

Global Perspectives

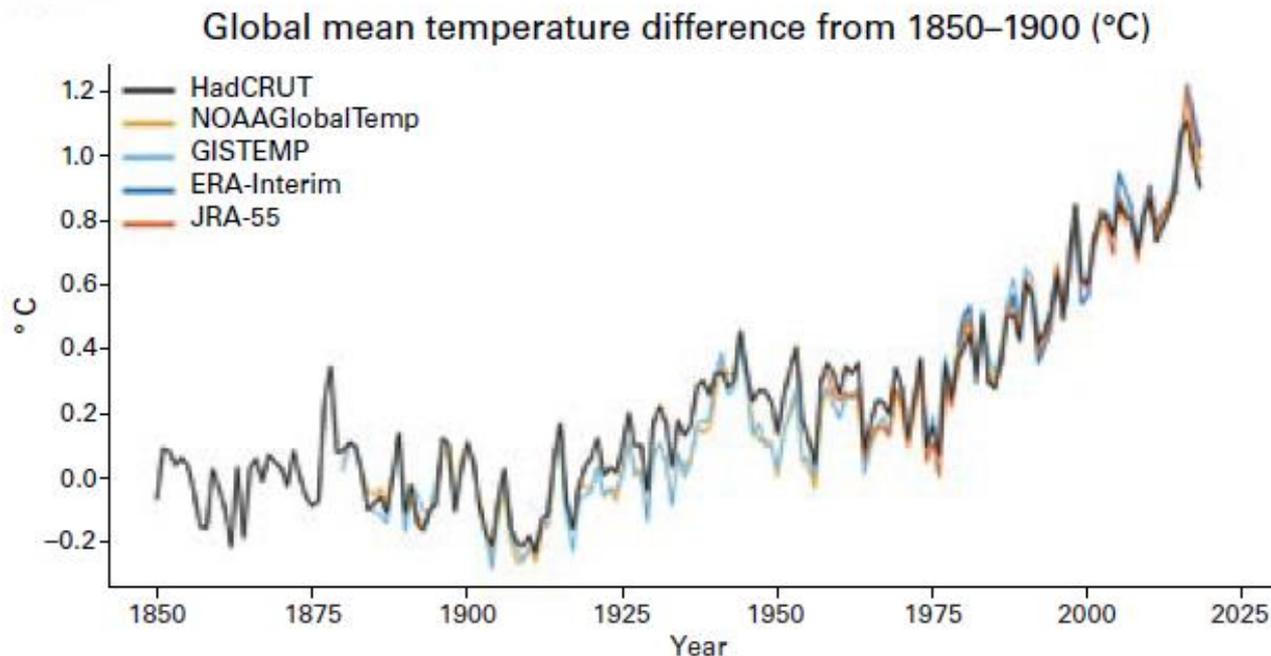


Phillip O'Brien

24th Oct 2019

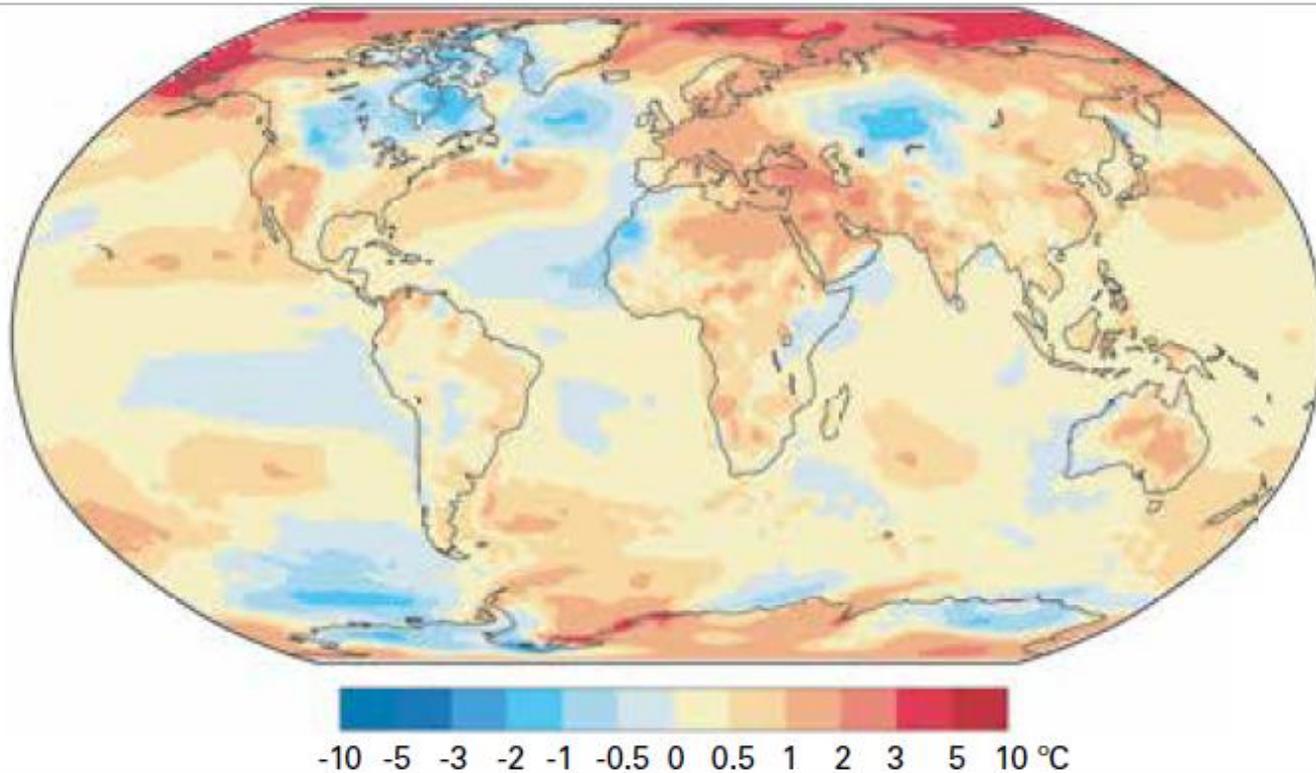
1. Introduction and context
2. Key messages
3. Next steps
4. Conclusions

- The global mean temperature for 2018 is estimated to be 0.99 ± 0.13 °C above the preindustrial baseline (1850–1900).
- The year 2018 was the fourth warmest on record and the past four years – 2015 to 2018 – were the top four warmest years in the global temperature record.



Source: UK Met Office Hadley Centre.

2018 compared to average 1980-2010



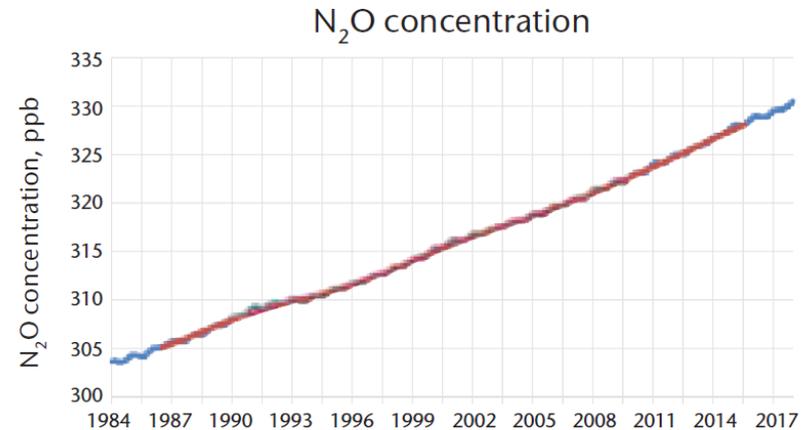
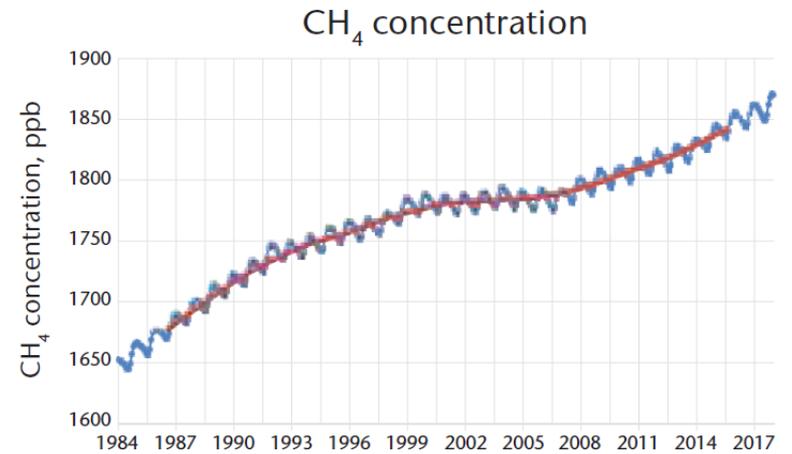
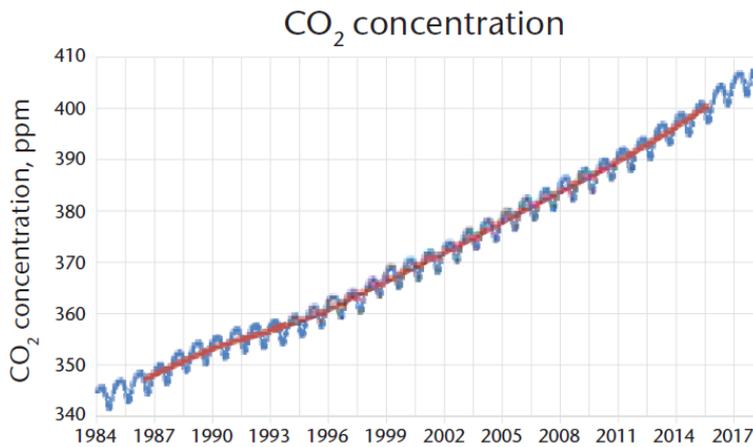
Source: ECMWF ERAInterim data, Copernicus Climate Change Service.

Bad News: Greenhouse gases in the atmosphere



The current growth rate of CO₂ of 2.6 ppm/year corresponds to a mass of about 50 kg CO₂ per person per week worldwide.

Source: WMO Global Atmosphere Watch



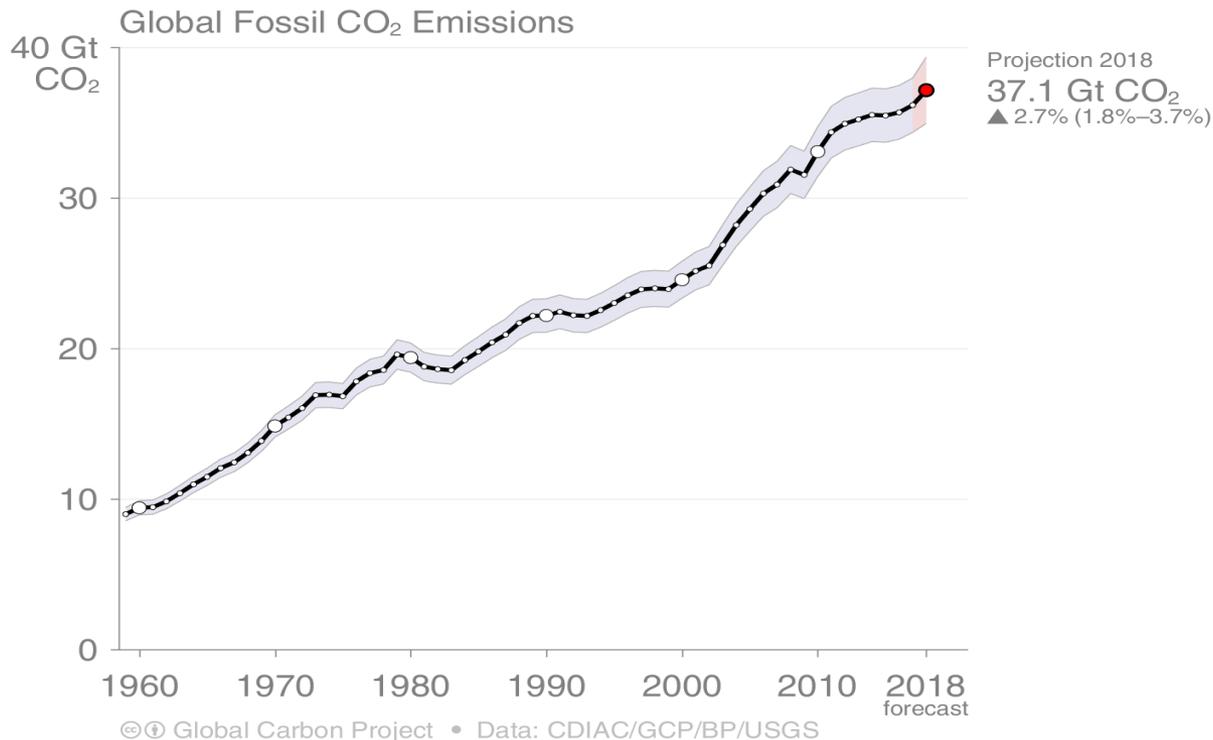
	<i>Concentration</i>			<i>Growth rate</i>		
	<i>2015-2017</i>	<i>2011-2015</i>	<i>2015-2017 % to pre- industrial</i>	<i>2015-2017</i>	<i>2011-2015</i>	<i>% change</i>
CO ₂	403	395.5	145	2.6	2.2	+18%
CH ₄	1851.7	1826.4	256	8.7	7.2	+21%
N ₂ O	329.1	326.2	122	0.87	0.73	+19%

Source: WMO Global Atmosphere Watch

Global Fossil CO₂ Emissions

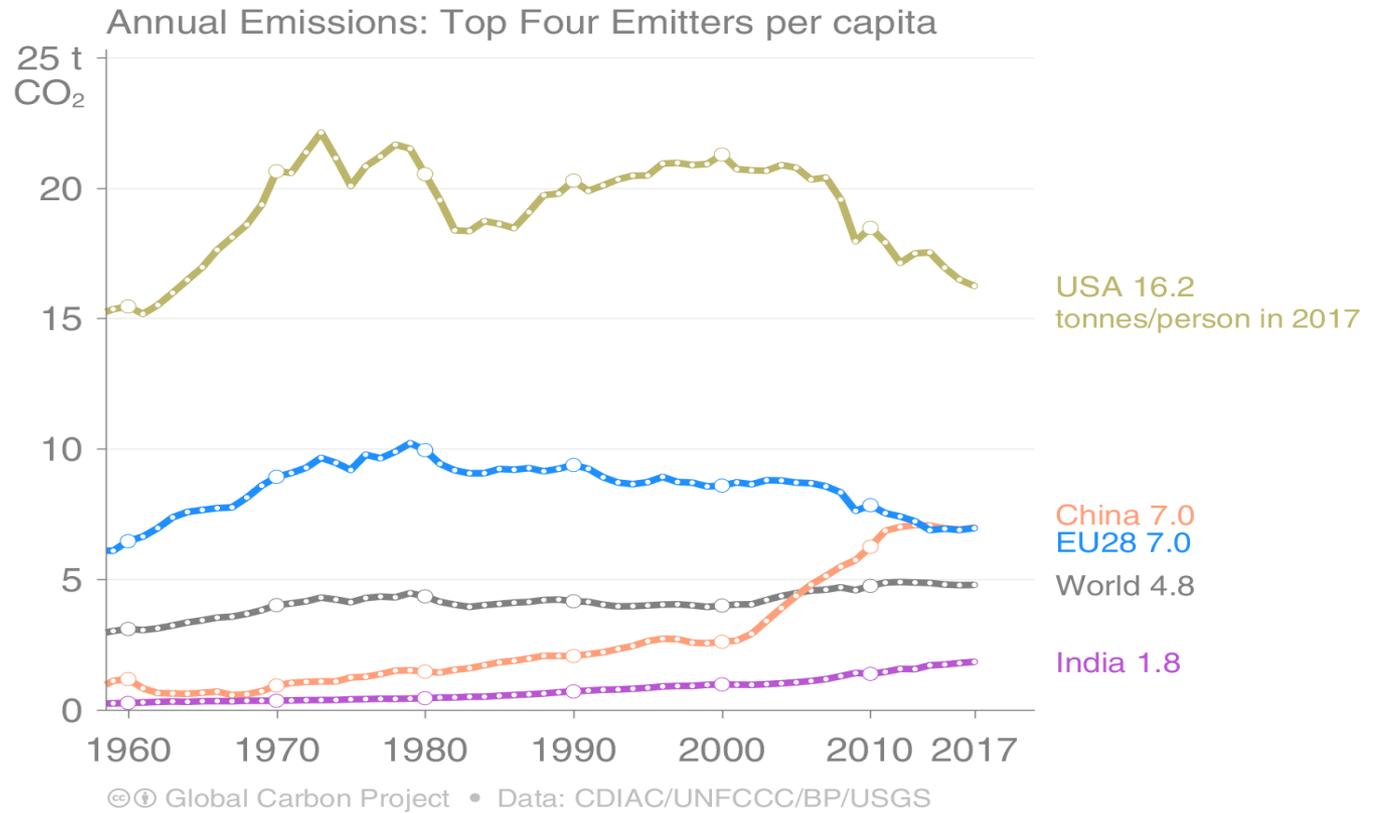


- Global fossil CO₂ emissions have risen steadily over the last decades. The peak in global emissions is not yet in sight.



- Estimates for 2015, 2016 and 2017 are preliminary ; 2018 is a projection based on partial data.
Source: [CDIAC](#); [Le Quéré et al 2018](#); [Global Carbon Budget 2018](#)

Emissions per capita



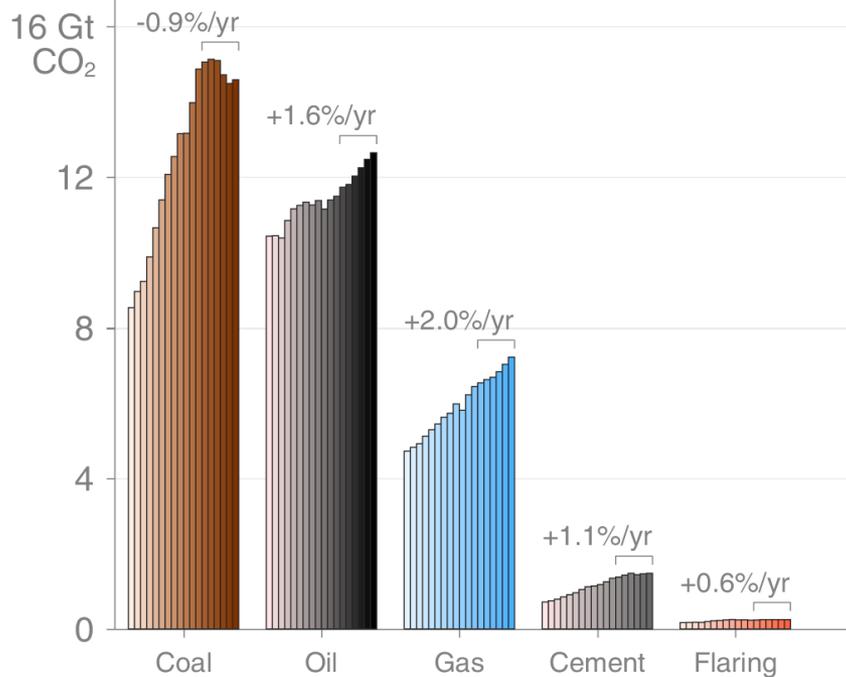
■ Source: [CDIAC](#); [Le Quéré et al 2018](#); [Global Carbon Budget 2018](#)

Fuel type and Energy Consumption



Global Fossil CO₂ Emissions, 2000–17

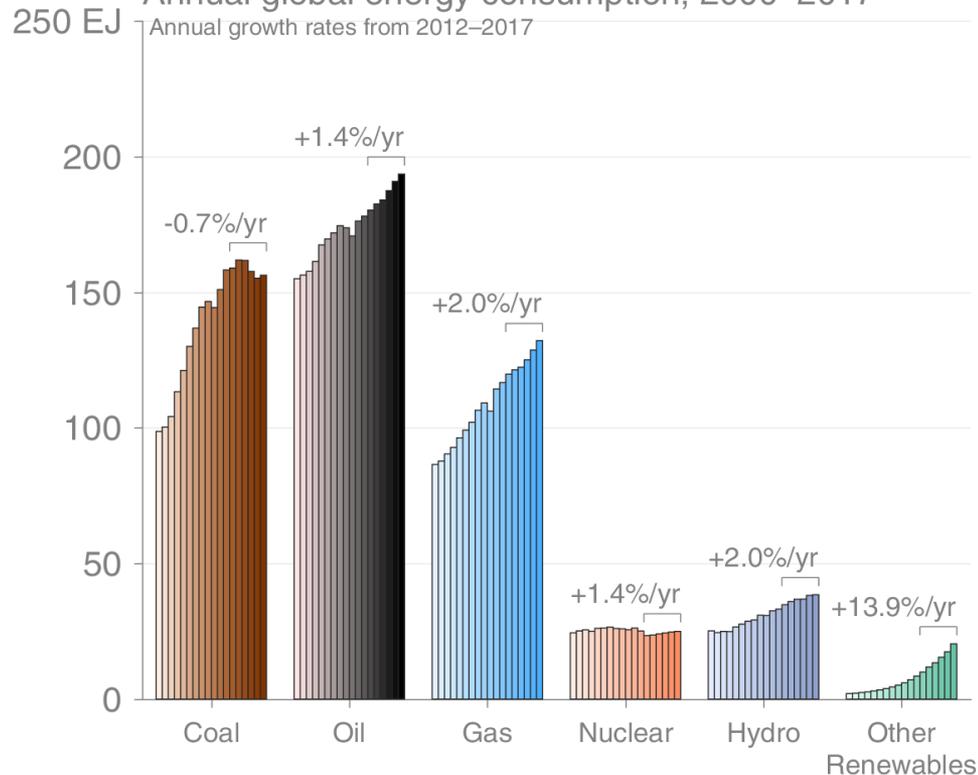
Annual growth rates from 2012–2017



© Global Carbon Project • Data: CDIAC/UNFCCC/BP/USGS

Annual global energy consumption, 2000–2017

Annual growth rates from 2012–2017



© Global Carbon Project • Data: BP

Good News: Ozone Hole



- Slowly, but surely, the Ozone Hole is repairing
- 30 years since the Montreal protocol came into force

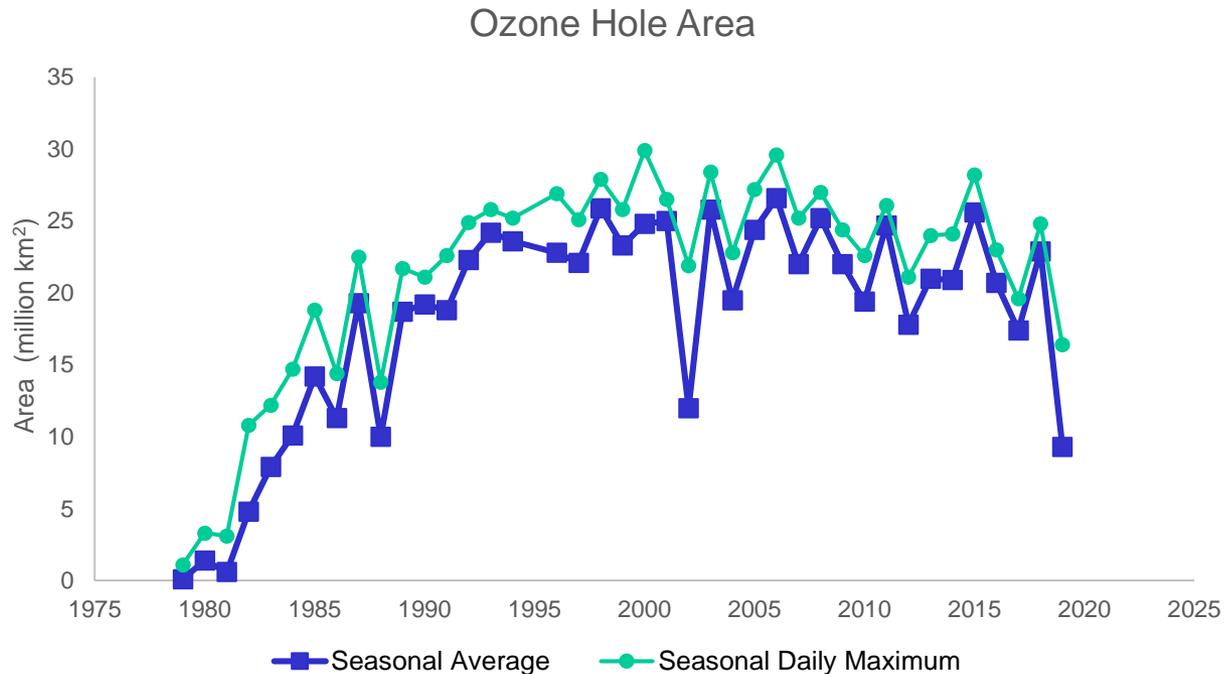


Credit: Robert Schwarz/University of Minnesota

Good News: Ozone Hole



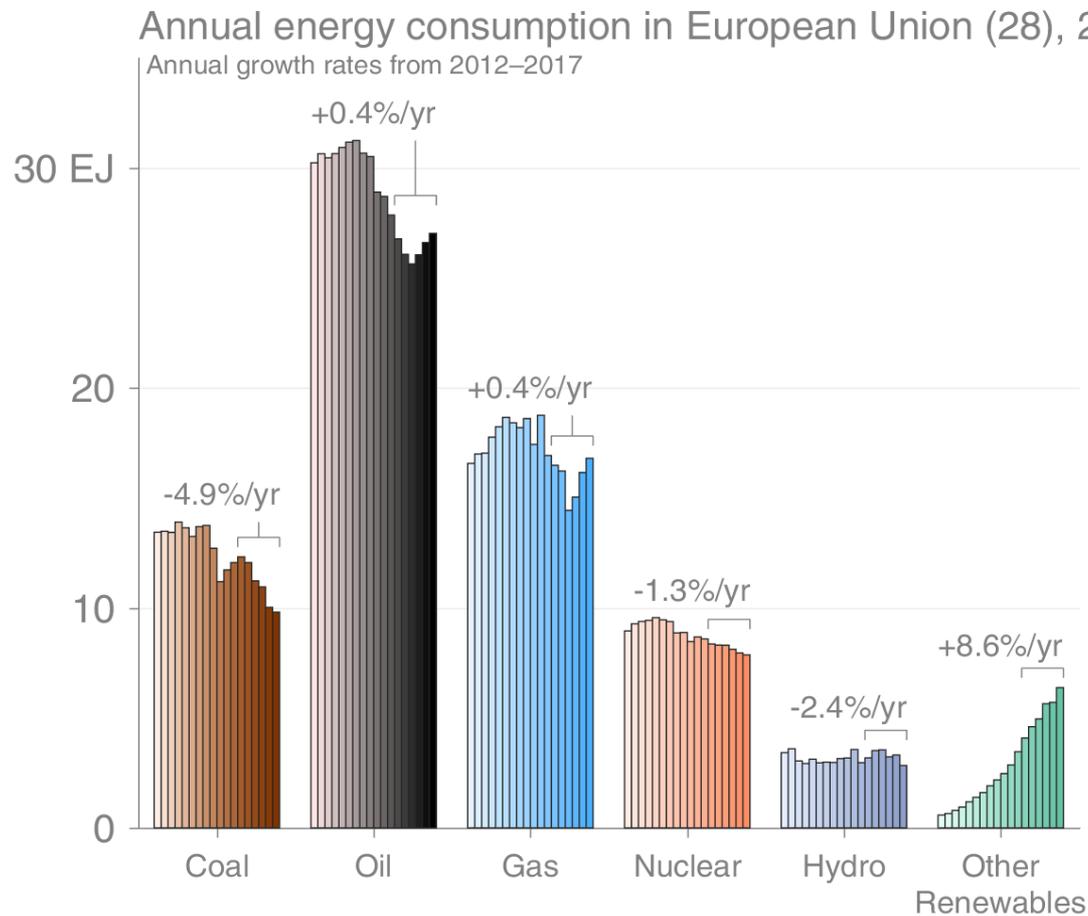
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Energy use in the European Union



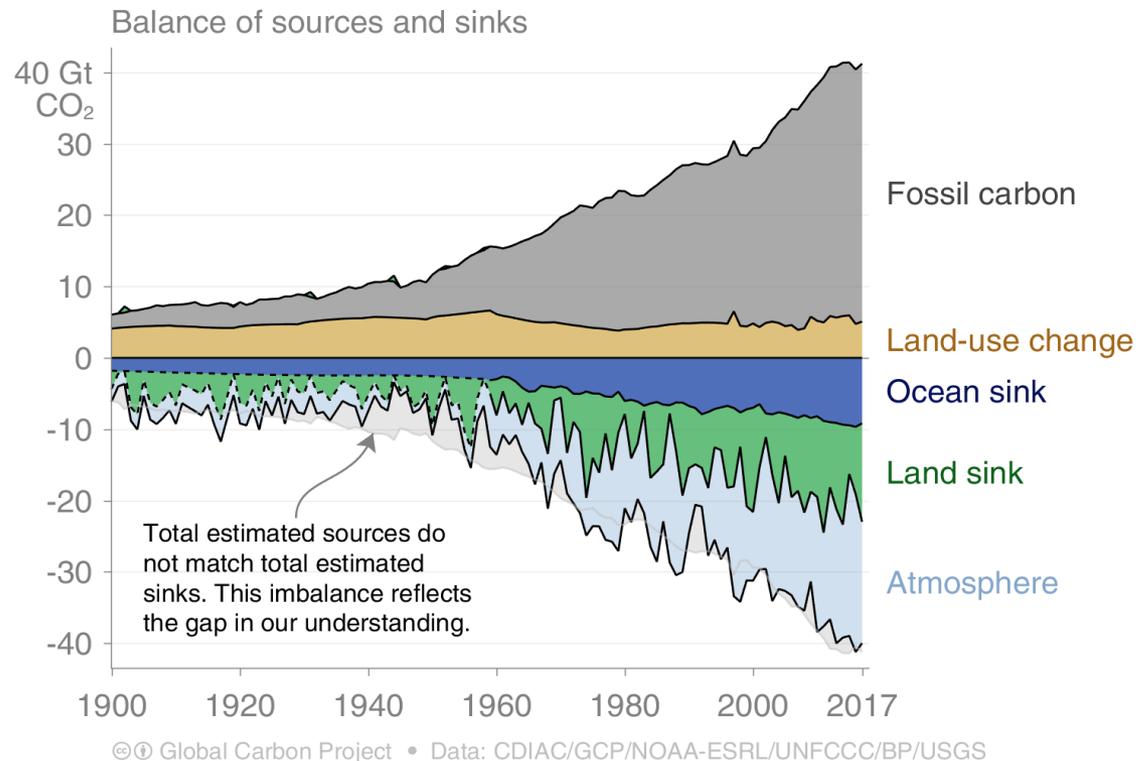
- Consumption of both oil and gas has rebounded in recent years, while coal continues to decline. Renewables are growing strongly.



Carbon Imbalance



Carbon emissions are partitioned among the atmosphere and carbon sinks on land and in the ocean



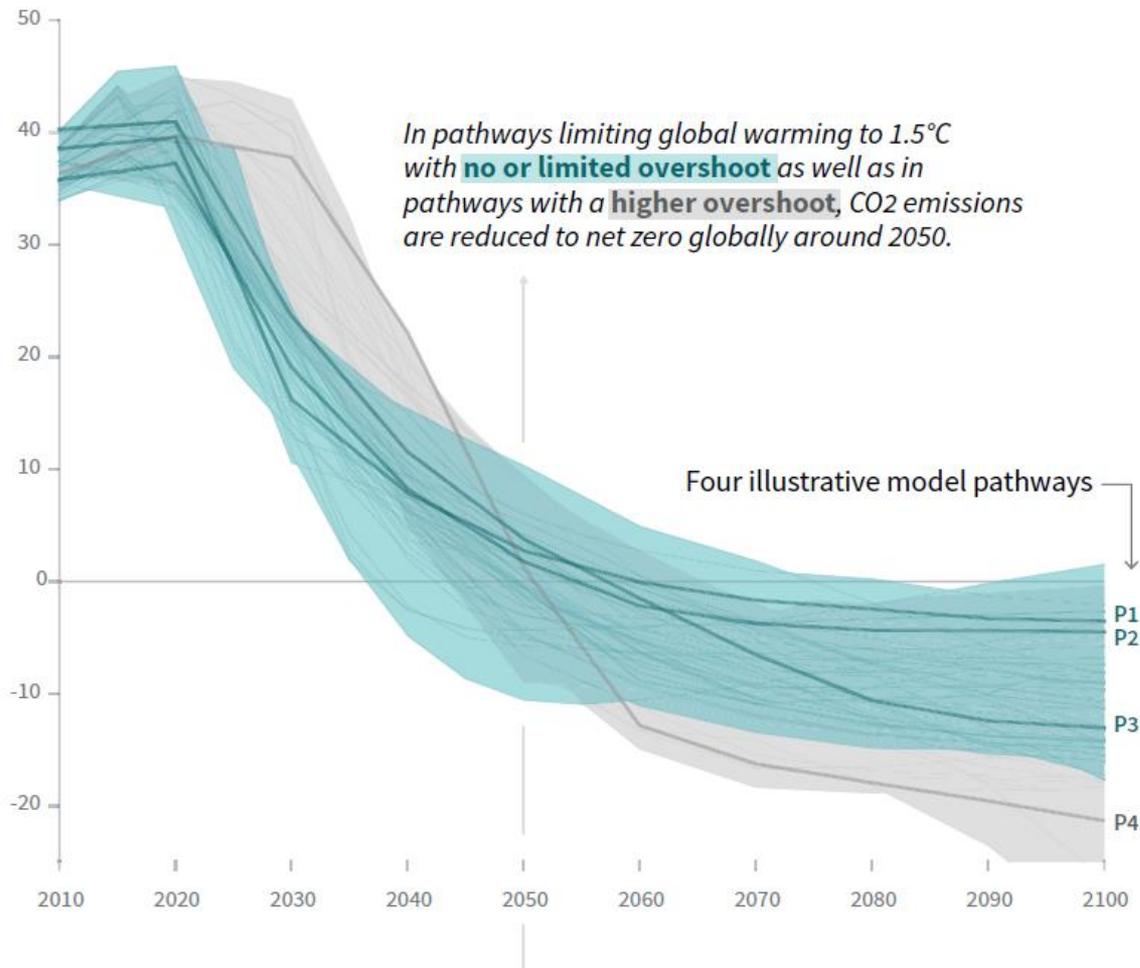
Le Quéré, et al., 2018: Global carbon budget 2018. *Earth System Science Data*, 10:2141–2194; and March 2019 updates

Carbon dioxide pathways relative to 2010



Global total net CO₂ emissions

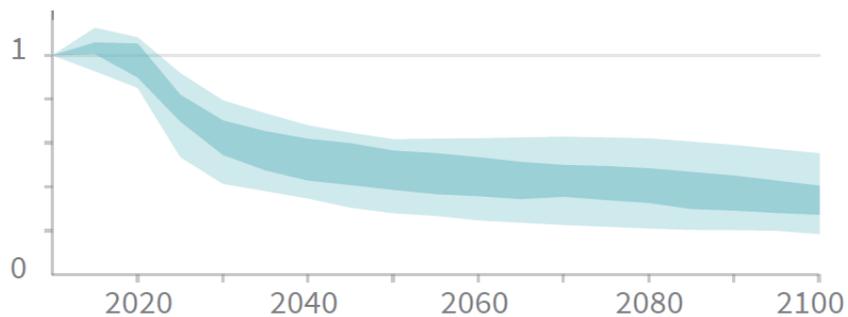
Billion tonnes of CO₂/yr



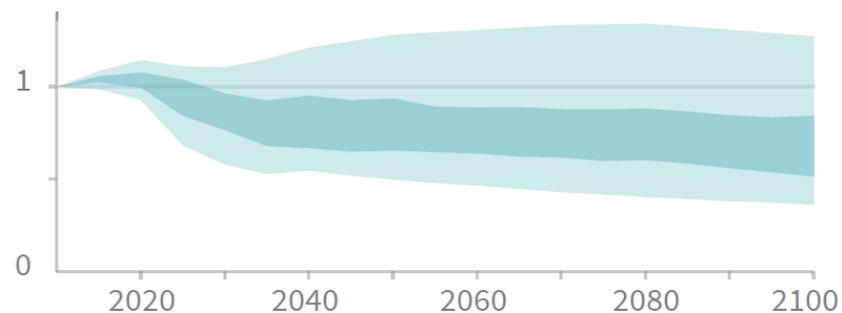
Global pathways; non-CO₂ emissions relative to 2010



Methane emissions

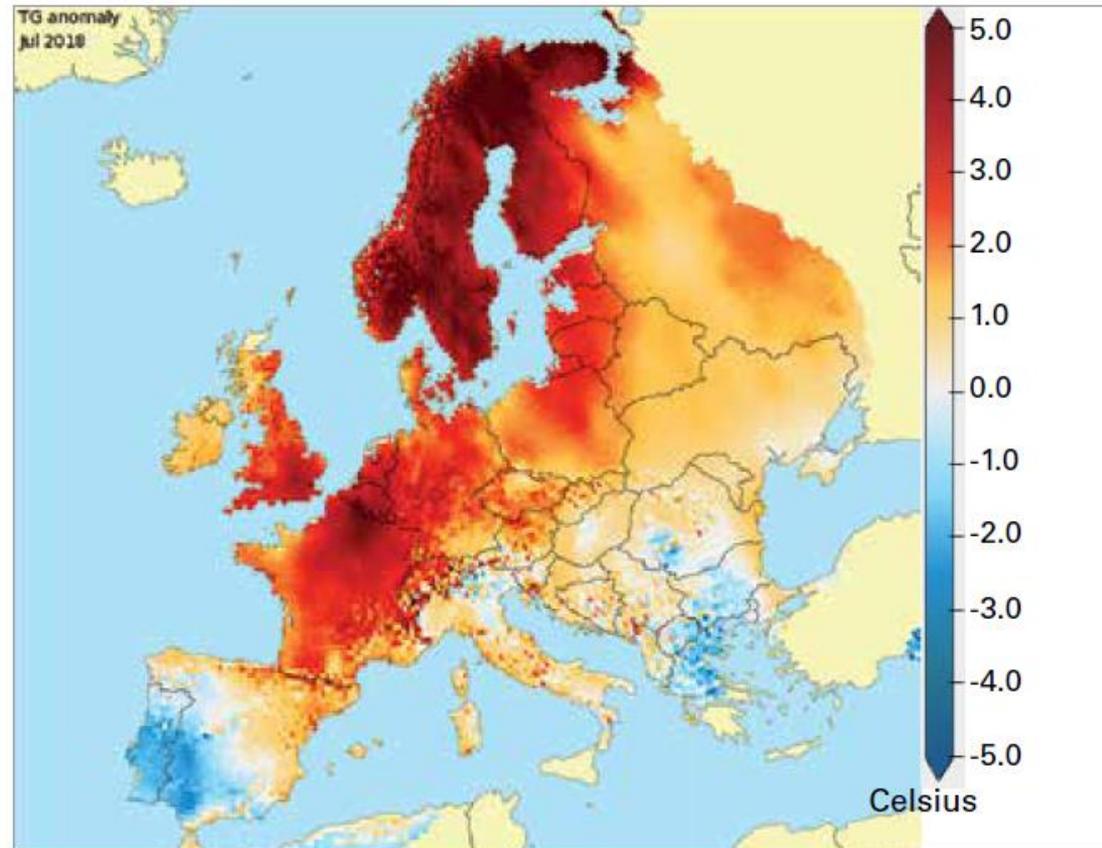


Nitrous oxide emissions



European Heat and drought 2018

- The summer of 2018 has been remarkable in northern Europe. A very persistent high-pressure anomaly over Scandinavia caused high temperature anomalies and drought there from May to (at least) July.
- We estimate that the probability to have such a heat or higher is generally more than two times higher today than if human activities had not altered climate.



Europe experienced elevated temperatures for many months during 2018, as shown here for July.

Source: Copernicus Climate Change Service European State of the Climate Monthly Reports.

- A similarly frequent heatwaves would have likely been about 4 °C cooler a century ago
- A heatwave that intense is occurring at least 10 times more frequently today than a century ago.
- Numerous June records and all-time records at single stations were broken in other countries such as [Czech Republic](#), Spain and Switzerland. In Switzerland new June records were confirmed at more than 40 stations, and new all-time records were confirmed at [6 altitude stations](#). In Austria and the Netherlands, the whole month of June 2019 was the [warmest ever recorded](#), in a large part due to the heatwave.

Record Breaking European July 2019

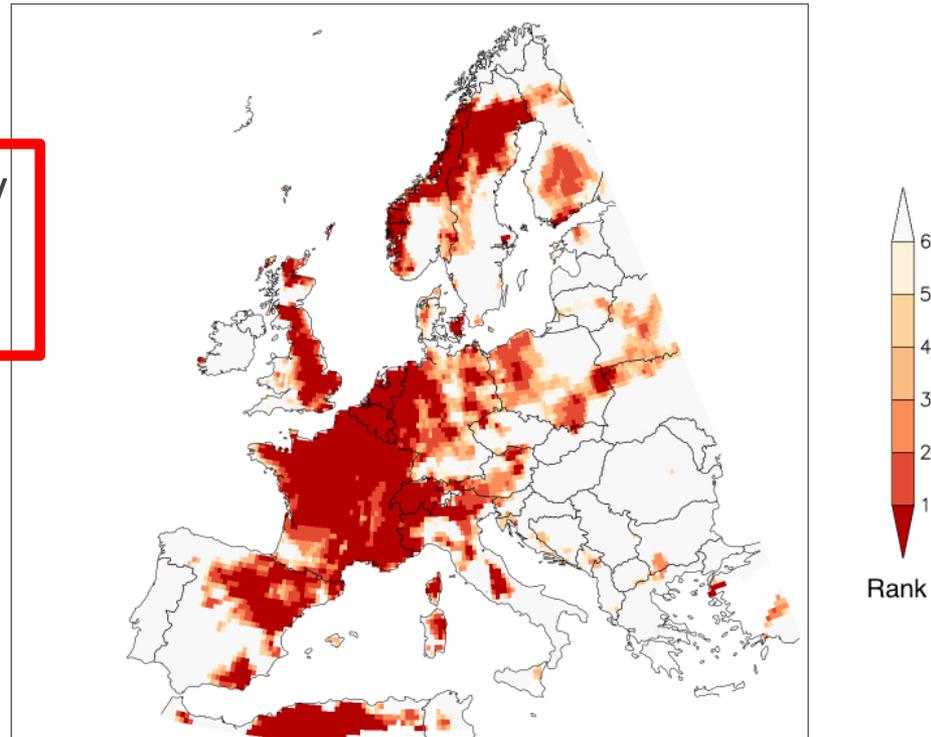


- Heatwave 100 times more likely than without Climate Change in France and Netherlands (at least 10x)
- Heatwave 10 times more likely than without Climate Change in UK and Germany (at least 3x)

Every heatwave occurring in Europe today is made more likely and more intense by human-induced climate change.

World Weather Attribution

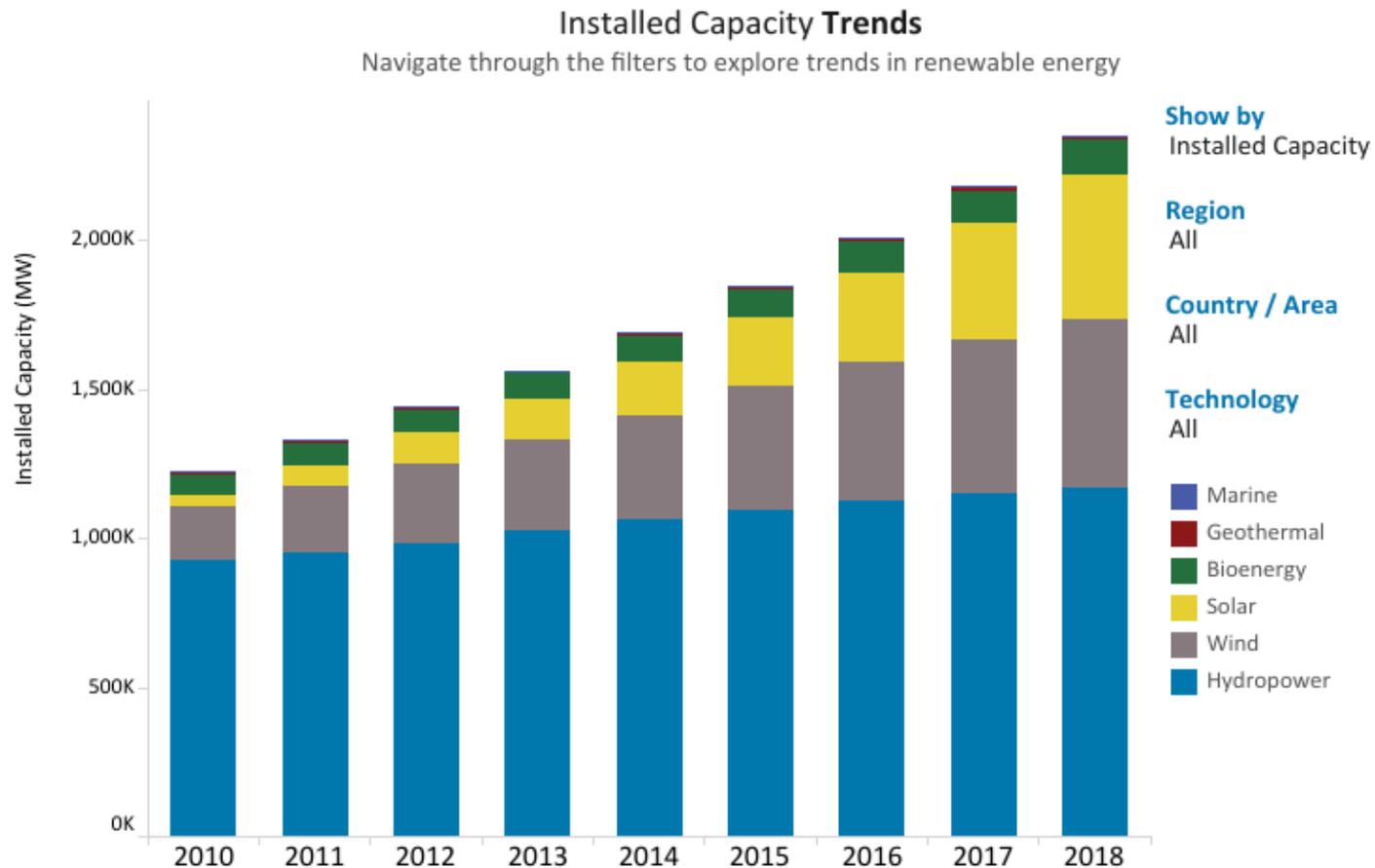
<https://www.worldweatherattribution.org/>



Good News: New Investment in Renewables



■ >60% new capacity is Renewable



Good News: Cost of Renewables



Renewables at Scale are cost competitive with Fossil Fuels

Levelised Cost of Electricity of utility-scale renewable power generation technologies, 2010–2018

