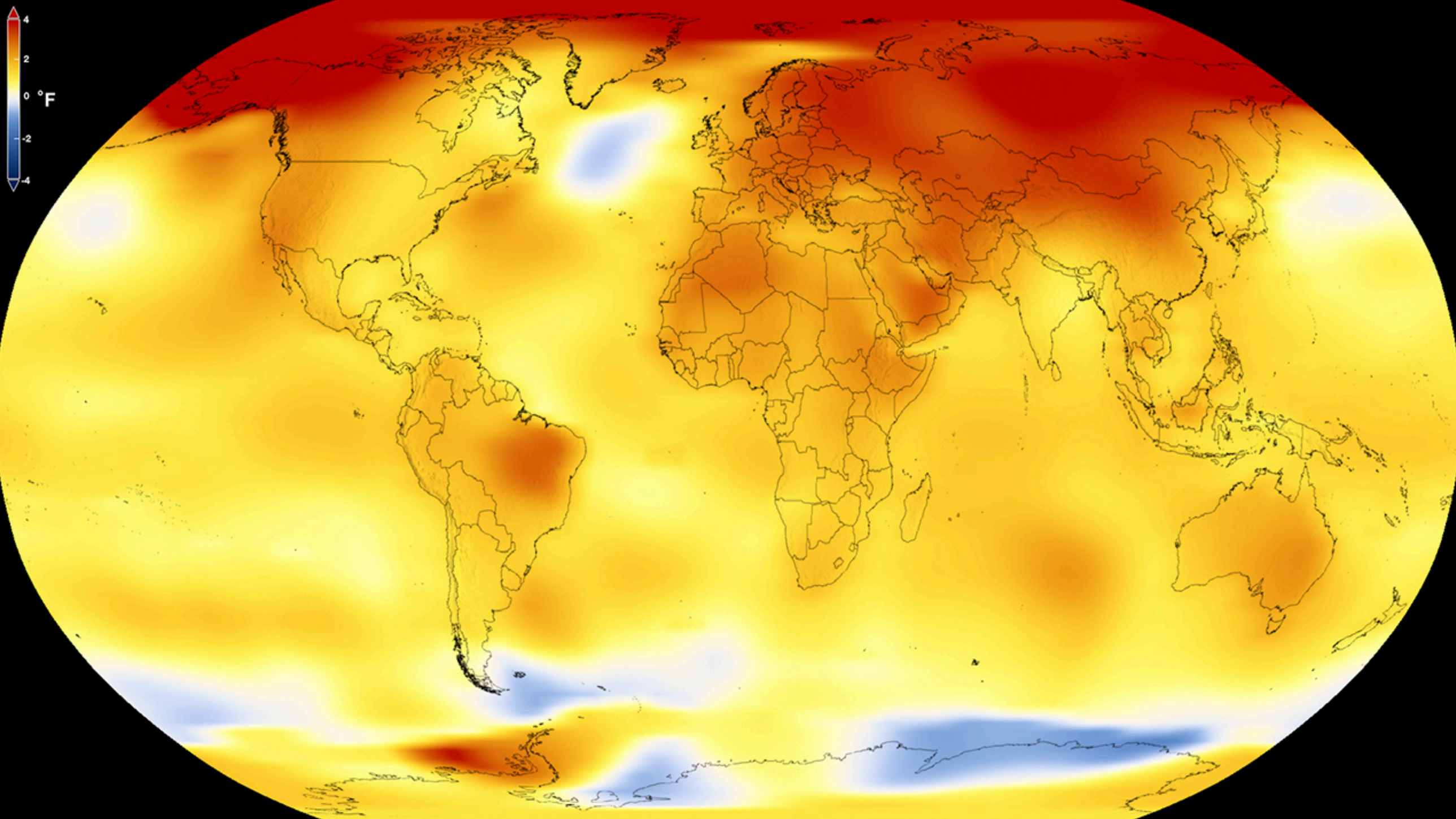
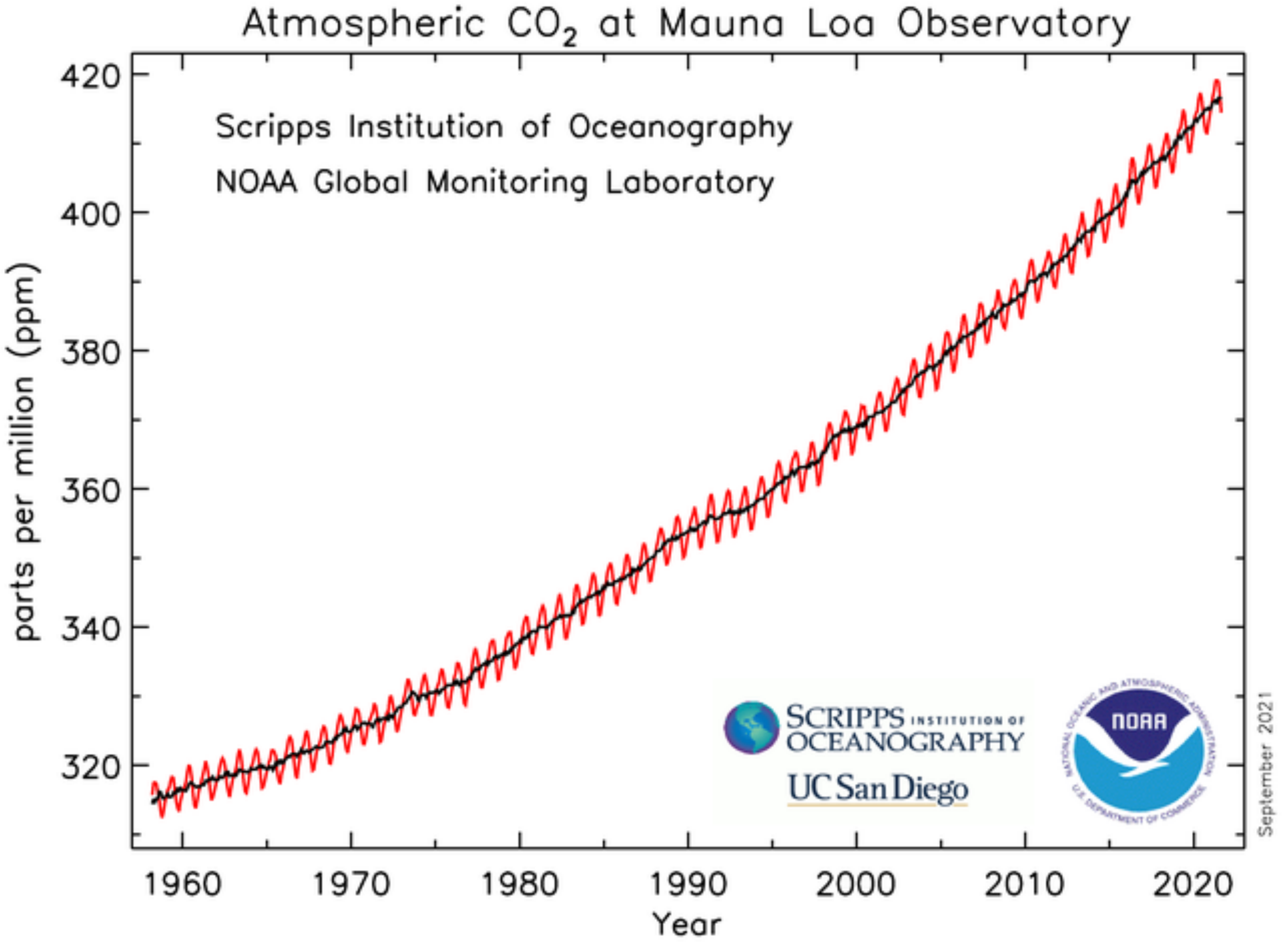
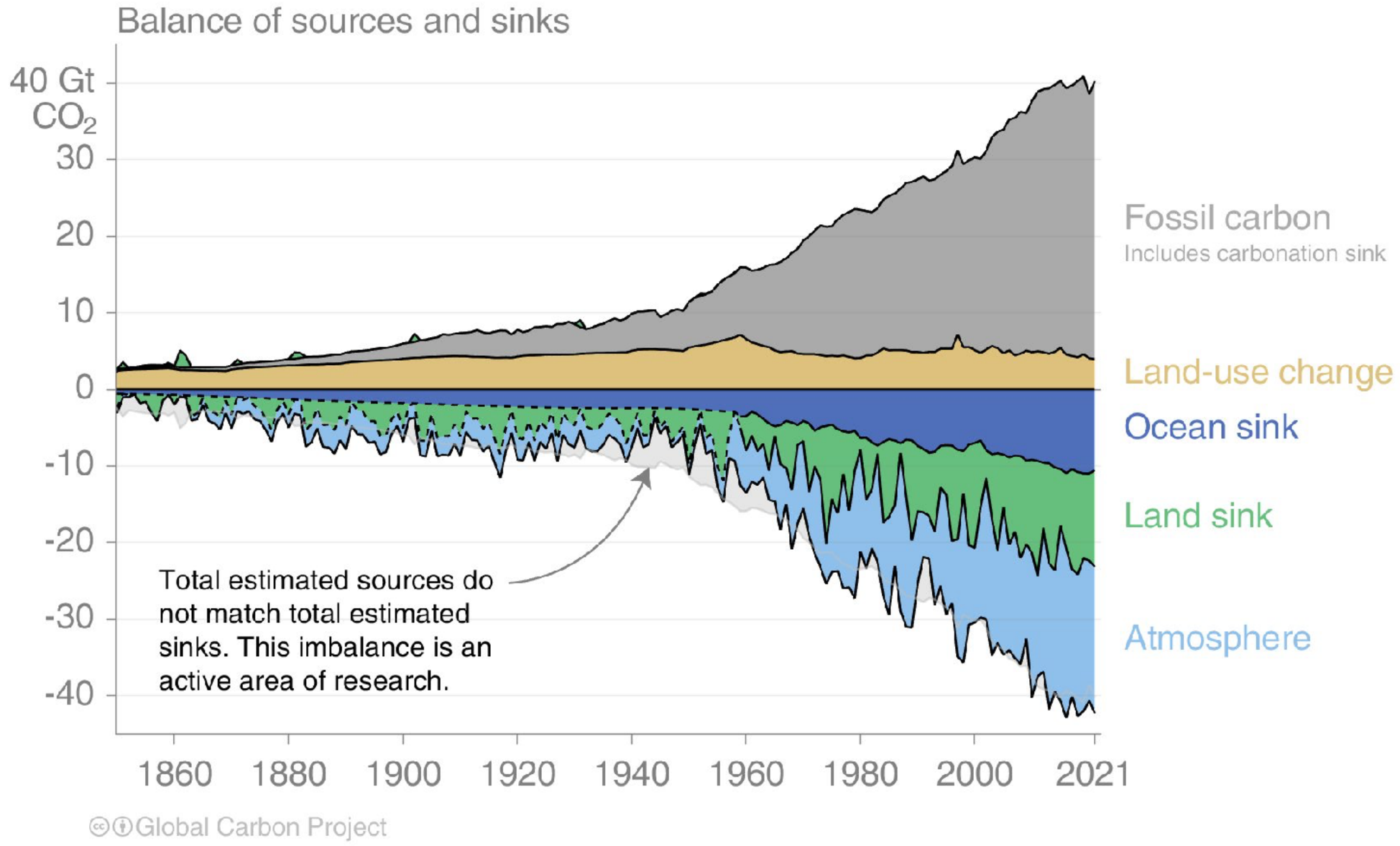
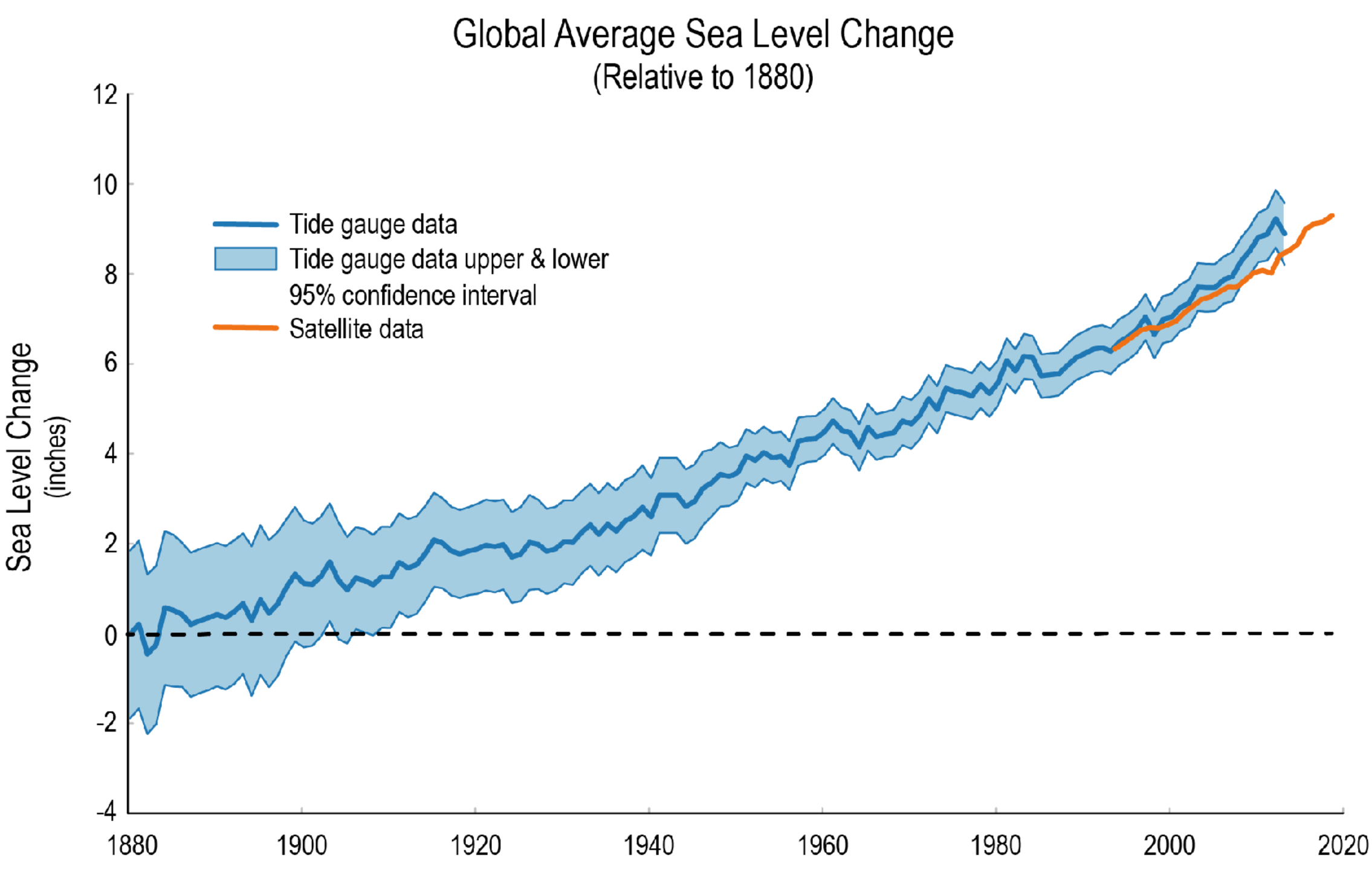
You've heard the news


4
2
0 °F
-2
-4


Atmospheric CO_2 at Mauna Loa Observatory
Scripps Institution of Oceanography
NOAA Global Monitoring Laboratory
parts per million (ppm)
420
400
380
360
340
320
1960
1970
1980
1990
2000
2010
2020
Year
SCRIPPS INSTITUTION OF OCEANOGRAPHY
UC San Diego
NOAA
September 2021

Ocean/land sinks = ~55% of annual emissions. 45% remain in atmosphere.

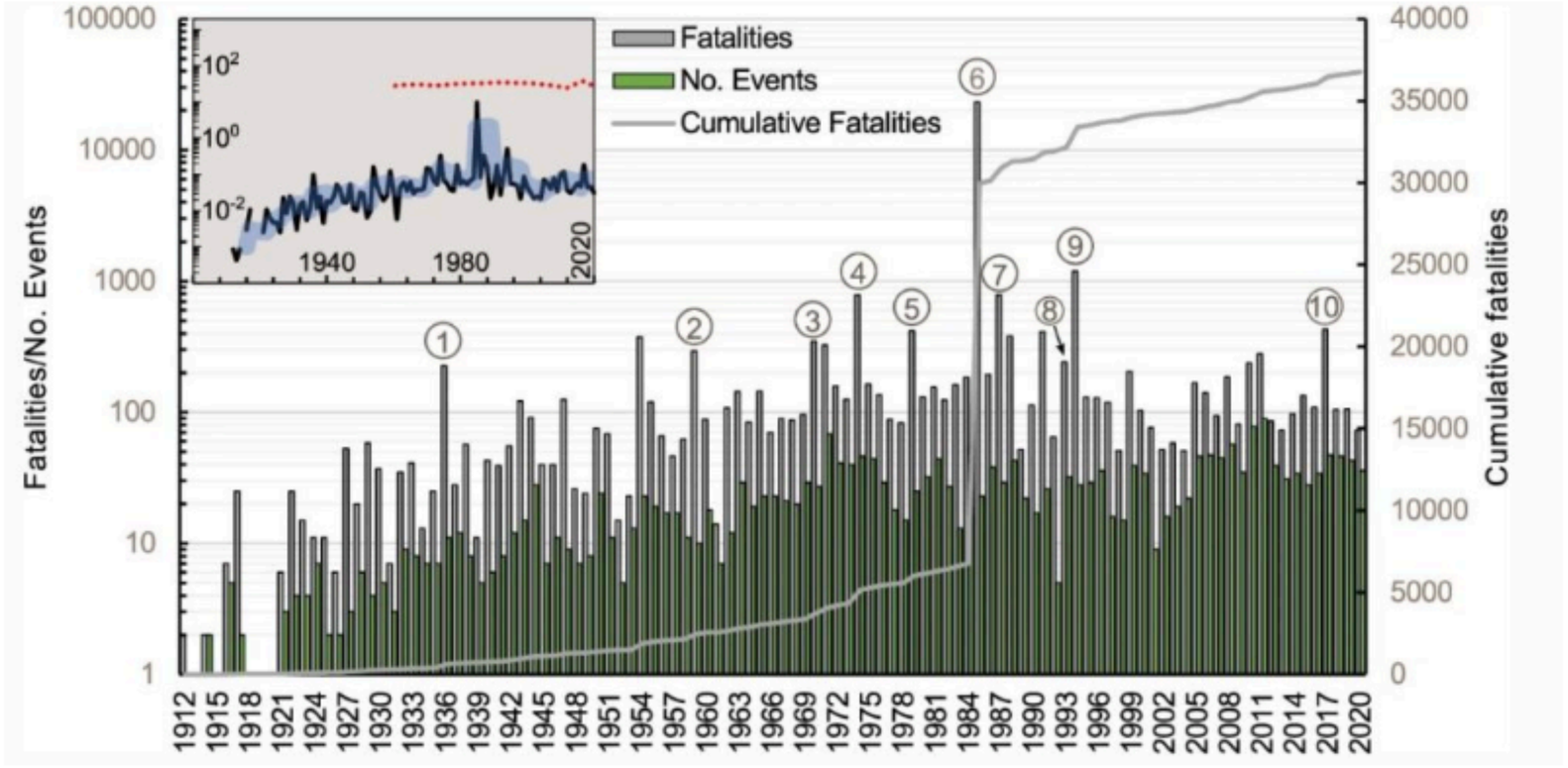



Global Average Sea Level Change
(Relative to 1880)
Sea Level Change
(inches)
12
10
8
6
4
2
0
-2
-4
Tide gauge data
Tide gauge data upper & lower
95% confidence interval
Satellite data
1880
1900
1920
1940
1960
1980
2000
2020




© Francois Walschaerts/AFP

Worsening landslides in Colombia



Numbers of landslides and landslide fatalities in Colombia through time. Graph from Garcia-Delgado *et al.* (2022). The figure caption is: Temporal distribution of deadly landslides, their fatalities and cumulative total of fatalities from 1912 to 2020. The numbers in circles correspond to the top 10 deadliest events as follows: (1) Túquerres (9 January 1936; n = 170 fatalities); (2) Ibagué (29 June 1959; n = 250); (3) Chiriguaná (10 November 1970; n = 123); (4) Quebrada Blanca–Guayabetal (28 June 1974; n = 400); (5) El Playón (25 November 1979; n = 300); (6) Armero–Chinchiná (13 November 1985; n = 23,084); (7) Villatina–Medellín (28 September 1987; n = 562); (8) Andes (26 April 1993; n = 120); (9) Páez (6 June 1994; n = 1100); and (10) Mocoa (31 March 2017; n = 333). To check the location of these events please refer to Fig. 2. The upper-left inset shows annual fatalities normalised by the number of events.

Helbert Garcia-Delgado, et al, "Fatal landslides in Colombia (from historical times to 2020) and their socio-economic impacts," *Landslides, March 21, 2022*

CLIMATE

How climate change drives inland floods

August 3, 2022 · 1:57 PM ET



REBECCA HERSHER



Vehicles after a flood in July 2022 in Jackson, Ky. Deadly floods in the region were caused by very heavy rain.

Global warming is killing the Great Barrier Reef, study says

By Ashley Strickland, CNN

Updated 3:23 PM EDT, Wed April 18, 2018



Photos: Australia's Great Barrier Reef suffers 'extreme' coral bleaching

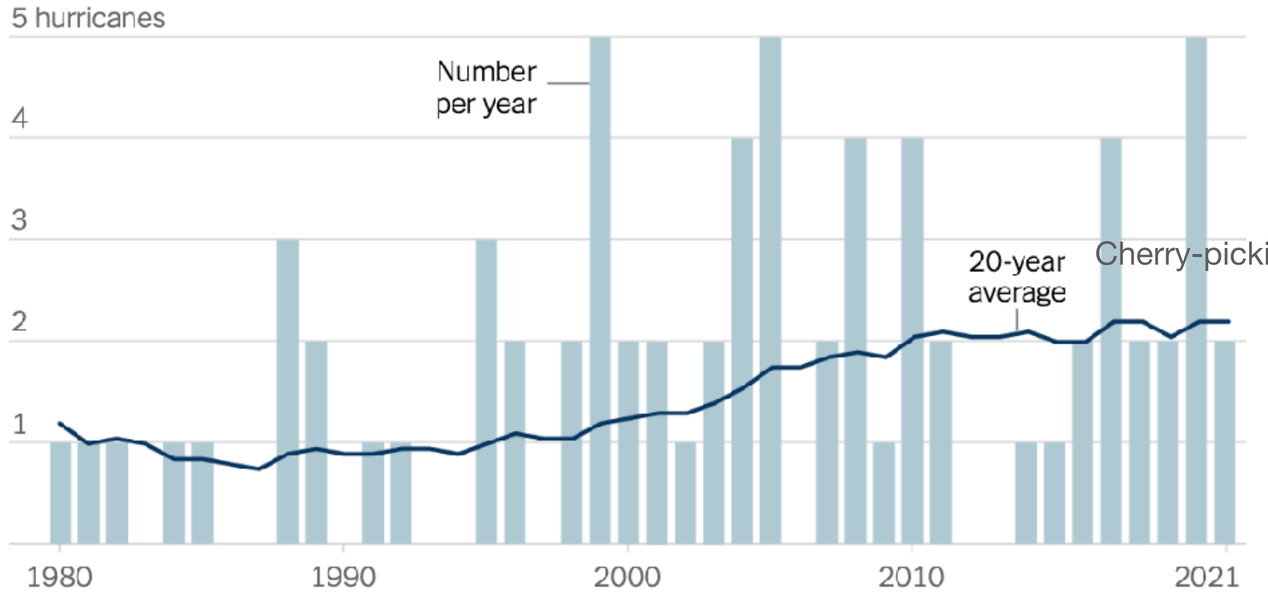

ENVIRONMENTAL
PROGRESS



ENVIRONMENTAL PROGRESS

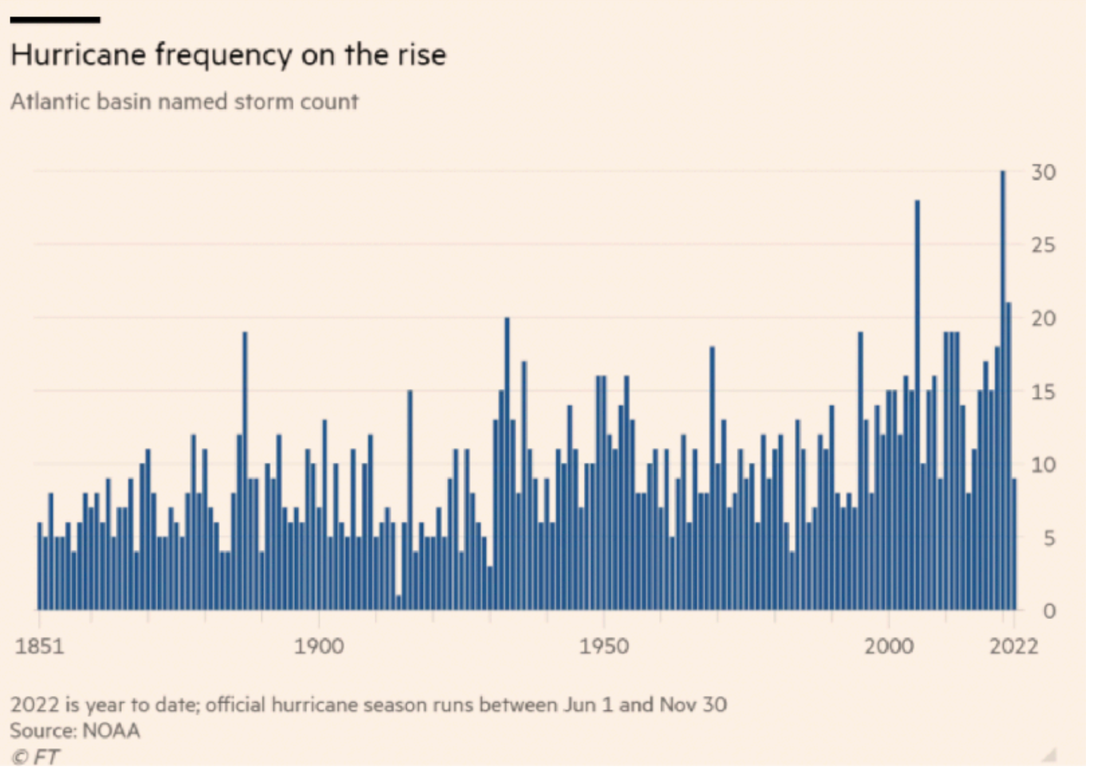

Annual U.S. solar photovoltaic module shipments and average value (2006–2019)
shipments
million peak kilowatts
18
16
14
12
10
8
6
4
2
0
2006 2008 2010 2012 2014 2016 2018
average value
dollars per peak watt
$4.00
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
$0.00
2006 2008 2010 2012 2014 2016 2018
eia

Category 4 and 5 Atlantic hurricanes since 1980



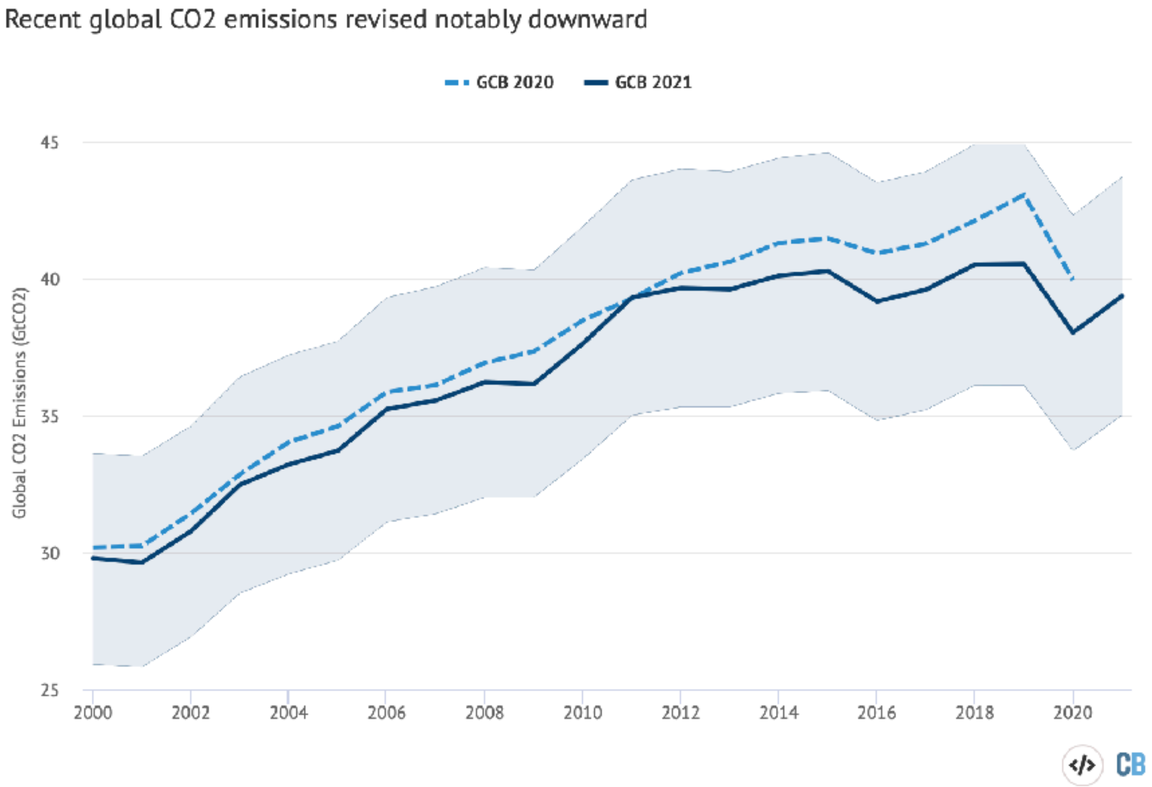
Source: NOAA • By The New York Times

Cherry-picking

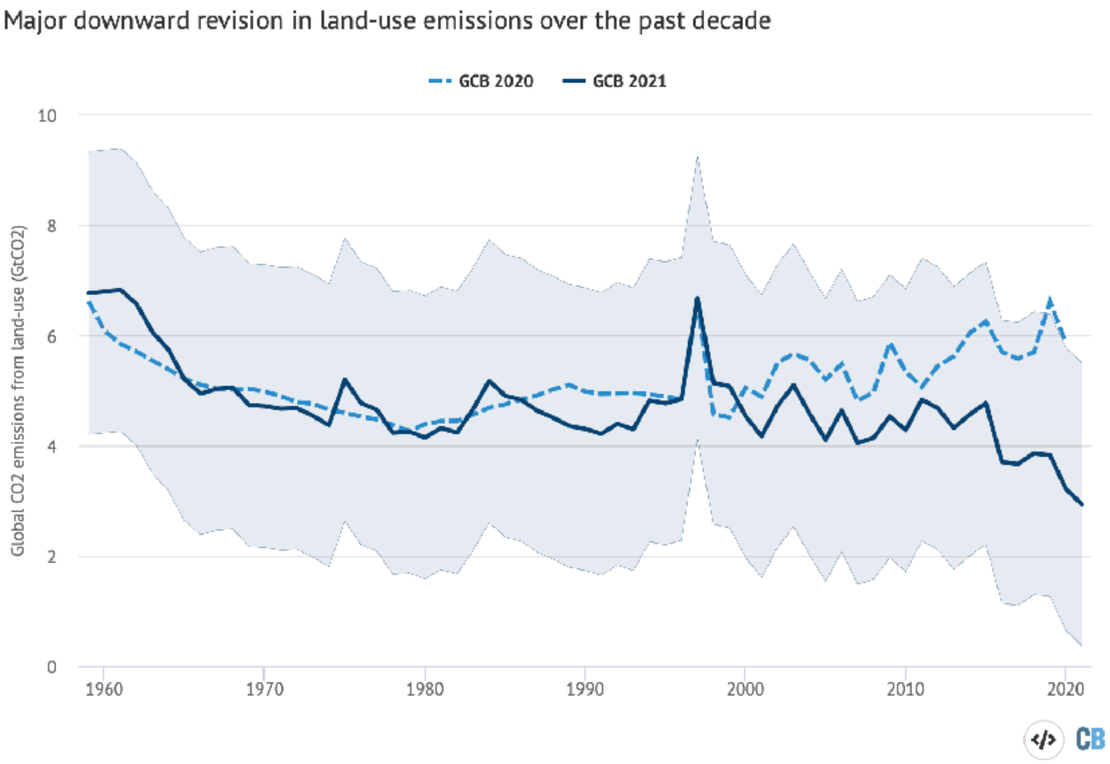


But there's more to the story

Global Emissions in Decline



Annual total global CO2 emissions – from fossil and land-use change – between 2000 and 2021 for both the 2020 and 2021 versions of the Global Carbon Project's Global Carbon Budget. Shaded area shows the estimated one-sigma uncertainty for the 2021 budget. Data from the Global Carbon Project; chart by Carbon Brief using Highcharts.

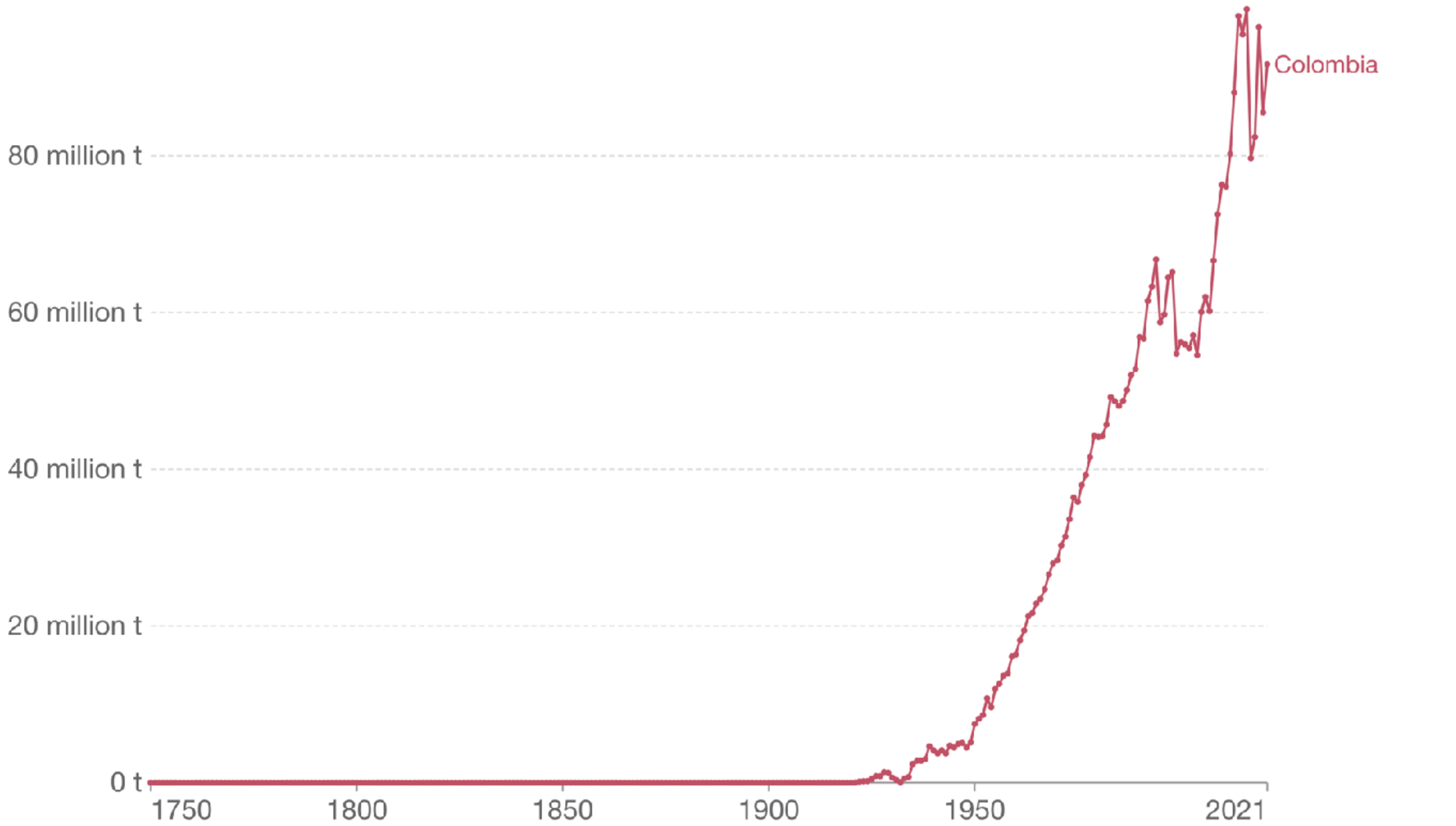


Annual global CO2 emissions from land-use change between 1959 and 2021 for both the 2020 and 2021 versions of the Global Carbon Project's Global Carbon Budget. Shaded area shows the estimated one-sigma uncertainty for the 2021 budget. Data from the Global Carbon Project; chart by Carbon Brief using Highcharts.

Source: Zeke Hausfather, Carbon Brief, November 4, 2021

Annual CO_2 emissions

Carbon dioxide (CO_2) emissions from fossil fuels and industry[1] . Land use change is not included.

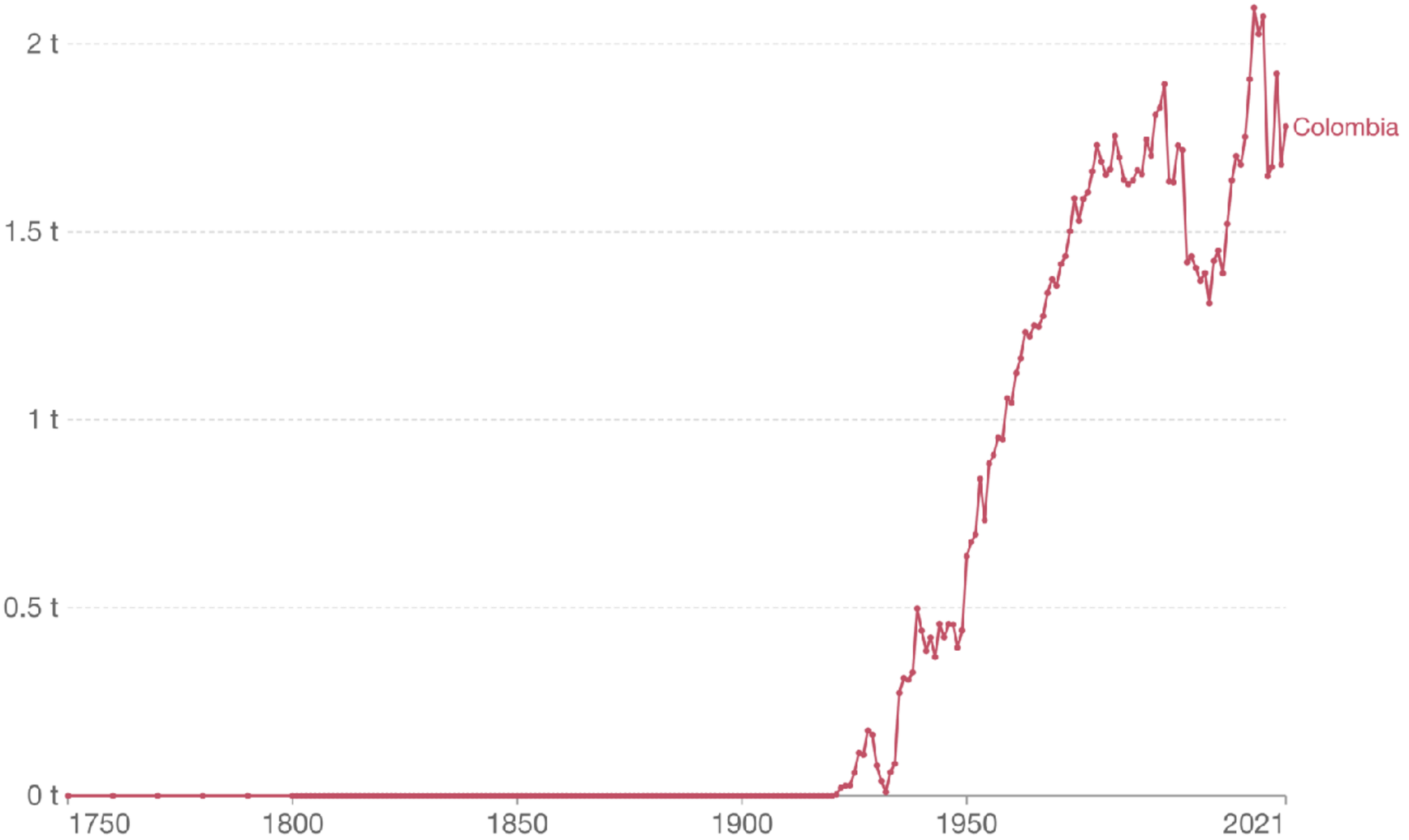


Source: Our World in Data based on the Global Carbon Project (2022) OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO_2) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO_2 includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

Per capita CO_2 emissions

Carbon dioxide (CO_2) emissions from fossil fuels and industry[1] . Land use change is not included.

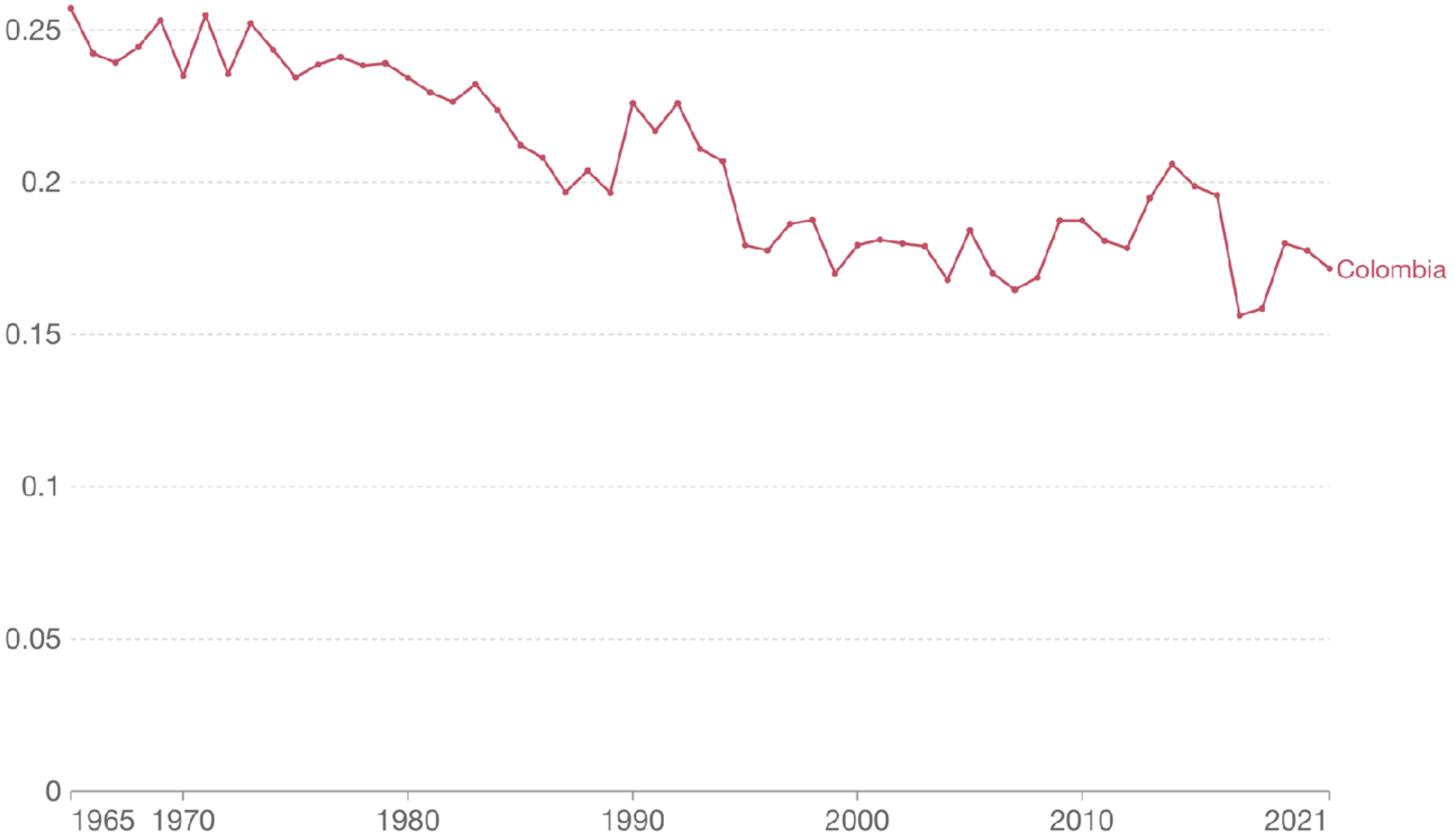


Source: Our World in Data based on the Global Carbon Project (2022) OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO_2) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO_2 includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

Carbon intensity of energy production

This measures the amount of carbon dioxide emitted per unit of energy production. This is measured in kilograms of CO_2 per kilowatt-hour.

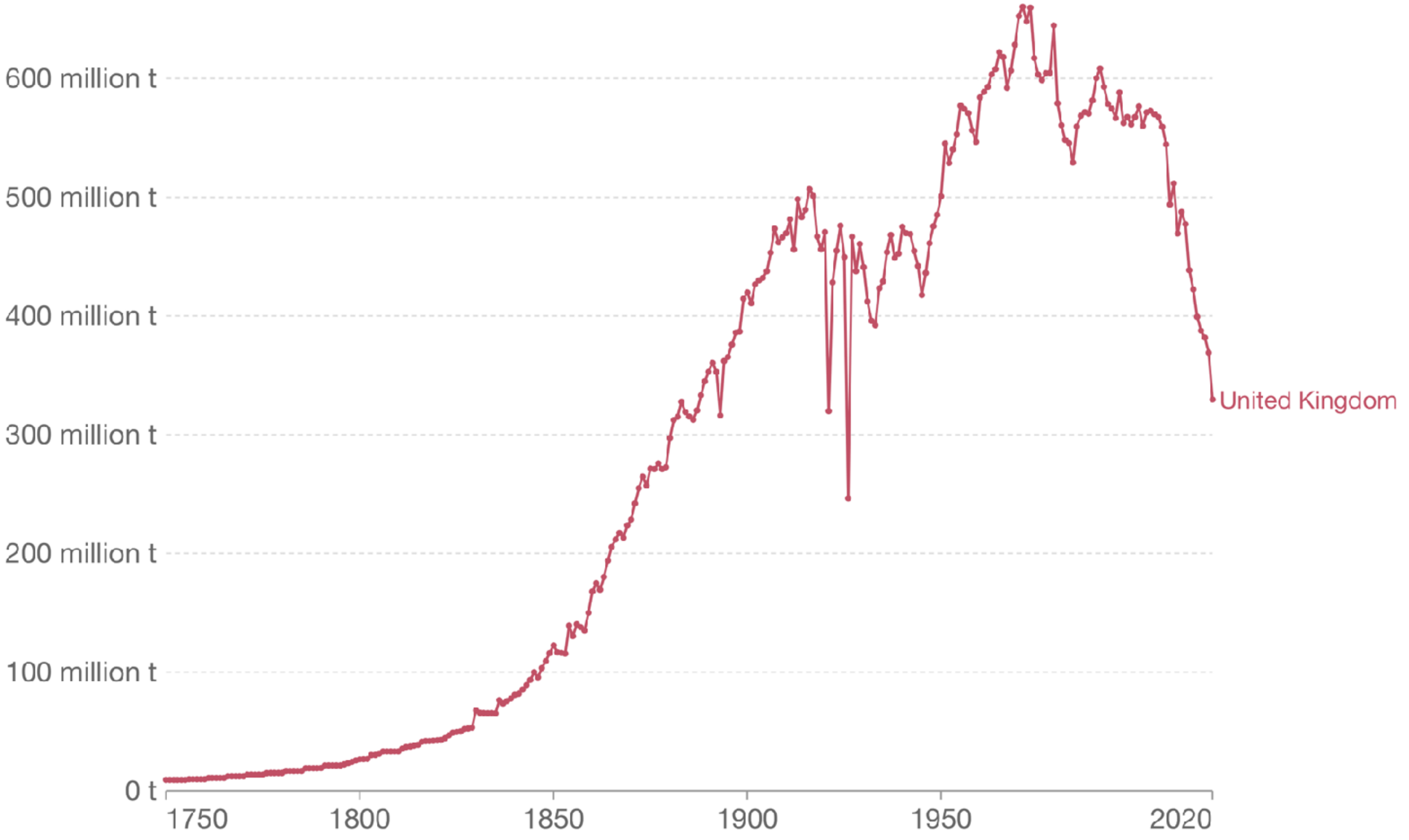


Source: Our World in Data based on the Global Carbon Project (2022)

OurWorldInData.org/emissions-drivers • CC BY

Annual CO_2 emissions

Carbon dioxide (CO_2) emissions from fossil fuels and industry. Land use change is not included.



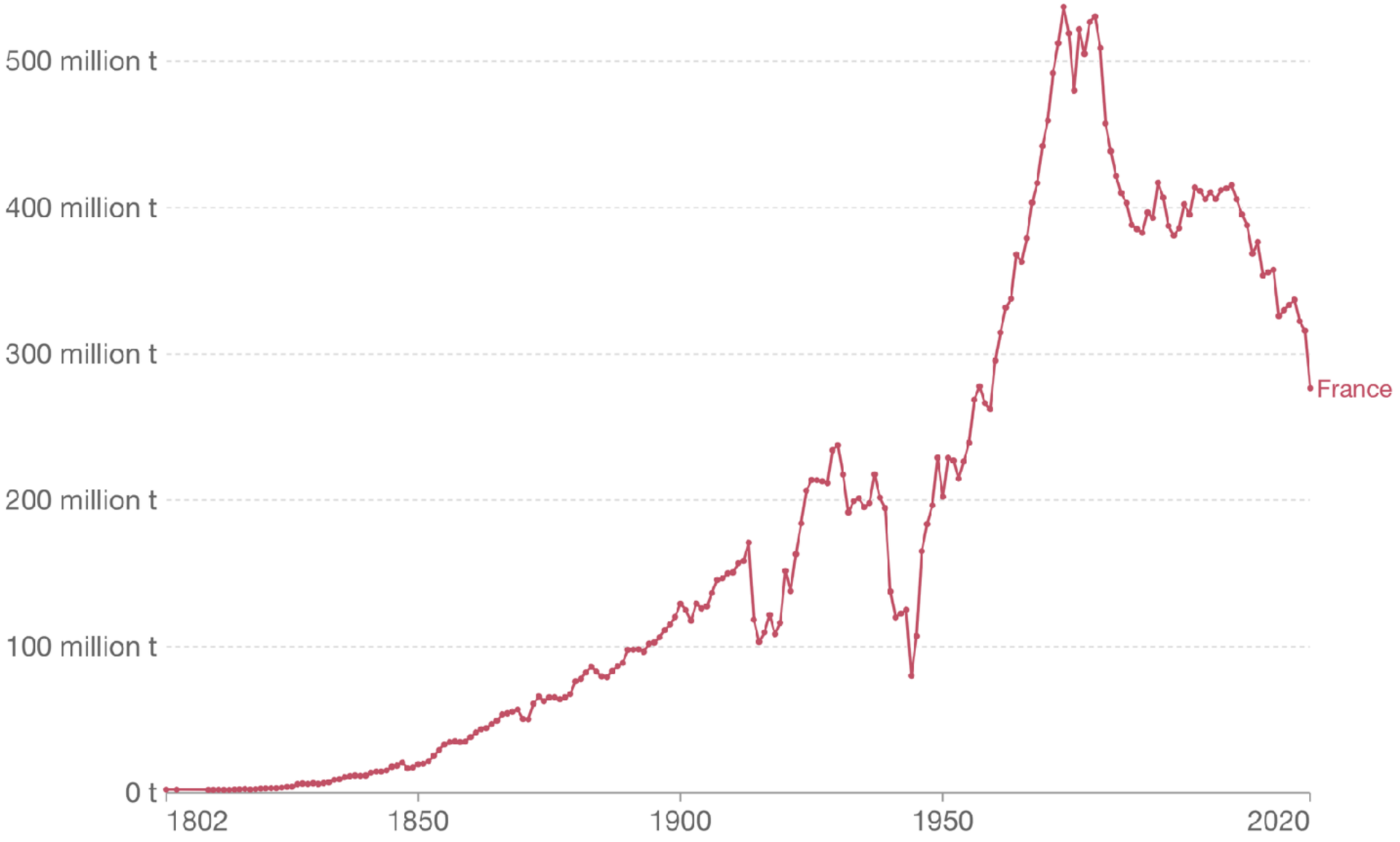
Source: Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

Annual CO_2 emissions

Carbon dioxide (CO_2) emissions from fossil fuels and industry. Land use change is not included.

Our World in Data

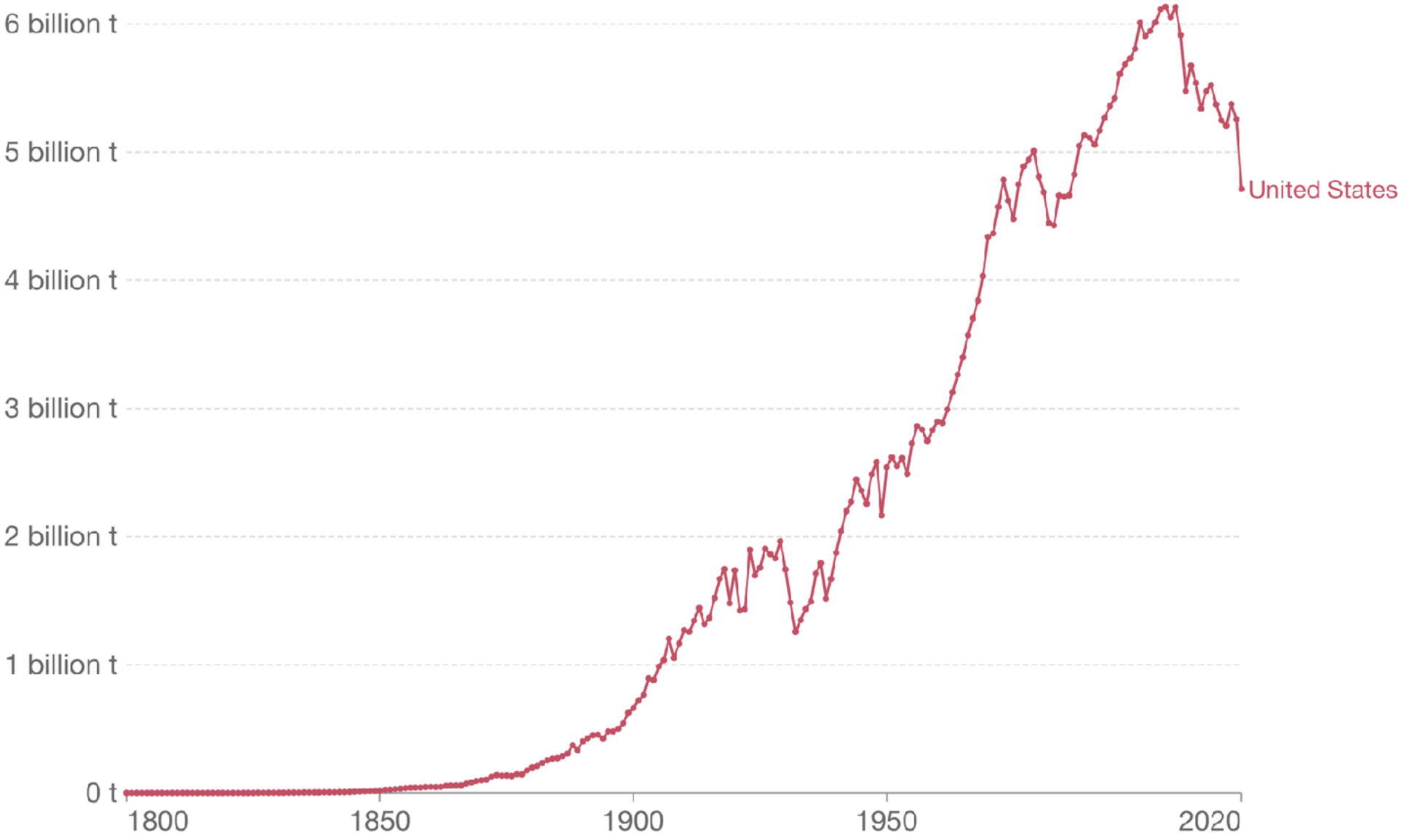


Source: Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

Annual CO_2 emissions

Carbon dioxide (CO_2) emissions from fossil fuels and industry. Land use change is not included.

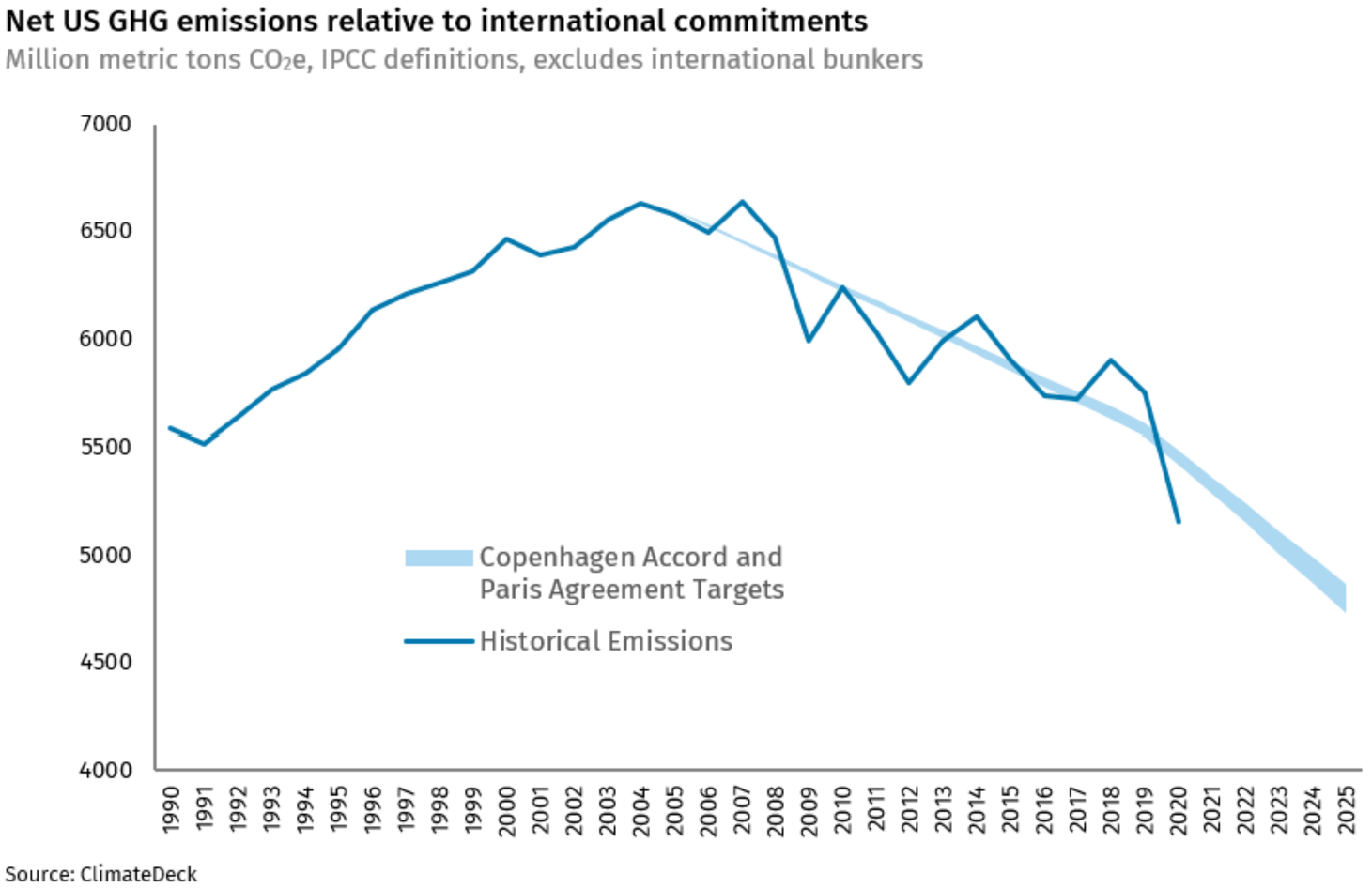


Source: Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

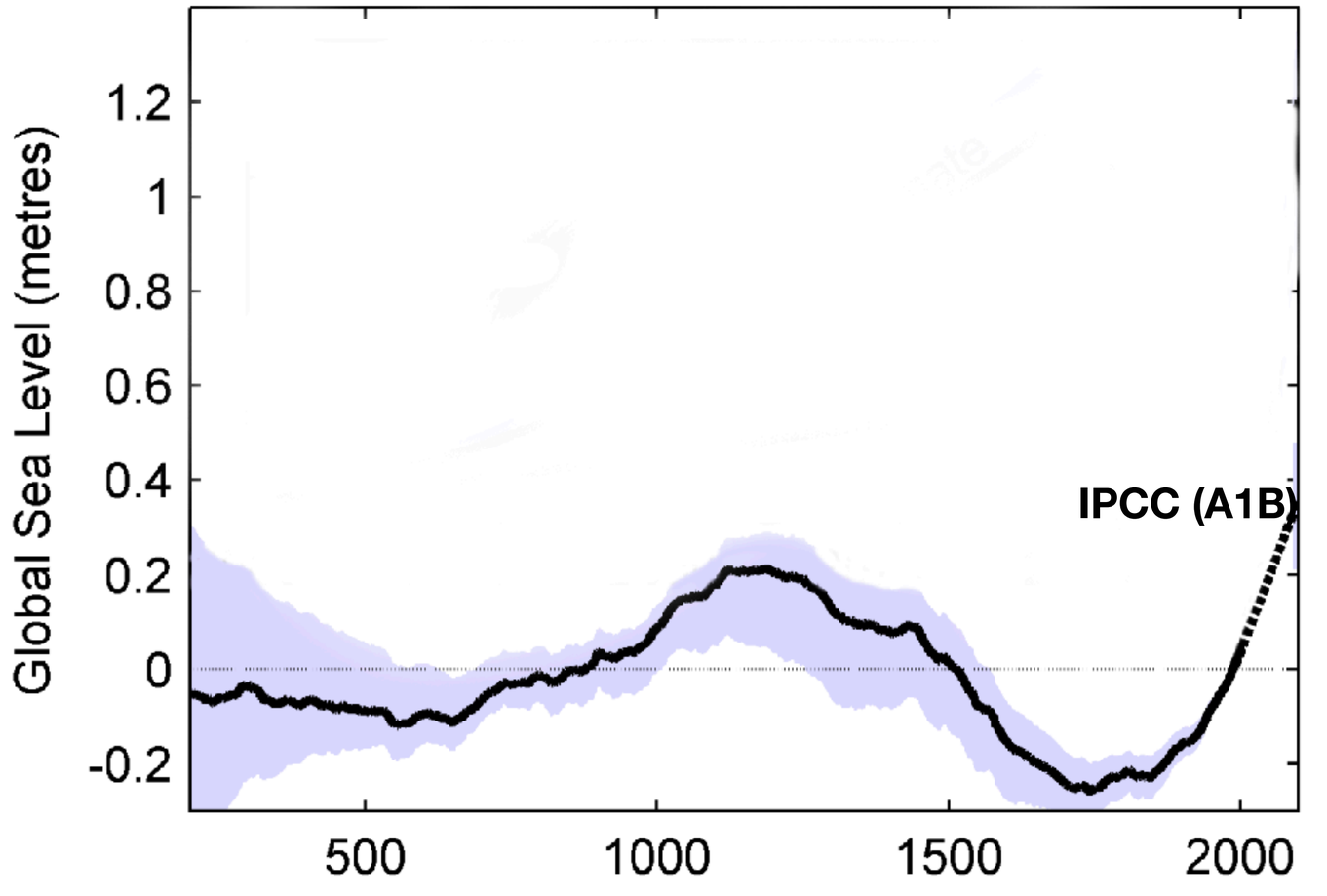
U.S. Is World Climate Leader

"The U.S. saw the largest decline in energy-related CO_2 emissions in 2019 on a country basis." – International Energy Agency, 2020



Source: Rhodium Group, Jan 12, 2021

Even if IPCC's predictions prove to be significant under-estimates, the pace of sea level rise will allow time for adaptation



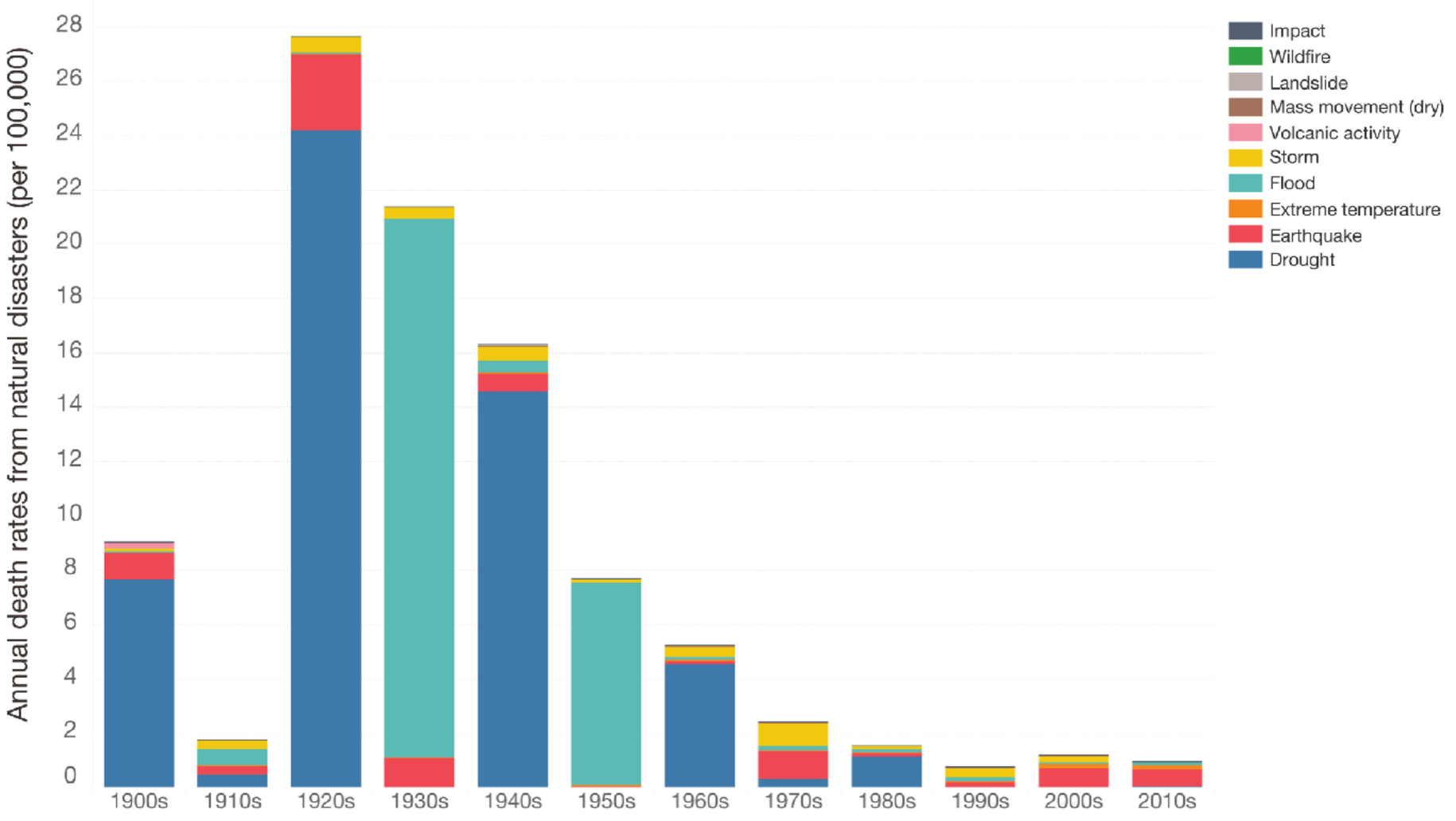
ENVIRONMENTAL PROGRESS

Source: Grinsted, A., J. C. Moore, and S. Jevrejeva (2009), Reconstructing sea level from paleo and projected temperatures 200 to 2100AD, Clim. Dyn., doi:10.1007/s00382-008-0507-2.

Global annual death rate from natural disasters, by decade

Our World in Data

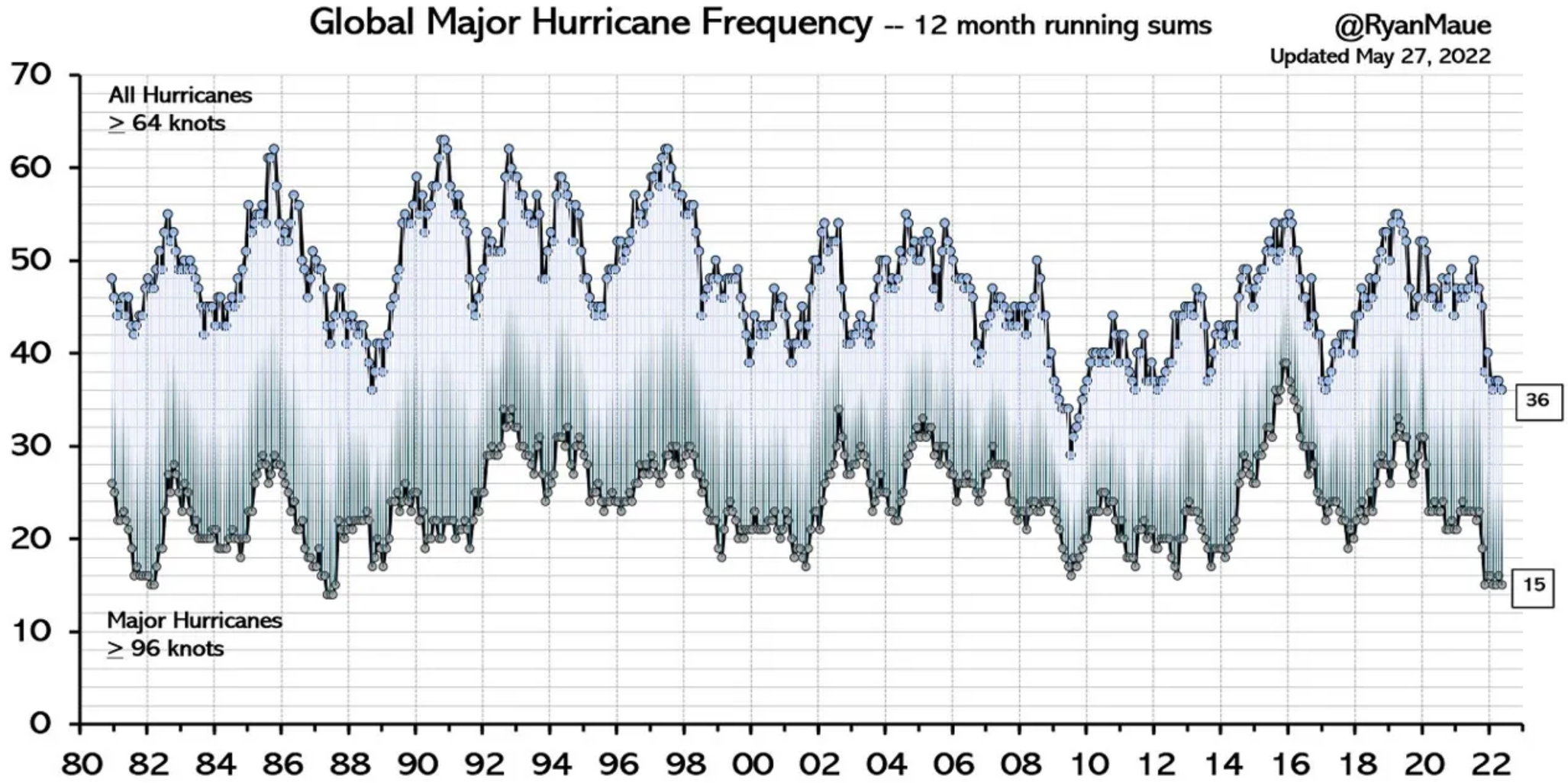
Global death rate measured as the number of deaths per 100,000 of the world population.
This is given as the annual average per decade (by decade 1900s to 2000s; and then six years from 2010-2015).



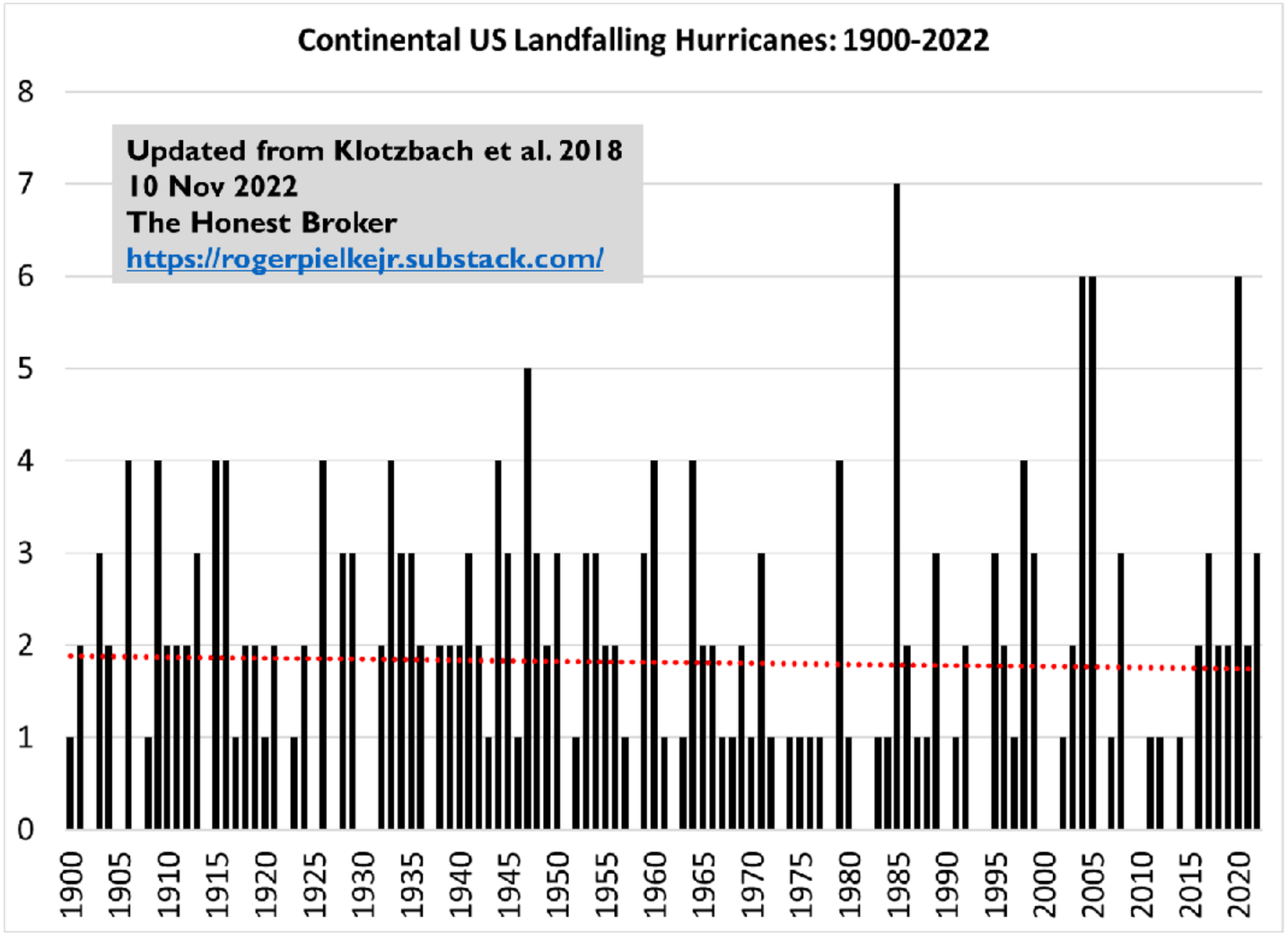
Source: EMDAT (2017): OFDA/CRED International Disaster Database, Université catholique de Louvain – Brussels – Belgium.
The data visualization is available at OurWorldinData.org. There you find research and more visualizations on this topic.

Licensed under CC-BY-SA by the authors Hannah Ritchie and Max Roser.

No trend in global major hurricane frequency

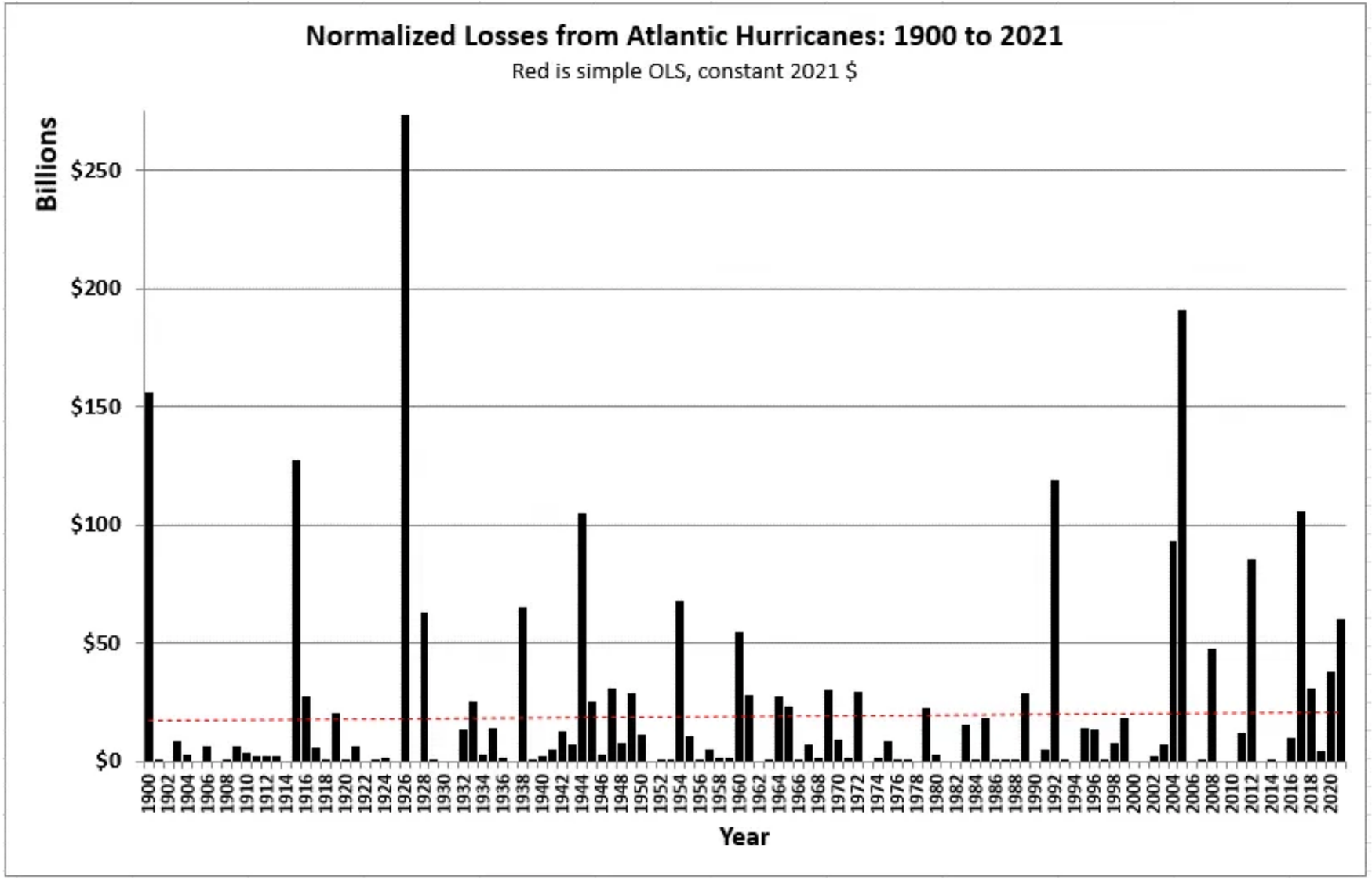


Landfalling US Hurricanes have declined



Philip J. Klotzbach et al, "Continental U.S. Hurricane Landfall Frequency and Associated Damage: Observations and Future Risks," *Bulletin of the American Meteorological Society*, July 2018

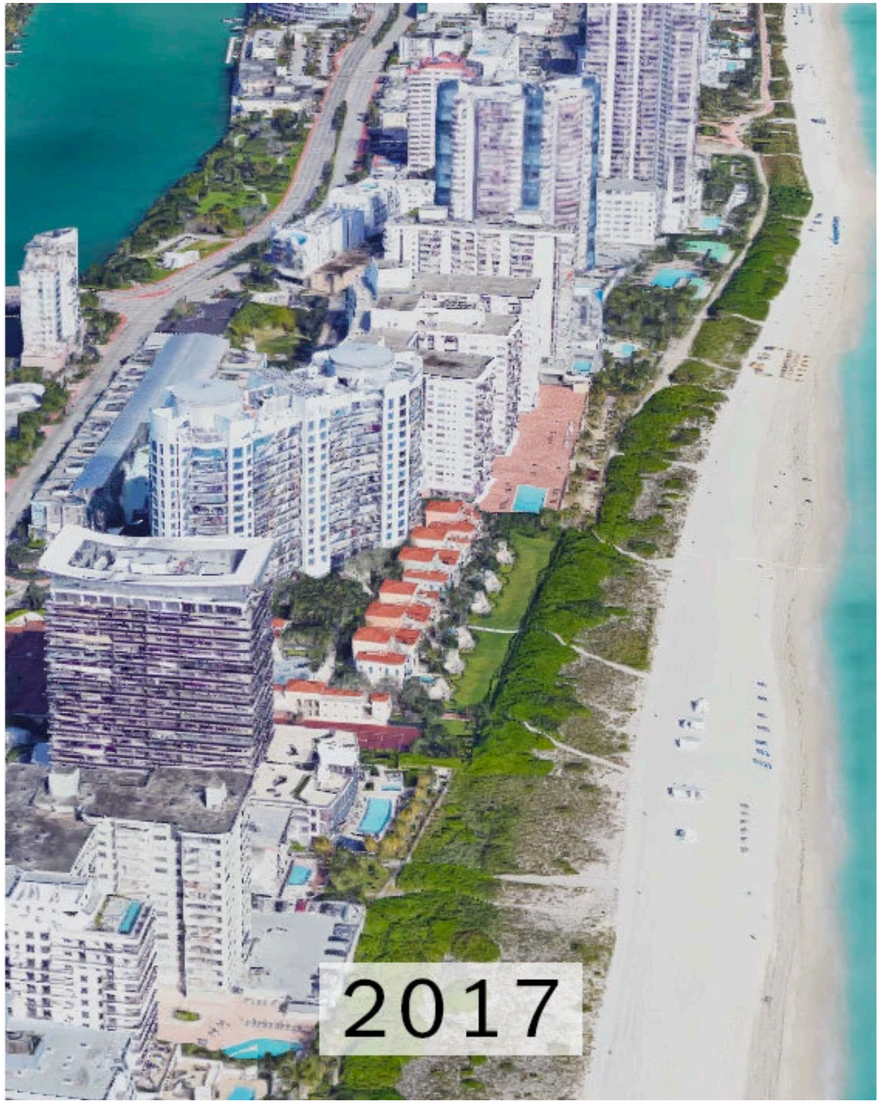
No increase in cost of hurricane damage



Jessica Weinkle, et al., “Normalized hurricane damage in the continental United States 1900–2017, *Nature Sustainability*, November 2018

Miami Beach, Then and Now

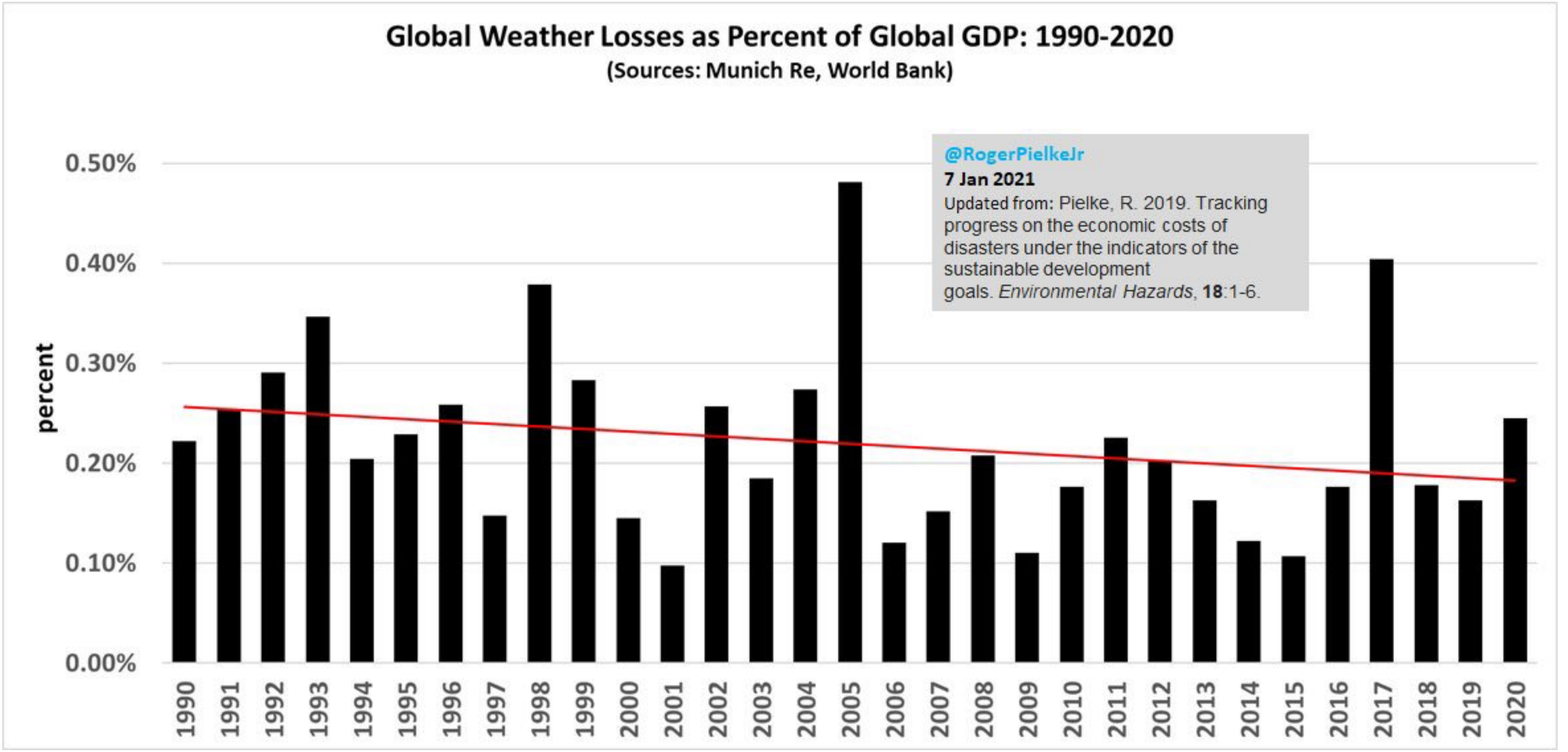




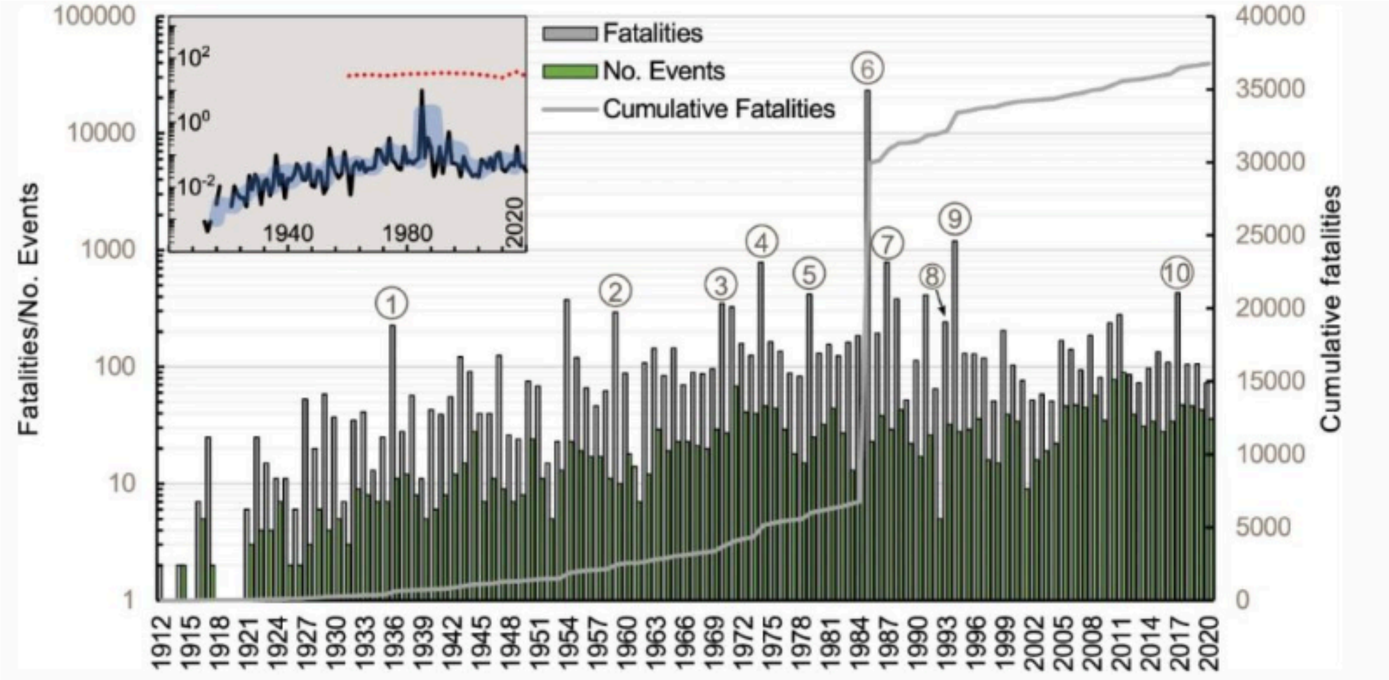
ENVIRONMENTAL PROGRESS

Source: Roger Pielke, Jr., The Climate Fix: What Scientists and Politicians Won't Tell You About Global Warming, 171.

Cost of disasters declining everywhere



“Departments with low income, high levels of corruption and inequality are usually more affected” by landslides



Numbers of landslides and landslide fatalities in Colombia through time. Graph from Garcia-Delgado *et al.* (2022). The figure caption is: Temporal distribution of deadly landslides, their fatalities and cumulative total of fatalities from 1912 to 2020. The numbers in circles correspond to the top 10 deadliest events as follows: (1) Túquerres (9 January 1936; n = 170 fatalities); (2) Ibagué (29 June 1959; n = 250); (3) Chiriguaná (10 November 1970; n = 123); (4) Quebrada Blanca–Guayabetal (28 June 1974; n = 400); (5) El Playón (25 November 1979; n = 300); (6) Armero–Chinchiná (13 November 1985; n = 23,084); (7) Villatina–Medellín (28 September 1987; n = 562); (8) Andes (26 April 1993; n = 120); (9) Páez (6 June 1994; n = 1100); and (10) Mocoa (31 March 2017; n = 333). To check the location of these events please refer to Fig. 2. The upper-left inset shows annual fatalities normalised by the number of events.

Helbert Garcia-Delgado, et al, “Fatal landslides in Colombia (from historical times to 2020) and their socio-economic impacts,” *Landslides, March 21, 2022*

NOAA & IPCC Predict Far Larger Decline in Hurricane Frequency Than Increase in Intensity

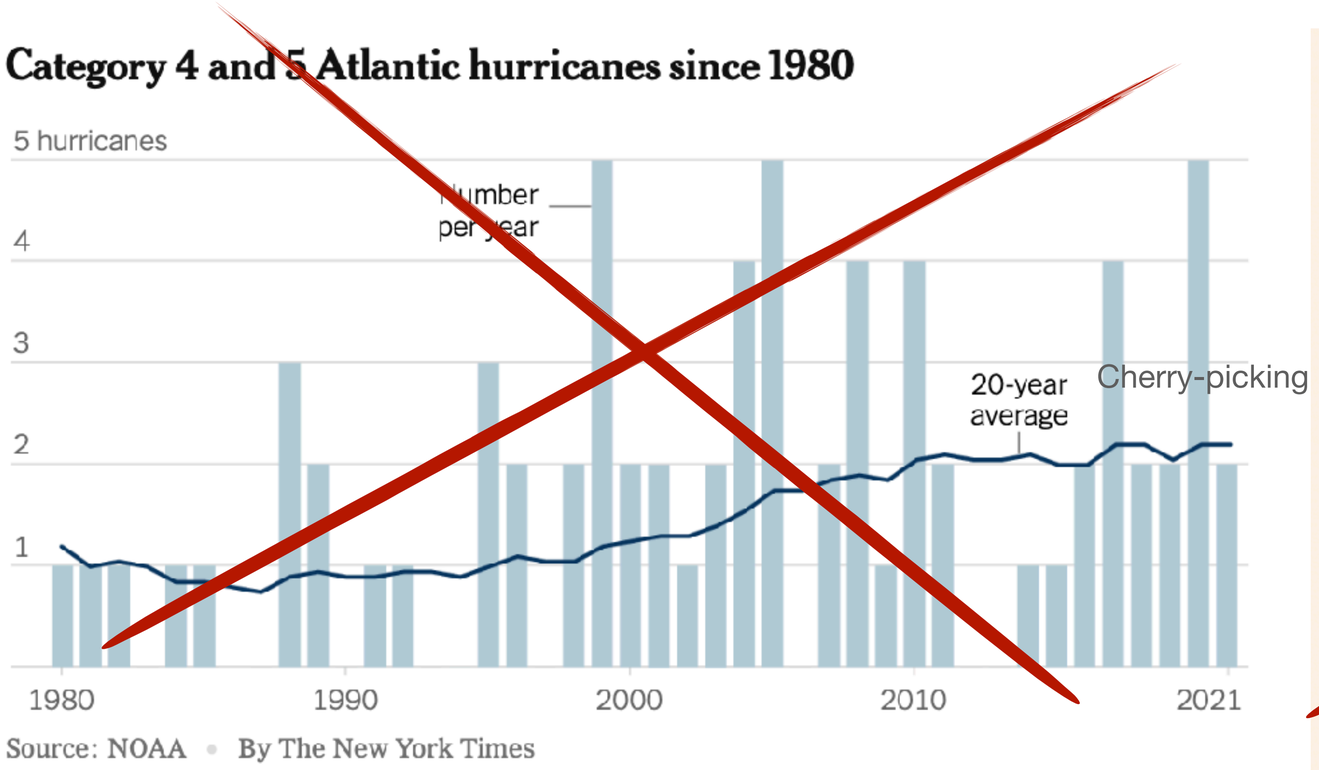
"The model also supports the notion of a substantial decrease (~25%) in the overall number of Atlantic hurricanes and tropical storms... and the lifetime maximum intensity of Atlantic hurricanes will increase by about 5% during the 21st century."

Source: Tom Knutson, Senior Scientist, "Global Warming and Hurricanes," NOAA, August 9, 2021

"The total global frequency of tropical cyclone frequency formation will decrease or remain unchanged with increasing global warming."

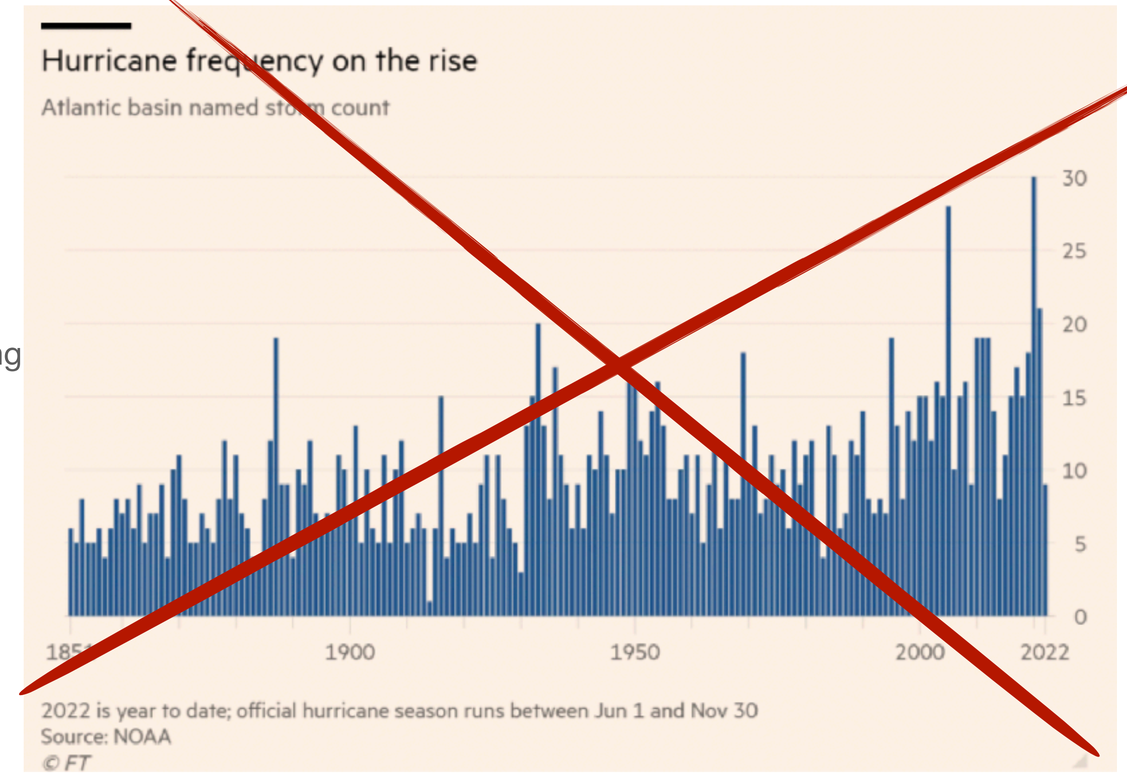
Source: – S.I., N. Nicholls, et al., "A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)," Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 109-230.

Cherry-picks post-1980 period to mislead readers

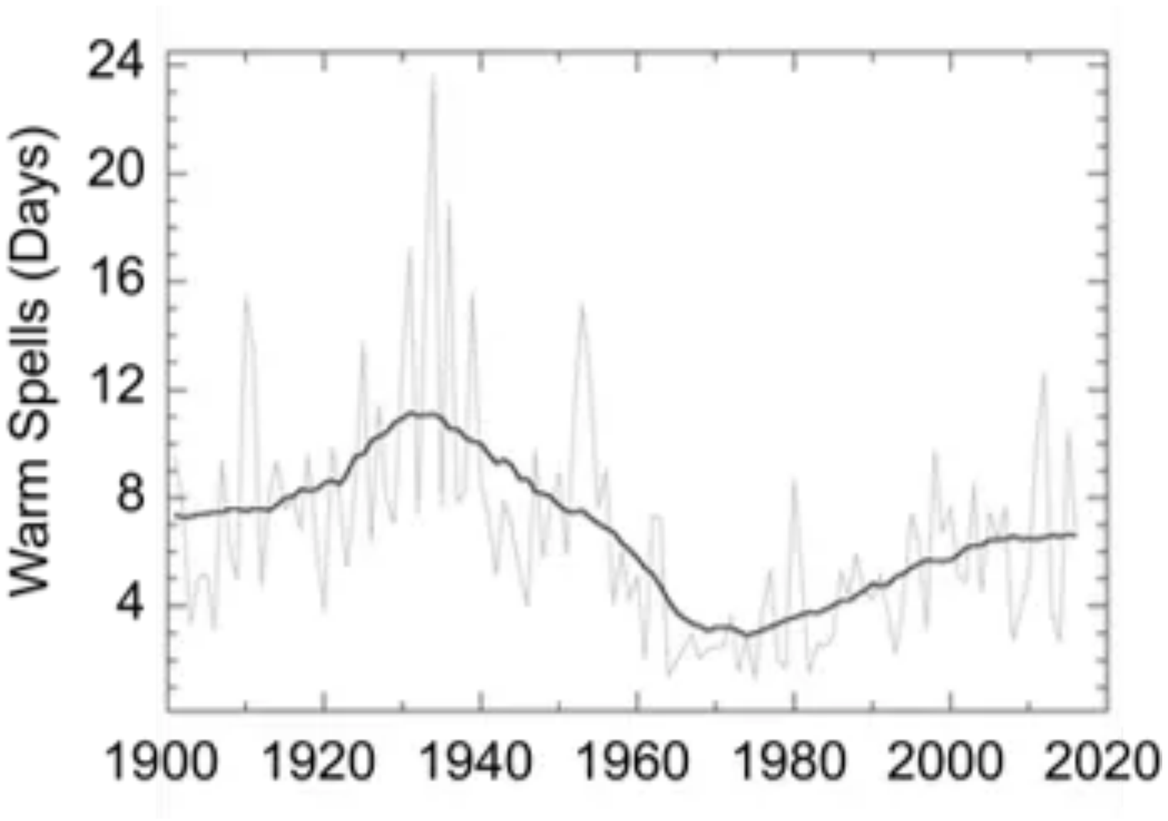


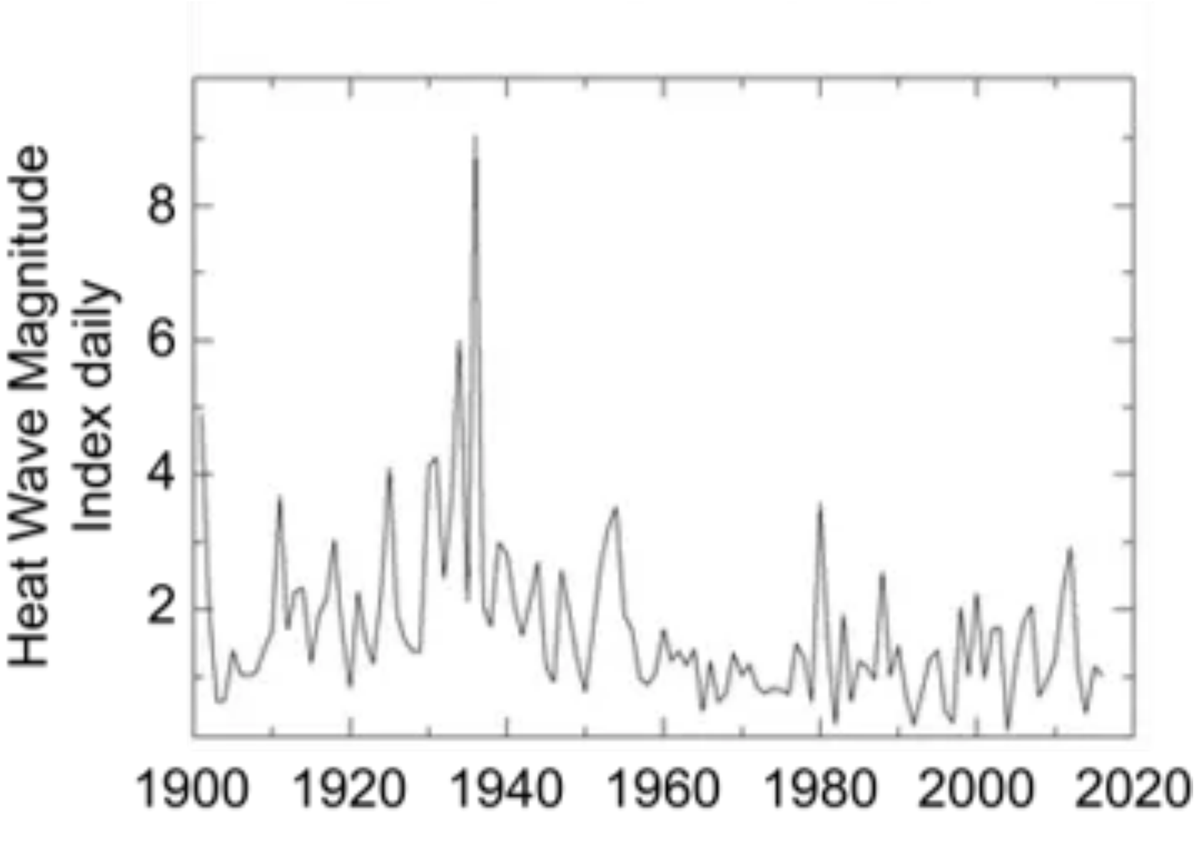
Cherry-picking

Misrepresents better hurricane detection as rising frequency



No trend in U.S. heat wave frequency or magnitude





U.S. Global Change Research Program, "Chapter Six: Temperature Changes in the United States, *Fourth National Climate Assessment*, 2017
https://science2017.globalchange.gov/chapter/6/

Declining deaths from heat waves in U.S.

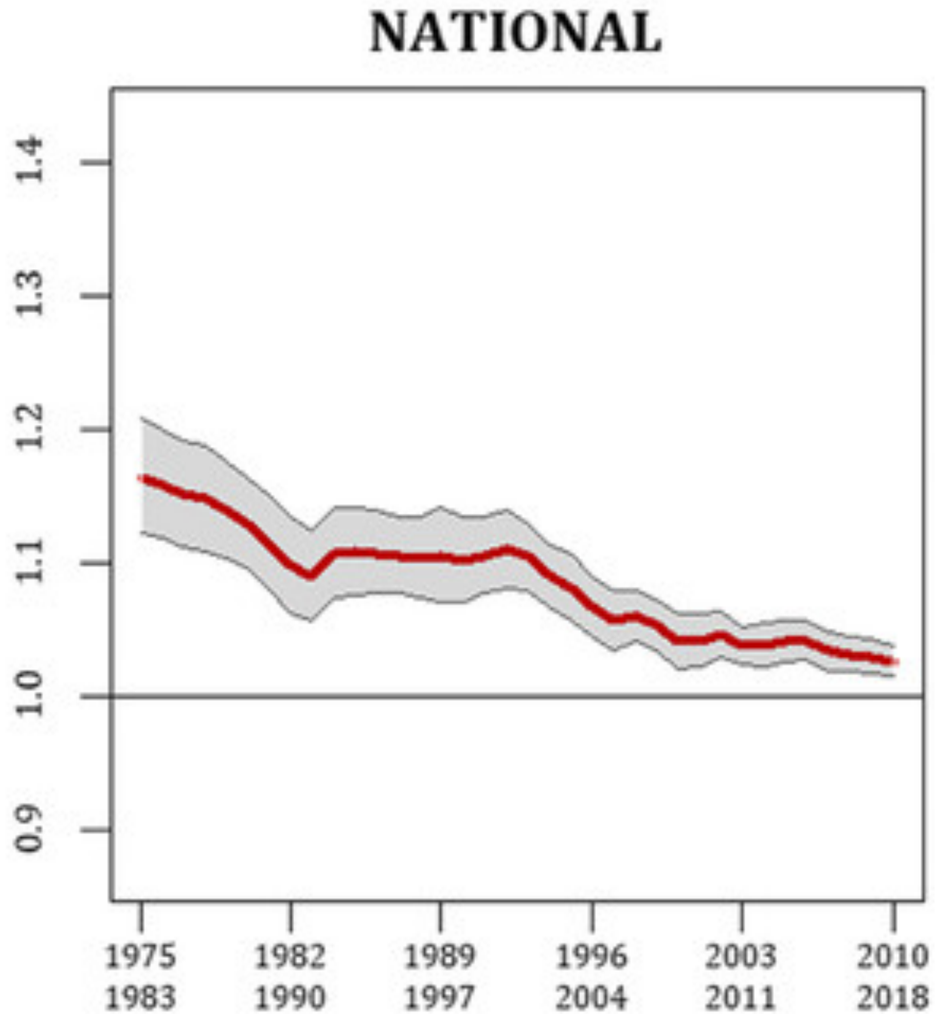


Chart shows “relative risk for mortality on extreme heat event days as compared with non-EHE days, divided into rolling 9-yr intervals. The red line represents the point estimate, and gray shading represents the 95% confidence interval.”

Scott C. Sheridan, “Recent Trends in Heat-Related Mortality in the United States: An Update through 2018,” *Weather, Climate, and Society,* December 2020. https://journals.ametsoc.org/view/journals/wcas/13/1/wcas-d-20-0083.1.xml

Droughts not increasing in Europe

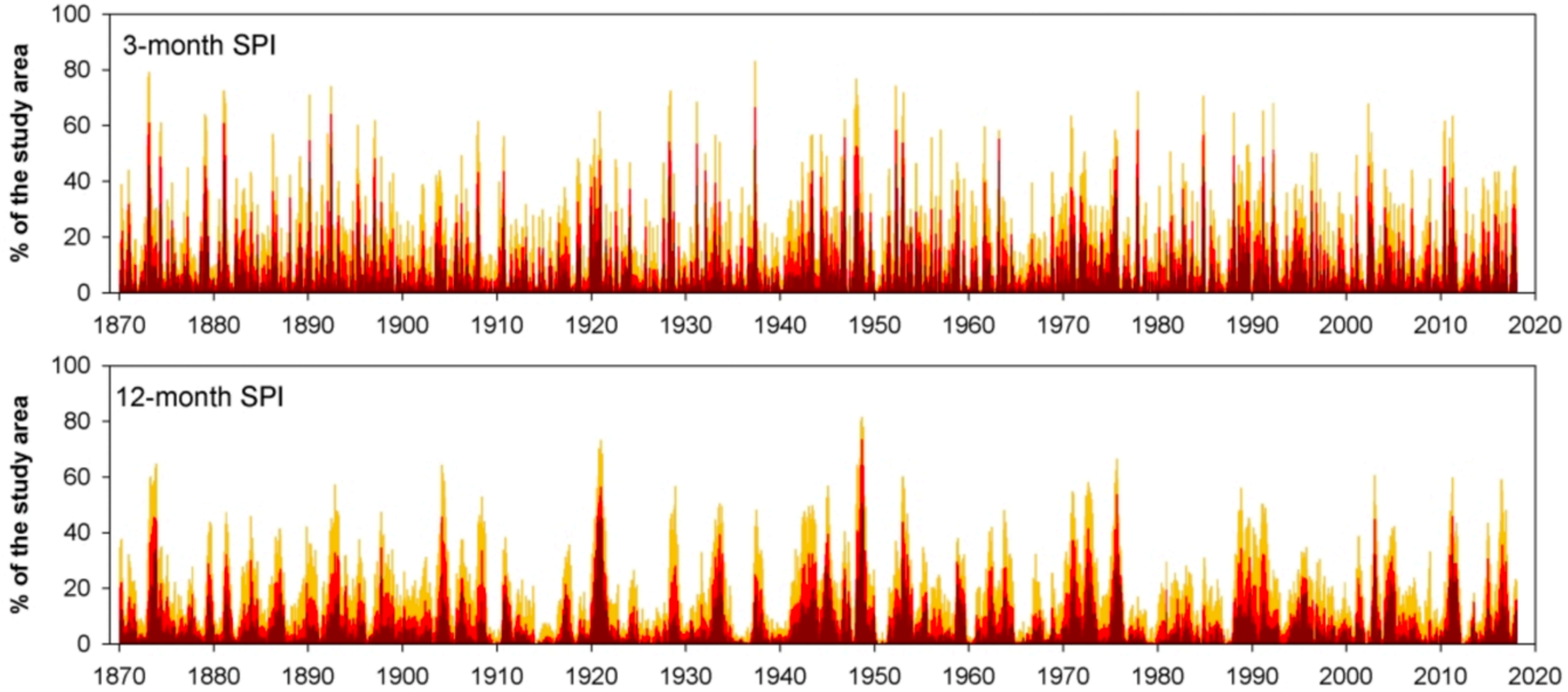
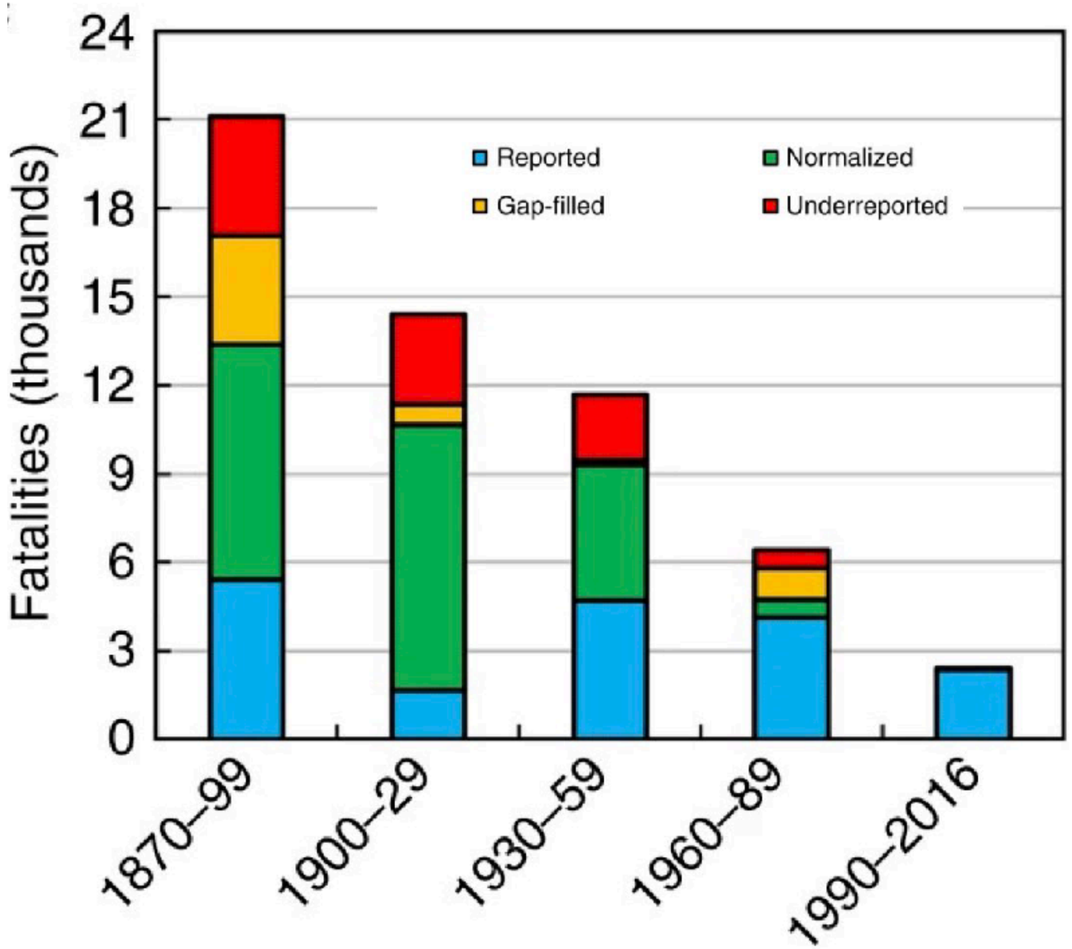


FIGURE 8 Evolution of the European land area impacted by mild , moderate and severe droughts from 1871 to 2018

Sergio M. Vicente-Serrano, et al., "Long-term variability and trends in meteorological droughts in Western Europe (1851–2018)," *International Journal of Climatology*, June 2020.

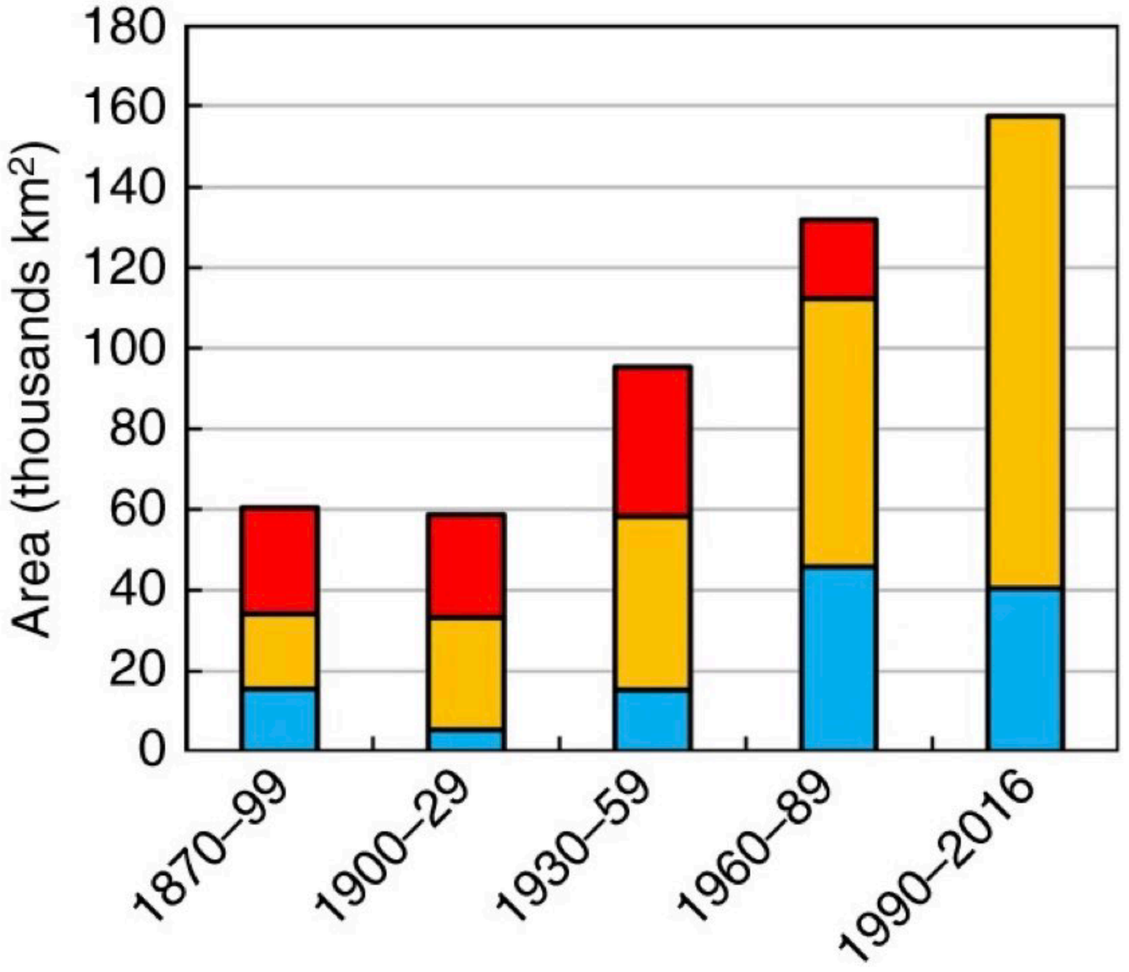
Flood Deaths Declining in Europe

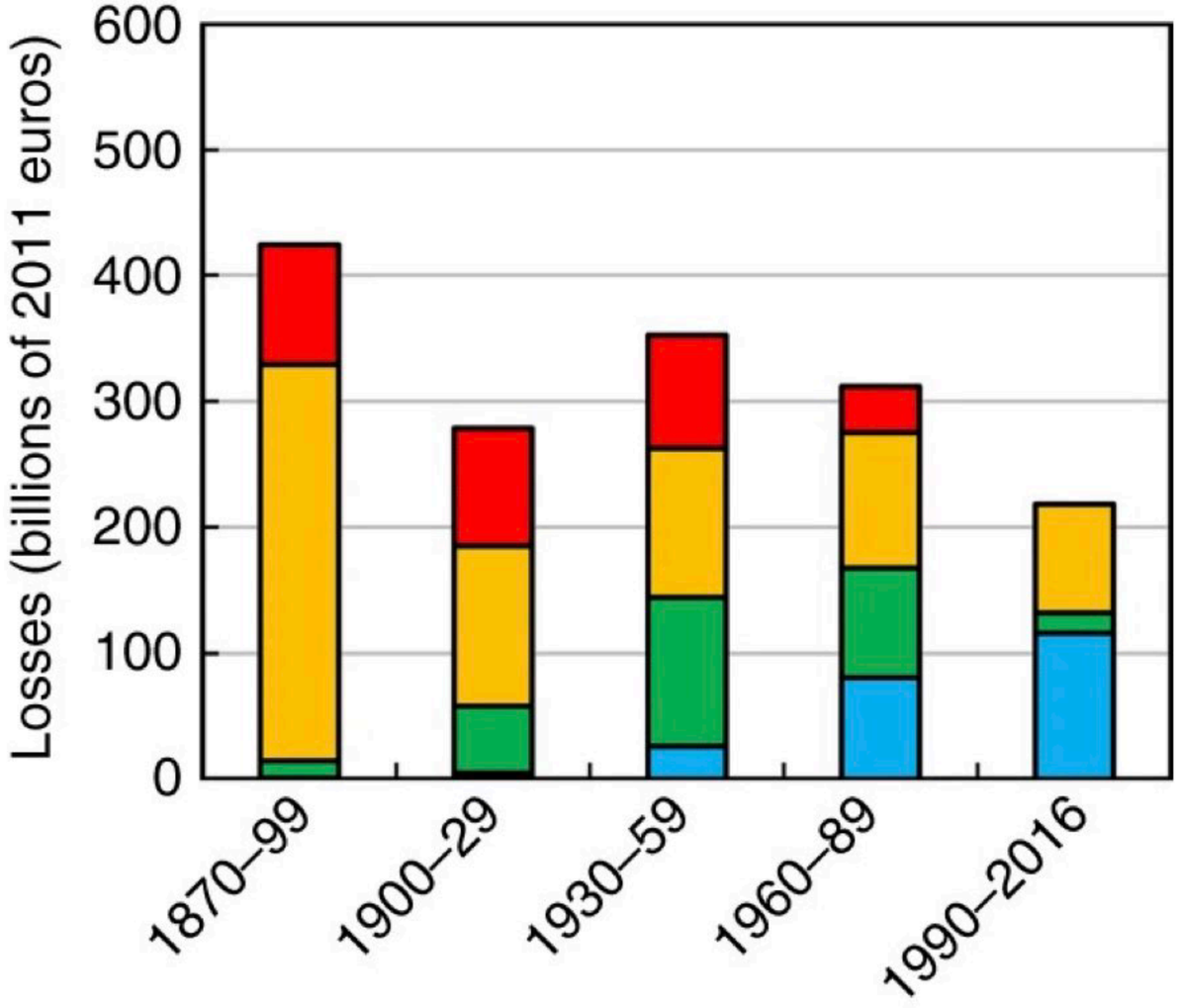




ource: Paprotny, D., Sebastian, A., Morales-Nápoles, O. *et al.* Trends in flood losses in Europe over the past 150 years. *Nature Commun* 9, 1985 (2018). https://doi.org/10.1038/s41467-018-04253-1

Greater Area Flooded But Less Damage



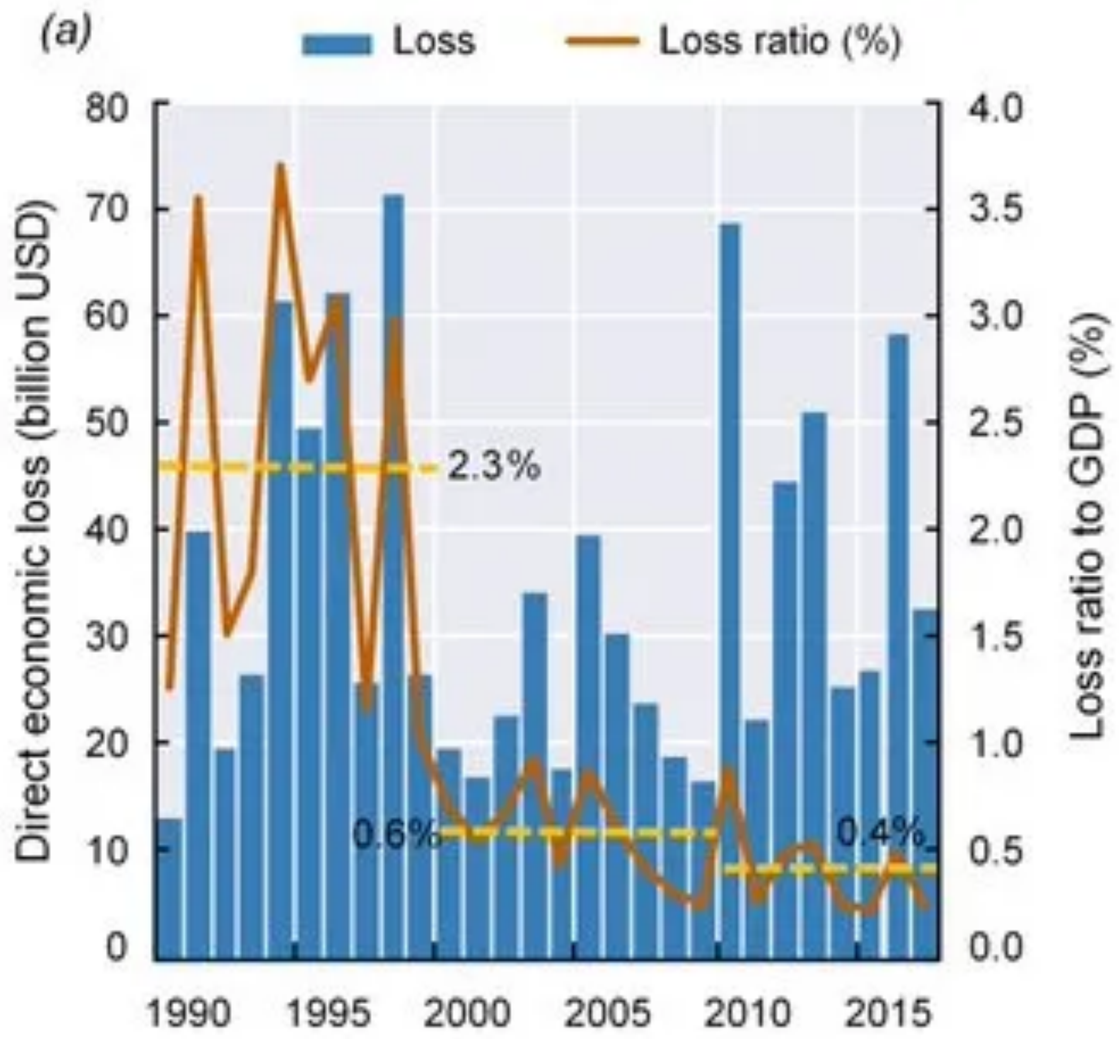


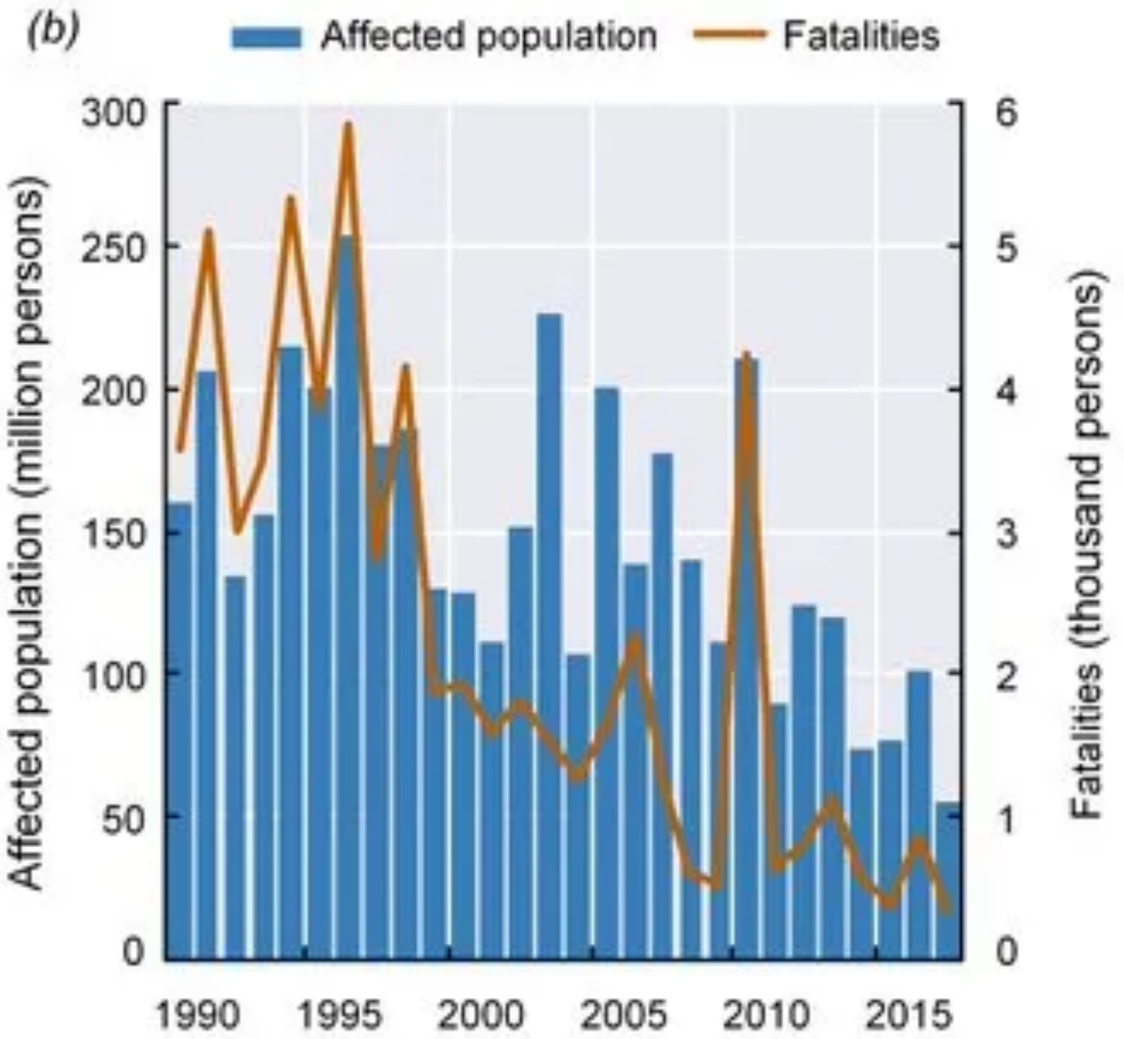
Reported
Normalized
Gap-filled
Underreported

ENVIRONMENTAL PROGRESS

Source: Paprotny, D., Sebastian, A., Morales-Nápoles, O. *et al*. Trends in flood losses in Europe over the past 150 years. *Nature Commun* 9, 1985 (2018). https://doi.org/10.1038/s41467-018-04253-1

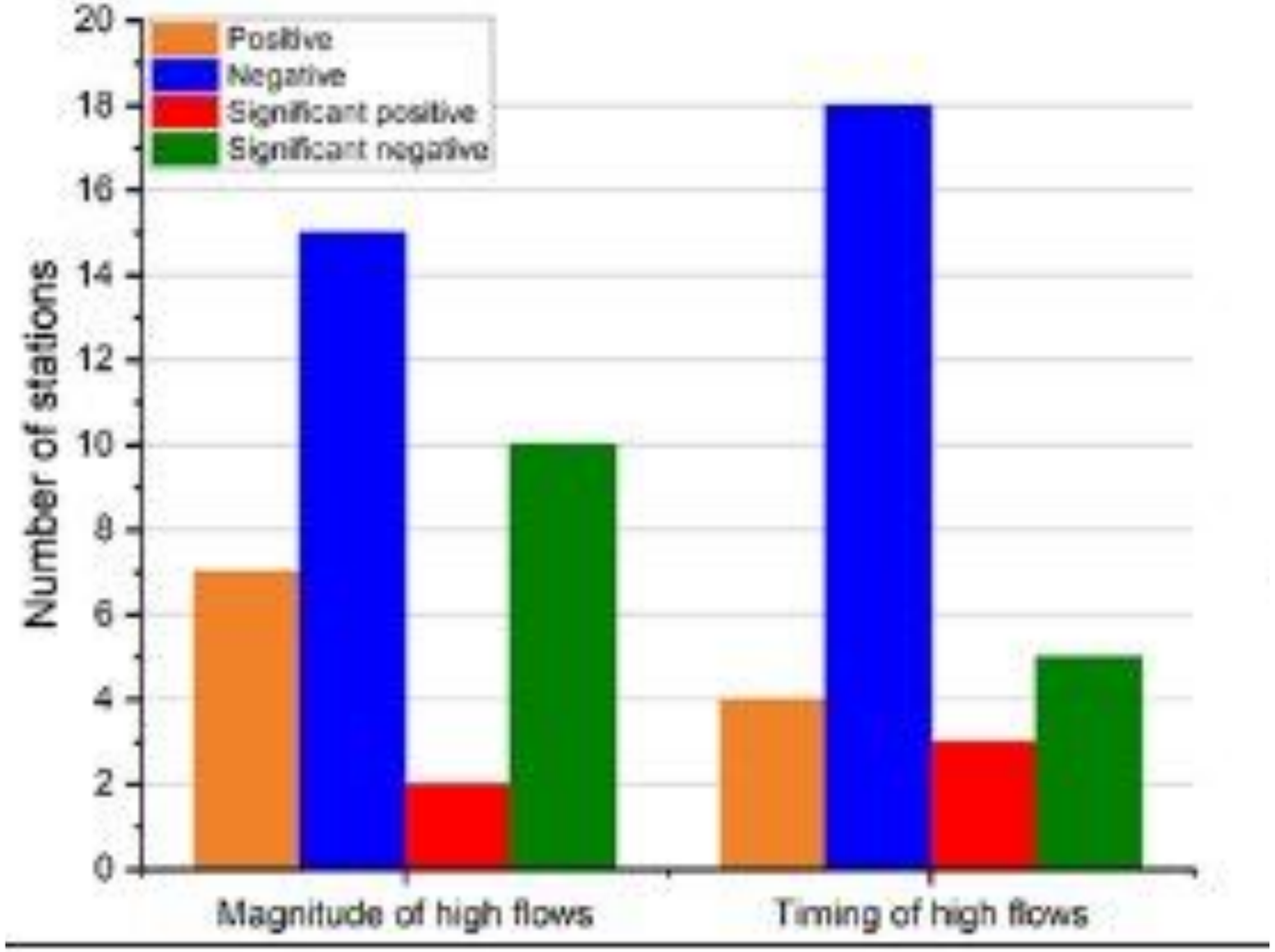
Declining flood mortality & costs in China





Shiqiang Du, "Brief communication: Rethinking the 1998 China floods to prepare for a nonstationary future," *Nat. Hazards Earth Syst. Sci.*, 19, 715–719, 2019

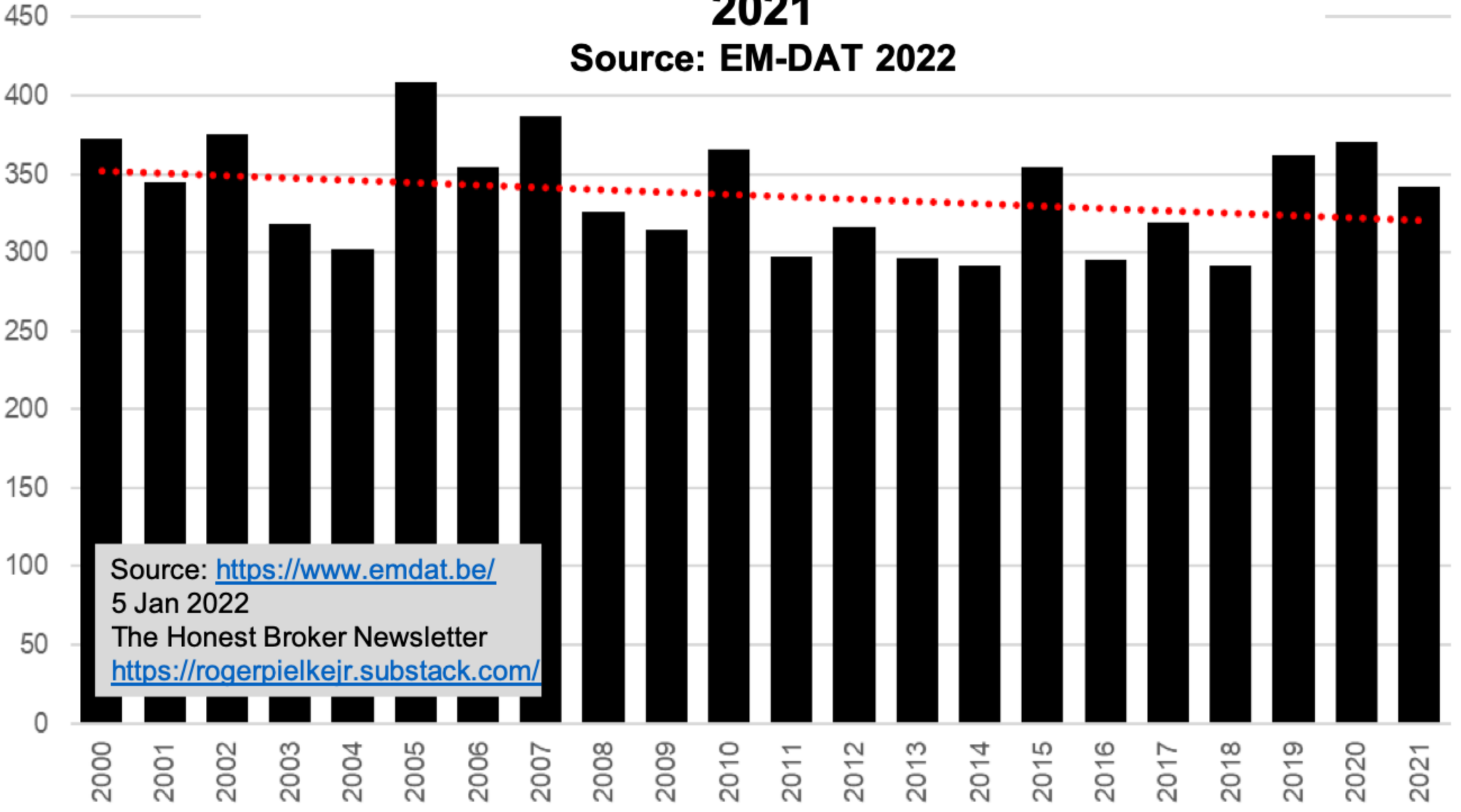
Declining flooding in Pakistan



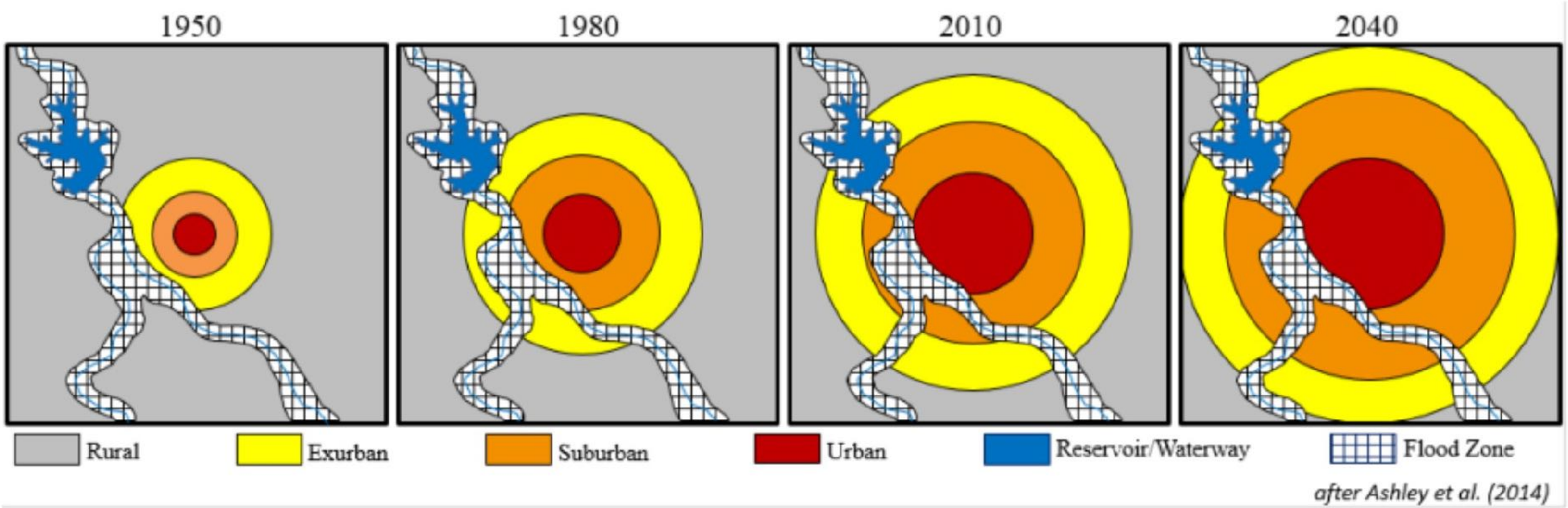
Muhammed Yaseen, et al., "Contemporary Trends in High and Low River Flows in Upper Indus Basin, Pakistan," *Water Journal*, January 24, 2022

Global Weather and Climate Disasters 2000 to 2021

Source: EM-DAT 2022

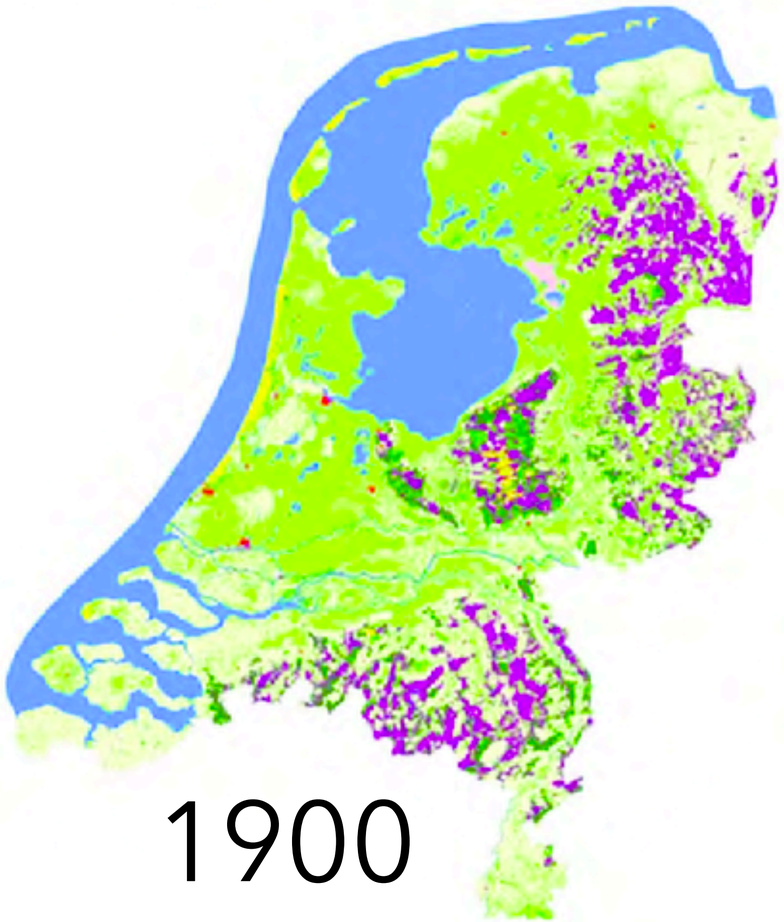


More people living in flood zones explains rising costs

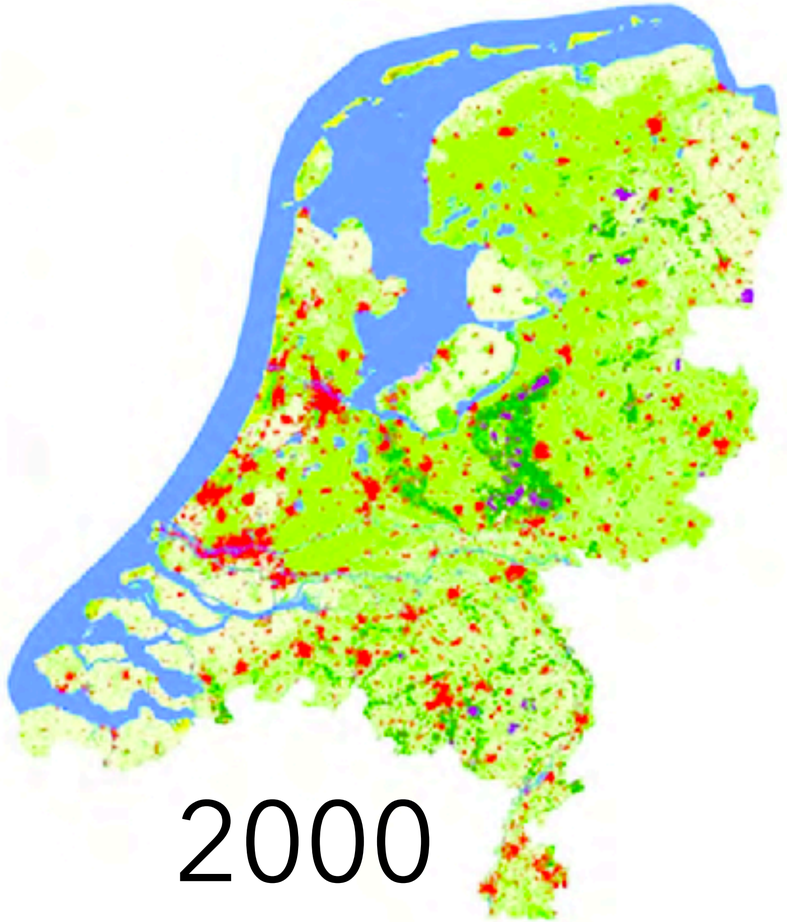


A conceptual model of the "expanding bull's-eye effect" for a hypothetical metropolitan region that is characterized by increasing development spreading from an urban core over time. A sample **flood** scenario is overlaid to show how expanding development creates larger areas of potential impacts from hazards. Credit: Stephen M. Strader

1/3 of the Netherlands lies below sea level, some areas as low as 7 meters



1900

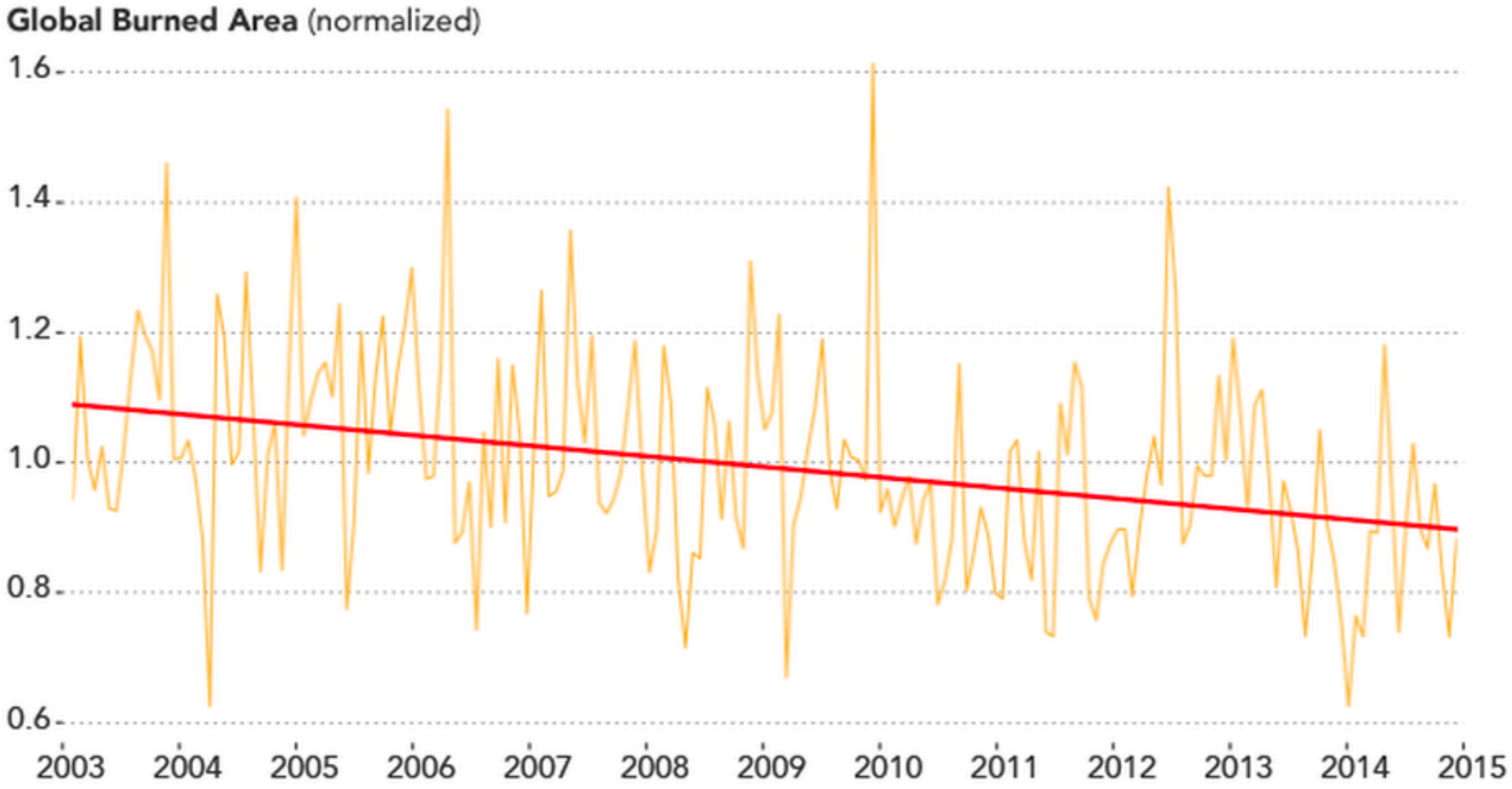


2000

ENVIRONMENTAL PROGRESS

Source: "First National Report on Forest Genetic Resources for Food and Agriculture," Ministry of Economic Affairs, November 2012

According to NASA scientists, from 2003 to 2019, the area burned globally declined 25%, an area the size of Texas



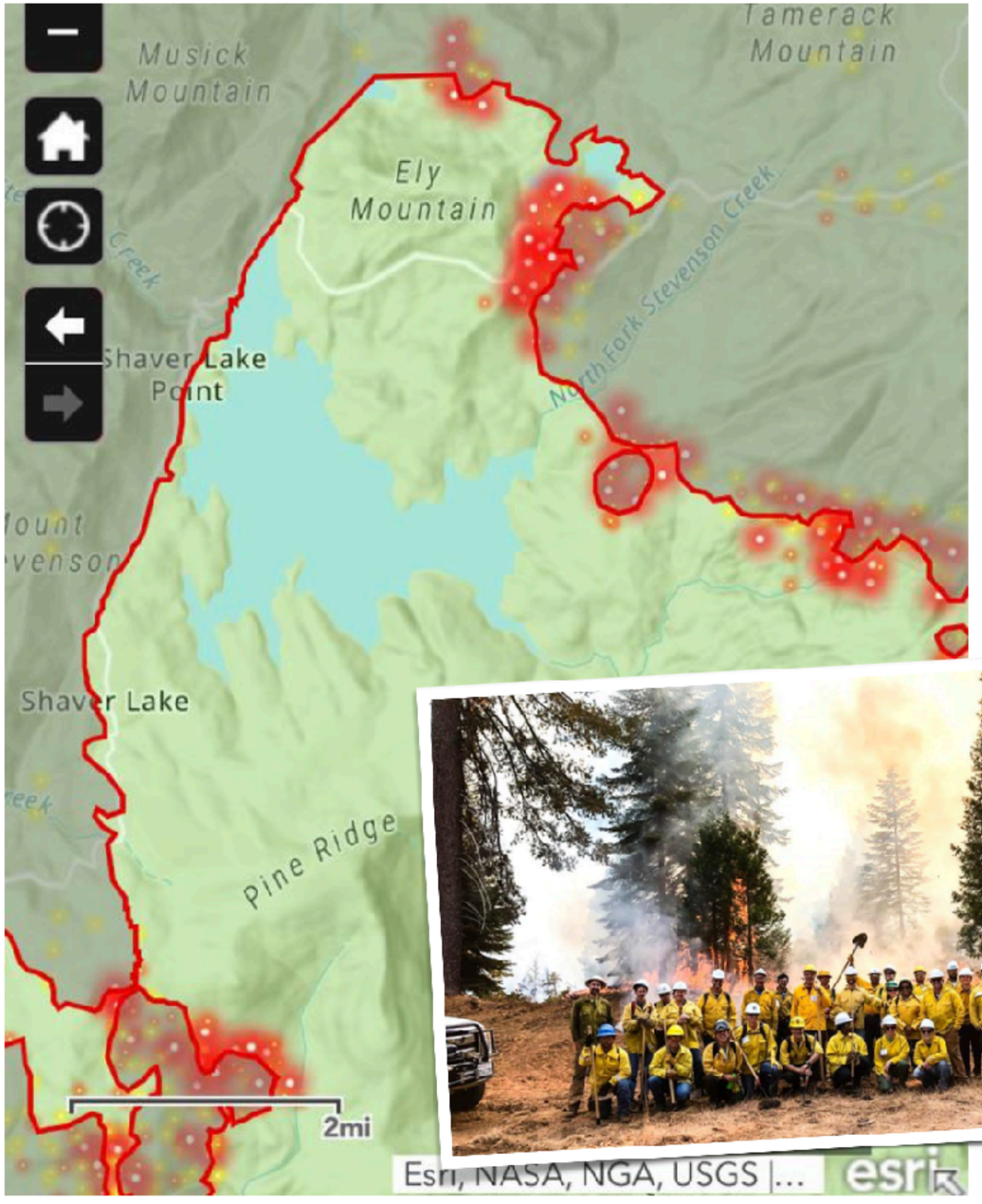
Source: N. Andela, et al., "A human-driven decline in global burned area," *Science*, June 30, 2017







Good forest management prevents high-intensity fires, as California's Shaver Lake proved in 2020.



"The fire comes up to [Shaver Lake] drops to the ground, and stays out of the tree crowns" – forest historian Jared Dahl Aldern

"I'm not worried about the fire on our property because it's like a hot prescribed burn. But on the forest service lands it's all fuel, and so if the fire gets in there you know it's going to rage." – Shaver Lake forester Ryan Stewart

Links to original sources for quotes at Michael Shellenberger, "Forests that Survive Megafires," *Forbes*, Sept 13, 2020

CNN Live TV

Parts of Great Barrier Reef record highest amount of coral in 36 years

By Tara Subramaniam, CNN

Updated 5:43 AM EDT, Thu August 04, 2022



(CNN) — Parts of the Great Barrier Reef have recorded their highest amount of coral cover since the Australian Institute of Marine Science (AIMS) began monitoring 36 years ago, according to a report published Thursday.

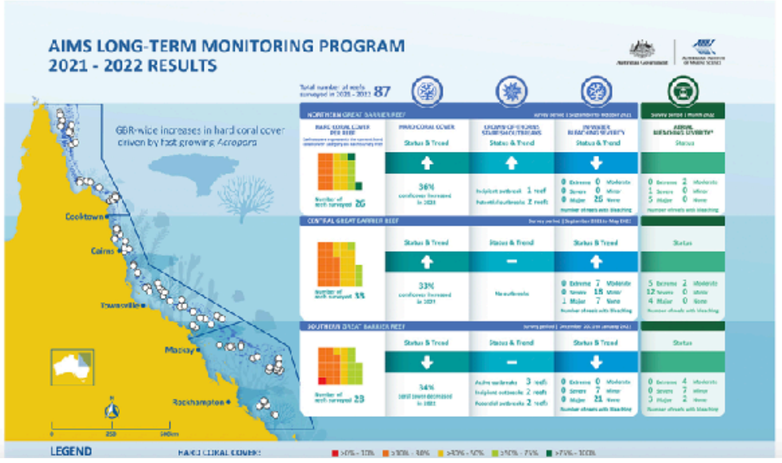
An AIMS survey of 87 reefs found that between August 2021 and May 2022, average hard coral cover in the upper region and central areas of the reef increased by around one third.

It's a rare piece of good news for the world-famous reef, which in March underwent its sixth mass bleaching event.

Research topics About Partnerships Information Centre Data Careers

Long-Term Monitoring Program Annual Summary Report of Coral Reef Condition 2021/22

Continued coral recovery leads to 36-year highs across two-thirds of the Great Barrier Reef



Read full report

AIMS' Annual Summary Report of Coral Reef Condition 2021/22 is available to download.

Download the report →

Contact

Dr Mike Emslie

AIMS Long-Term Monitoring Program Team Leader

E: m.emslie@aims.gov.au

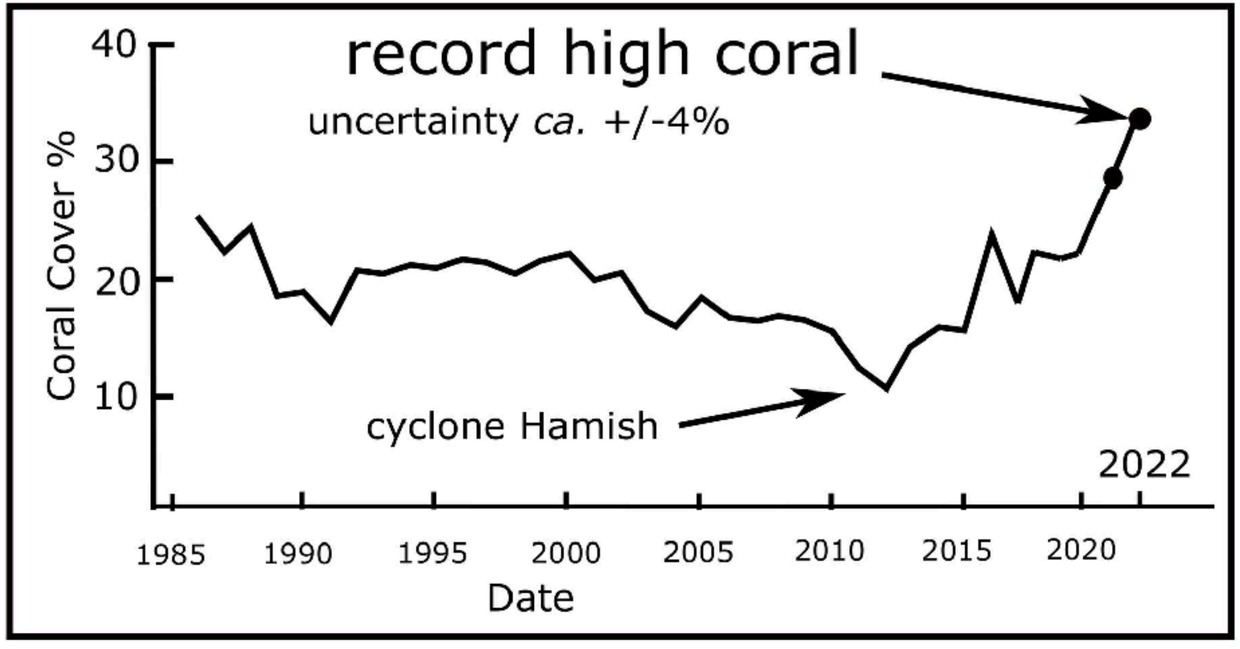
Media enquiries

E: media@aims.gov.au

Media releases →

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Nearly nine million Hawksbill sea turtles were hunted for their (bioplastic) shells between 1844 to1992...







As a result, fossil plastics saved the Hawksbill turtles...

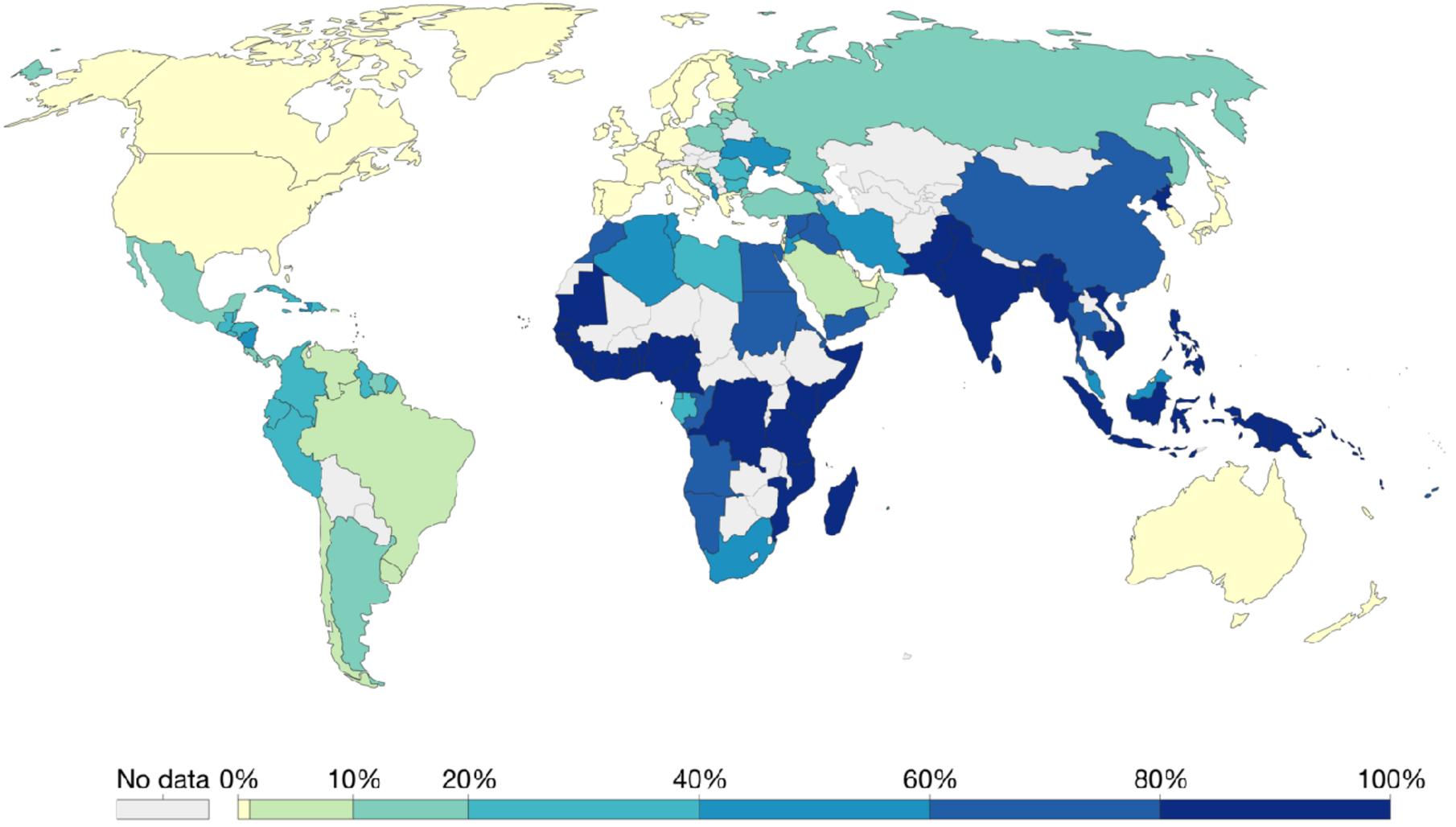
ENVIRONMENTAL PROGRESS

Source: Tina Deines, "Endangered hawksbill turtle shell trade is much bigger than scientists ever suspected" *National Geographic,* March 27, 2019

Share of plastic waste that is inadequately managed, 2010

Share of total plastic waste that is inadequately managed. Inadequately disposed waste is not formally managed and includes disposal in dumps or open, uncontrolled landfills, where it is not fully contained. Inadequately managed waste has high risk of polluting rivers and oceans. This does not include 'littered' plastic waste, which is approximately 2% of total waste (including high-income countries).

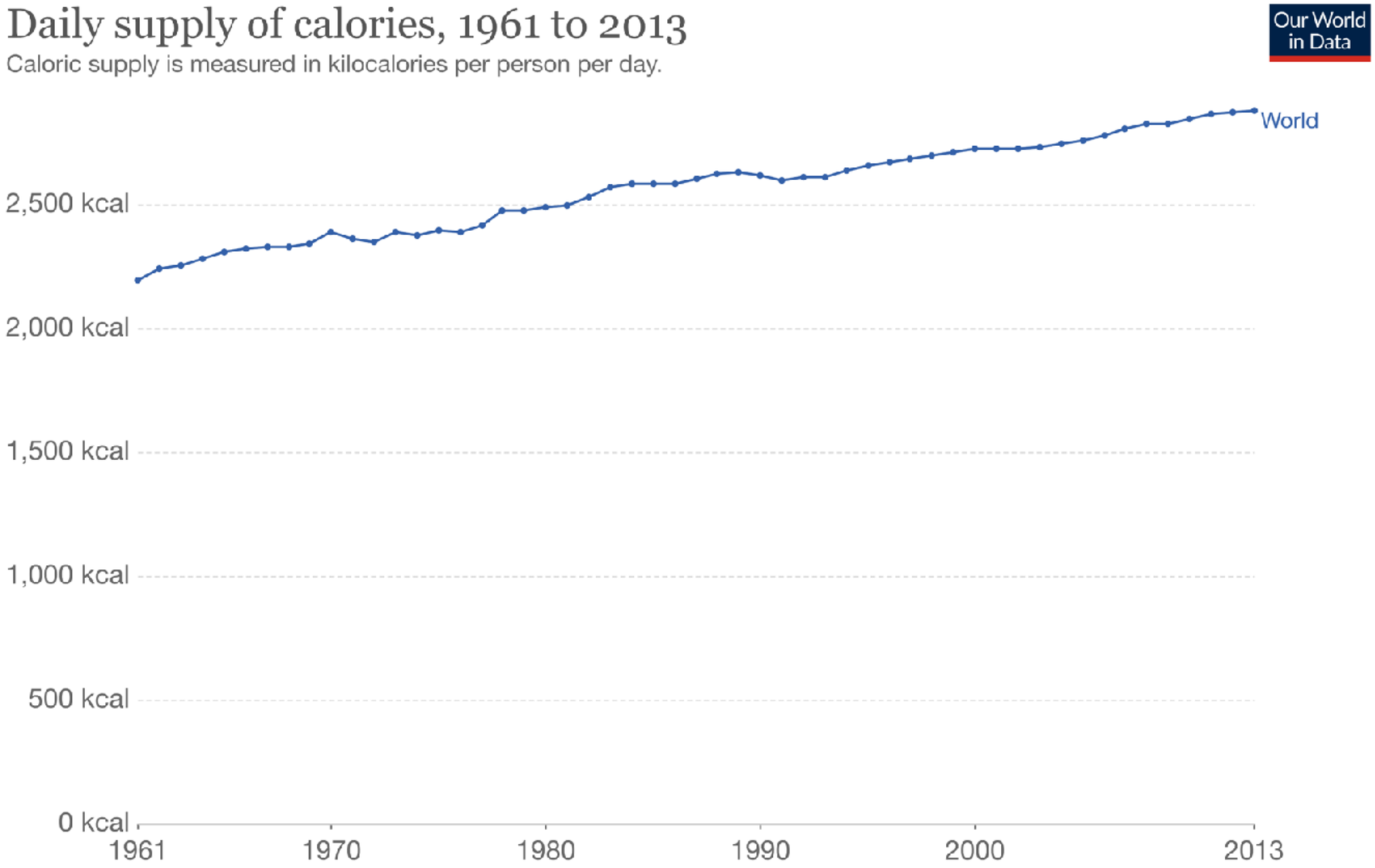
Our World in Data



ENVIRONMENTAL PROGRESS

Source: OurWorldinData.org; based on Jambeck et al. (2015)

Energy and Progress

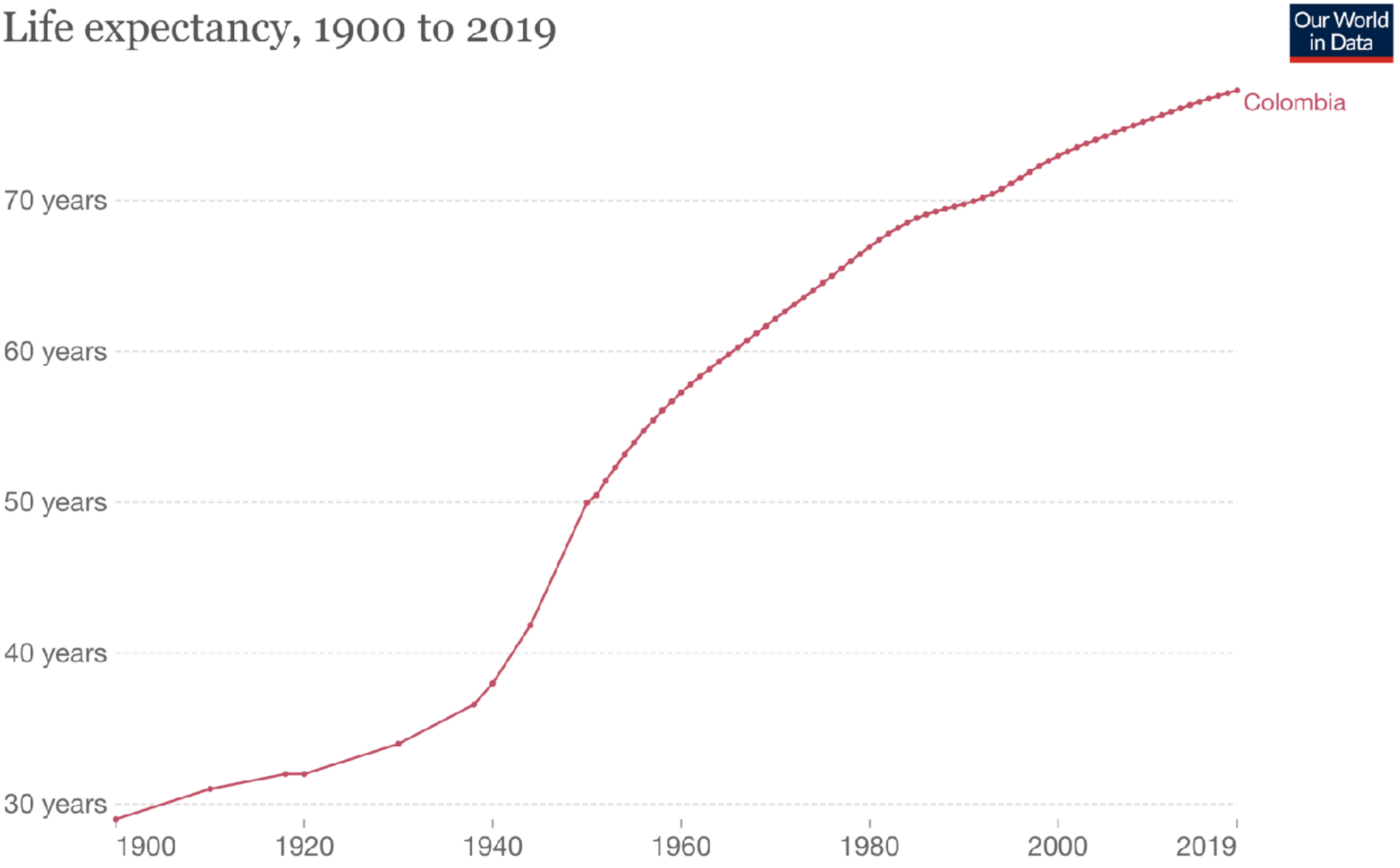


We already produce enough food for **10 billion** people, a **25% surplus**

ENVIRONMENTAL PROGRESS

Source: OurWorldInData.org/food-supply; UN Food and Agriculture Organization (FAO)

Life expectancy, 1900 to 2019



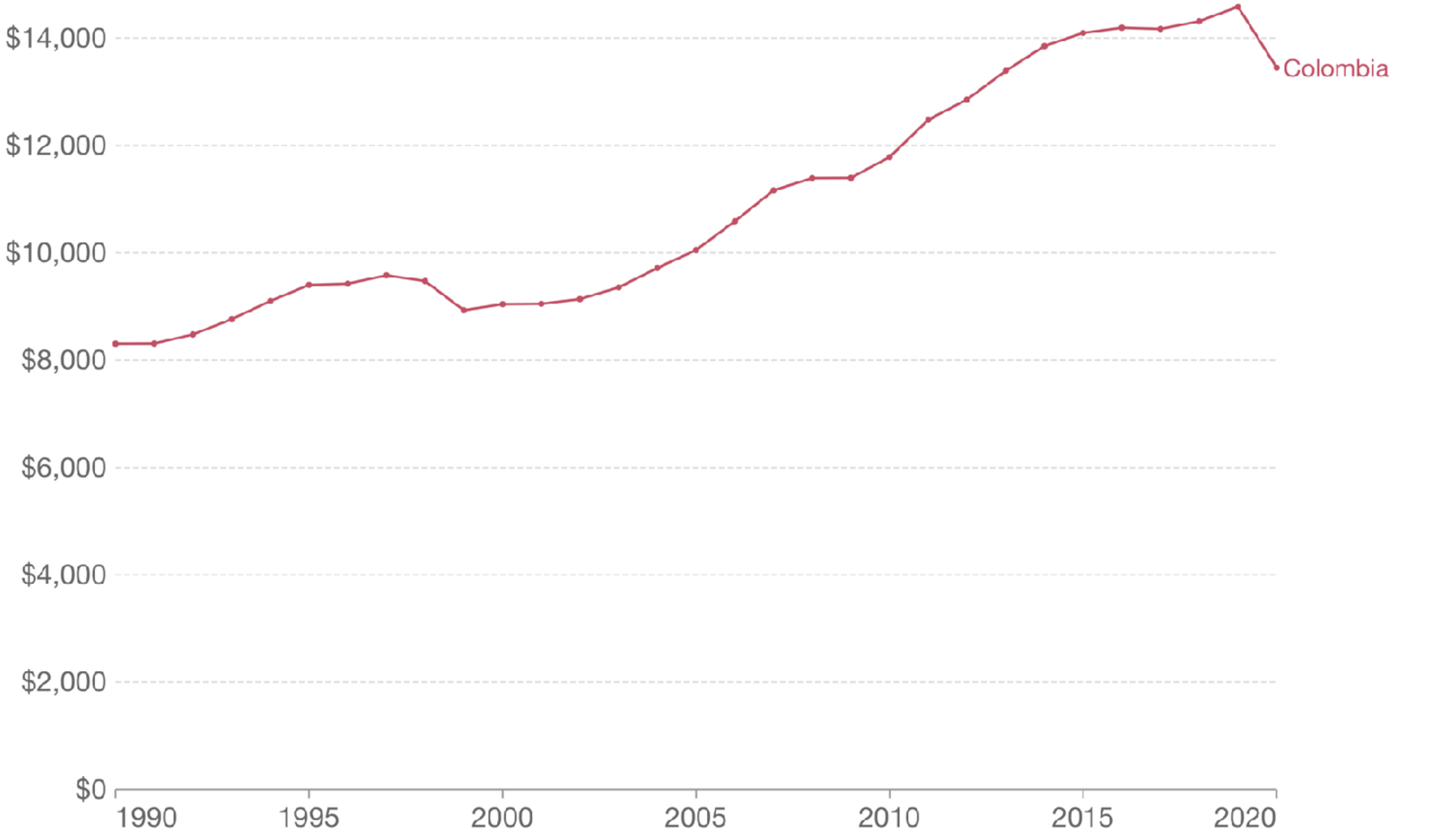
Source: Riley (2005), Clio Infra (2015), and UN Population Division (2019) OurWorldInData.org/life-expectancy • CC BY

Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year wer to stay the same throughout its life.

GDP per capita

Measured in constant international-$.

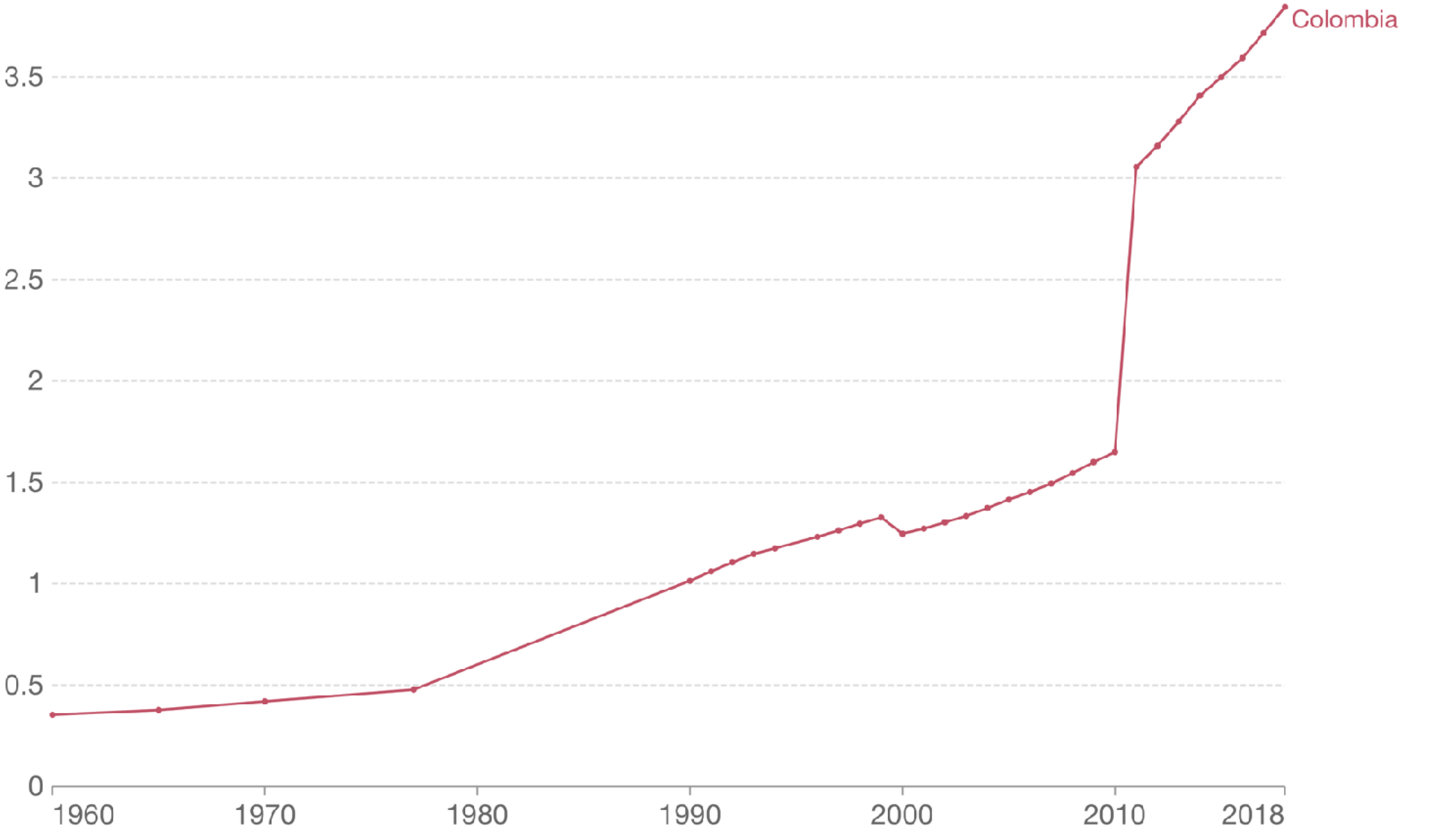
Our World in Data



Source: Data compiled from multiple sources by World Bank

OurWorldInData.org/economic-growth • CC BY

Medical doctors per 1,000 people



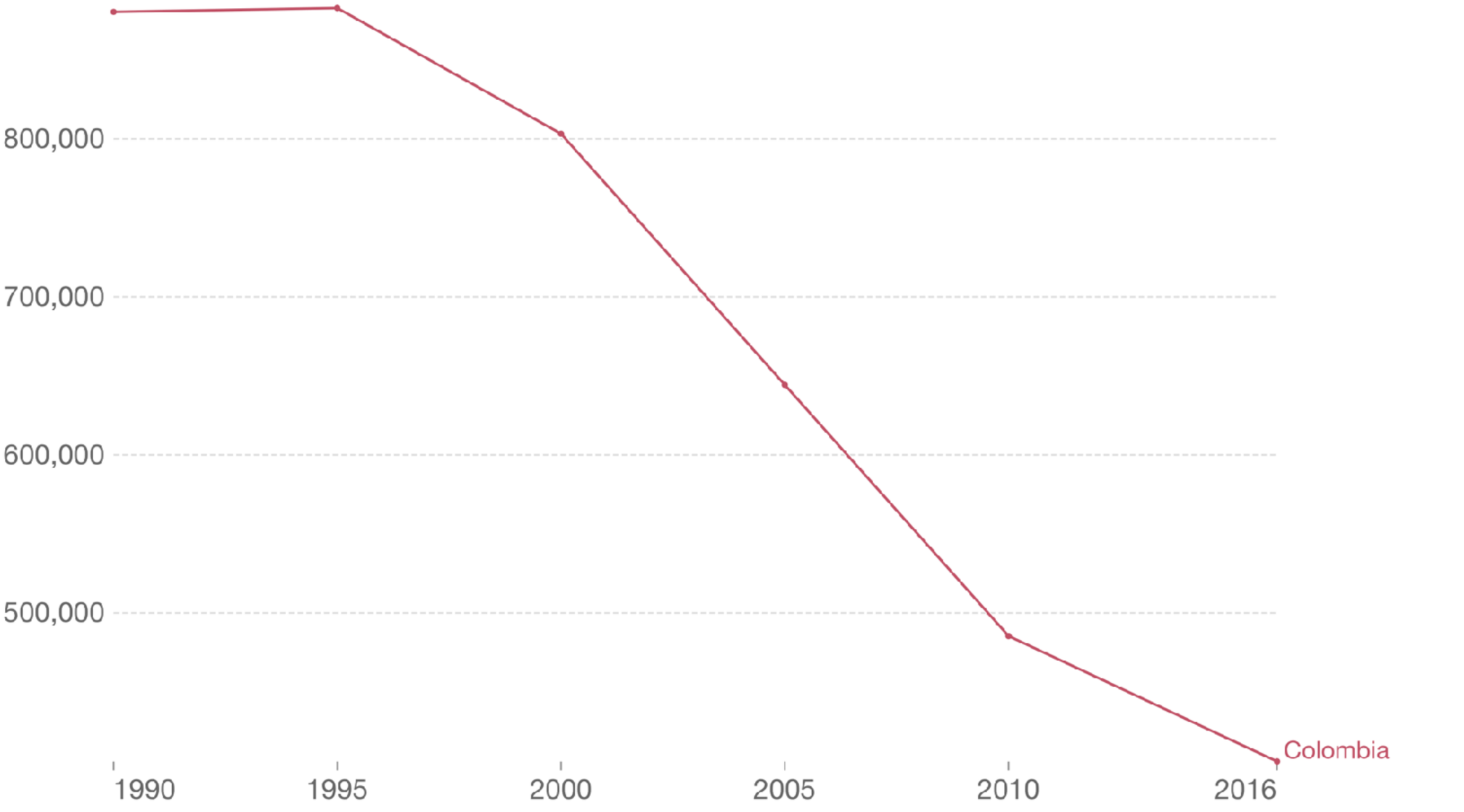
Source: Data compiled from multiple sources by World Bank
Note: Medical doctors include generalist physicians and specialist medical practitioners.

CC BY

Malnutrition: Number of children who are stunted

The number of children younger than five who are stunted – significantly shorter than the average for their age, as a consequence of poor nutrition or repeated infection.

Our World in Data



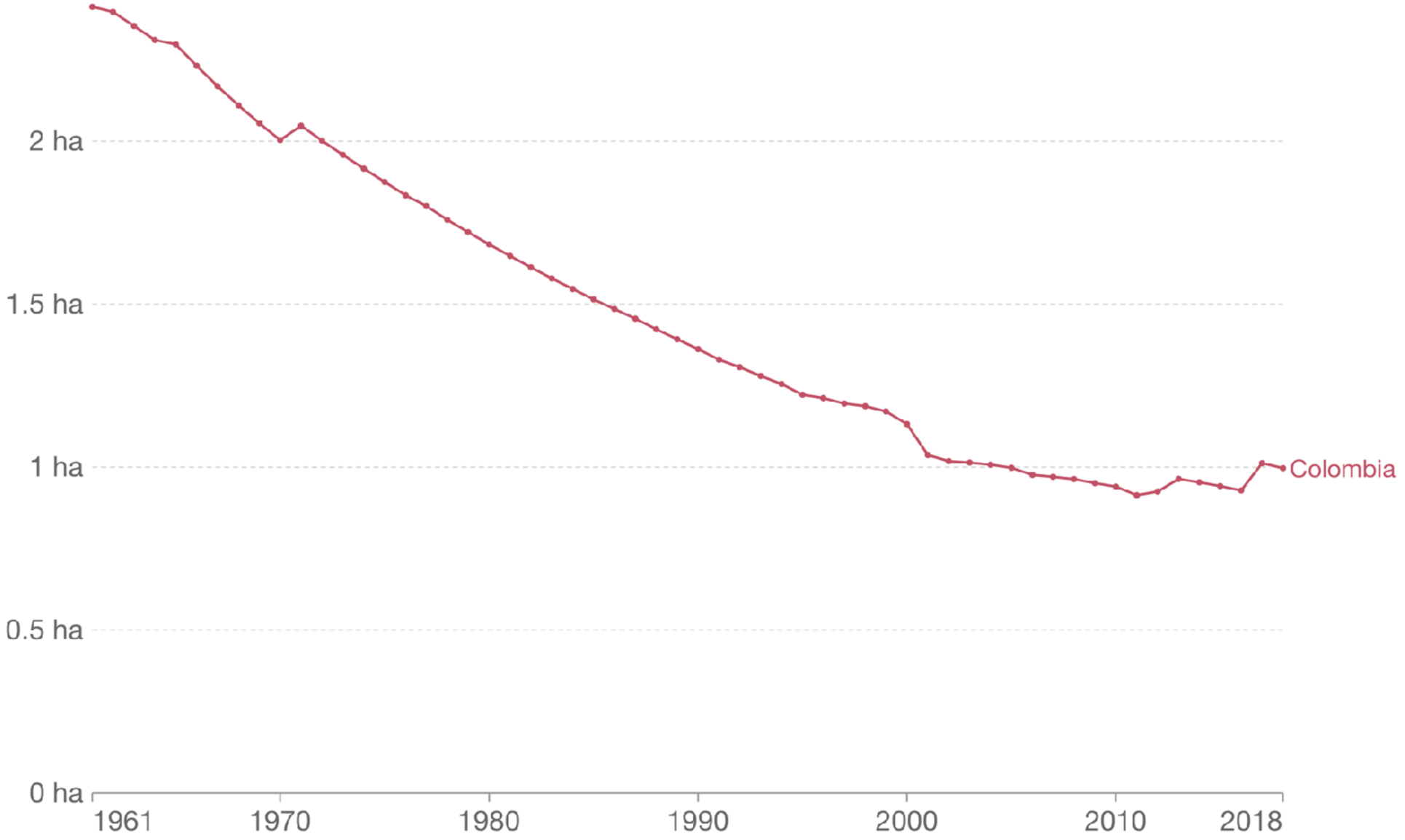
Source: Institute for Health Metrics and Evaluation (IHME)

OurWorldInData.org/hunger-and-undernourishment • CC BY

Agricultural land per capita

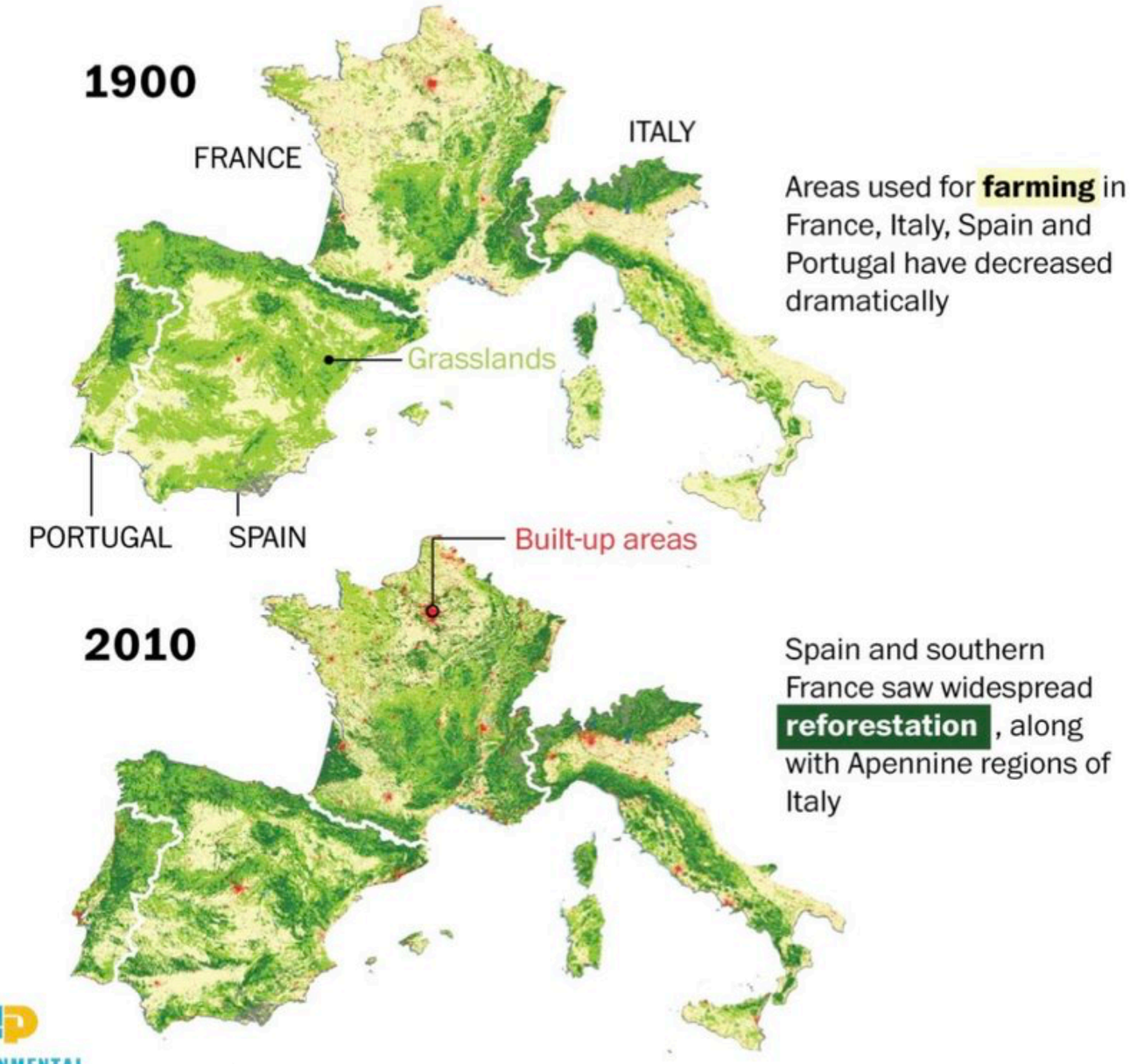
Agricultural land is the sum of cropland and land used as pasture for grazing livestock.

Our World in Data



Source: Food and Agriculture Organization of the United Nations

OurWorldInData.org/land-use • CC BY

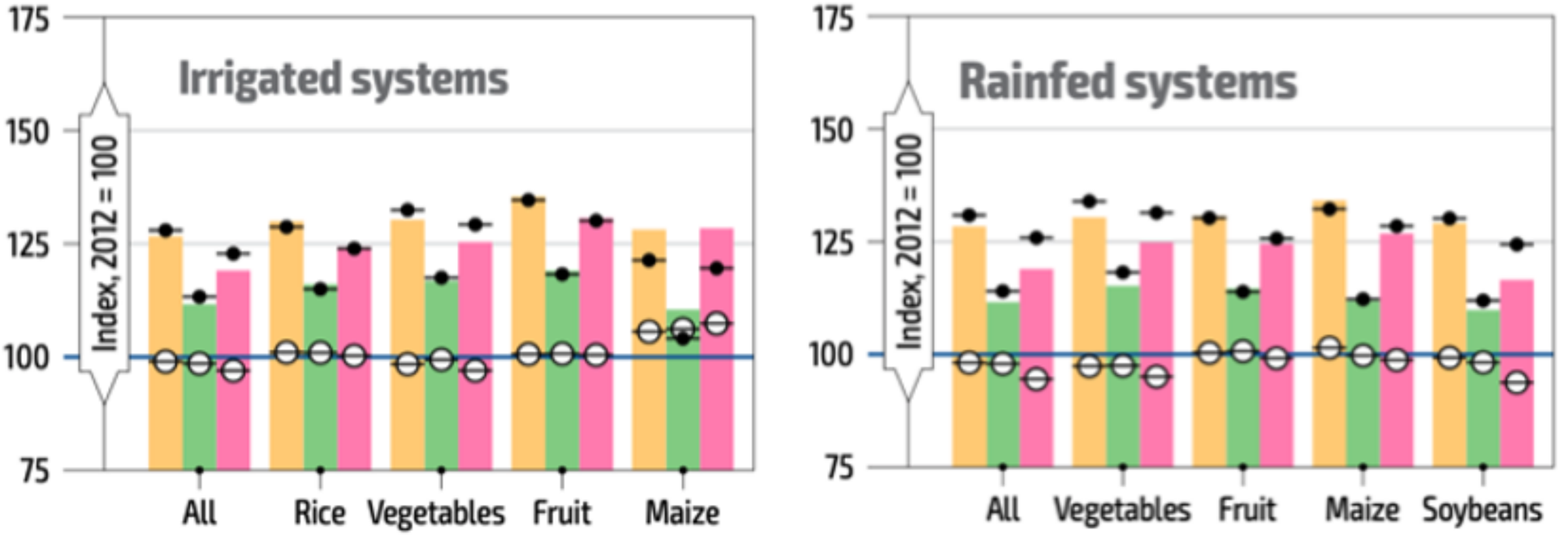


Between 1900 and 2010, the intensification of agriculture allowed Spain and France to reforest

ENVIRONMENTAL PROGRESS

Source: Rick Noack, "Watch: How Europe is greener now than 100 years ago," Washington Post, December 4, 2014.

Tech Change Outweighs Climate Change in Food Production



Note: Coloured bars indicate price-independent changes in yields attributed to both technical progress and climate change. The white circles indicate changes in yields arising from climate change, while the black barred dots indicate changes arising from technical progress. Climate change impacts are computed based on FAO-IIASA GAEZ v4 (scenario without CO2 fertilization, median value for five climate models). Changes in yields are shown for the four top commodities, as classified in the FAO GAPS model, in each region, and production system, ranked by value of production in 2012. In this figure, "Citrus" and "Other fruit" are aggregated into "Fruit". "All" refers to the aggregated change in production over the total harvested areas for all crops. Note that the results of research into the impacts of climate change on fruit trees are not conclusive (Ramírez and Kallarackal, 2015).

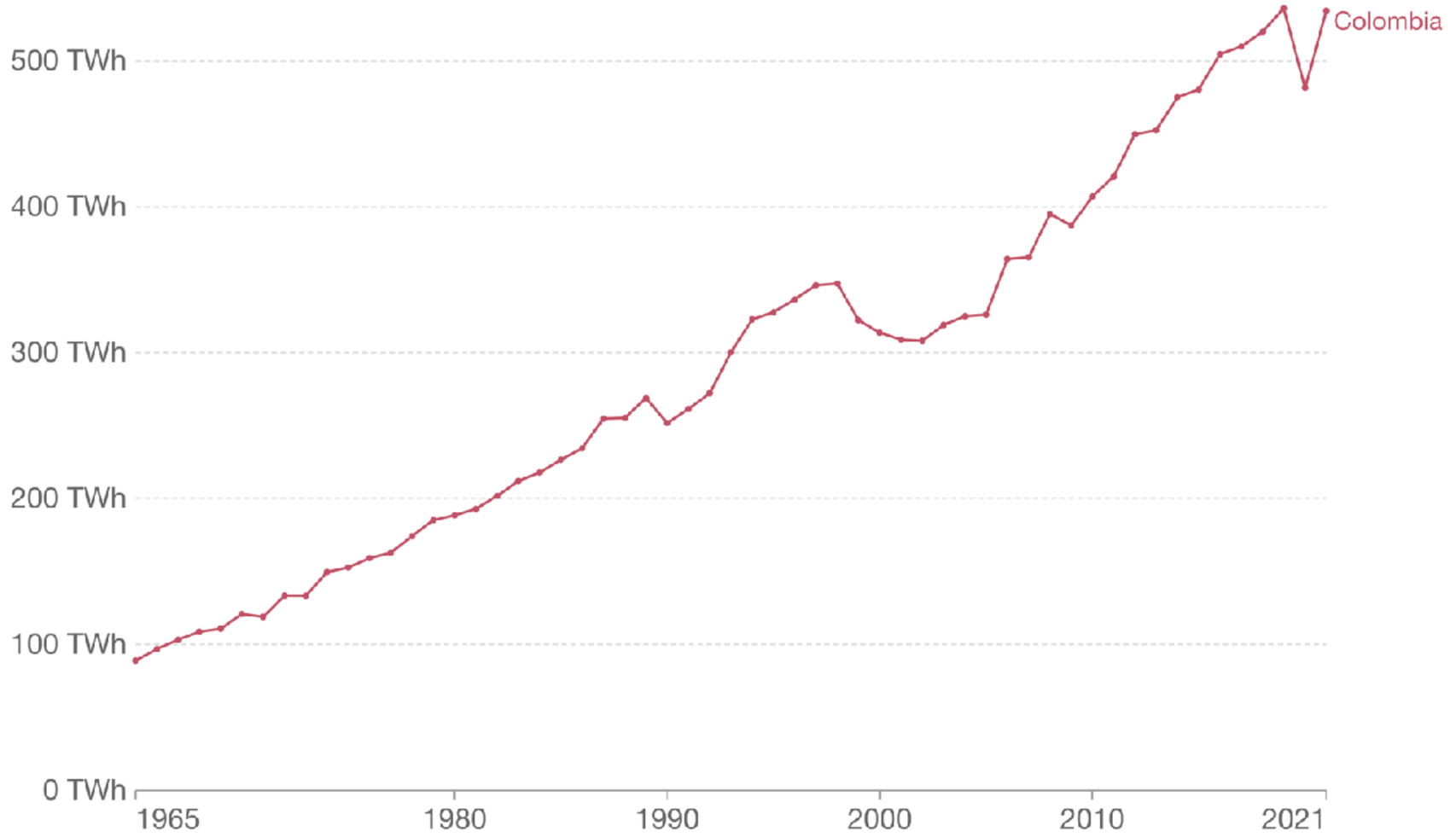
Sources: FAO Global Perspectives Studies, based on FAOSTAT (various years) for historical crop yields and value of production; FAO-IIASA GAEZ v4 for climate change shifters; and FAO expert judgement for technical shifters.

FAO. 2018. ***The future of food and agriculture - Alternative pathways to 2050***

Energy overview

Primary energy consumption

Primary energy[1] consumption is measured in terawatt-hours (TWh).



Source: BP Statistical Review of World Energy; and EIA

OurWorldInData.org/energy • CC BY

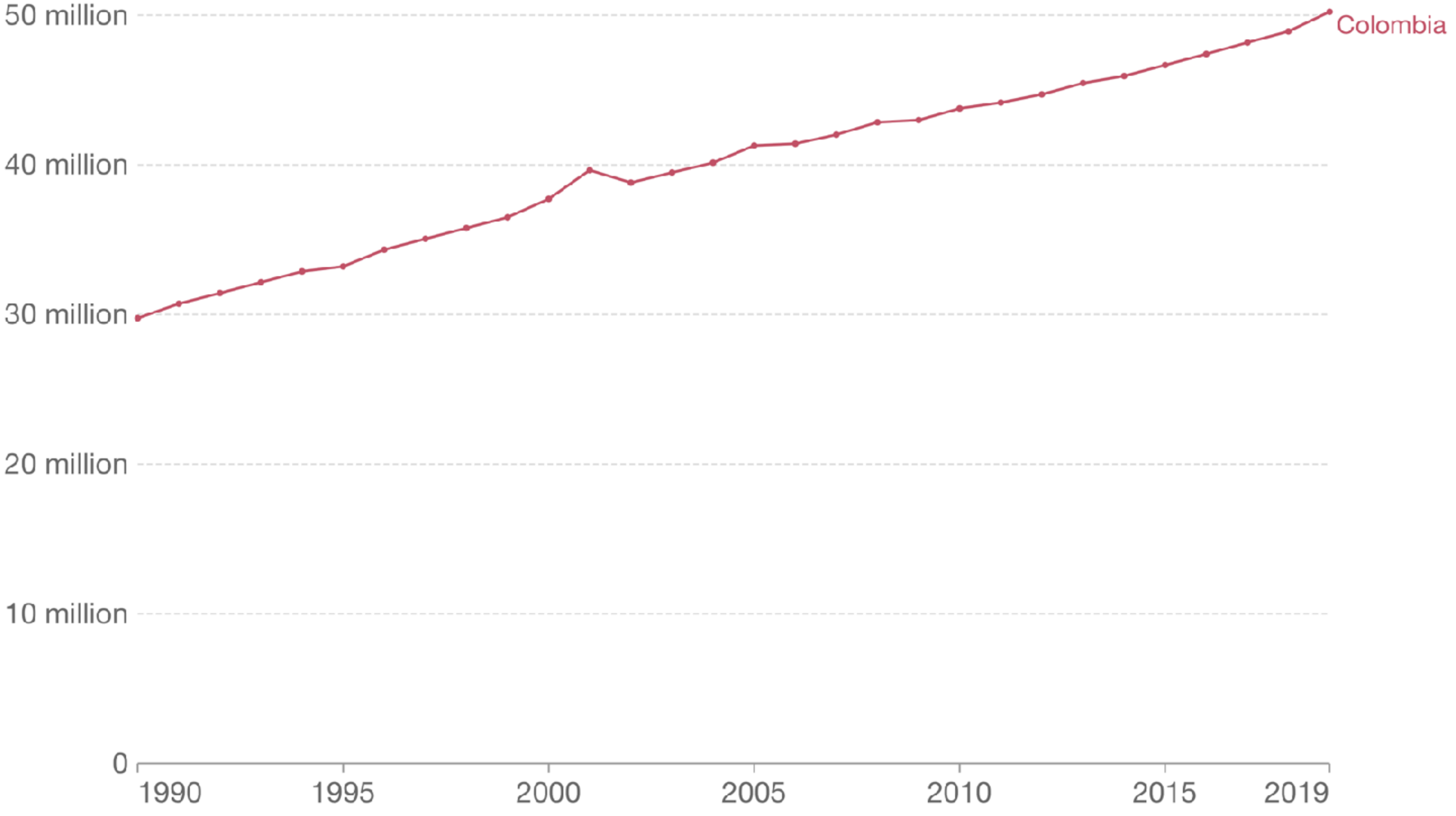
Note: Data includes only commercially-traded fuels (coal, oil, gas), nuclear and modern renewables. It does not include traditional biomass.

---

1. Primary energy: Primary energy is the energy as it is available as resources – such as the fuels that are burnt in power plants – before it has been transformed. This relates to the coal before it has been burned, the uranium, or the barrels of oil. Primary energy includes energy that is needed by the end user, plus inefficiencies and energy that is lost when raw resources are transformed into a useable form. You can read more on the different ways of measuring energy in our article.

Number of people with access to electricity

The definition used in international statistics adopts a very low cutoff for what it means to 'have access to electricity'. It is defined as having an electricity source that can provide very basic lighting, and charge a phone or power a radio for 4 hours per day.

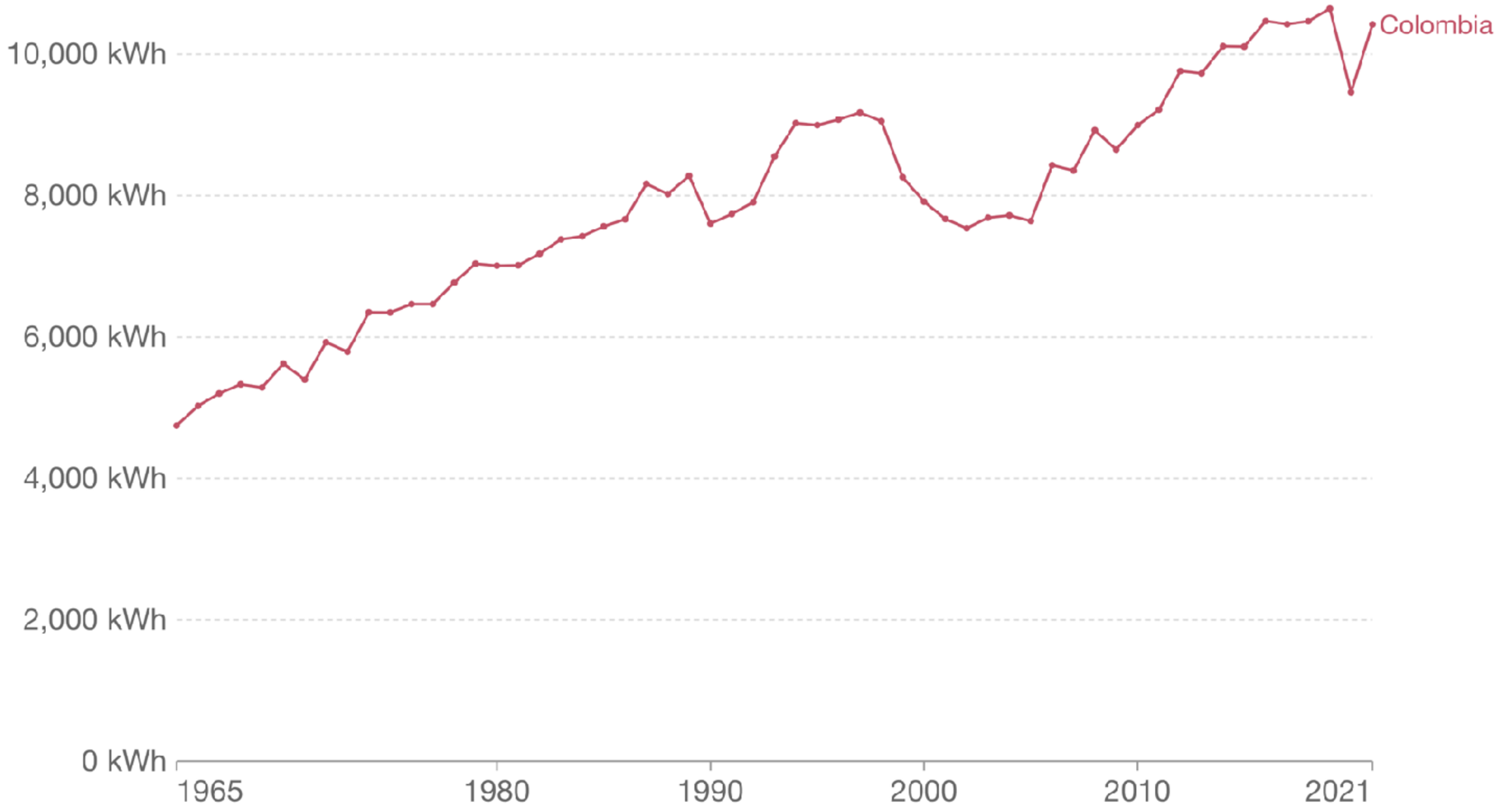


Source: Calculated by Our World in Data based on data published by the World Bank

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Energy use per person

Energy use not only includes electricity, but also other areas of consumption including transport, heating and cooking.

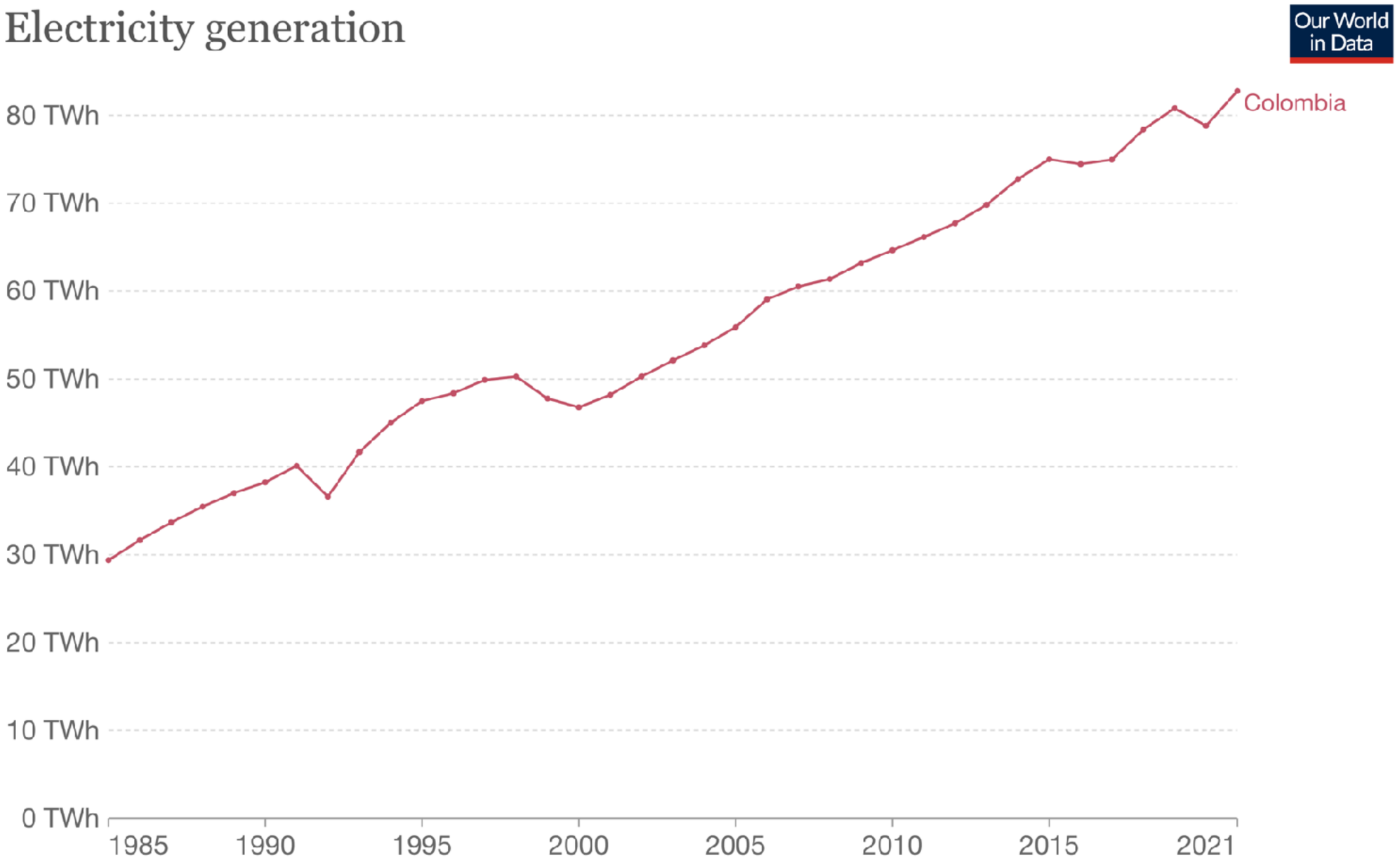


Source: Our World in Data based on BP & Shift Data Portal

OurWorldInData.org/energy • CC BY

Note: Energy refers to primary energy – the energy input before the transformation to forms of energy for end-use (such as electricity or petrol for transport).

Electricity generation

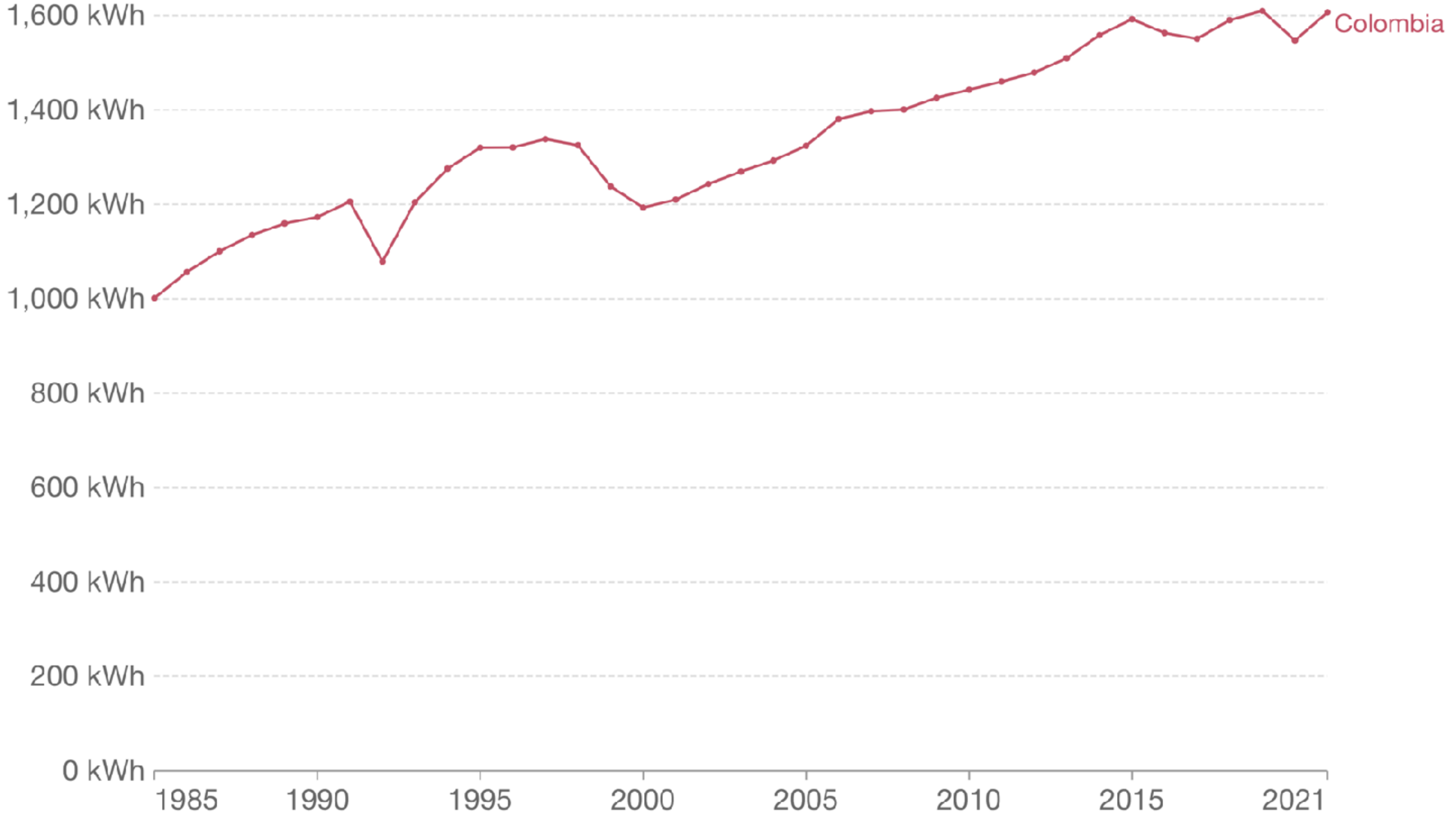


Source: Our World in Data based on BP Statistical Review of World Energy (2022); Our World in Data based on Ember's Global Electricity Review (2022); Our World in Data based on Ember's European Electricity Review (2022)

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Per capita electricity generation

This is annual average electricity generation per person, measured in kilowatt-hours.

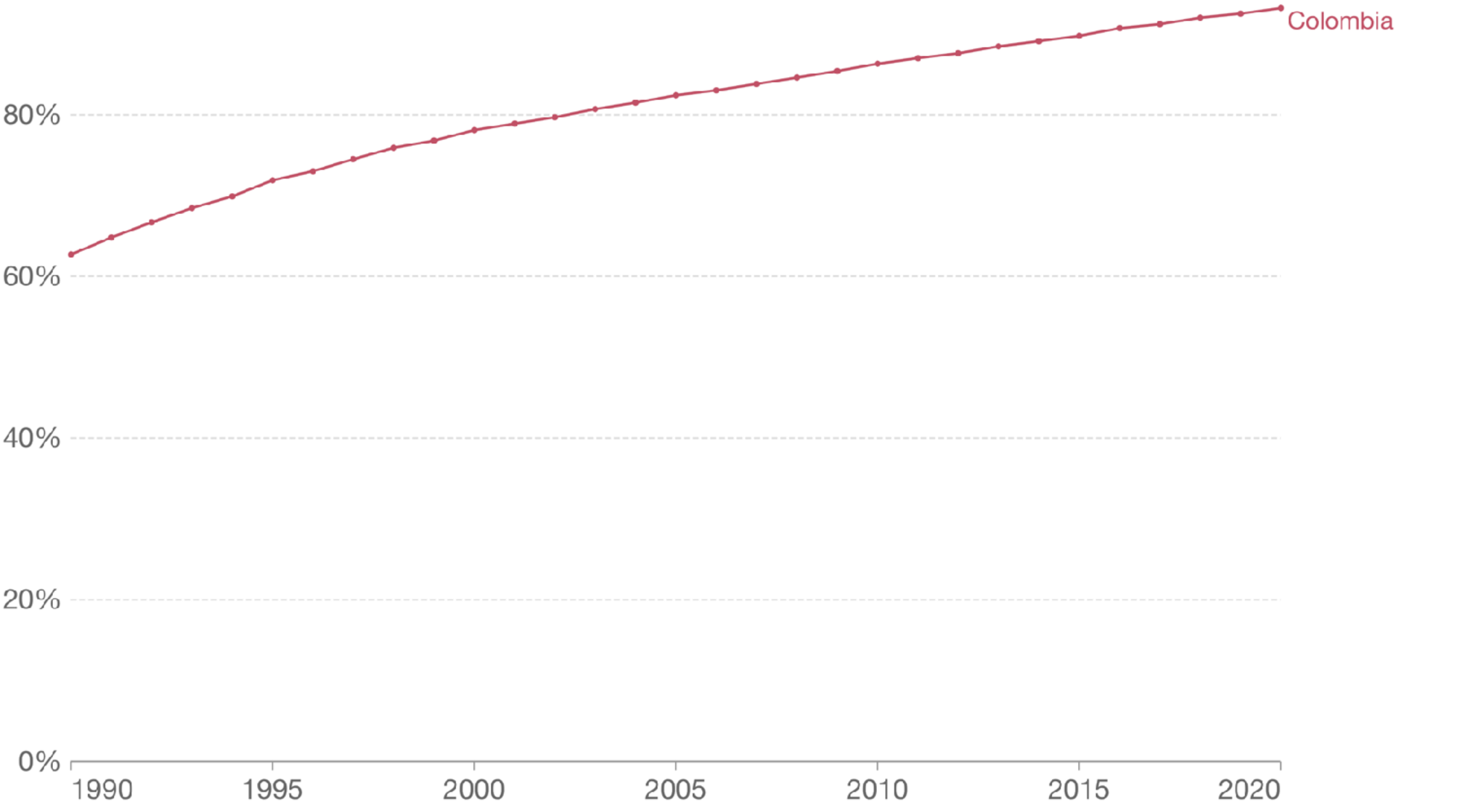


Source: Our World in Data based on BP Statistical Review of World Energy (2022); Our World in Data based on Ember's Global Electricity Review (2022); Our World in Data based on Ember's European Electricity Review (2022)

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Share of the population with access to clean fuels for cooking

Access to clean fuels or technologies such as clean cookstoves reduce exposure to indoor air pollutants, a leading cause of death in low-income households.

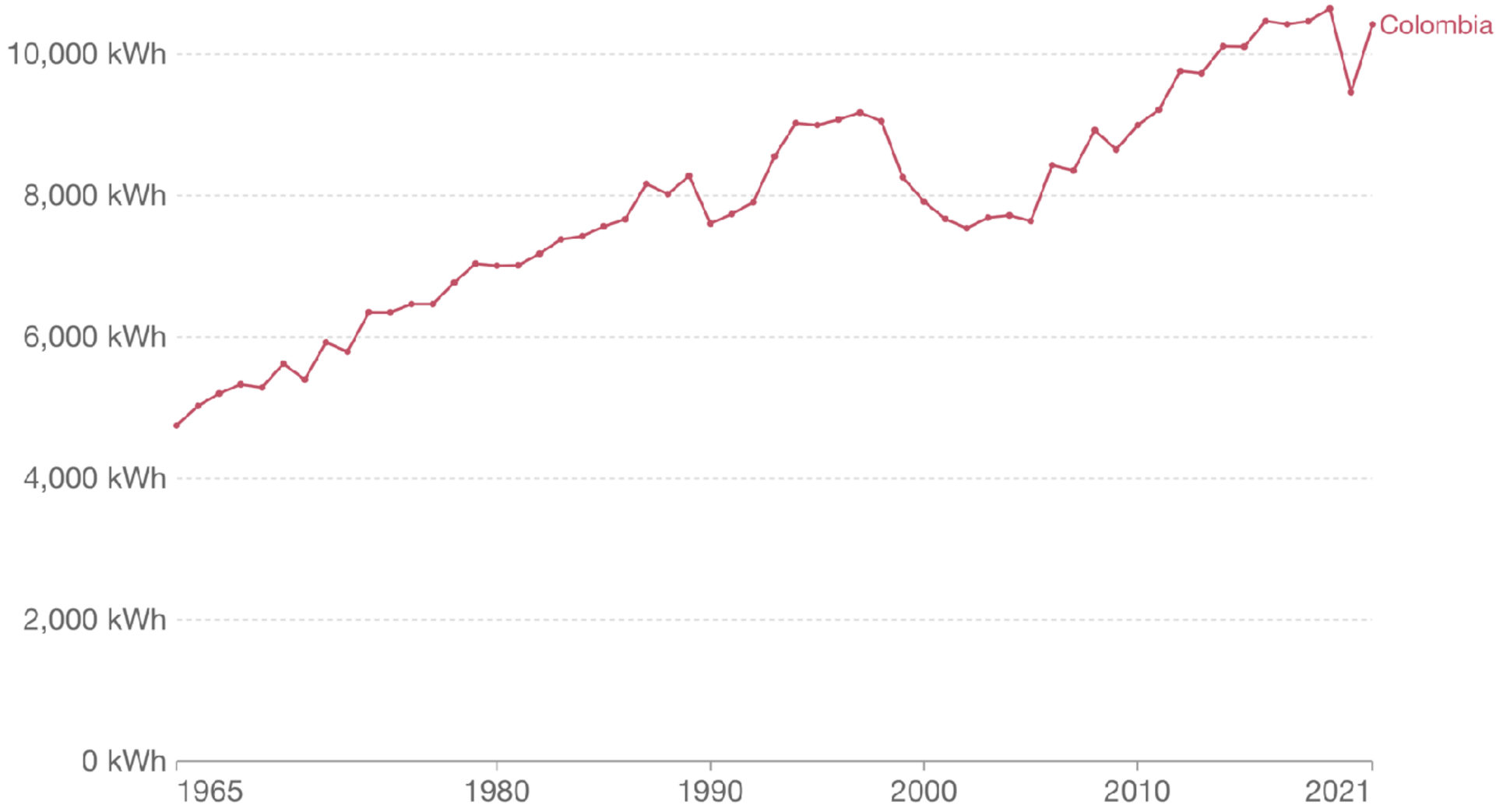


Source: WHO, Global Health Observatory (2022)

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Energy use per person

Energy use not only includes electricity, but also other areas of consumption including transport, heating and cooking.



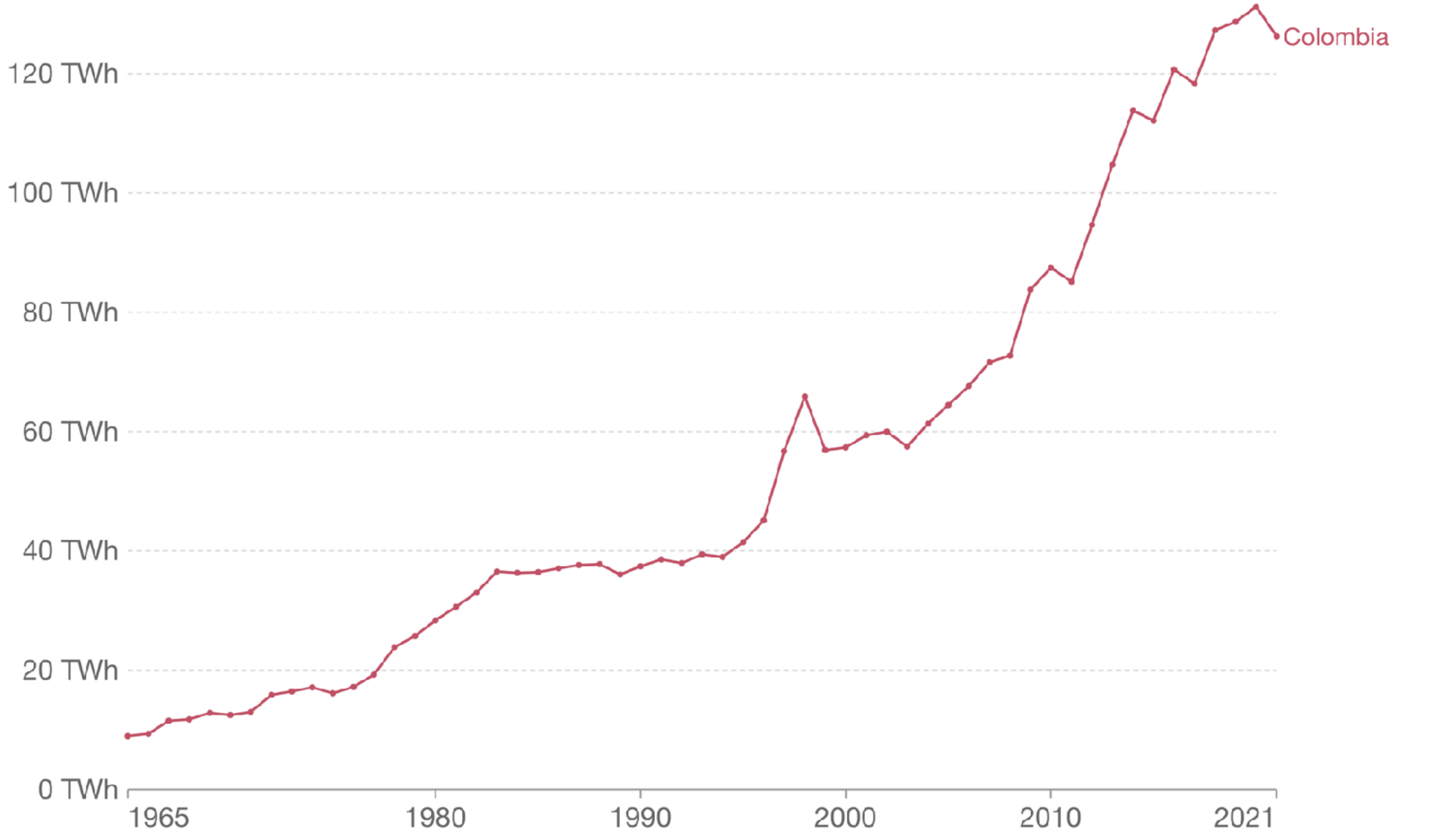
Source: Our World in Data based on BP & Shift Data Portal

OurWorldInData.org/energy • CC BY

Note: Energy refers to primary energy – the energy input before the transformation to forms of energy for end-use (such as electricity or petrol for transport).

Gas consumption

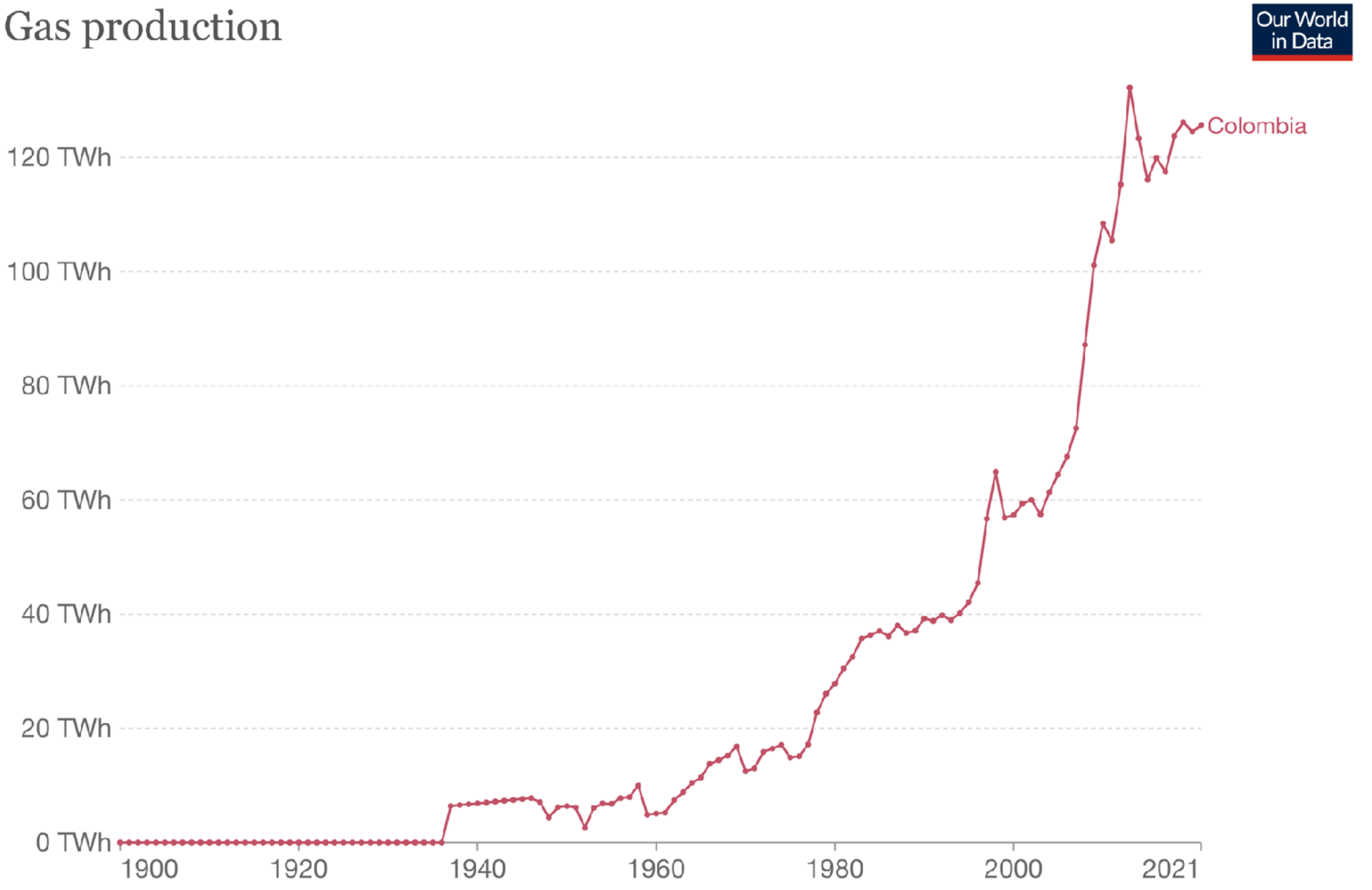
Natural gas consumption is measured in terawatt-hour (TWh) equivalents per year.



Source: BP Statistical Review of Global Energy

OurWorldInData.org/fossil-fuels • CC BY

Gas production



Source: BP Statistical Review of World Energy; the SHIFT Project

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Limits of Renewables

Share of electricity production from fossil fuels

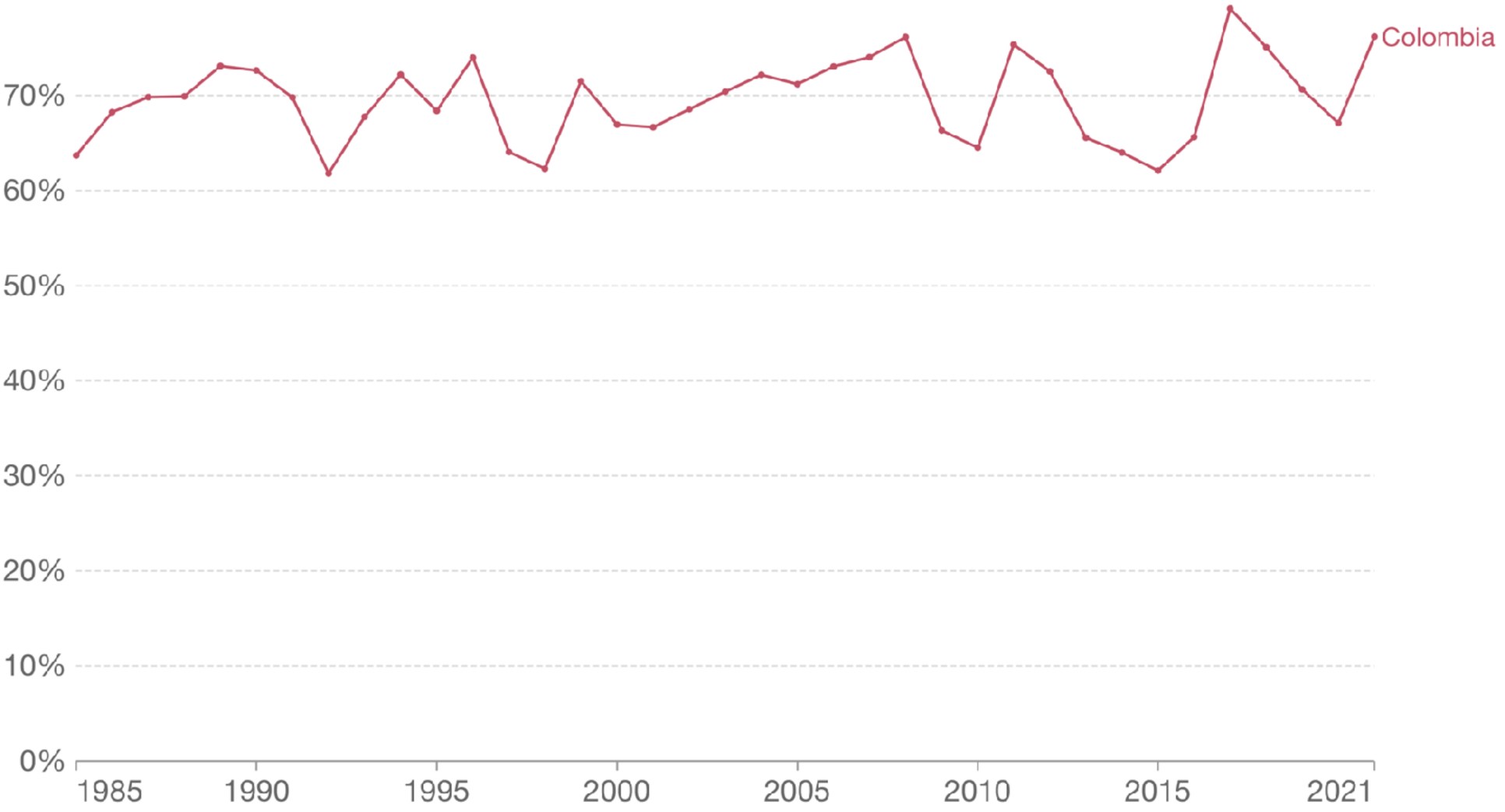


Source: Our World in Data based on BP Statistical Review of World Energy (2022); Our World in Data based on Ember's Global Electricity Review (2022); Our World in Data based on Ember's European Electricity Review (2022)

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Share of electricity from low-carbon sources

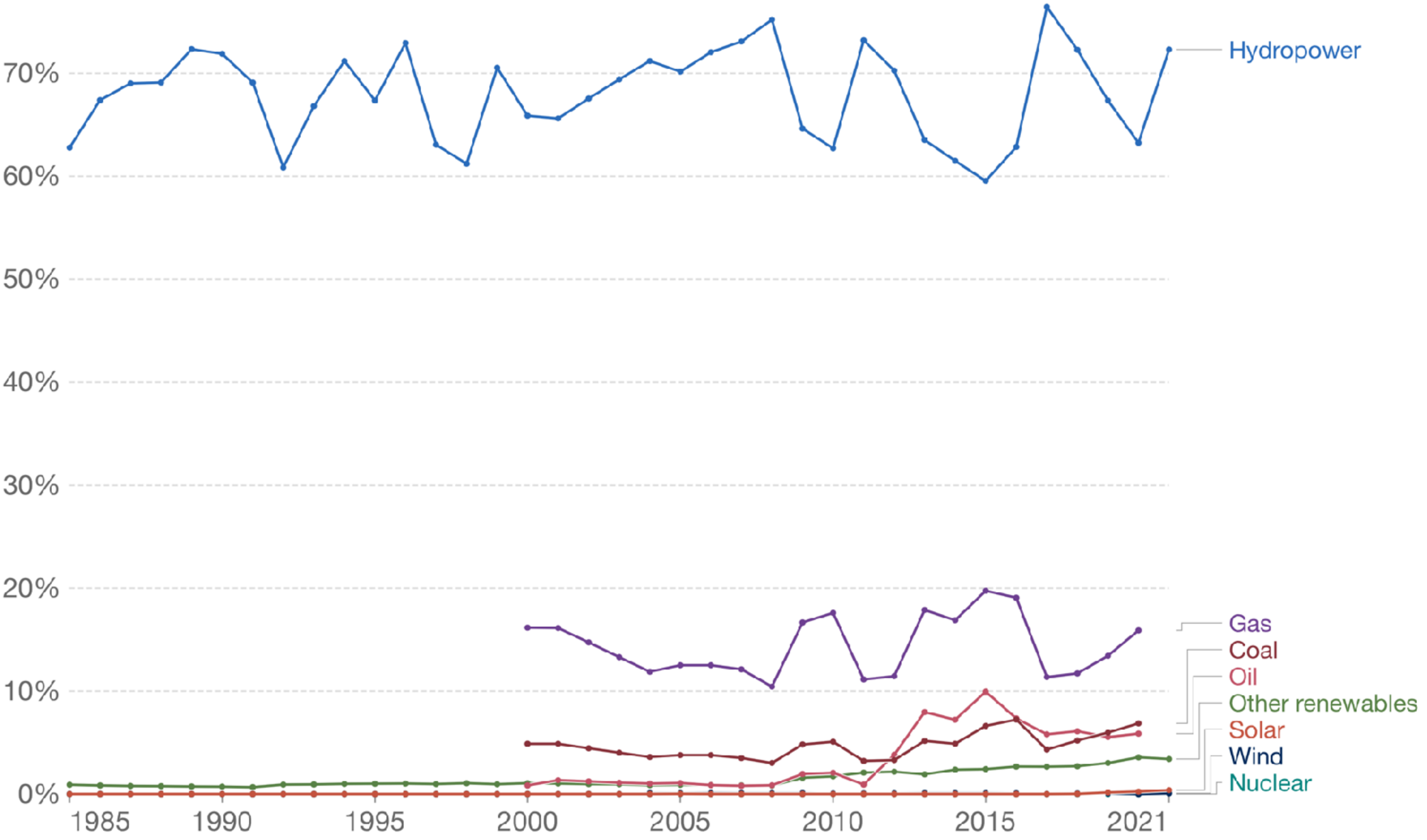
Low-carbon electricity is the sum of electricity from nuclear and renewable sources (including solar, wind, hydropower, biomass and waste, geothermal and wave and tidal).



Source: Our World in Data based on BP Statistical Review of World Energy (2022); Our World in Data based on Ember's Global Electricity Review (2022); Our World in Data based on Ember's European Electricity Review (2022)

OurWorldInData.org/low-carbon-electricity-by-country • CC BY

Share of electricity production by source, Colombia



Source: Our World in Data based on BP Statistical Review of World Energy & Ember

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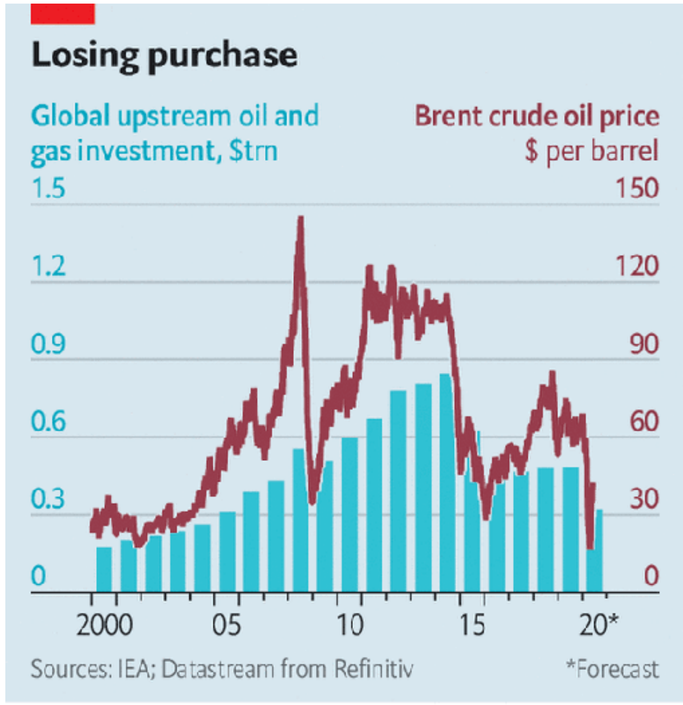
Press release

Global coal demand is set to return to its all-time high in 2022

28 July 2022

Anti-oil and gas activism resulted in return to coal





"ESG [environmental, social, and governance] considerations account for much of the decline in capital expenditure by international oil companies in recent years and the investor exodus out of oil and gas markets." — *The Financial Times,* October 27, 2021

ENVIRONMENTAL PROGRESS

The New York Times

PLAY TH



Europe Is Sacrificing Its Ancient Forests for Energy

Governments bet billions on burning timber for green power. The Times went deep into one of the continent's oldest woodlands to track the hidden cost.

By Sarah Hurtes and Weiyi Cai
Photographs by Andreea Campeanu September 7, 2022

Desperate Europeans Return to the World's Oldest Fuel for Warmth

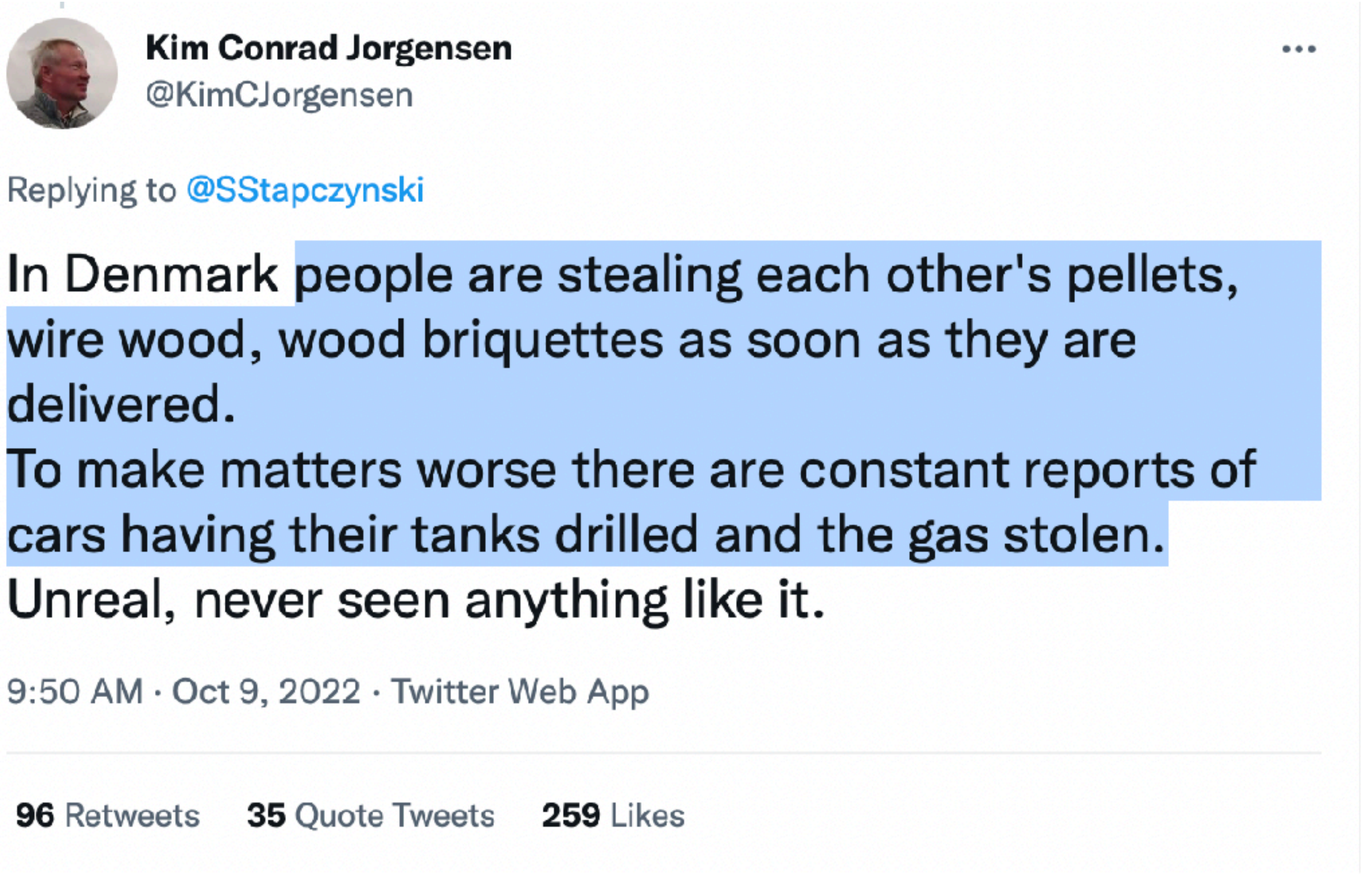
'It's back to the old days' as demand for firewood soars due to gas shortage.

By Lars Paulsson and Josefine Fokuhl
October 7, 2022, 10:00 PM PDT

Want the lowdown on European markets? In your inbox before the open, every day. Sign up here.

Not far from Berlin's Tempelhof airport, Peter Engelke is putting up a new security gate at his warehouse because of concerns about desperate people pilfering his stock. The precious asset at risk is firewood.

Engelke's actions reflect growing anxiety across Europe as the continent braces for energy shortfalls, and possibly blackouts, this winter. The apparent sabotage of the Nord Stream gas pipeline is the latest sign of the region's critical position as Russia slashes supplies in the standoff over the war in Ukraine.



People in Poland Are Burning Trash to Stay Warm This Winter

Russia's war in Ukraine has exposed the vulnerability of Europe's fuel supplies. In Poland, some households are hoarding garbage to replace their coal.



Smoke rises from household chimneys in the suburbs of Krakow, Poland. *Photographer: Bartek Sadowski/Bloomberg*

By Maciej Martewicz and Piotr Skolimowski
October 5, 2022, 9:00 PM PDT

When Paulina Mroczkowska noticed a growing pile of garbage in the yard of a carpenter's workshop across the street, the alarm bell rang. Her concern wasn't over the hazards of uncollected waste, but how it was going to be used.

Poland is home to 40 of the 100 cities with the worst air quality in the European Union because of a reliance on coal to heat homes, a legacy of the communist era that championed mining. But now a shortage of the fuel and the soaring cost of living are spurring people to burn alternatives – including household refuse.

More from **Bloomberg Green**

Indonesia Plans EV Purchase Subsidies in 2023 to Spur Sales

Hurricane Julia Hits Nicaragua With Torrential Rainfall

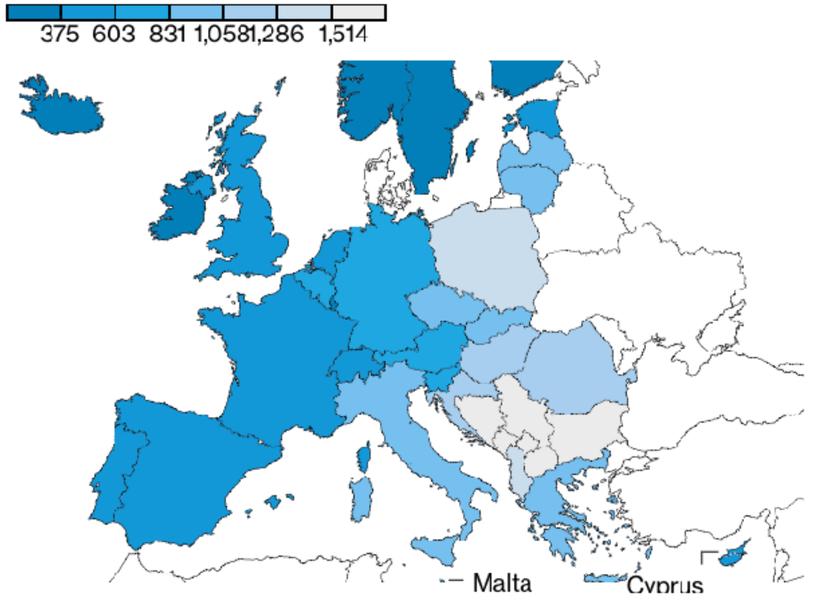
Venezuela Deaths Climb to 22 After Heavy Rain Brings Mudslides

Huge Barge Backup Eases on Mississippi, Freeing Tons of Cargo

"It's so bad this season that you can smell trash burning every day, which is completely new," said Mroczkowska, 35, a mother of three from Jablonna on the northern outskirts of Warsaw. "Rarely can you smell a regular fuel. It's scary to think what happens when it really gets cold."

As Russia's war in Ukraine exposes the fragility of Europe's energy security, Poland has another layer of risk: that efforts to tackle pollution go backwards in a country with among the continent's highest prevalence of premature deaths linked to contaminated air.

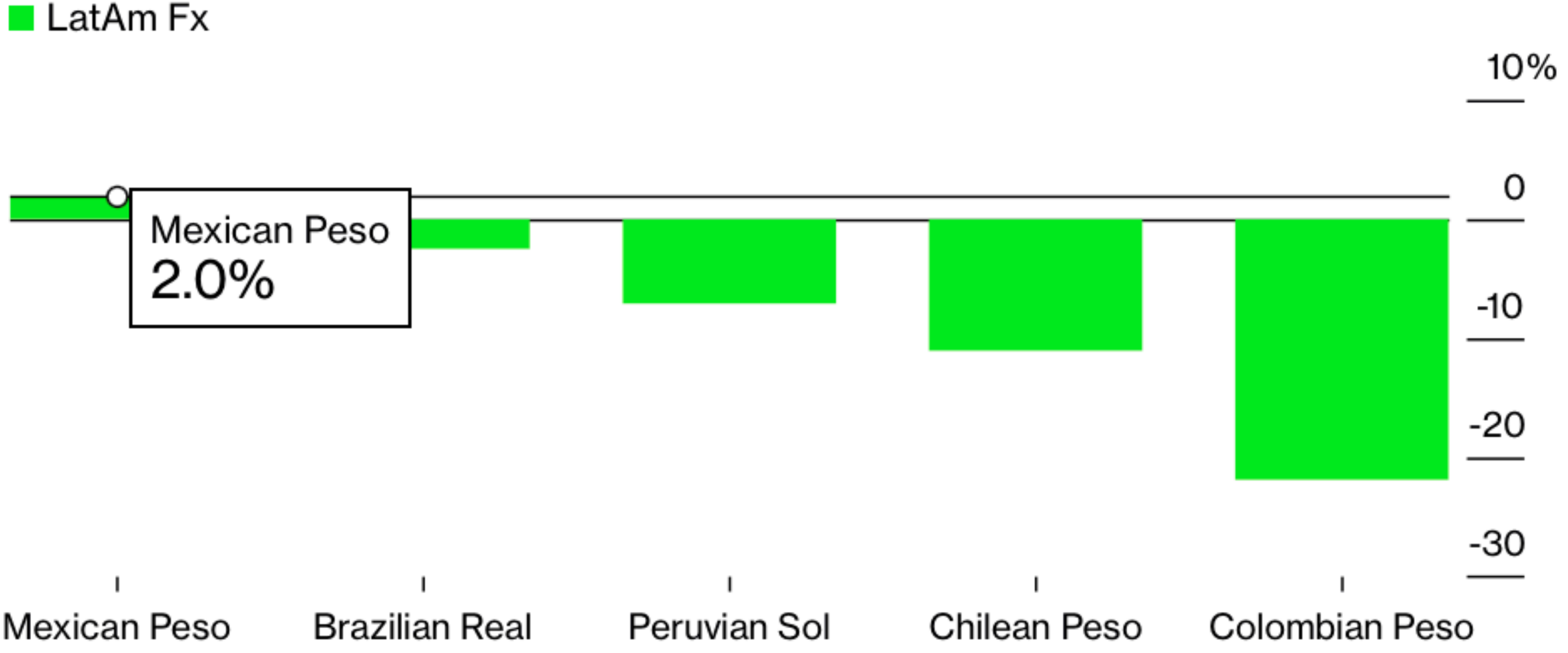
Deadly Air
Pollution in the EU has the worst impact in Poland and Bulgaria



Source: European Environment Agency
Years of life lost per 100,000 people in 2019

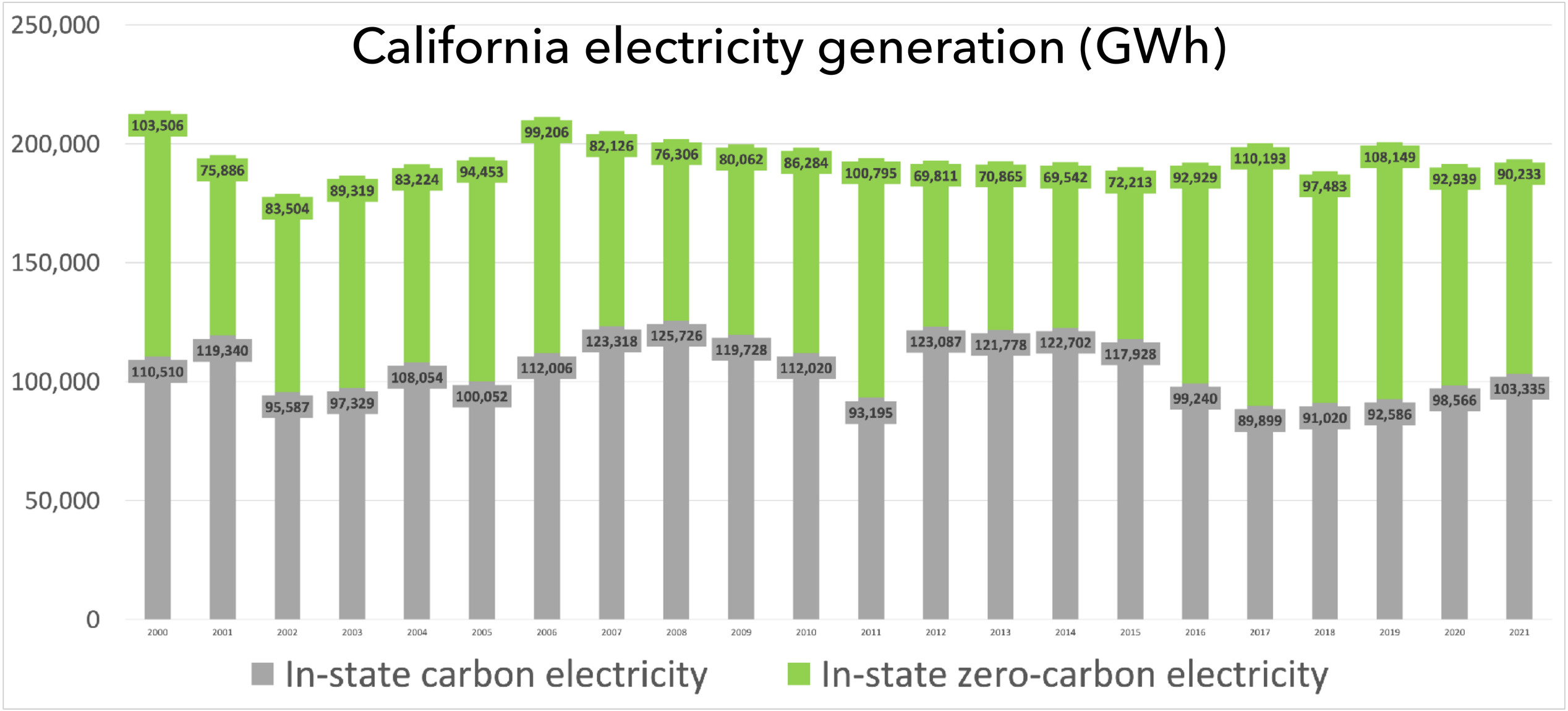
Petro Peso

The Colombian peso has lost a fifth of its value against the dollar since Gustavo Petro was elected president in June



Source: Bloomberg
Note: Data from June 17 through Oct. 24

California electricity generation (GWh)

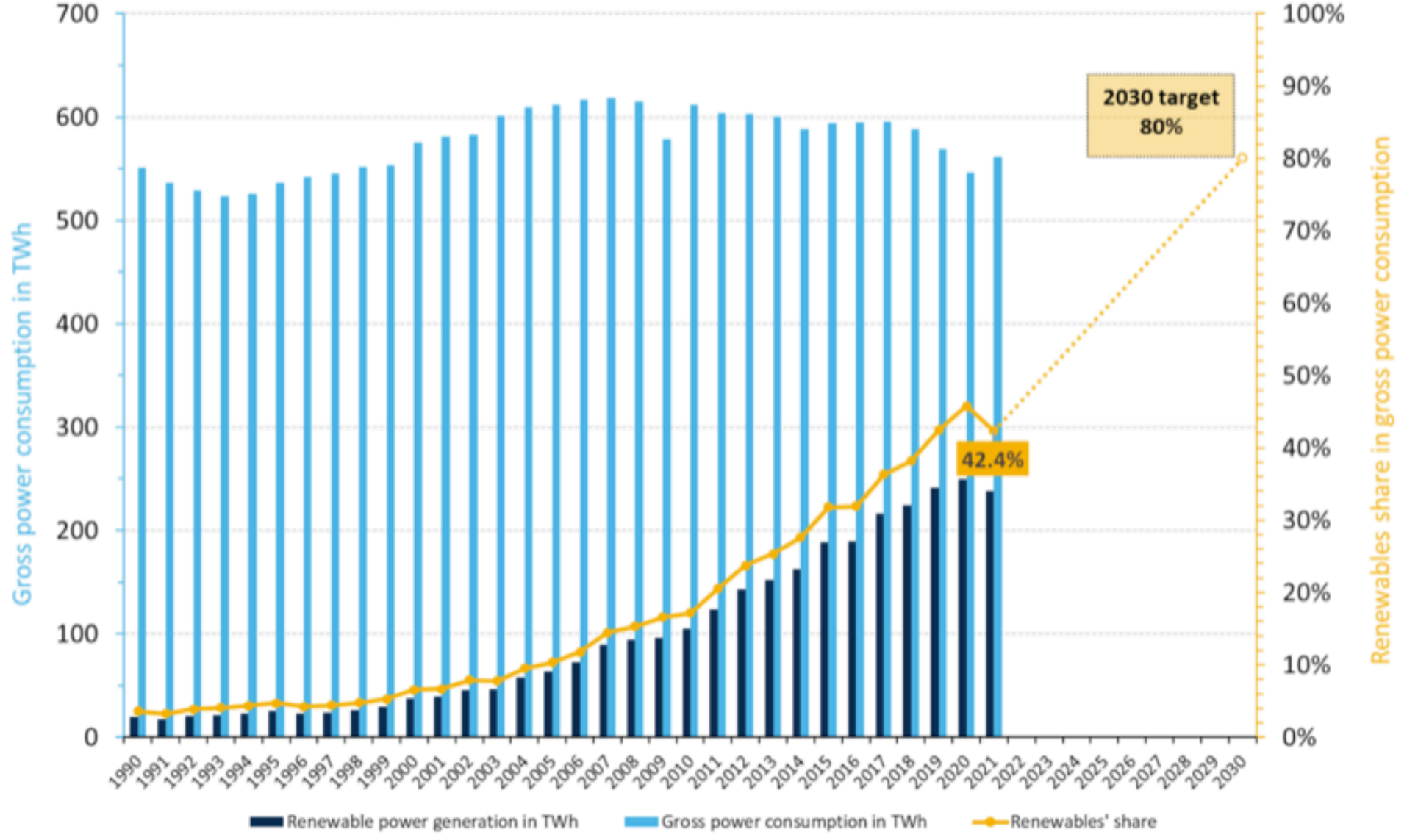


Source: California Energy Commission, accessed September 7, 2022, https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data

Renewables' share in gross power consumption in Germany 1990 - 2021.

Data: BDEW 2021, preliminary.

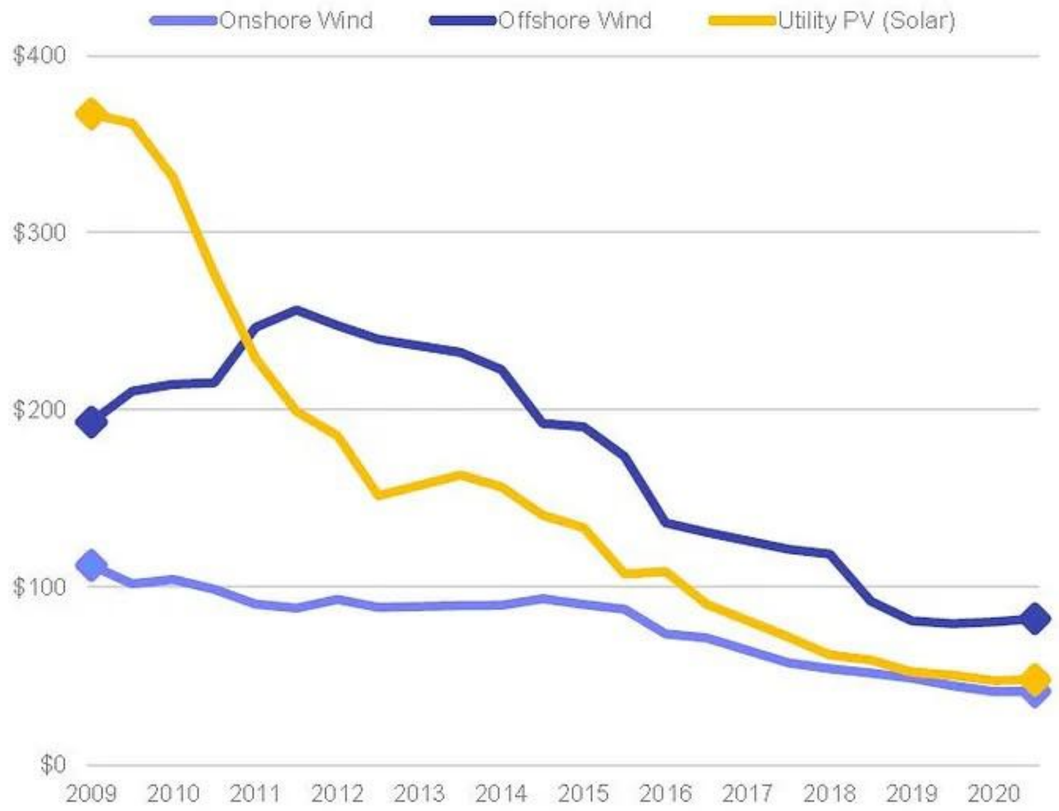
CLEAN ENERGY WIRE



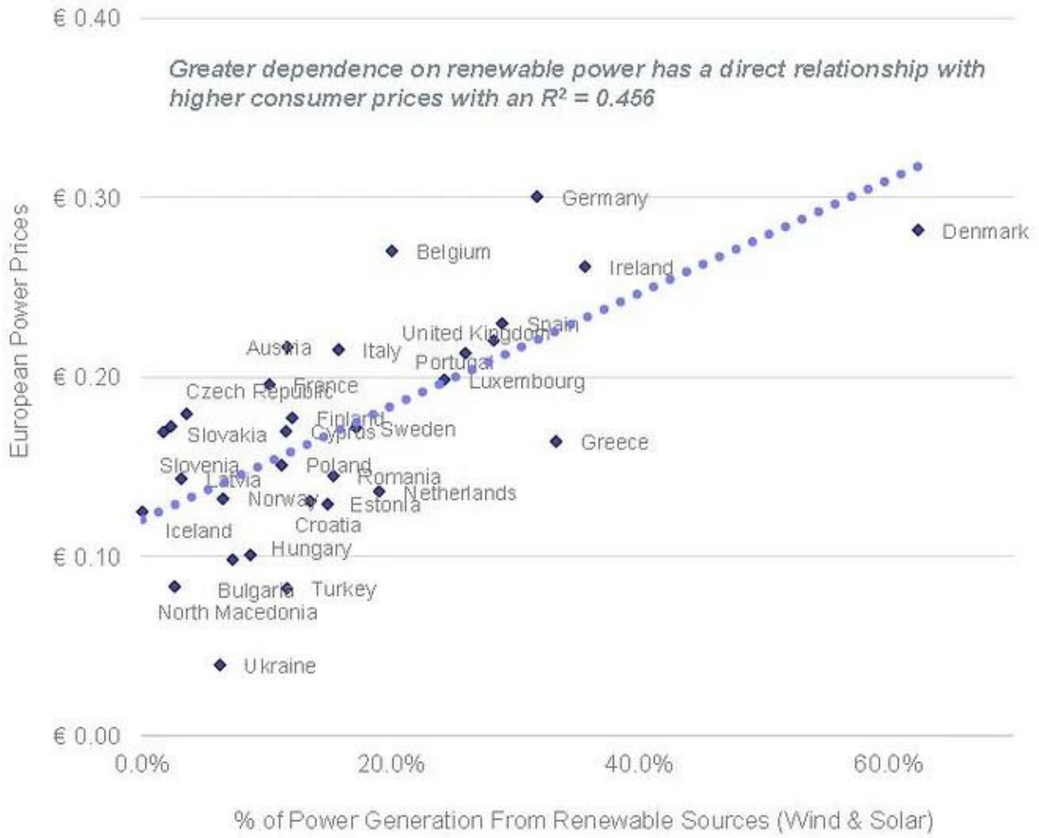
Associated Costs Are Still High For Renewables

In our view, levelized cost of energy (LCOE), a common measure of renewables cost, is an incomplete metric as it does not account for high associated costs of transmission and back-up generation

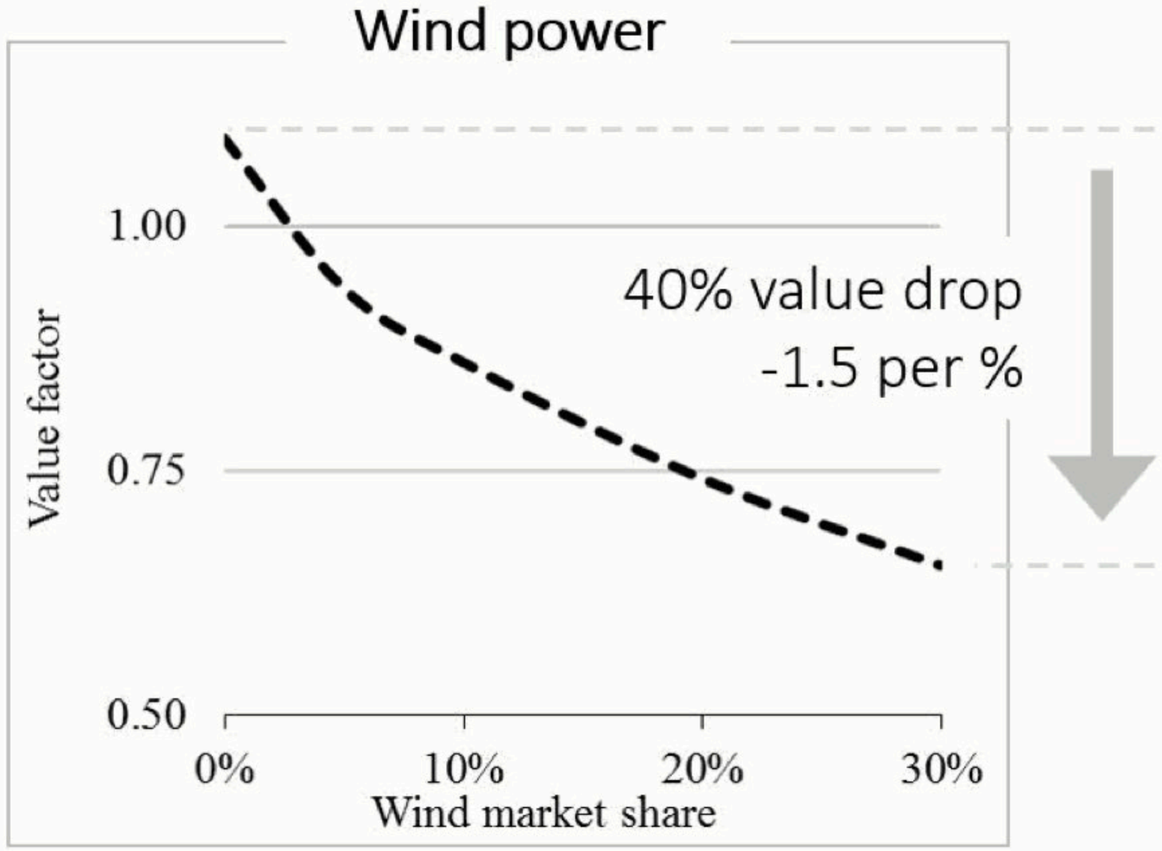
LEVELIZED COST OF ENERGY ($/MWH)



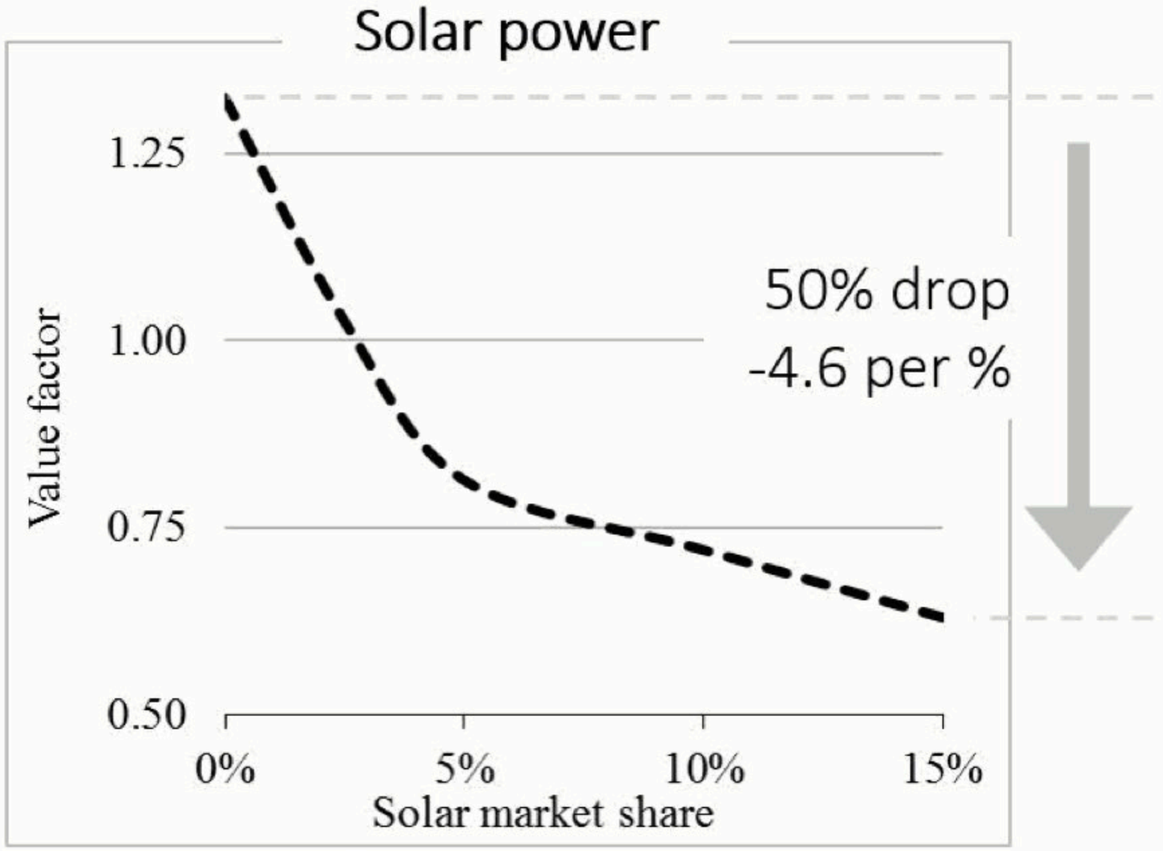
POWER PRICES AND % OF RENEWABLE GENERATION



Value of Wind & Solar Decline



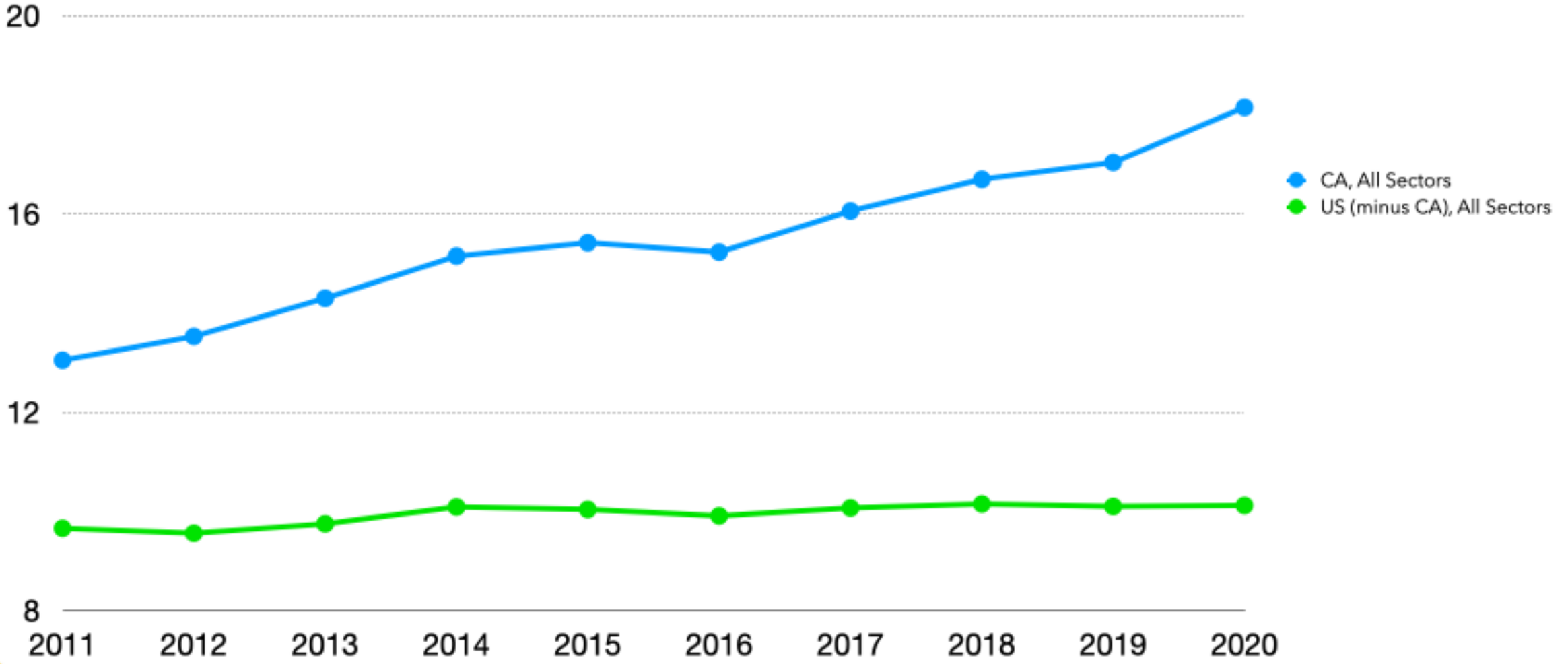
Source: updated from Hirth (2013): Market value



Source: updated from Hirth (2015): Market value of solar

Source: Lion Hirth, "Market Value of Variable Renewables," EUI Working Paper, 2013, http://cadmus.eui.eu/bitstream/handle/1814/27135/RSCAS_2013_36.pdf?sequence

Electricity Prices in California rose 7x more than in rest of the U.S.

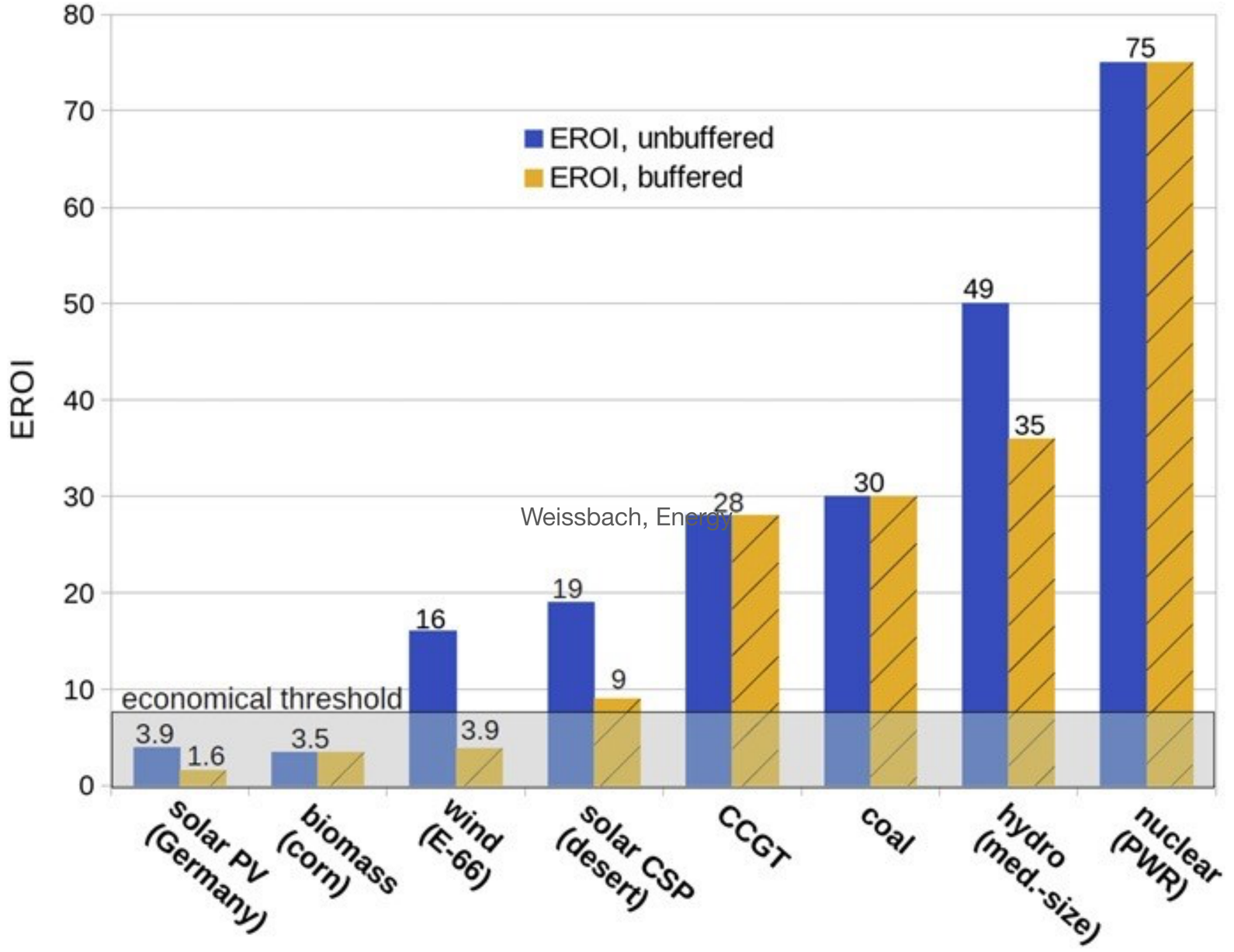


ENVIRONMENTAL PROGRESS

Source: U.S. Energy Information Administration, 2011-2020

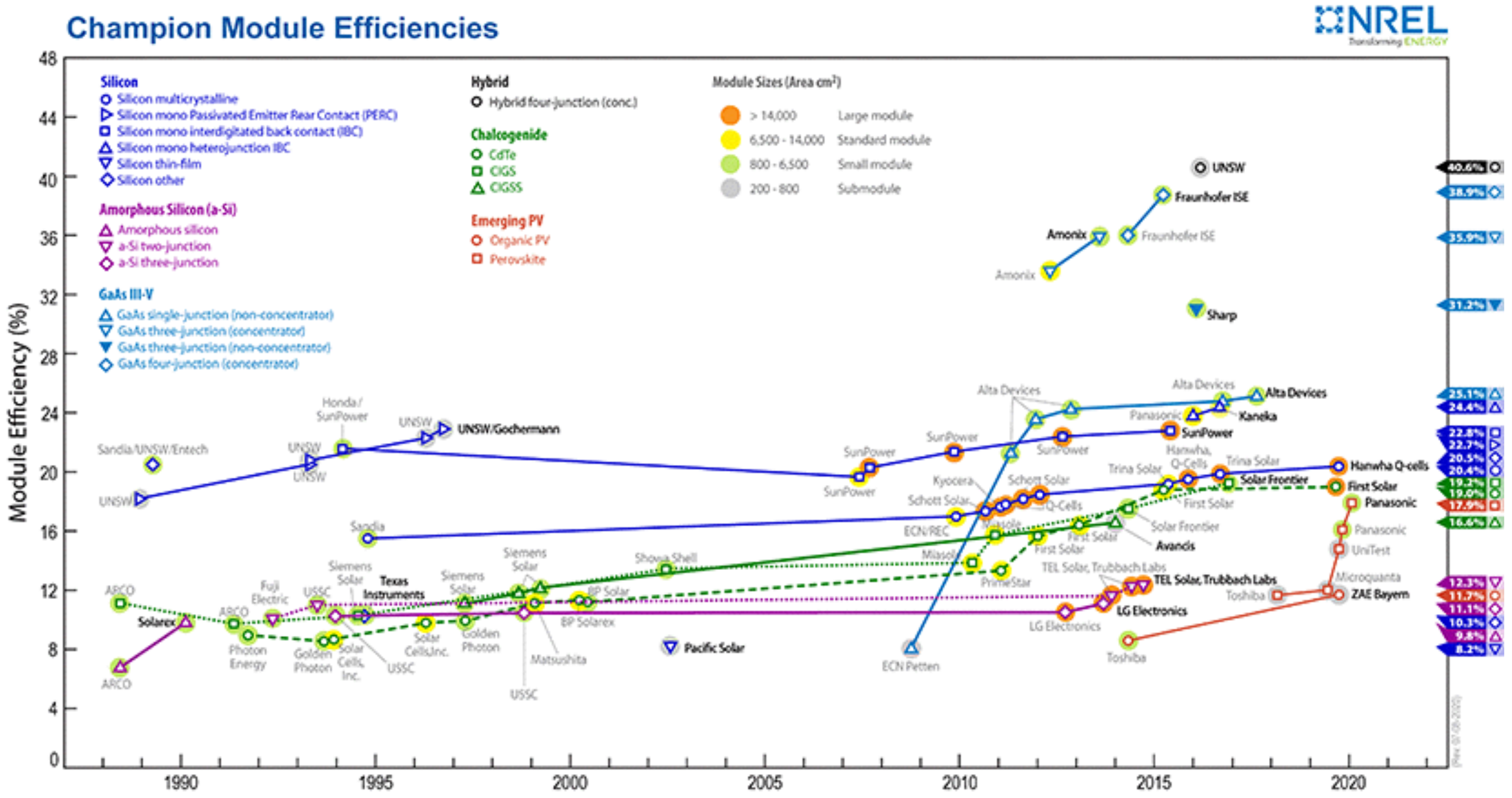
It would require **15,280** storage centers the size of Escondido, the largest in California, to provide just **4 hours** of backup power for the U.S. grid — at an estimated cost of **$764 billion**





D. Weißbach, G. Ruprecht, A. Huke, K. Czerski, S. Gottlieb, A. Hussein,, "Energy intensities, EROIs (energy returned on invested), and energy payback times of electricity generating power plants," *Energy*, 2013,

Solar Panel Efficiencies Increased 3% over last decade



The New York Times

Chinese Solar Companies Tied to Use of Forced Labor

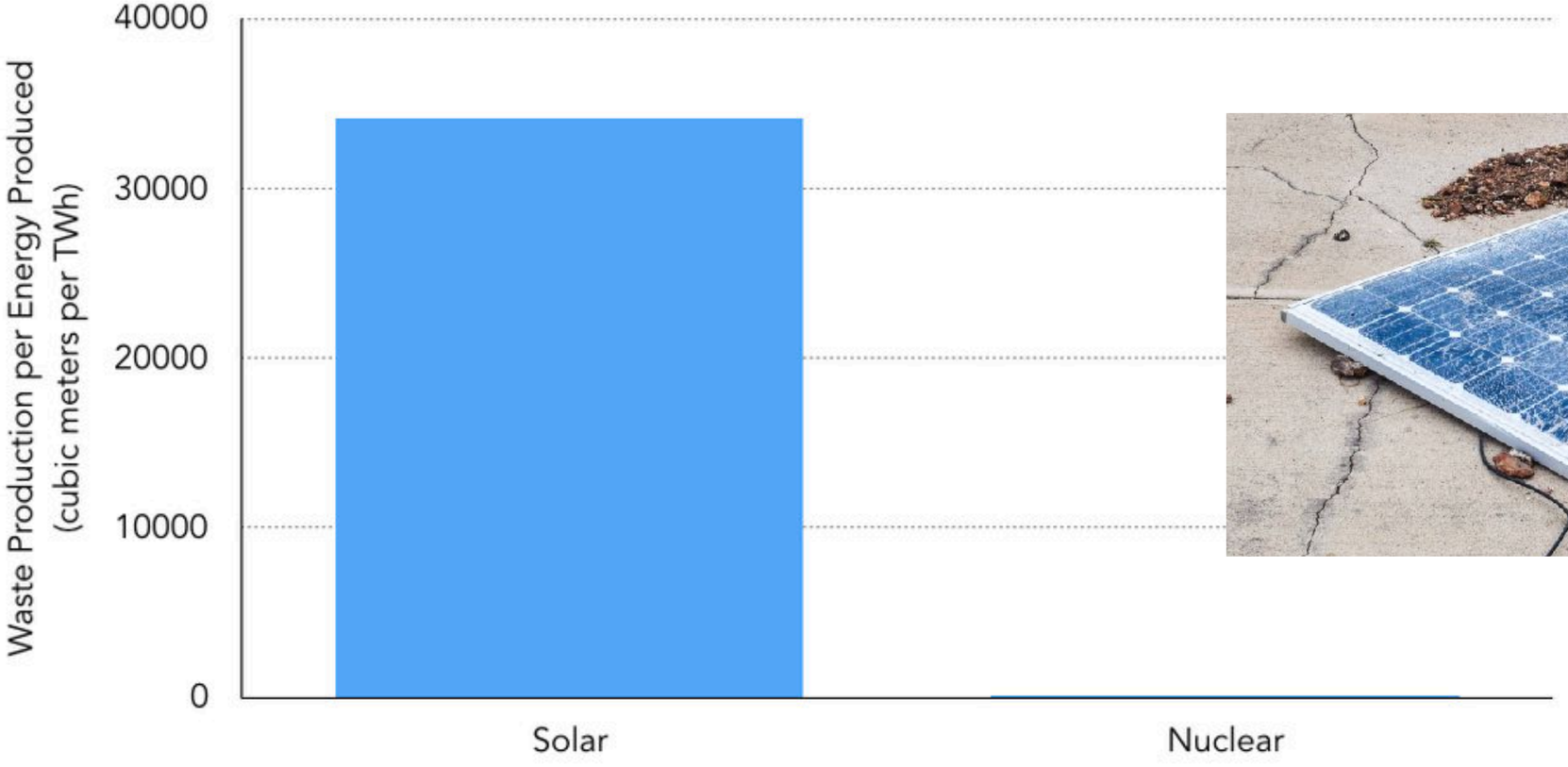
A new report shows some of the world's biggest solar companies work with the Chinese government to absorb workers from Xinjiang, programs that are often seen as a red flag for forced labor.



By Ana Swanson and Chris Buckley

Published Jan. 8, 2021 Updated Jan. 28, 2021

Solar panels produce ~300x more waste than nuclear reactors when providing the same amount of energy.





Sources and Notes:

US GAO, http://www.gao.gov/key_issues/disposal_of_highlevel_nuclear_waste/issue_summary

World Nuclear Association, http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-waste-management.aspx

http://www.world-nuclear.org/information-library/facts-and-figures/world-nuclear-power-reactors-archive/reactor-archive-december-2015.aspx

IAEA, https://www.iaea.org/PRIS/home.aspx

BP, http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Solar panels specifications vary. Panel specifications were standardized according to TrinaSolar's Duomax Dual Glass 60-Cell Module:
http://static.trinasolar.com/sites/default/files/PS-M-0474%20A%20Datasheet_Duomax_PEG5.XX_US_Feb_2017_A.pdf

ENVIRONMENTAL PROGRESS

Harvard Business Review

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Sustainable Business Practices

The Dark Side of Solar Power

by **Atalay Atasu, Serasu Duran,** and **Luk N. Van Wassenhove**

June 18, 2021



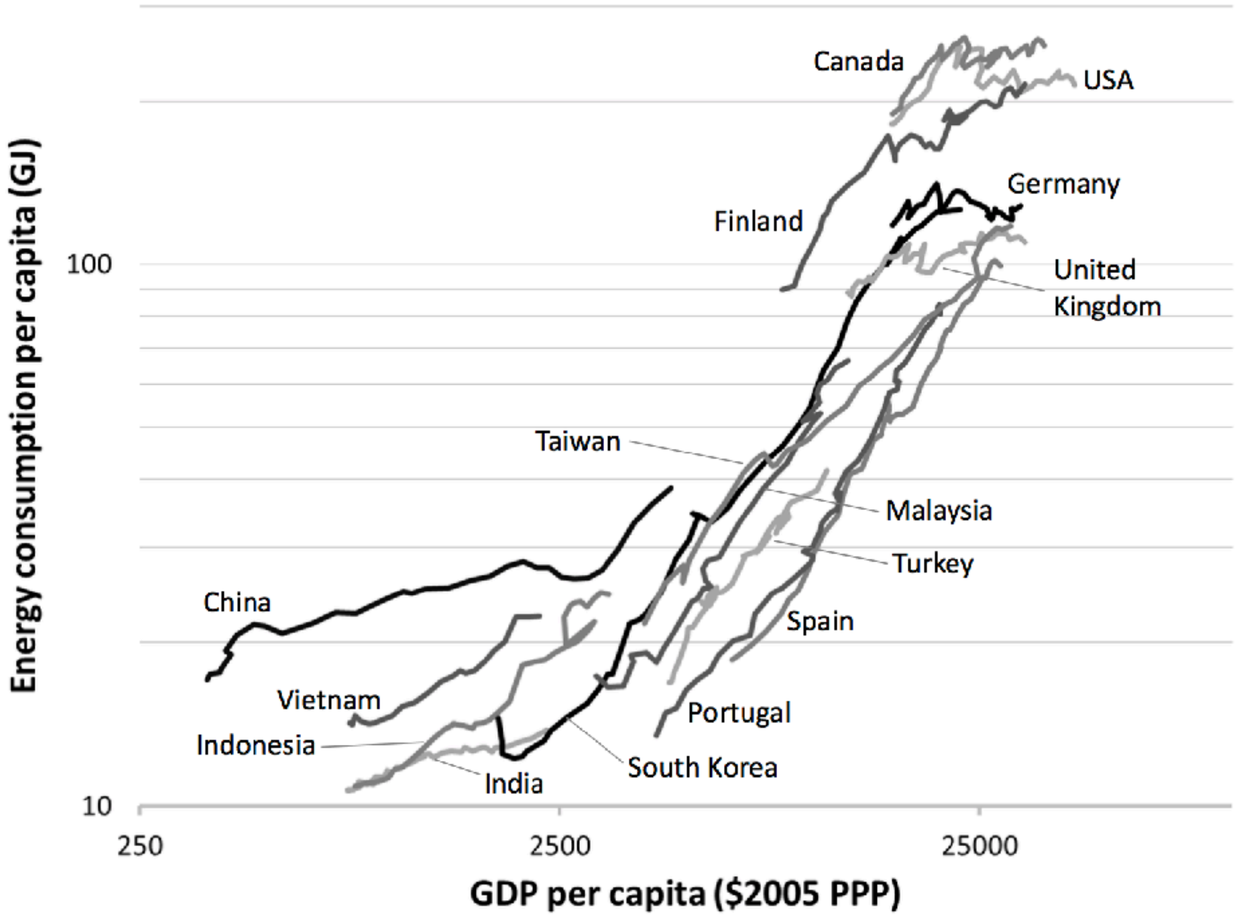
A major new study of the economics of solar, published in *Harvard Business Review* (HBR), finds that the waste produced by solar panels will make electricity from solar panels four times more expensive than the world's leading energy analysts thought.

"The economics of solar," write Atalay Atasu and Luk N. Van Wassenhove of INSEAD**,** one of Europe's leading business schools, and Serasu Duran of the University of Calgary, will "darken quickly as the industry sinks under the weight of its own trash."

Decouple energy from matter

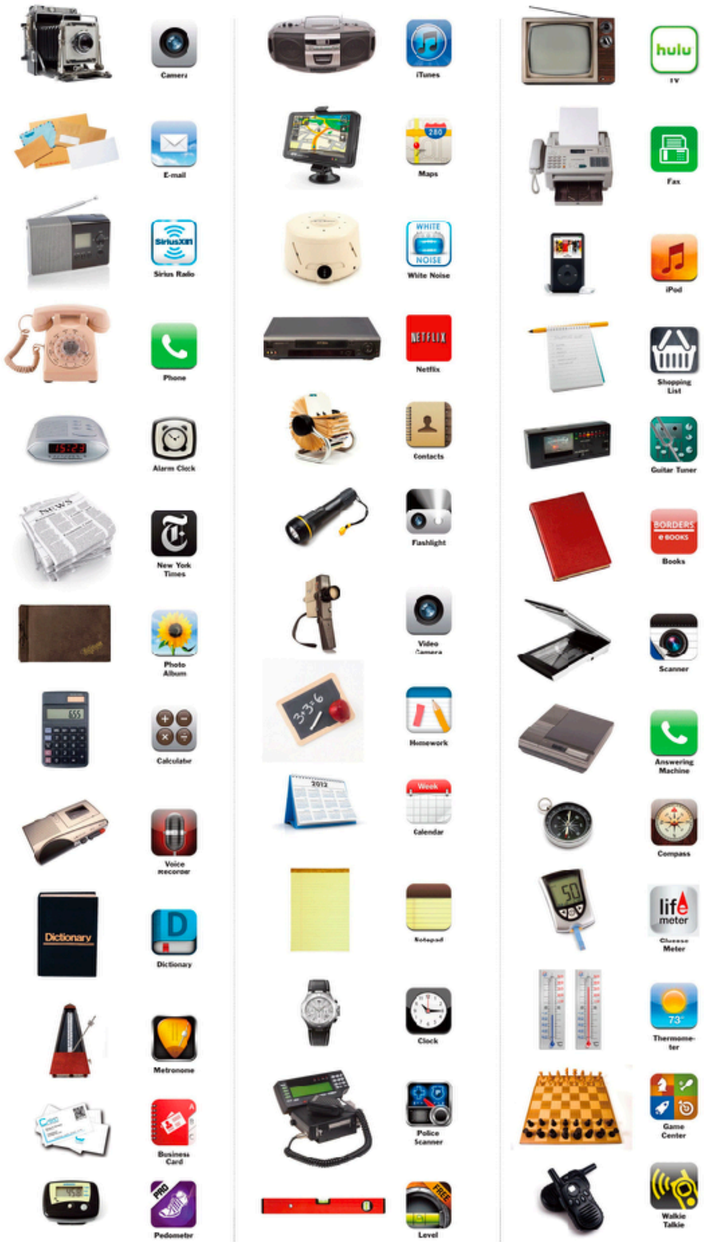
Energy consumption tightly tied to GDP

Figure 1: The *Energy Ladder*: Per Capita Final Energy Consumption and GDP at PPP, 1960 – 2006



Notes: Both axes have a logarithmic scale. Energy consumption data are obtained from the International Energy Agency's Extended Energy Balances, GDP per capita from the World Bank's World Development Indicators.

DEMATERIALIZATION:
Using less to produce more





Matter-dense fuels

Energy-dense fuels

Renewables (wood, solar, biofuels, wind)

Coal

Oil

Natural Gas

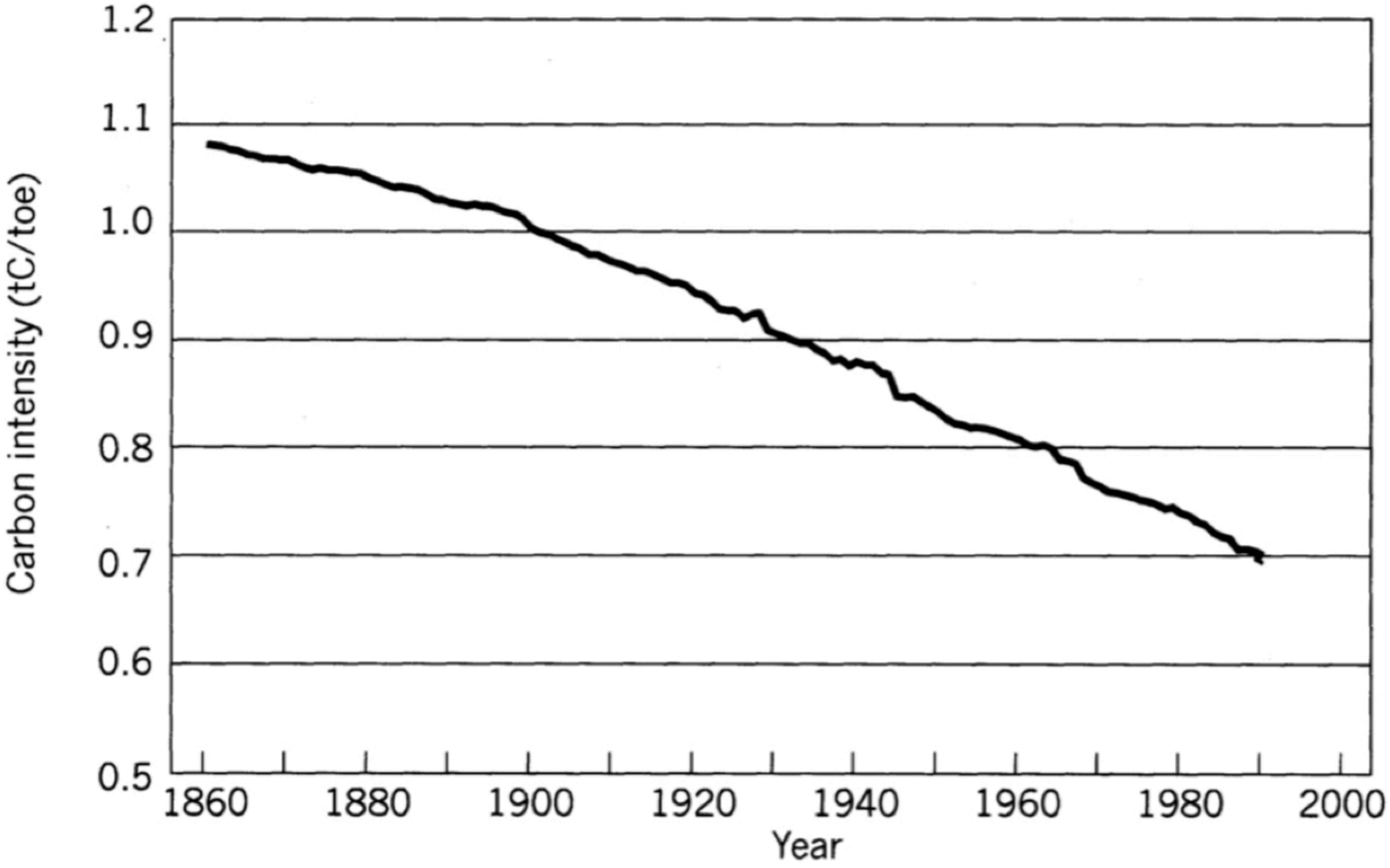
Uranium







As a consequence of energy transitions, the carbon-intensity of energy has declined for more than 150 years



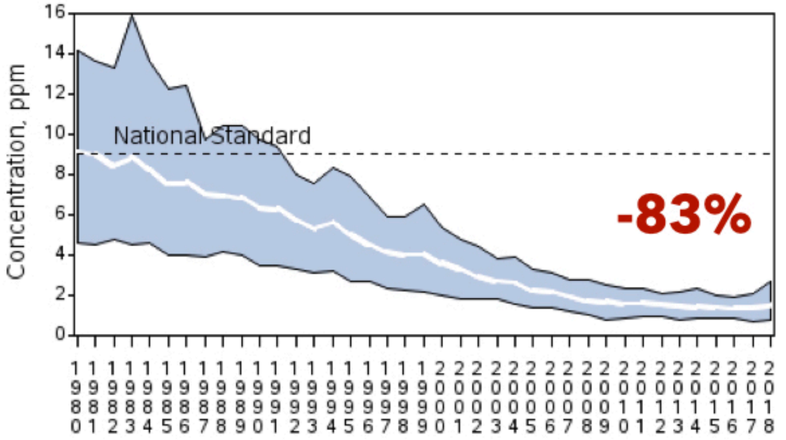
ENVIRONMENTAL PROGRESS

Source: Nebojša Nakićeović, "Freeing Energy from Carbon," 99.

As a result of cleaner-burning coal, the transition to natural gas, cleaner vehicles, and other technological changes, the U.S. and other developed nations have seen major improvements in air quality

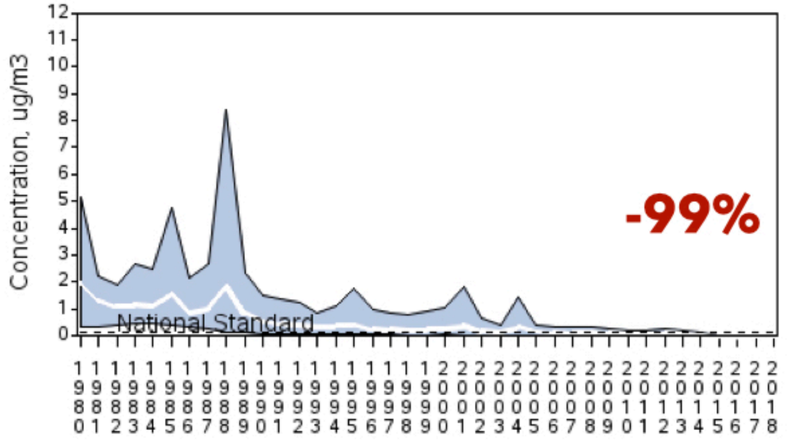
CO Air Quality, 1980 - 2018

(Annual 2nd Maximum 8-hour Average)
National Trend based on 44 Sites



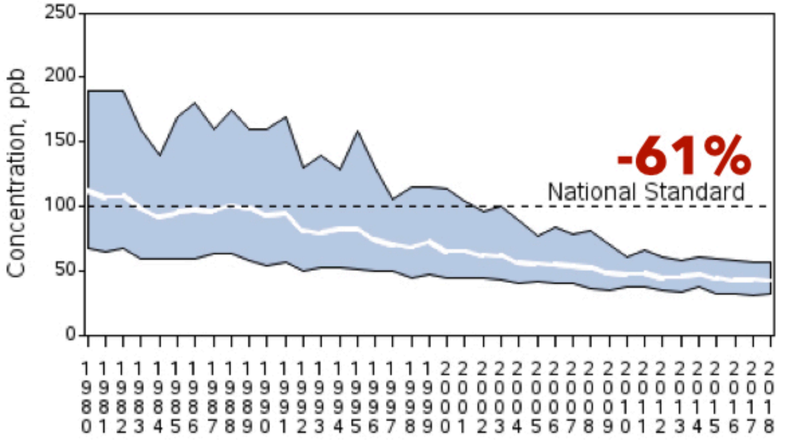
Lead Air Quality, 1980 - 2018

(Annual Maximum 3-Month Average)
National Trend based on 6 Sites



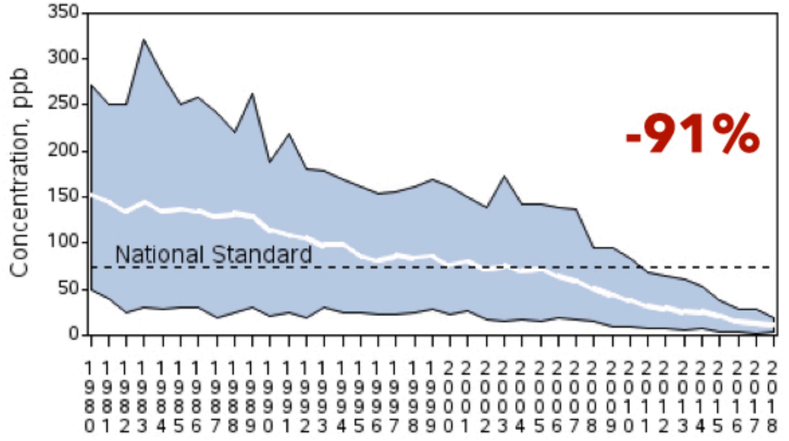
NO2 Air Quality, 1980 - 2018

(Annual 98th Percentile of Daily Max 1-Hour Average)
National Trend based on 22 Sites



SO2 Air Quality, 1980 - 2018

(Annual 99th Percentile of Daily Max 1-Hour Average)
National Trend based on 37 Sites



ENVIRONMENTAL PROGRESS

Source: "Air Quality–National Summary," United States Environmental Protection Agency

Needs 379 times more land for solar than nuclear





ENVIRONMENTAL PROGRESS

Source: Comparison between Diablo Canyon Nuclear Plant and Topaz. In 2018, Diablo Canyon produced 18.29 TWh of electricity on an approximate land area of .742 square kilometers. In 2018, Topaz produced 1.3 TWh of electricity on an approximate land area of 20 square kilometers. Generation data from Energy Information Agency.

Needs 421 times more land for wind than nuclear

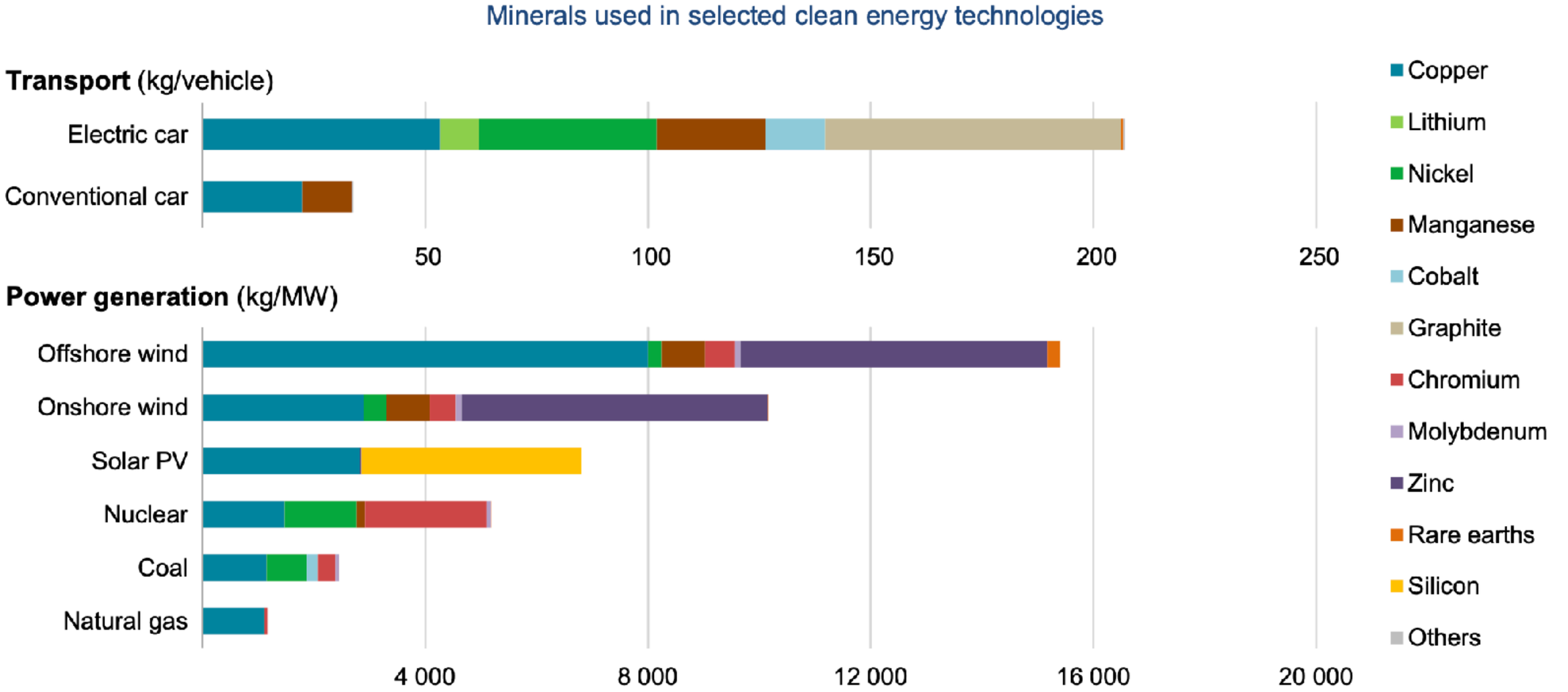




ENVIRONMENTAL PROGRESS

Source: Comparison between Diablo Canyon Nuclear Plant and Alta Wind Energy Center. In 2018, Diablo Canyon produced 18.29 TWh of electricity on an approximate land area of .742 square kilometers. In 2018, Alta produced 3.52 TWh of electricity on an approximate land area of 60.1 square kilometers. Generation data from Energy Information Agency.

The rapid deployment of clean energy technologies as part of energy transitions implies a significant increase in demand for minerals

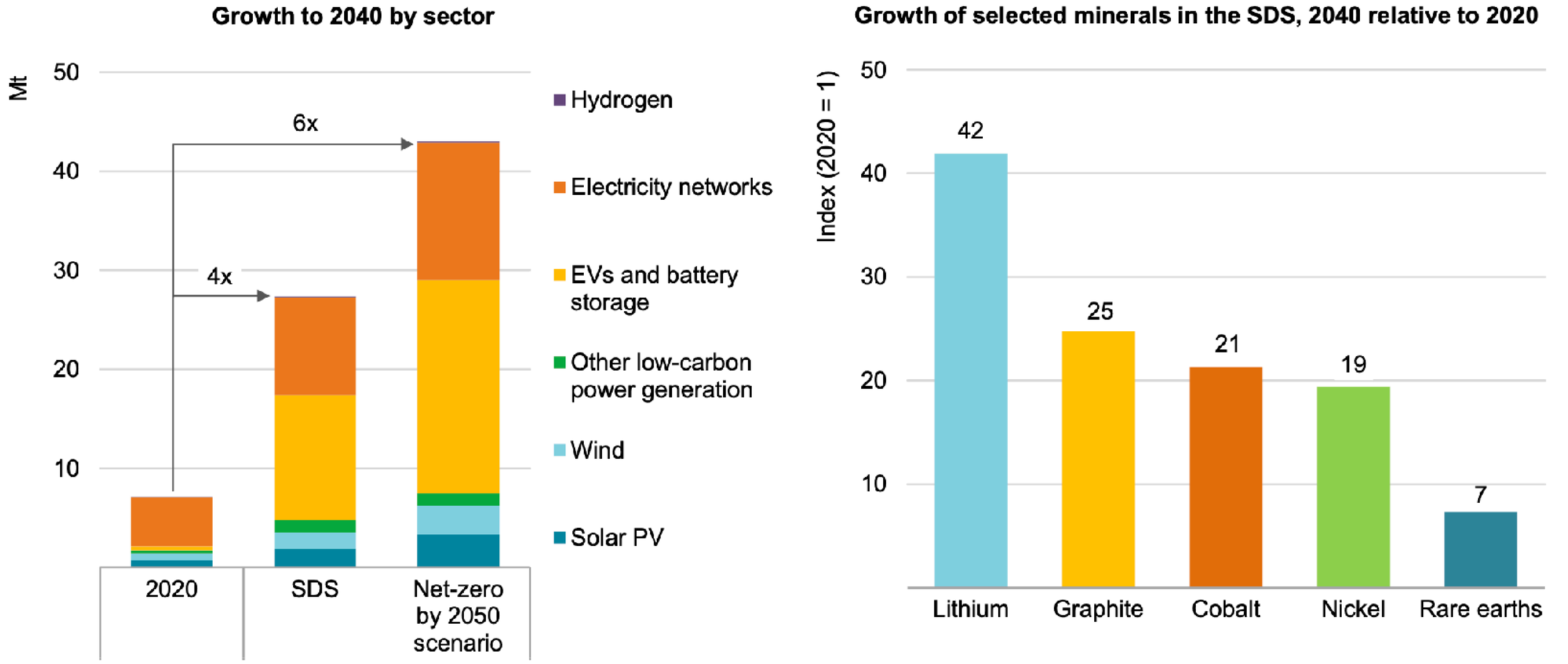


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Notes: kg = kilogramme; MW = megawatt. Steel and aluminium not included. See Chapter 1 and Annex for details on the assumptions and methodologies.

Mineral demand for clean energy technologies would rise by at least four times by 2040 to meet climate goals, with particularly high growth for EV-related minerals

Mineral demand for clean energy technologies by scenario

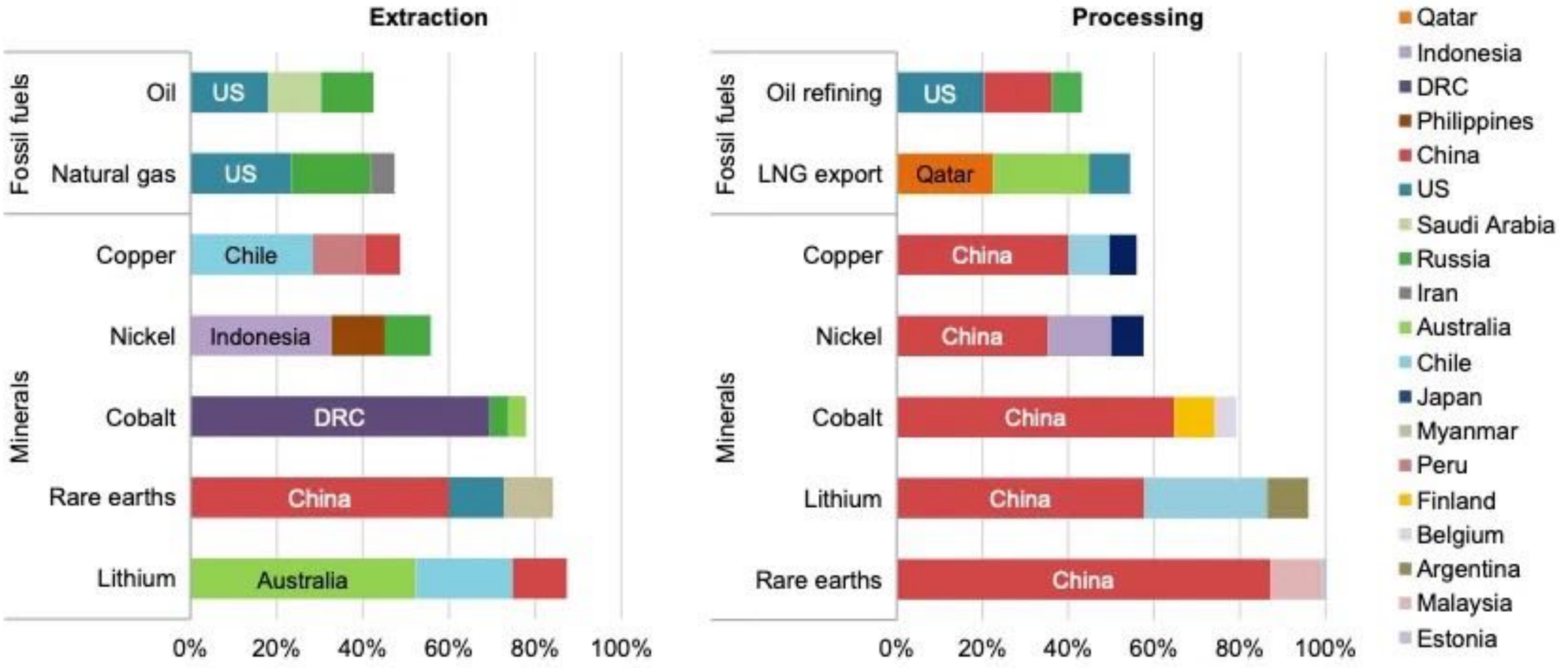


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Notes: Mt = million tonnes. Includes all minerals in the scope of this report, but does not include steel and aluminium. See Annex for a full list of minerals.

Production of many energy transition minerals today is more geographically concentrated than that of oil or natural gas

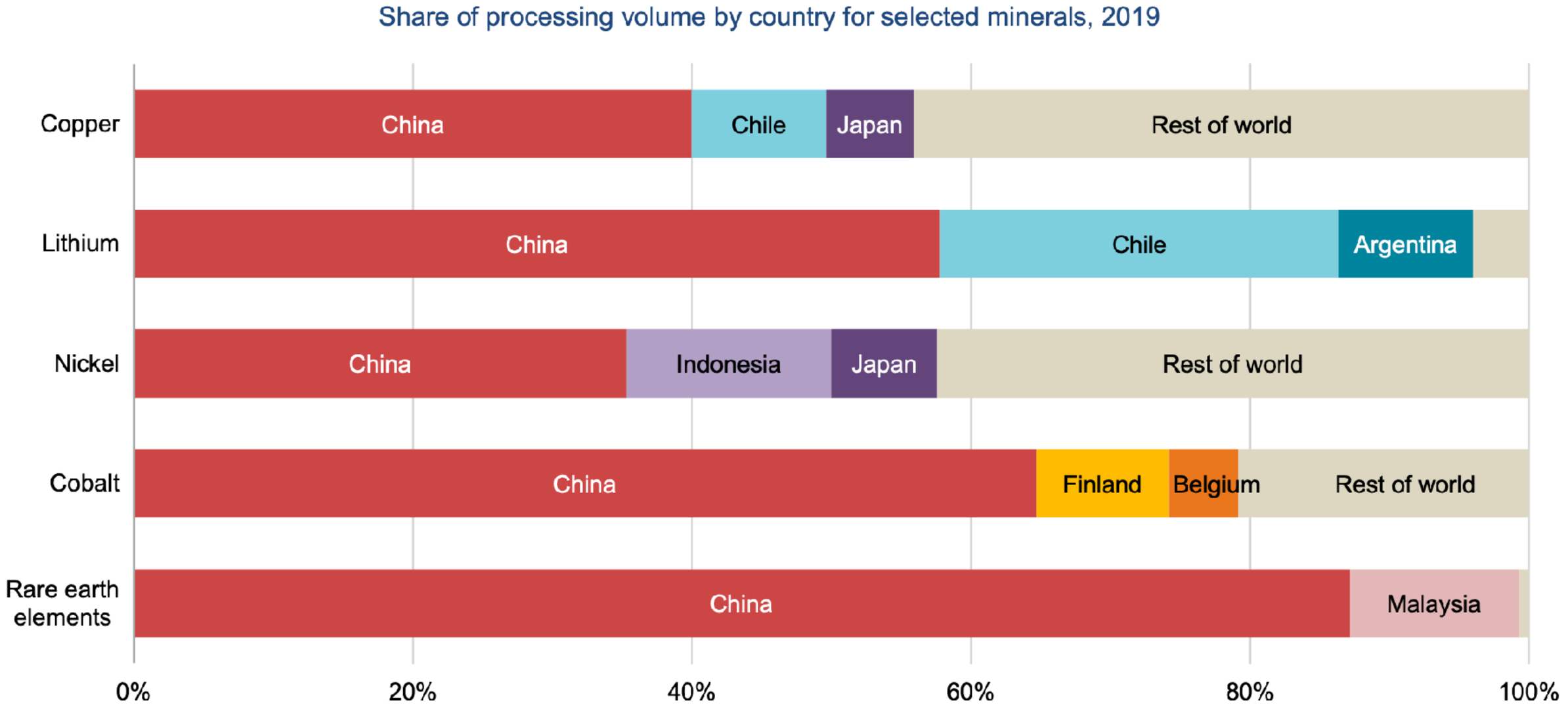
Share of top three producing countries in production of selected minerals and fossil fuels, 2019



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Notes: LNG = liquefied natural gas; US = United States. The values for copper processing are for refining operations.
Sources: IEA (2020a); USGS (2021), World Bureau of Metal Statistics (2020); Adamas Intelligence (2020).

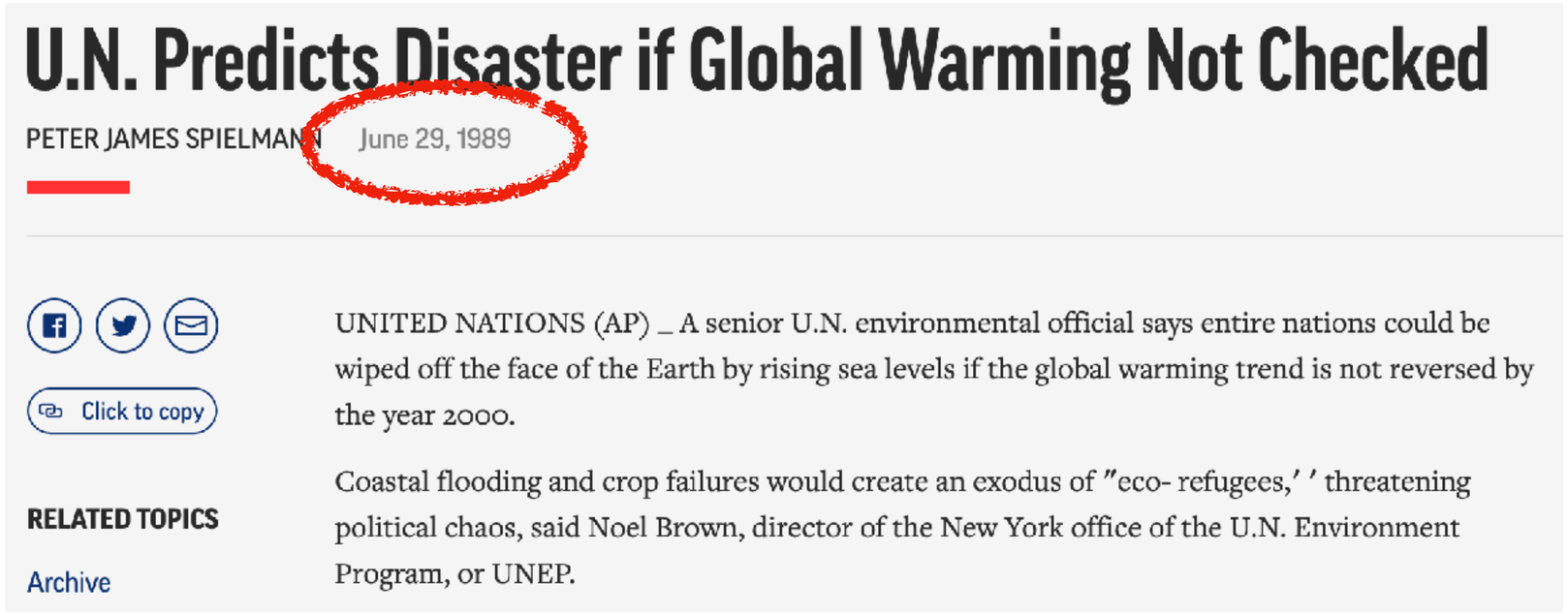
The level of concentration is similarly high for processing operations, with China's significant presence across the board



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Why everyone got it wrong

Fear Sells



U.N. Predicts Disaster if Global Warming Not Checked

PETER JAMES SPIELMANN June 29, 1989

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Source: Peter James Spielmann, "UN Predicts Disaster if Global Warming Not Checked," Associated Press, June 29, 1989, https://

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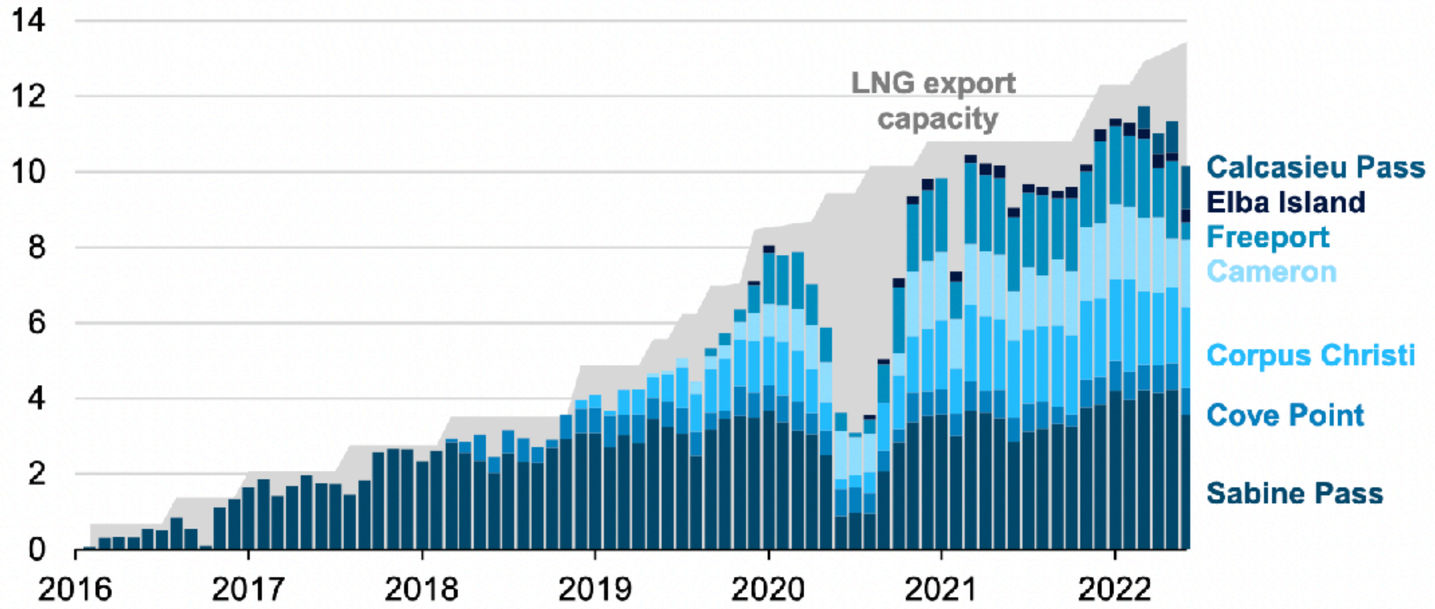


Demand domestic production

JULY 25, 2022

The United States became the world's largest LNG exporter in the first half of 2022

Monthly U.S. liquefied natural gas (LNG) exports (Jan 2016–Jun 2022)
billion cubic feet per day



Data source: U.S. Energy Information Administration, *Liquefaction Capacity Table*, and U.S. Department of Energy *LNG reports*

Note: June 2022 LNG exports are EIA estimates based on tanker shipping data. LNG export capacity is an estimated peak LNG production capacity of all operational U.S. LNG export facilities.

Let's go!

