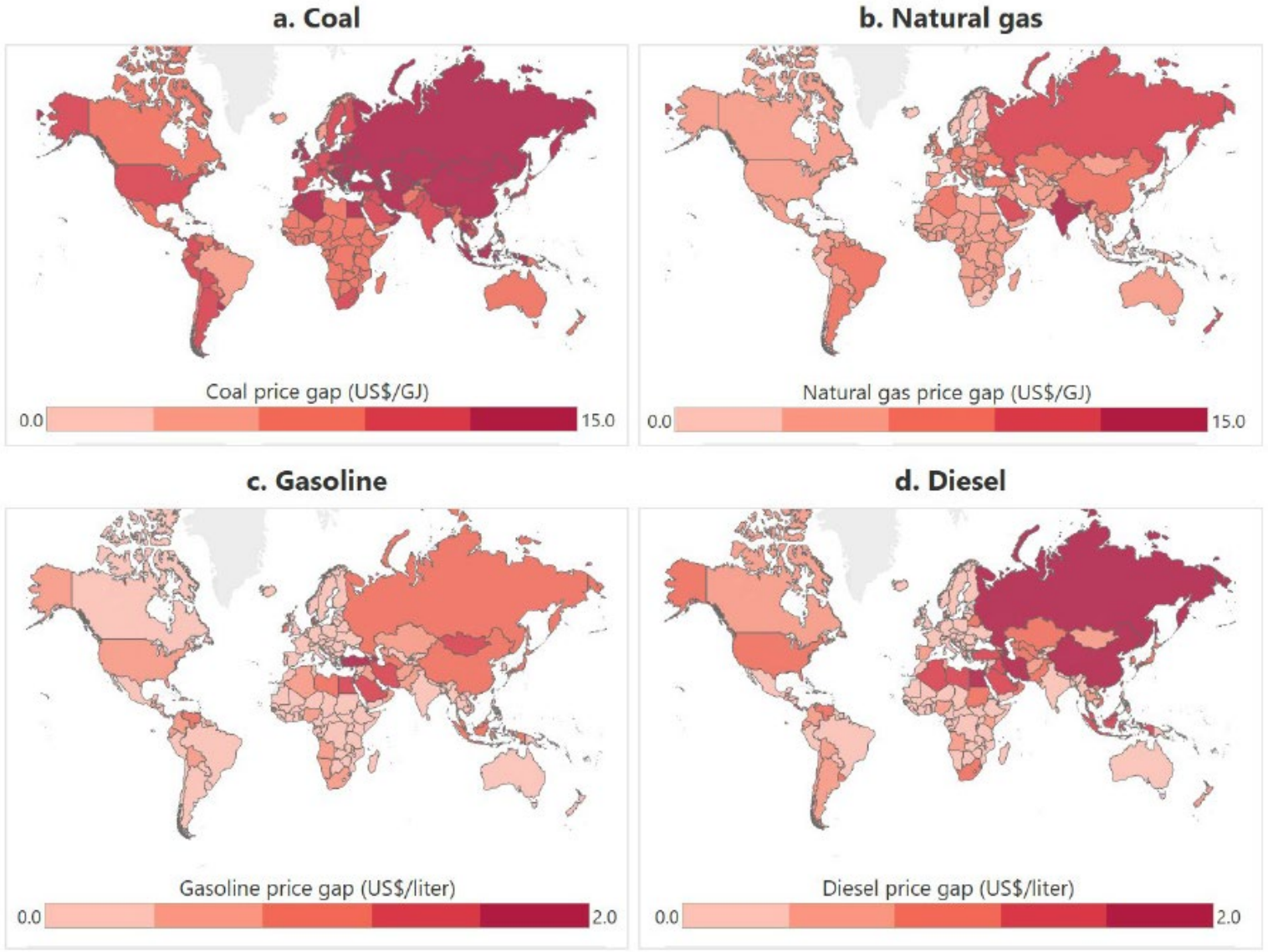
Pricing gap

Efficient pricing includes not only supply costs, but also external costs:

- climate change
- air pollution
- (for transport fuels) traffic congestion.

User prices are supply costs net of tax/subsidy interventions

Figure ES1. Gaps between efficient prices and user prices for fossil fuels by country, 2020



Source. IMF staff.

[Still Not Getting Energy Prices Right: A Global and Country Update of Fossil Fuel Subsidies]

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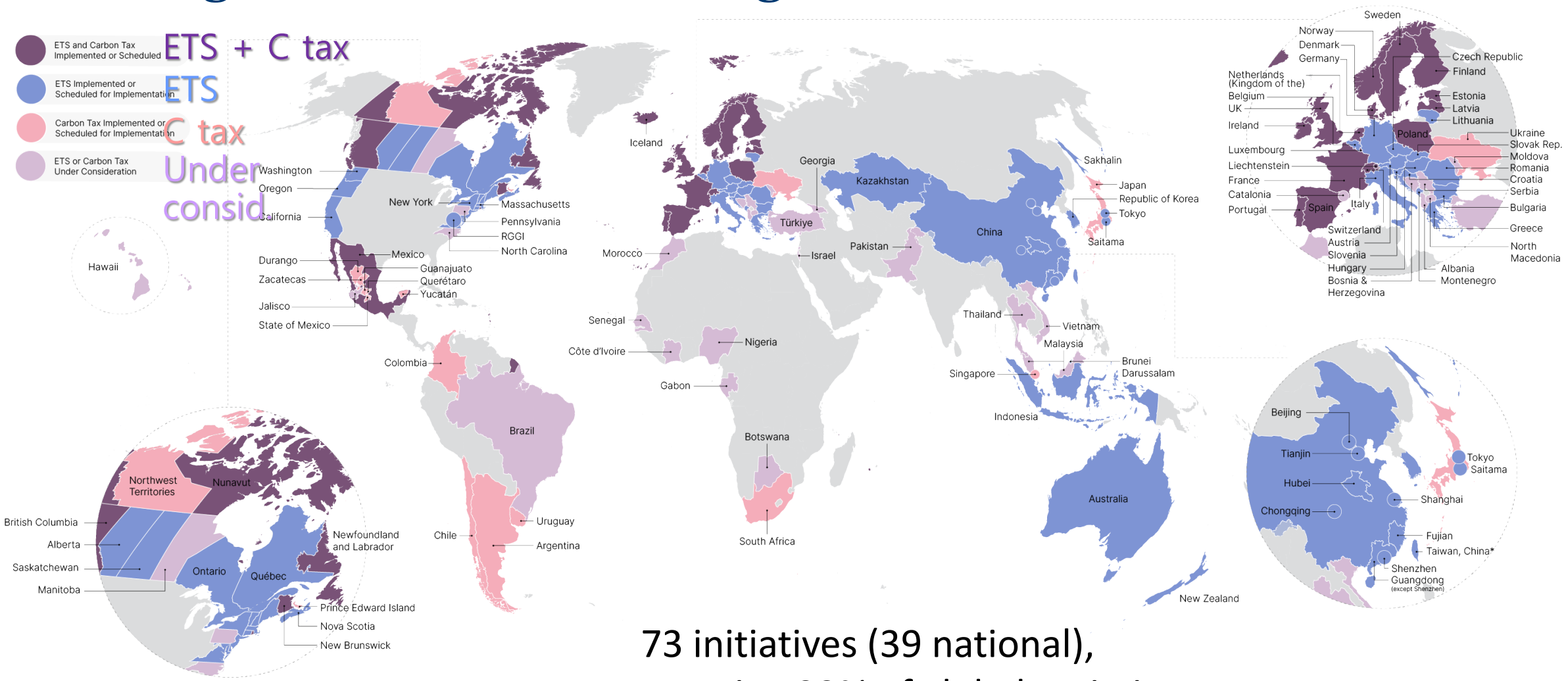
State and Trends of Carbon Pricing (2023):
Tracking Direct Carbon Pricing



73 initiatives (39 national),
covering 23% of global emissions

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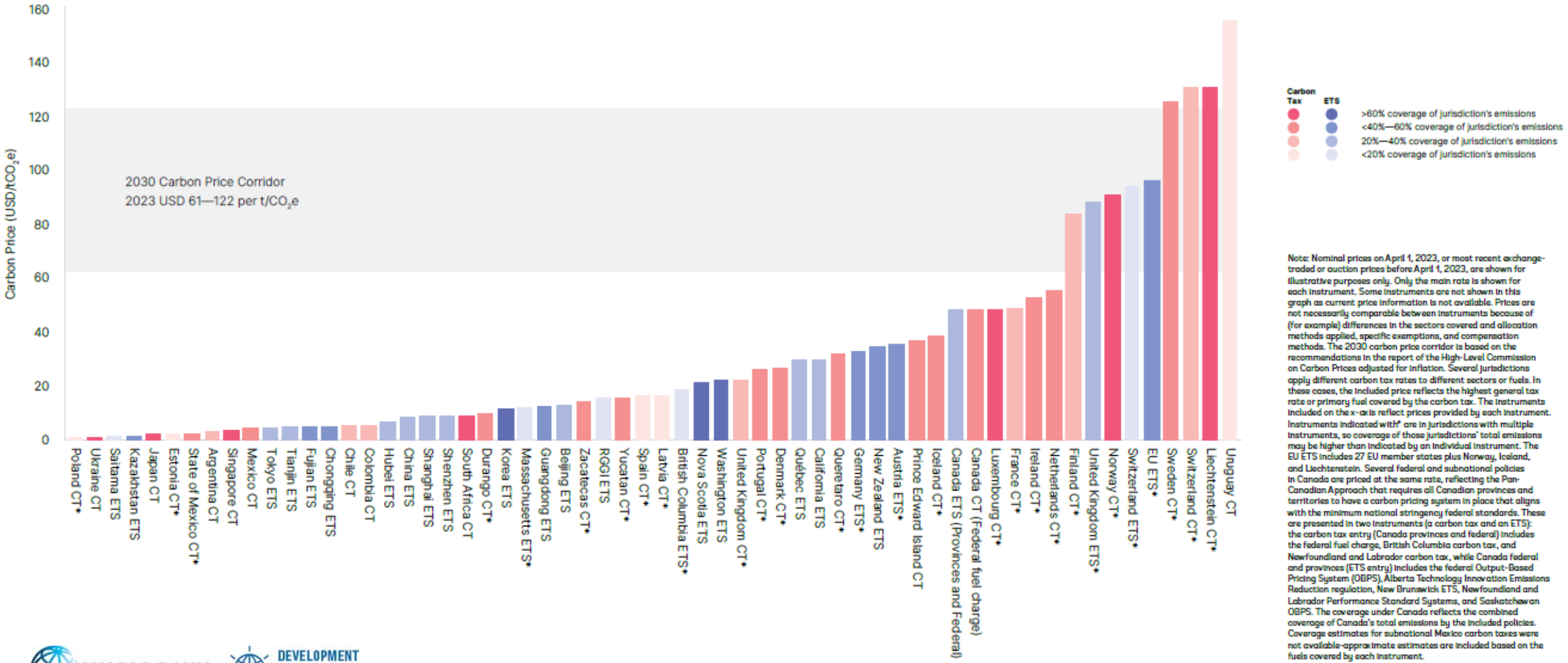
Dispersion in price levels and coverage

FIGURE 3
PRICES AND COVERAGE ACROSS ETSs AND CARBON TAXES



Note: Nominal prices on April 1, 2023, or most recent exchange-traded or auction prices before April 1, 2023, are shown for illustrative purposes only. Only the main rate is shown for each instrument. Some instruments are not shown in this graph as current price information is not available. Prices are not necessarily comparable between instruments because of (for example) differences in the sectors covered and allocation methods applied, specific exemptions, and compensation methods. The 2030 carbon price corridor is based on the recommendations in the report of the High-Level Commission on Carbon Prices adjusted for inflation. Several jurisdictions apply different carbon tax rates to different sectors or fuels. In these cases, the included price reflects the highest general tax rate or primary fuel covered by the carbon tax. The instruments included on the x-axis reflect prices provided by each instrument. Instruments indicated with* are in jurisdictions with multiple instruments, so coverage of those jurisdictions' total emissions may be higher than indicated by an individual instrument. The EU ETS includes 27 EU member states plus Norway, Iceland, and Liechtenstein. Several federal and subnational policies in Canada are priced at the same rate, reflecting the Pan-Canadian Approach that requires all Canadian provinces and territories to have a carbon pricing system in place that aligns with the minimum national stringency federal standards. These are presented in two instruments (a carbon tax and an ETS): the carbon tax entry (Canada provinces and federal) includes the federal fuel charge, British Columbia carbon tax, and Newfoundland and Labrador carbon tax, while Canada federal and provinces (ETS entry) includes the federal Output-Based Pricing System (OBPS), Alberta Technology Innovation Emissions Reduction regulation, New Brunswick ETS, Newfoundland and Labrador Performance Standard Systems, and Saskatchewan OBPS. The coverage under Canada reflects the combined coverage of Canada's total emissions by the included policies. Coverage estimates for subnational Mexico carbon taxes were not available-approximate estimates are included based on the fuels covered by each instrument.

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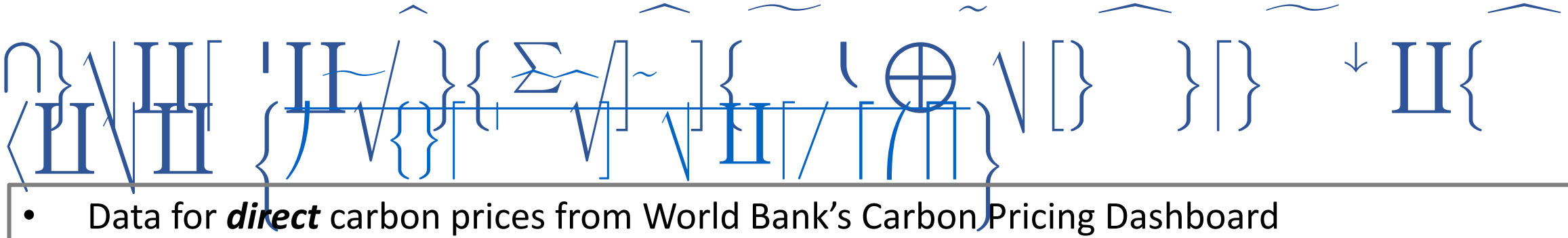


- Data for ***direct*** carbon prices from World Bank's Carbon Pricing Dashboard
  - nominal rates and coverage for each ETS and carbon tax.

- Data for ***indirect*** carbon pricing compiled using a price-gap approach

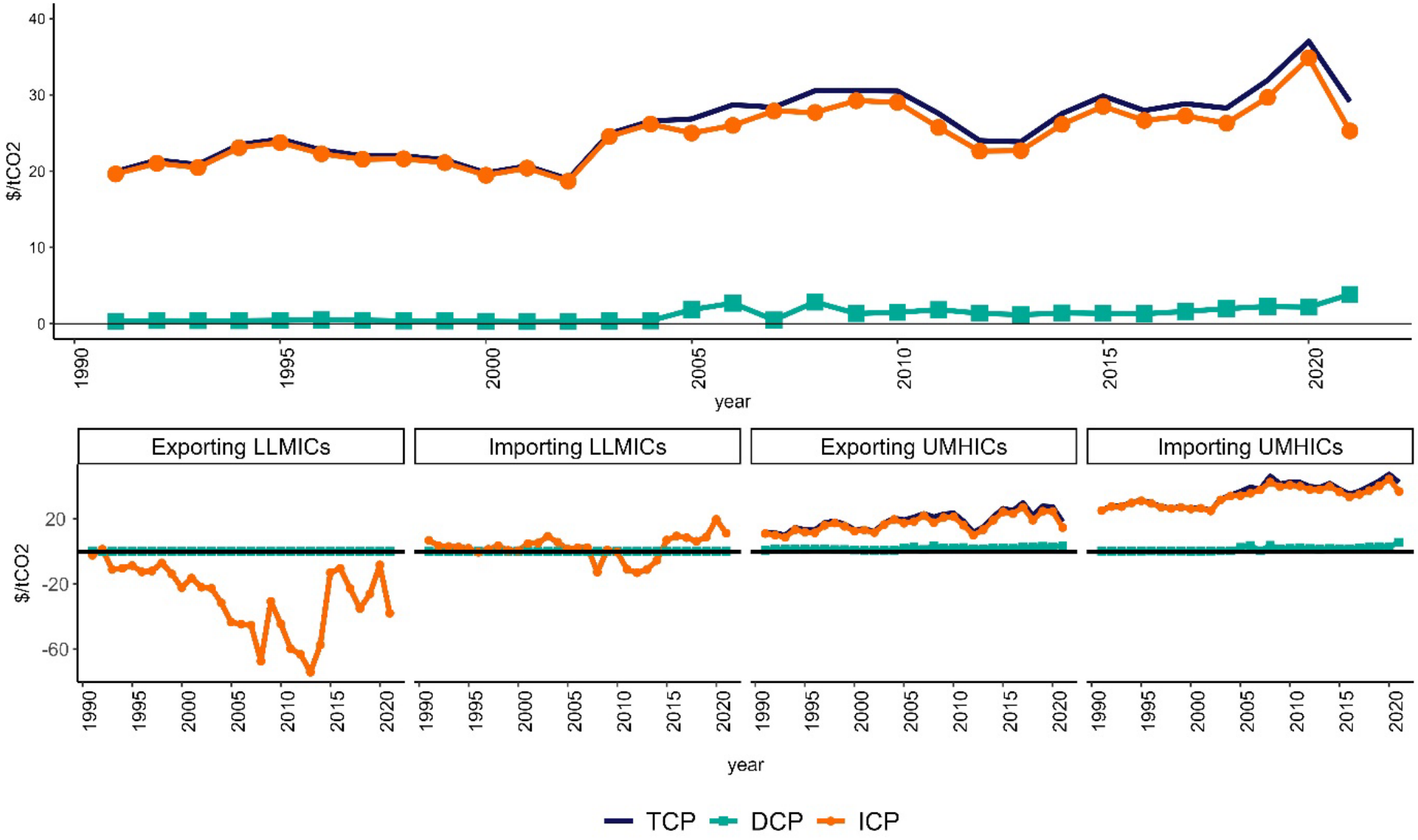
  $$\textit{net fuel tax} = \textit{retail price} - \textit{supply cost} - \textit{VAT payments} - \textit{upstream carbon price}$$

- Annual average retail prices mostly from IMF and World Bank
- Supply costs
  - Petroleum products from IEA
  - Natural gas based on hub, import or net-back export prices
  - Coal inferred using method from Parry et al., (2021)
- VAT deviations (the difference between the overall VAT rate and the VAT rate applying to a specific fuel) based on IMF database

- Covers sectors, fuels, and aggregates for 142 countries over the period 1991 to 2021

GLOBAL TRENDS IN TOTAL CARBON PRICING (TCP)

- Direct carbon pricing: carbon tax, ETS
- Indirect carbon pricing: fuel taxes net of subsidies



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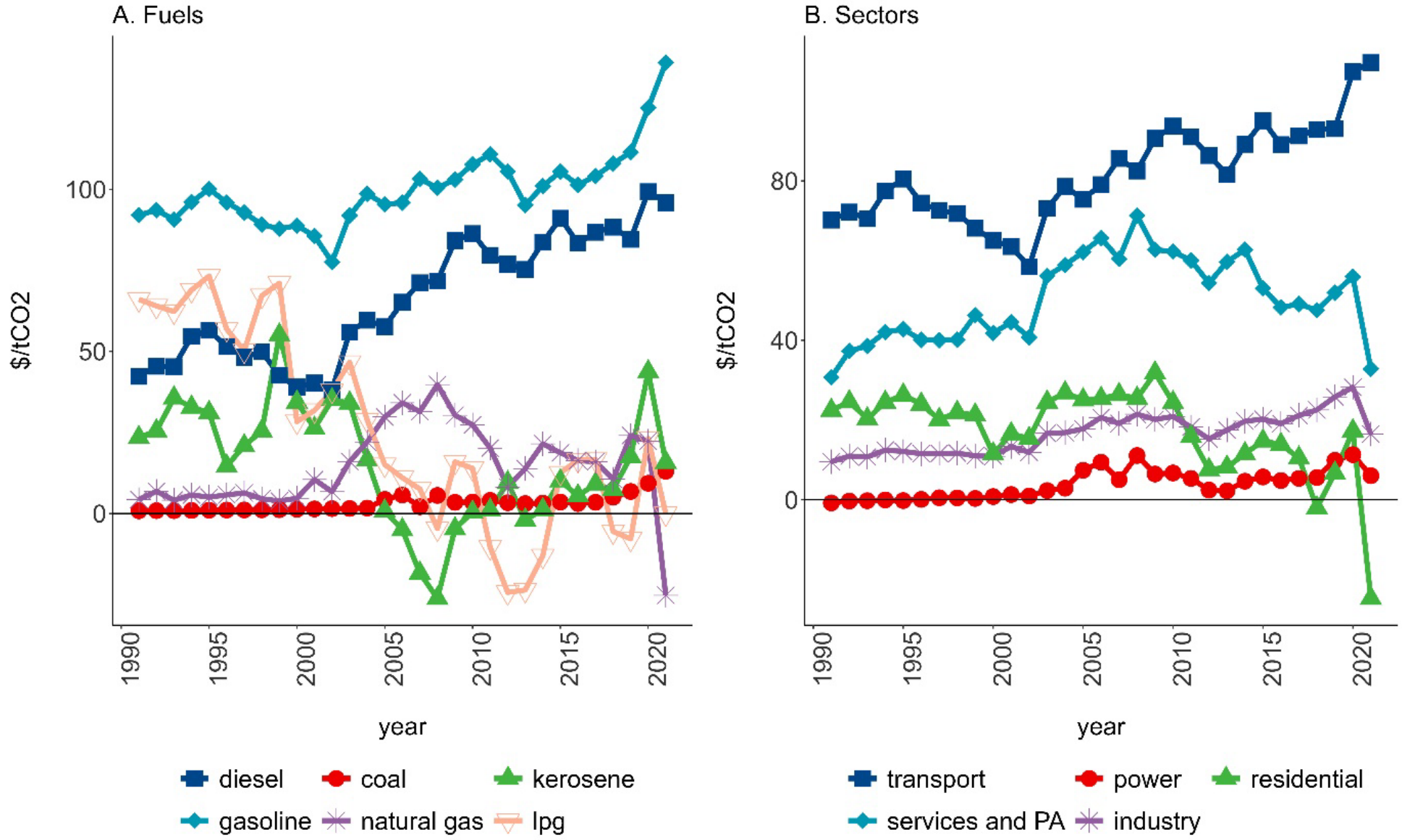
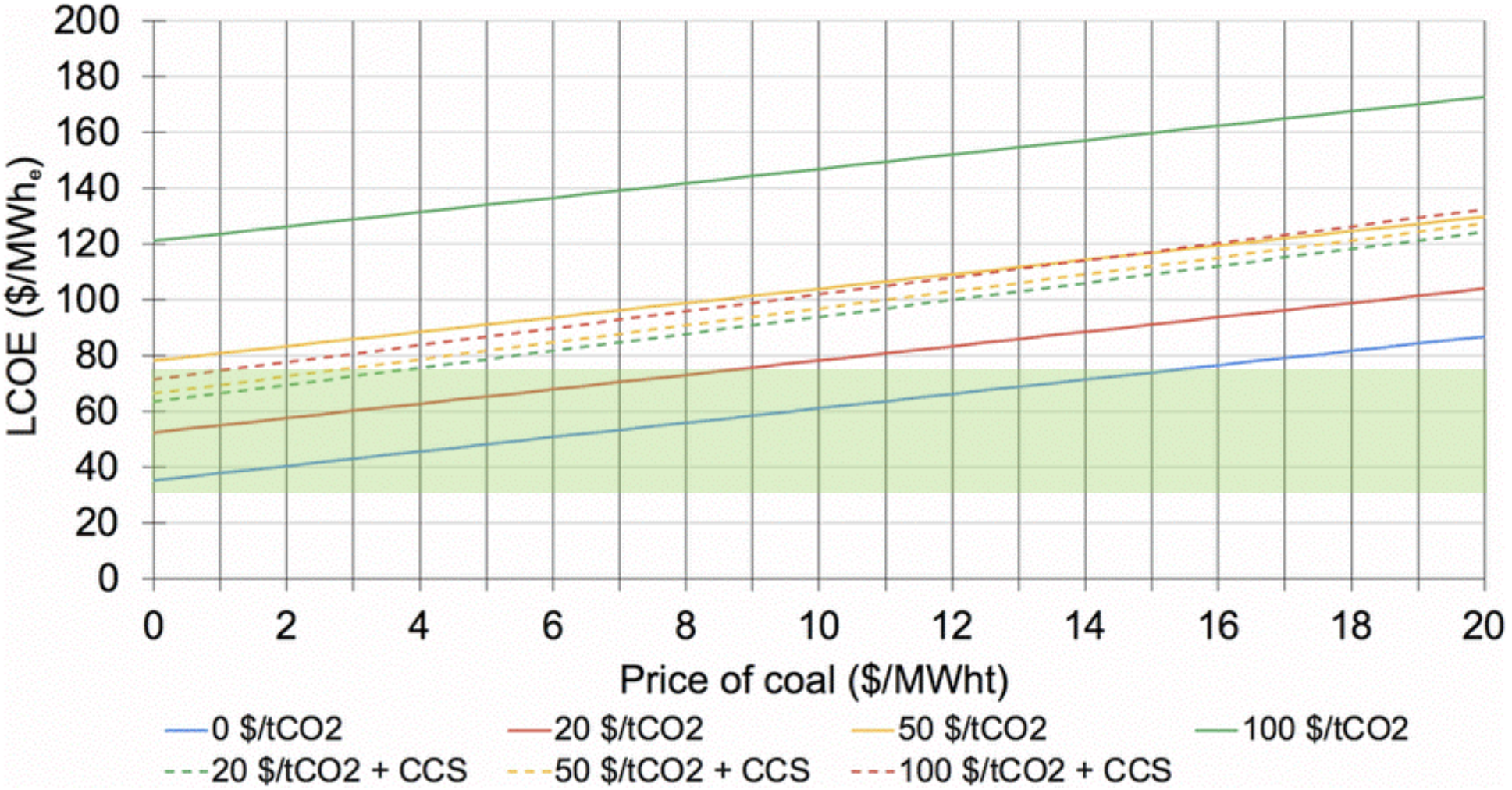

A. Fuels
B. Sectors
$/tCO2
100
50
0
80
40
1990
1995
2000
2005
2010
2015
2020
year
diesel
coal
kerosene
gasoline
natural gas
lpg
transport
power
residential
services and PA
industry

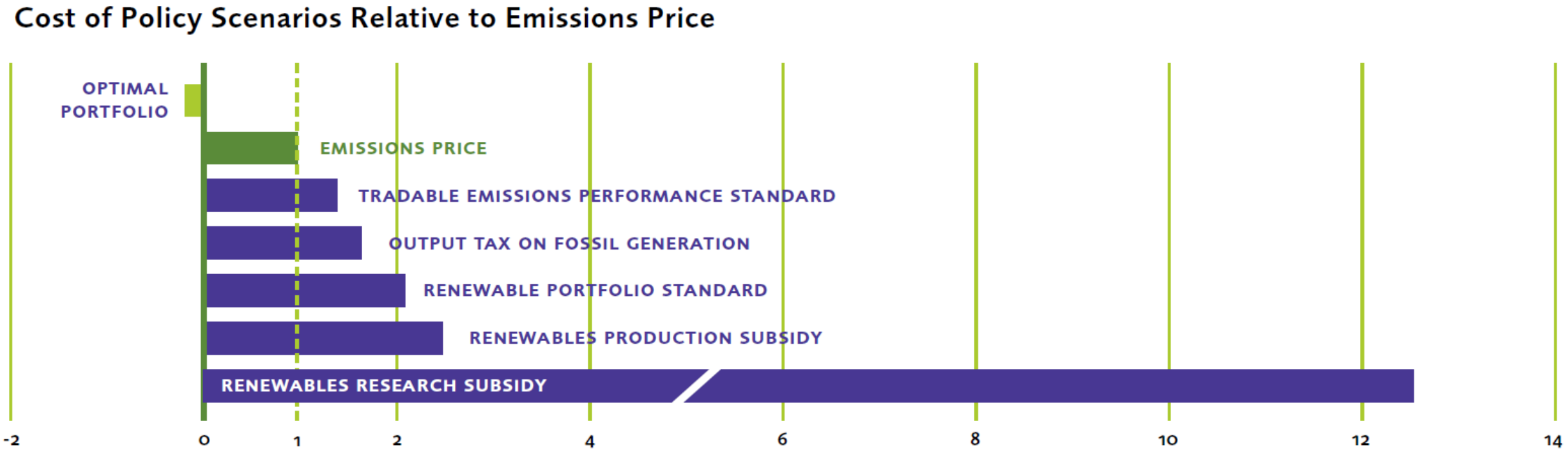
Prices and the competitiveness of coal



LCOE of newly commissioned utility-scale solar PV, onshore and offshore wind

Source: Handley, Slesinski, & Hsu (2021)

Relative costs of greening electricity without carbon pricing

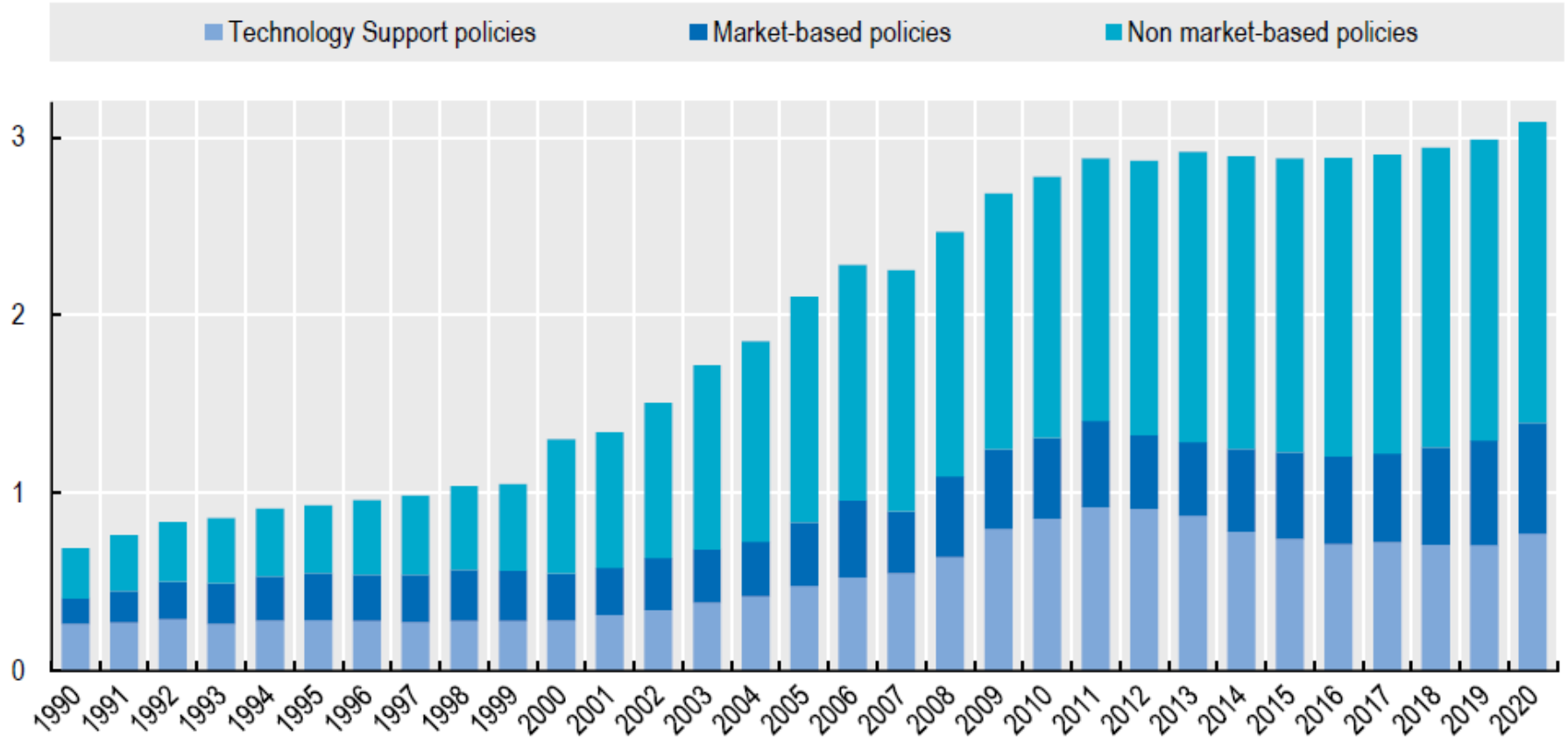


Fischer, C. and R.G. Newell. 2008. Environmental and Technology Policies for Climate Mitigation, *Journal of Environmental Economics and Management*. 55 (2): 142–162.

Climate policy should be a mix—to address other market failures—but with greater reliance on carbon pricing

Developed countries rely heavily on subsidies and regulations; not clear this mix is as affordable or feasible in developing countries

Figure 10. Average climate policy stringency across OECD countries, 1990-2020



Source: (Kruse et al., 2022[19]).

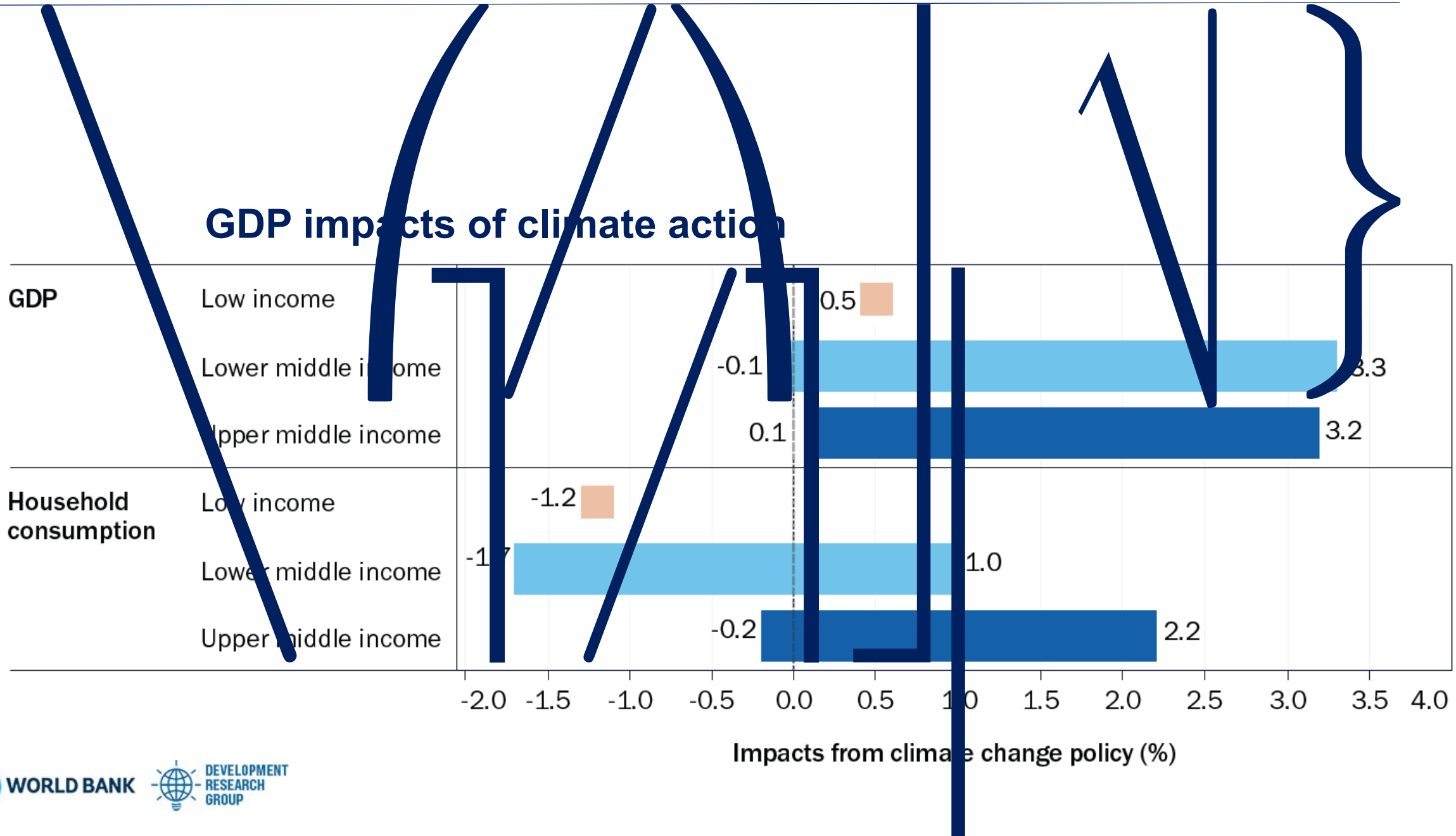
World Bank Group

COUNTRY CLIMATE AND DEVELOPMENT REPORT

WORLD BANK GROUP
Climate Change

April 11, 2023
Washington, D.C.

Macroeconomic impacts of climate policies would be low or positive



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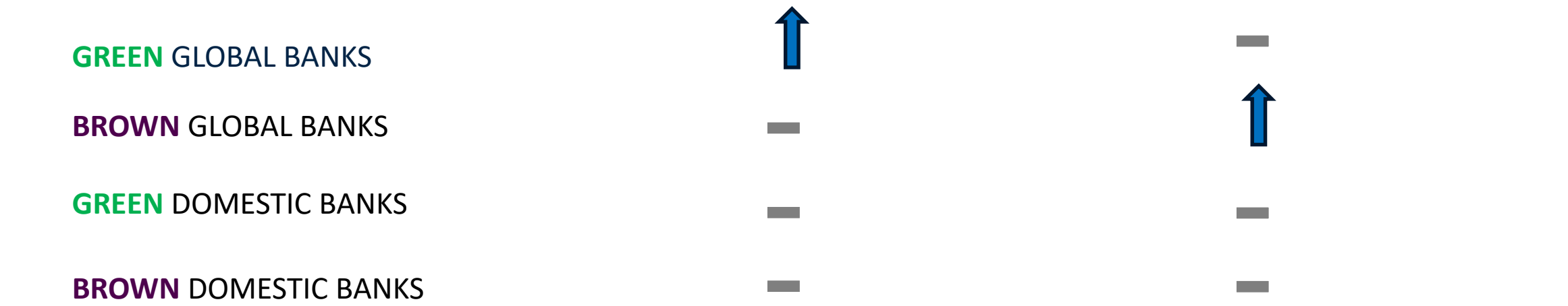
Potential for low-cost low-carbon policies

- Leveraging financial incentives through broad-based market-based mechanisms is more cost-effective than other approaches
- Removing fossil fuel subsidies and raising carbon prices improves public finance and macroeconomic efficiency
  - Raises revenues
  - Compared to traditional taxes, carbon pricing has less interaction with labor market distortions and informality, leading to potential “double dividend”
  - Reduces need for reliance on costly subsidies to crowd in private finance
- Improved air quality from climate mitigation enhances growth
  - Improved productivity
  - Lower healthcare costs
- Infrastructure investments can make the total effect of carbon pricing progressive

Government commitments to address climate change can attract foreign banks with strong preferences for green assets

"Global Bank Lending Under Climate Policy"
IMF Economic Review



Heterogeneity across banks

- 1 SD ↑ in climate policy: 5.2% ↑ credit of **green** global banks
- **Brown** global banks do not exit countries implementing climate policies
- No effects on domestic banks

Spillover effects

- **Brown** global banks appear to expand their presence in countries with relatively weaker climate regulation

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Opportunities

- Strong role for finance ministries to play in supporting climate-friendly development
- Central banks can play supporting role to facilitate green finance
- Big need to scale up international climate finance to developing countries
- Domestic policies are needed to align market incentives and attract private finance
- Growing trade preferences for low-carbon goods

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Summary: levers for transformative climate finance

Figure 4: Eight levers for transformative climate finance