

• 19 September 2024

# What does peak emissions mean for China — and the world?

The milestone is essential for slowing global warming, but the hard work is still to come.

• By [Xiaoying You](#)



China is ramping up its solar-power generation. Credit: VCG via Getty

The world might be witnessing the bending of a key climate curve. Various projections have suggested that carbon emissions from China, the world's largest emitter, will probably peak soon — if they haven't

already — well ahead of Beijing’s pledge that they would [peak before 2030](#).

“What happens with China’s emissions in the next year and next decade is absolutely decisive for the success of the global climate effort,” says Lauri Myllyvirta, an analyst who has tracked China’s emissions trends for more than a decade and is a fellow at the Asia Society Policy Institute, a think-tank based in Washington DC.

“Once China’s emissions peak, it’s likely that global emissions will also reach their peak,” says Dave Jones, an electricity analyst at Ember, a London-based think-tank.

But some researchers say that current peak predictions have big uncertainties owing to various factors, such as the future path of China’s economy. And although reaching the peak will be a major climate milestone, China's emissions must continue to fall to [net zero](#), which could be challenging, say some researchers.

### **Early peak**

China reports its greenhouse-gas emissions to the United Nations through a national communication on climate change every four years and a separate report every two years. But those statistics have a major lag, and China’s latest ones were for 2018.

Assessments by Myllyvirta suggest that China's emissions have been declining since March. This points to a possible 2023 peak, he says, but only if China's clean-energy production can stick to last year's record-breaking growth rate in 2024 and its energy consumption drops to its pre-pandemic level. China installed a staggering 217 gigawatts of solar-power capacity in 2023 alone. The [United States](#) has installed 137 gigawatts in its entire history.

Myllyvirta calculates China's monthly CO<sub>2</sub> emissions by analyzing energy, industrial and customs data from the Chinese government, industry bodies and commercial companies. Analysts can also estimate how much China's emissions have changed every year by analyzing data released by China annually, he said. He thinks the current downward trend is largely because of the growth of clean energy.

### **Peak still to come**

Modelling by Ryna Cui, a researcher who specializes in coal transition at the University of Maryland in College Park, and her team predicts emissions will peak before 2025. Cui's team found that rapid deployment of green technologies and shrinking demand for emissions-intensive products, such as steel and cement, are pushing emissions down. But she cautions: "Emissions peaking can be a complex process, with possible small fluctuations, instead of one single point."

Short-term fluctuations have happened before. China's emissions declined between 2013 and 2016 after coal use had dropped under a government campaign to tackle air pollution. But a rebound occurred after fossil-fuel consumption went up again.

Other analysts think that it will take another year or so to confidently assess whether China's recent emissions decline is temporary or the beginning of a long-term trend. "There are very, very big uncertainties," says Bill Hare, a climate scientist and chief executive of Climate Analytics, headquartered in Berlin. Normally, researchers would need five years of emissions data to make a call on a trend, he explains.

### **Life after peak**

Peak emissions are just the beginning. China must also double down on its efforts to reduce emissions to net-zero to prevent global warming from getting worse, says Gunnar Luderer, an energy researcher at the Potsdam Institute for Climate Impact Research in Germany. [China has pledged to reach this before 2060.](#)

Hare and his colleagues are assessing China's technology and policy trends to project its emissions trajectory. They forecast two scenarios, one showing emissions staying flat for a few years, whereas in the other, emissions begin to decline. The unknowns include whether China will put many of the coal-power plants it

is currently building into operation and how fast it will deploy renewable-energy plants over the next few years.

China approved 83% less coal-power capacity in the first half of 2024 than in the year before, owing to massive renewable advancements, according to a [report](#) released in August by the Helsinki-based think-tank Centre for Research on Energy and Clean Air and Global Energy Monitor, a non-governmental organization based in Covina, California. This spells a possible end to China's coal-power capacity expansion in the next few years, once the projects that are under construction and waiting to be built are complete, Cui says.

Although to slash emissions, China will have to wean itself off coal entirely, and Myllyvirta foresees there will be “a lot of opposition from vested interests” in the coal industry, such as state-owned enterprises and local governments.

### **Time pressure**

China will have a much shorter time frame to achieve net zero, compared with the European Union and the United States, whose emissions peaked around 1979 and 2005, respectively.

Nevertheless, Sun Yongping, a climate economist at Huazhong University of Science and Technology in Wuhan, China, is confident about [China's ability to](#)

[reduce emissions after they peak](#). “Decarbonization requires two things: [technologies](#) and manufacturing capacity to bring these technologies into reality. China has both,” Sun says.

For others, China’s peaking will have a more profound significance. “The current global emission growth is largely driven by developing countries’ economic expansion,” says Mi Zhifu, a researcher in climate change economics at the University College London. “China’s experience in decarbonization could offer valuable lessons for other developing nations striving to decouple economic growth from their emissions.”

*doi: <https://doi.org/10.1038/d41586-024-02877-6>*

## **The rise of solar power and China's staggering EV growth may have pushed global emissions into decline**

By climate reporter **Jo Lauder**

- **Topic:**  
[Climate Change](#)

10h ago

**10 hours ago**



What future planet are we handing over to the next generations? It will all depend on the path we choose. (Supplied: Spyrakot)

[abc.net.au/news/major-climate-agencies-call-global-emissions-peak/104016030](https://abc.net.au/news/major-climate-agencies-call-global-emissions-peak/104016030)

For decades now, there's one fact that's a buzzkill for anyone who cares about climate change: despite all the talk and action, global emissions have not stopped increasing. But, the world is on the cusp of reversing that trend, finally. Two major international climate agencies predict global emissions have reached a critical inflection point and 2024 could be the beginning of the decline.

**"It's really hard to wrap your head around, how quickly and how big this change is," says Bloomberg NEF's head of Australian research, Leonard Quong.**

This critical gear change couldn't come soon enough as emissions must peak before 2025 to avoid dangerous

warming, according to the UN's leading climate science reports.

Several exciting trends are driving this transformation. Fossil fuels are being replaced with renewable energy sources at a growing rate, and the uptake of electric cars is accelerating.

And China, the world's largest greenhouse gas emitter, is leading the way.

## **It's all in the air**



Despite all the talk and action on climate change, emissions have kept rising. *(Supplied: Artinun)*

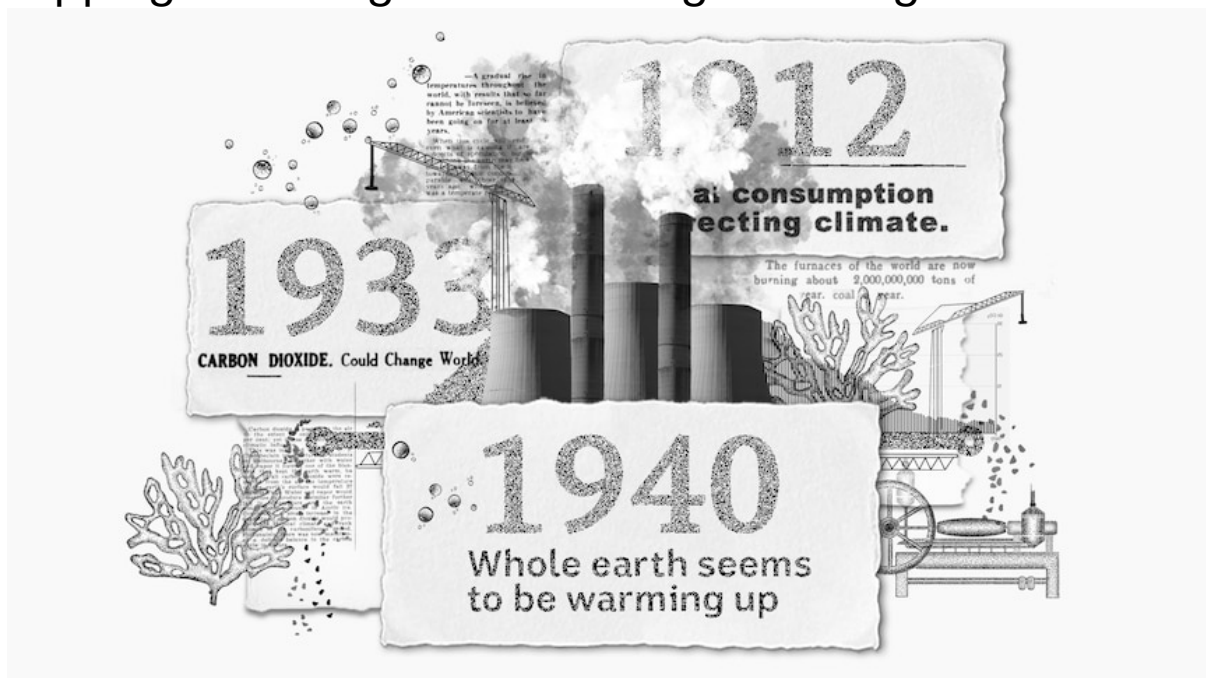
It's worth remembering why this is so momentous. Carbon dioxide, the warming gas we can't seem to stop spewing into the atmosphere, stays there for a long time. Like, a really long time.



It means that all the additional carbon added to the atmosphere since the Industrial Revolution will continue to warm the planet and haunt humankind for centuries to come.

### Buying time to act on climate change

Photo shows Composite graphic of old newspaper clippings detailing climate change coverage.



Strip out the politics, and the climate change story is very different to the one we've been told.

We've been aware of this problem for decades, but despite all the talk about climate change, emissions kept rising.

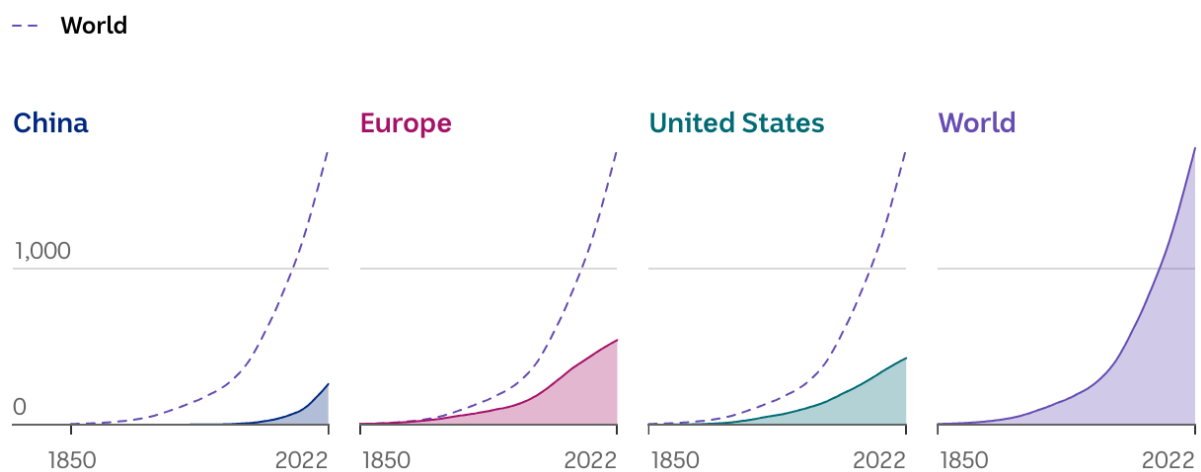
In fact, the world has added more emissions knowingly to the atmosphere since the first UN COP meeting than all of human history until that point.

Put another way — we've made the problem twice as bad since we knew it was bad.

It's critical the world stops adding to that problem. But it's not just enough to plateau in a high-emitting world, emissions need to drop, and they need to drop fast.

## The US, Europe and China make up almost three-quarters of the world's emissions

Running sum of CO2 emissions produced from fossil fuels and industry since the first year of recording in billion tons of CO2.



(Please use a modern browser to see the interactive version of this visualization)

ABC Source: [Global Carbon Budget \(2023\)](#) via [Our World in Data](#) [Get the data](#)

## The peak predictions

As we go about our daily lives, we often miss the bigger picture as the world changes around us.

Bloomberg NEF's head of Australian research, Leonard Quong says people often struggle to understand the magnitude of the current transition.

**"The simplest way we can put it is that global energy systems are facing the biggest, most rapid change since the Industrial Revolution and it's happening right now, Quong said.**

Both independent research firm Bloomberg NEF and the international Climate Analytics institute say it is possible we will see global emissions fall in 2024 and 2023 will have been the peak of global emissions. We will know if these predictions have come true at the end of the year.

"Although it's hard to say exactly when emissions have peaked, the data so far in 2024 seems that that was the right call," Quong said.

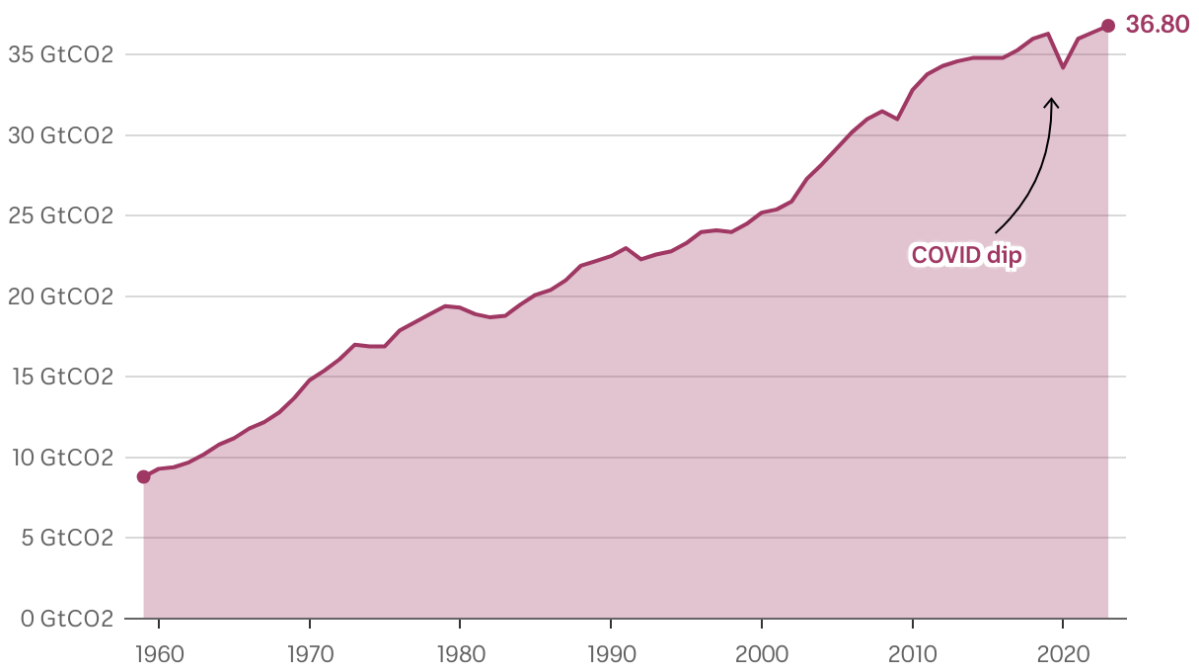
You might notice the dip in the chart below in global emissions in 2020 from the COVID-19 pandemic. That doesn't count, according to Neil Grant, a senior climate and energy analyst at Climate Analytics.

"With the COVID pandemic, emissions fell for one year but that wasn't due to this sort of structural underlying shifts in the energy system," Grant explained.

"To really define a peak, we need to see emissions fall and continue to fall, driven by long-term structural change such as the rollout of renewables and the decline of fossil fuels."

**The world's annual emissions are at the highest point ever**

Fossil fuel emissions, measured in gigatons of CO<sub>2</sub>, rose in 2023, but the rate of growth is slowing as they reach an inflection point.



(Please use a modern browser to see the interactive version of this visualization)

ABC Source: [Global Carbon Budget Get the data](#)

Climate Analytics's research came to the same conclusion, saying it is possible 2024 will be the start of a sustained decline in emissions.

"Our analysis from last year found that if wind and solar continue to accelerate at the pace that they have been, consistent with historical trends, then there's a 70 per cent chance that emissions would fall in 2024," Grant said.

But, he said, the past few months had created some bumps in the road to peak emissions, due to growing

electricity demand for AI, robust growth in China — and, ironically — climate change, with India suffering sustained heatwaves.

"This reduces the likelihood of emissions peaking in 2024. But it's still possible that they could fall, and if not this year, then next," said Grant.

**"Whether emissions fall or rise this year, we're really approaching a sort of inflection point at the moment."**

Most of the heavy lifting in emissions cuts between now and 2030 is done by the world's electricity sector.

## **Simple economics fuel renewables uptake**

Last year, 30 per cent of the world's electricity came from renewables, pushing out more and more fossil fuels.

Even if climate change and emissions weren't a problem, it's predicted the world would still be switching to solar and wind energy because it makes economic sense.

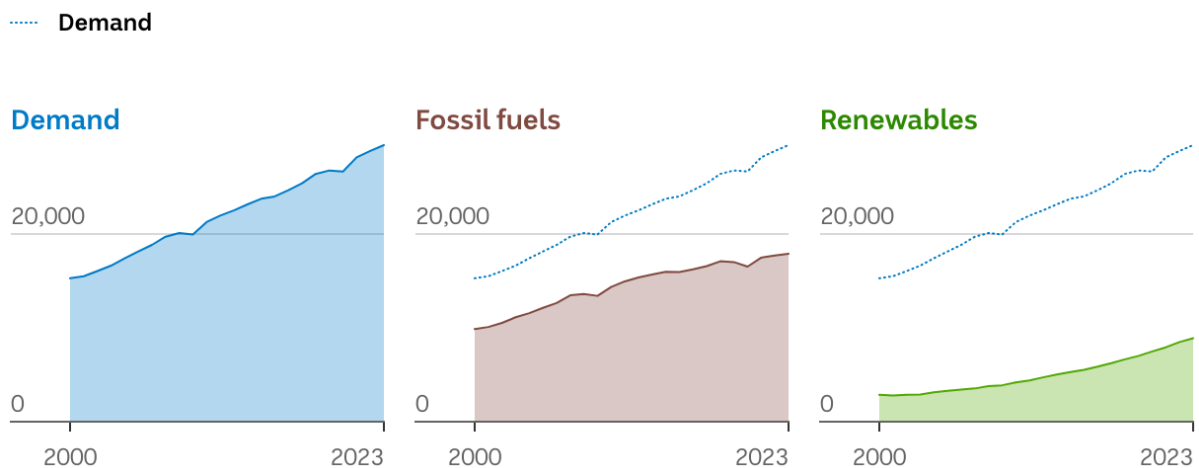
"For over three-quarters of the world's population, they now live in a country where it's cheaper to build new wind and solar generation than any other form of new carbon-intensive electricity supply, that is coal and gas," Bloomberg NEF's Leonard Quong said.

**"So if you live in a market where you need new electricity supply, you're likely to build wind and solar, even without considering the carbon or climate impacts of that type of technology."**

Quong says the energy sector is the most rational and affordable place to begin to reduce carbon emissions.

## **Renewable energy sources step in to meet rising global demand**

Global electricity demand and generation by aggregated fuel type in terawatt-hours.



(Please use a modern browser to see the interactive version of this visualization)

ABC Source: [Ember Climate Get the data](#)

"That's simply because we have the technologies today that are both commercially available, scaling, and in many instances, cheaper than carbon-intensive alternatives."

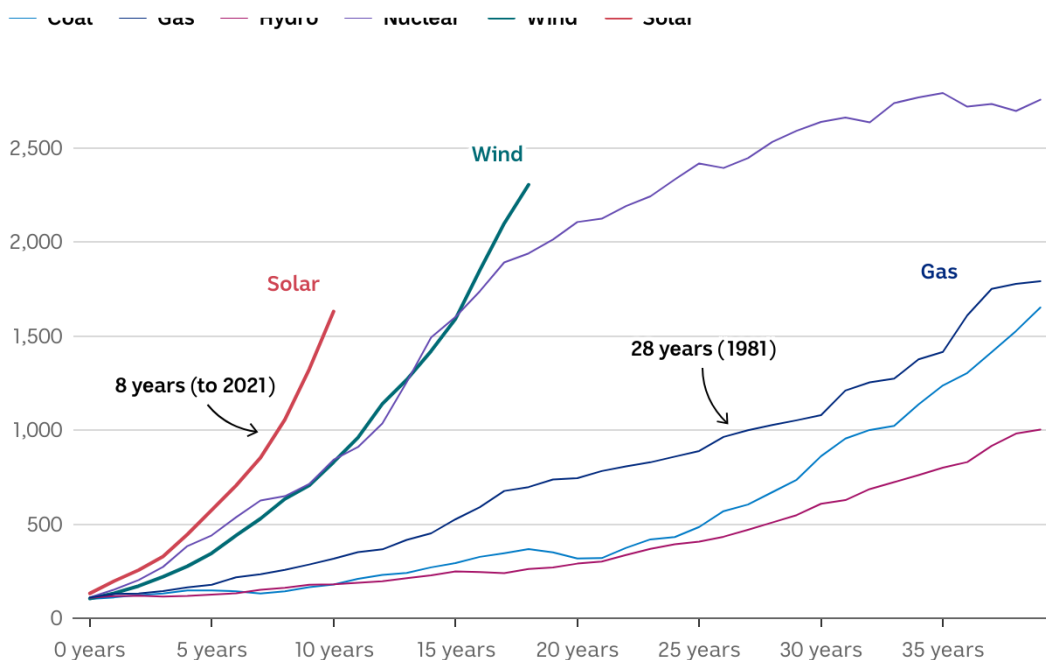
The Bloomberg NEF report is blunt about the future of fossil fuels saying "the era of fossil fuels' dominance is coming to an end."

**"Even if the transition is propelled by economics alone, with no further policy drivers to help, renewables could still cross a 50 per cent share of electricity generation at the end of this decade," it stated.**

Bloomberg NEF isn't predicting renewables to slow anytime soon.

## **Wind, solar scale up faster than any other electricity source in history**

It took gas 28 years to scale up to 1,000 terawatt-hours, while it was only eight years for solar and 12 for wind.



Increase in electricity generation in the years since reaching 100 terawatt-hours.

ABC Source: [Ember Global Electricity Review 2024 Get the data](#)

"The more we produce of these technologies, the more efficient we get. It doesn't take a big single project to understand how to do it better next time, you can make slow gradual improvements that drive down cost and increase efficiency."

"It also doesn't hurt that the world is in a very competitive market right now, for the supply of these technologies," Quong said.

It's worth also breaking out the trends around solar energy and the cost of solar.

## **The solar revolution**



A large solar plant in Beijing, China. (Getty Images: Xinzheng)



At this point in history, solar is unstoppable, a powerhouse. It's extremely cheap, for starters.

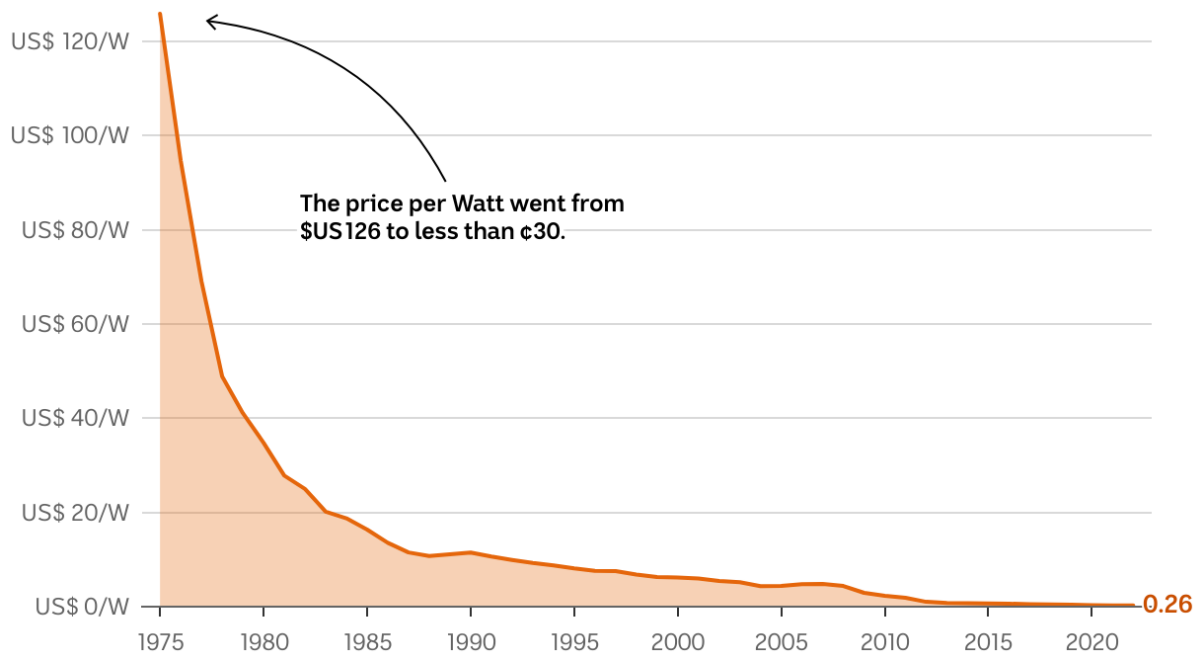
"Over the past decade, we've seen over a 90 per cent reduction in the cost of buying solar modules. That's an incredible cost trajectory for any technology in any sector of any system," Bloomberg NEF's Leonard Quong said.

It's now cheaper to build new solar energy than run existing coal-fired power stations.

The steep drop in solar costs is helping developing countries to speed up their transition to cleaner energy sources. Until now, economic growth had a Faustian connection with higher emissions. More growth, more climate damage.

### **The price of solar is now a small fraction of what it was 50 years ago**

Annual solar photovoltaic module prices from 1975 to 2022 in \$US per Watt.



(Please use a modern browser to see the interactive version of this visualization)

*ABC Source: International Renewable Energy Agency (2023); Nemet (2009); Farmer and Lafond (2016) via Our World in Data Get the data*

The International Energy Agency said international investment in solar will grow to \$500 billion this year, higher than all other forms of energy generation.

Nowhere is the pace of the transition and solar uptake more astonishing than in China.

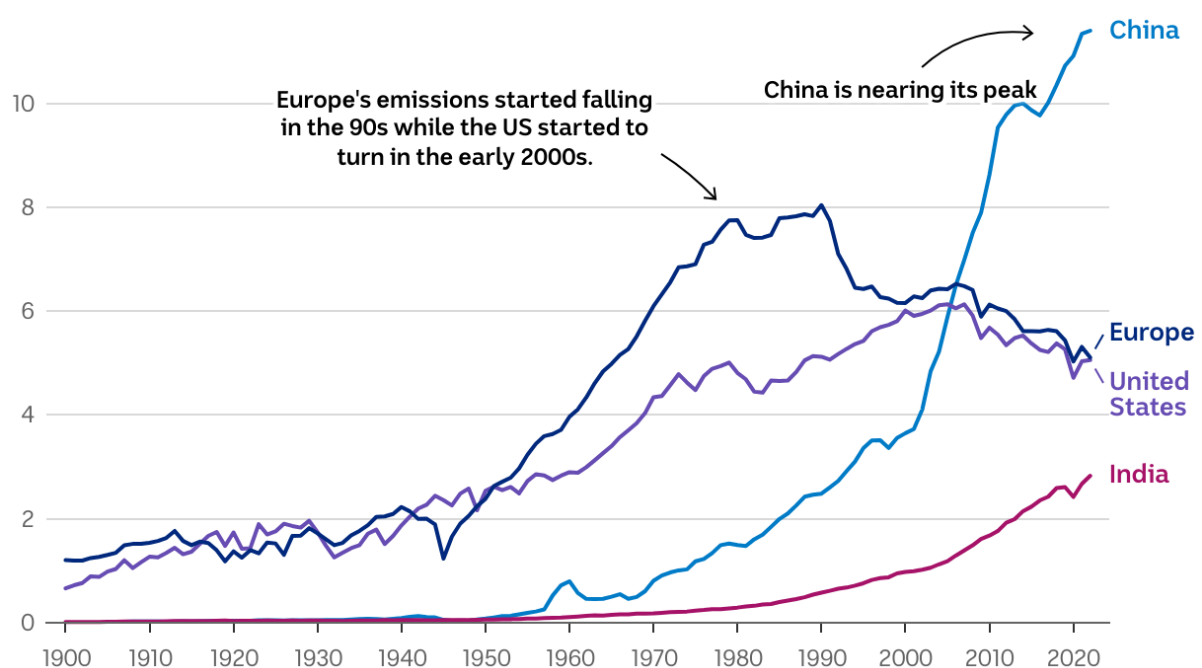
## China leads the way

It would be hard to bend the emissions curve without a shift from the world's biggest emitter, China.

The argument that's often trotted out — why should we do anything if China's still emitting so much — no longer hits like it used to.

## China's annual emission growth is slowing

Most big economies have already changed the trajectory of their emissions from fossil fuels and industry, measured in billion-tonnes of CO<sub>2</sub>.



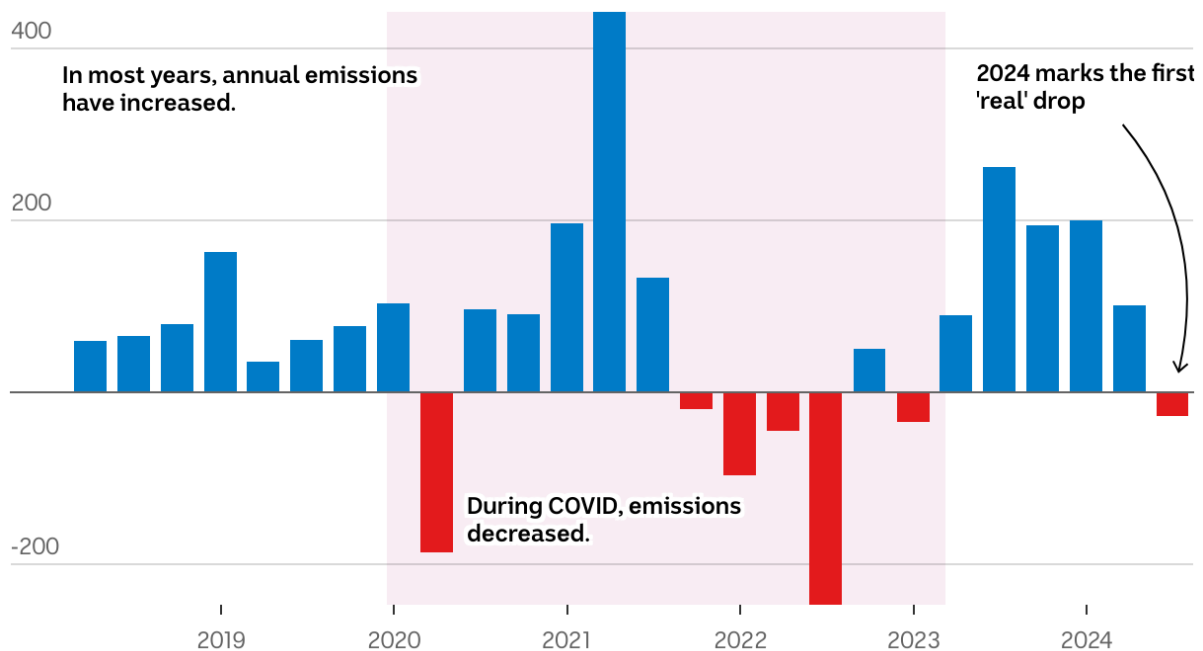
(Please use a modern browser to see the interactive version of this visualization)

ABC Source: [Our World in Data/Global Carbon Budget \(2023\) Get the data](#)

The latest research by climate science publisher Carbon Brief shows China's CO<sub>2</sub> emissions fell by 1 per cent in the second quarter of 2024, the first quarterly fall since the country re-opened from COVID-19.

## China's emissions fall for the first time post-COVID

China's CO2 emissions fell by 1 per cent in June 2024, the first quarterly fall since the country re-opened after lockdowns.



(Please use a modern browser to see the interactive version of this visualization)

*Year-on-year change in quarterly emissions from fossil fuels and cement in million tonnes of CO2 (mtCO2).*

*ABC Source: [Laurie Myllyvirta for Carbon Brief](#) [Get the data](#)*

In fact, China is leading the world in renewables deployment and investment, installing more solar last year than the rest of the world combined.

**"What is clear is within the next few years, that China's emissions from its electricity sector, as well as its transport sector, and industry, will begin to fall quite materially."**

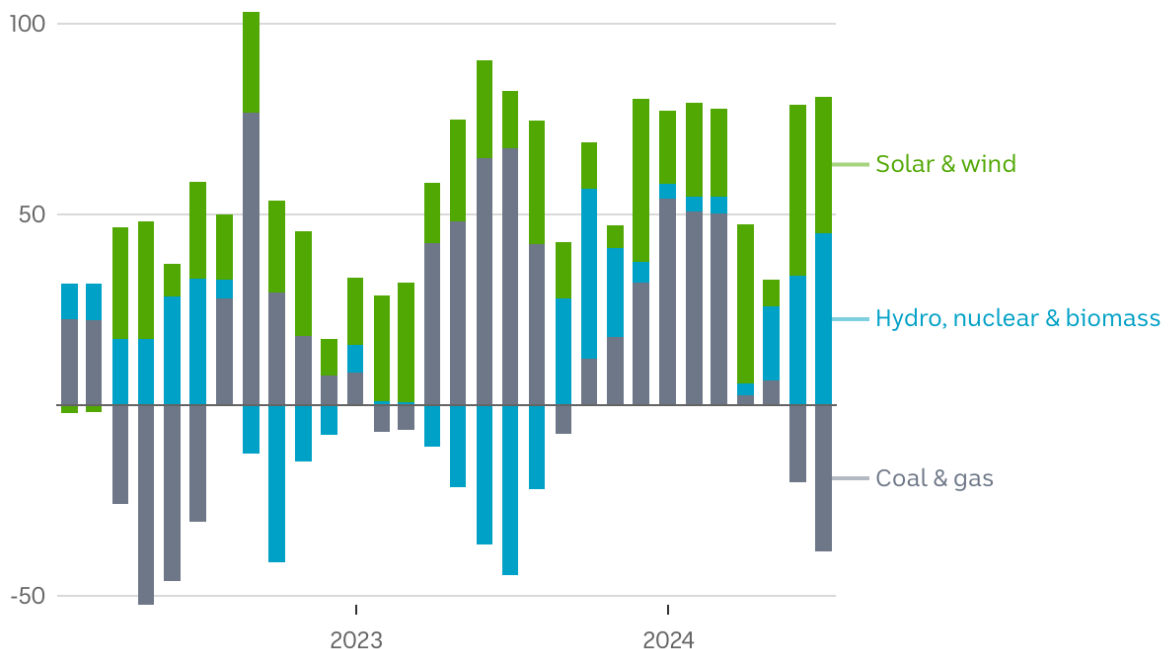
"China installed more solar power in one year than the US has installed in its entire history. It's just a really insane rate of change at the moment," said Neil Grant from Climate Analytics.

"China has been breaking records every year for wind and solar deployment.

"The pace of acceleration, particularly last year, did catch quite a lot of people by surprise and the signs are that China is on track to beat that again this year," Grant told the ABC.

## China's strong growth in clean energy sources is pushing fossil fuels into reverse

Year-on-year change in monthly electricity generation in terawatt-hours by fuel source.



(Please use a modern browser to see the interactive version of this visualization)

ABC Source: [Carbon Brief Get the data](#)

China has also invested heavily in renewables manufacturing and now provides around 90 per cent of the world's solar components.

It also has a strong wind industry and has invested heavily in electric cars.

This isn't just helping with China's carbon emissions issue, it's also improving air pollution.

## **Electric cars start overtaking**



In 2023, more than half of the EVs on the world's roads were in China, pushing China to be the world's largest EV market and producer. *(Supplied: Yan)*

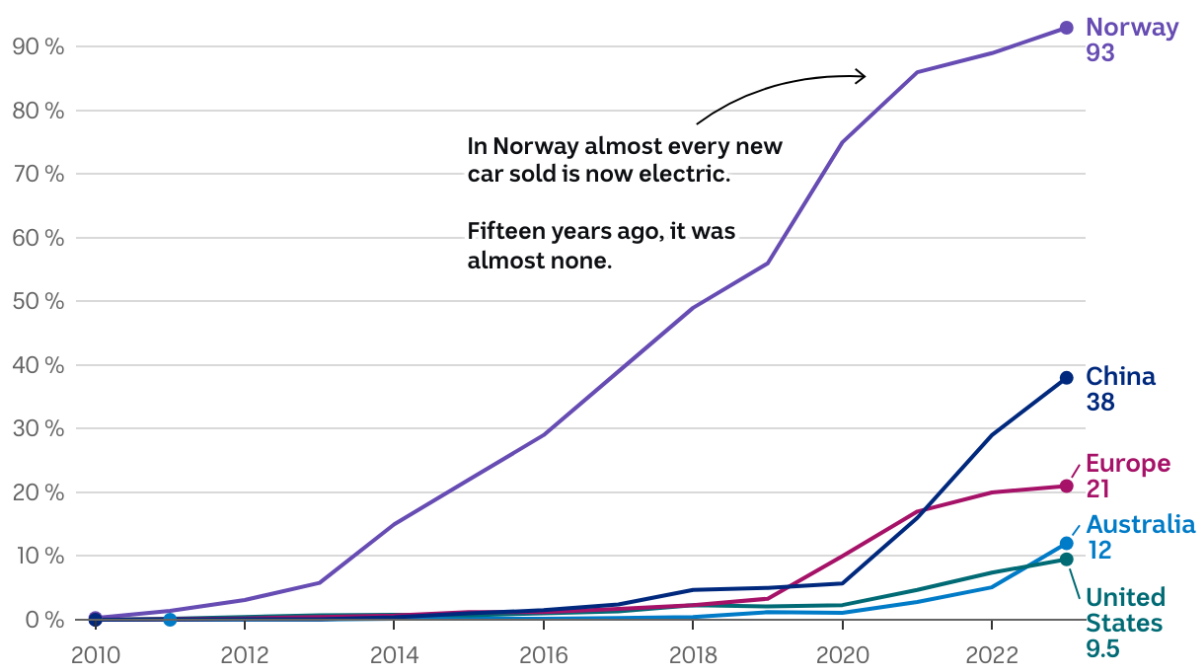
The other technology driving cuts in emissions — literally — is electric vehicles.

"Electric car sales in 2023 were 3.5 million higher than in 2022, a 35 per cent year-on-year increase. This is more than six times higher than in 2018, just five years earlier," according to data from the International Energy Agency.

The trend looks set to continue: as many electric cars were sold in the first quarter of this year as all of 2020.

## EVs take up a larger share of new cars sold around the world

Globally, around one in four new cars sold were EVs in 2023.



(Please use a modern browser to see the interactive version of this visualization)

*The percentage of electric car sales share includes fully battery-electric and plug-in hybrids.*

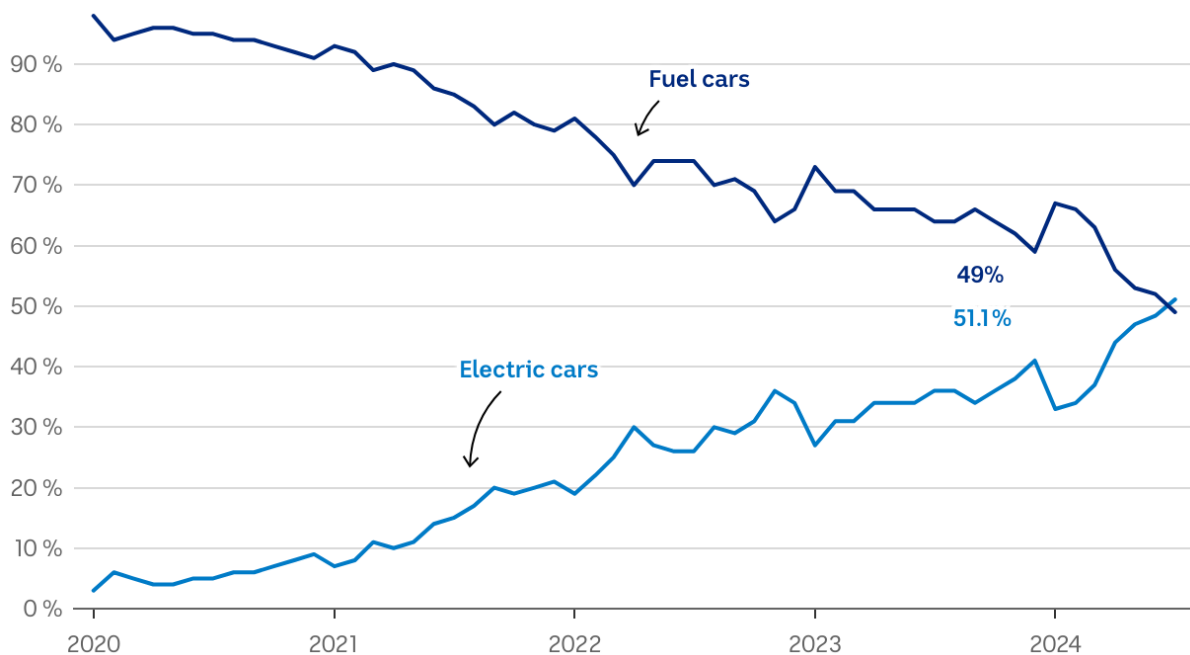
ABC Source: [International Energy Agency. Global EV Outlook 2024 via Our World in Data](#) [Get the data](#)

Bloomberg NEF anticipates EV growth to continue and therefore global demand for oil could start to fall within a few years, that is, peak oil is reached.

Once again, China is dominating this space. Over half of the electric cars on the planet are driving around on Chinese roads.

Chinese industry data obtained by Carbon Brief shows "new energy vehicles" (NEVs) accounted for around 51 per cent of all cars sold in China in July 2024.

## China sells more cars powered by electricity than traditional fuel cars



(Please use a modern browser to see the interactive version of this visualization)

*Data obtained by Carbon Brief from China's Passenger Car Association. New energy vehicles includes plug-in, battery, plug-in hybrid and fuel cell EVs.*

*ABC Source: [Carbon Brief Get the data](#)*



Electric cars are now cheaper than fuel-powered ones in China.

Like other renewable tech, China tipped considerable government support and policy towards electric automakers and manufacturing companies upstream in the supply chain, as well as giving out subsidies for drivers to go electric.

China also leads in battery production, allowing the industry to integrate smoothly with the local EV production line. If anything, the IEA warns that China has a high level of overcapacity when it comes to batteries.

#### **What Australia can learn from California's battery boom**

Photo shows View of a palm tree-lined road with a yellow middle strip in California leading into the horizon.



California, known for palm tree-lined boulevards and the iconic Hollywood hills, is adding another claim to fame: renewable energy.

As the world's biggest emitter, China's emissions are crucial, but there are promising signposts in other parts of the world.

The UK, the birthplace of coal power, has just shut down its last coal-fired power plant. The European Union is now getting more of its electricity from renewables than from coal and gas.

In California, large storage batteries have grown so much they've on occasion taken over as the number one energy source to supply evening power demand.

Increasingly, we're seeing glimpses of what a post-fossil fuel future looks like.

**"I've been in this space, looking at these markets looking at these technologies for over a decade now and sometimes I've struggled to wrap my head around the size, the scale, the speed, that this transition is happening," Quong says.**

"The question really is now, how fast will emissions from energy use power consumption and production around the world begin to fall?"

## **Time is of the essence**

While it's critical to stop emissions from rising, we can't sit around and celebrate.

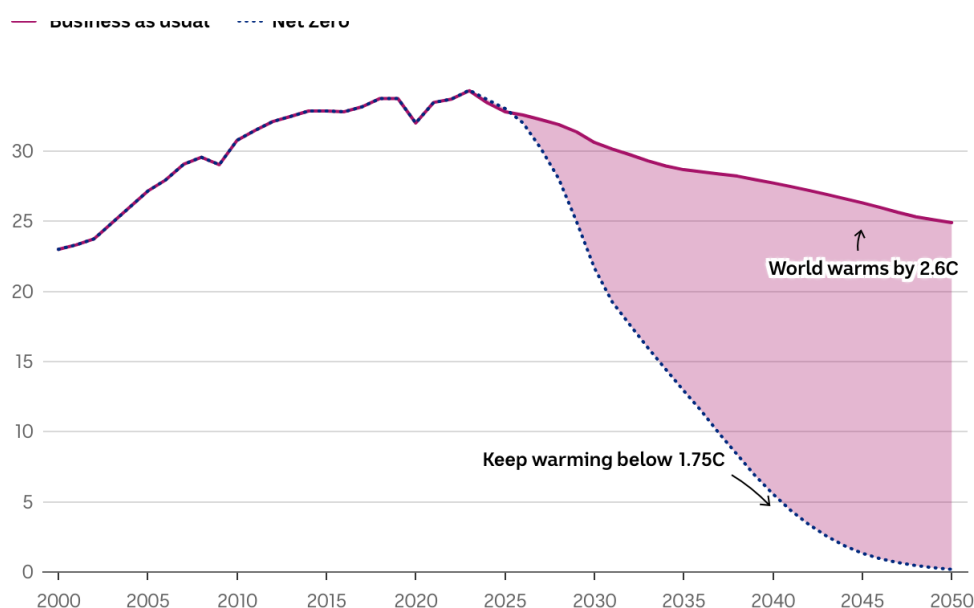
Bloomberg NEF shows different scenarios for what might happen after global emissions peak this year, if they do.

The "economic transition scenario" is similar to business-as-usual. It assumes that the existing climate policies stay in place but aren't strengthened, and the price trends for technologies continue in the same direction.

Under this scenario, emissions still peaked in 2023, but the trajectory is not worth celebrating: emissions will plateau and the world will warm by 2.6 degrees.

### **The gap between the current and a more aggressive pathway to cut back on emissions will dictate how much the world warms**

The trajectory of global greenhouse gas emissions post peak adopting a 'business as usual' and a more ambitious net zero approach.



Emissions in gigatons of CO2. ABC Source: BloombergNEF [Get the data](#)

This goes to show that peaking isn't enough, and the pace of the transition is also critical, according to ClimateWork's acting CEO Wei Sue.

"We have only a finite amount of emissions that we can put into the atmosphere before we reach a certain tipping point, or exceed certain temperature thresholds, such as 1.5 degrees, or even two degrees," Sue said.

Neil Grant from Climate Analytics, which suggested a 70 per cent chance that emissions peaked last year, also warns that the work is far from over.

"And peaking is only the start of the journey — the speed at which we reduce emissions really matters. So the shape of the curve, in other words, really matters.

"The Intergovernmental Panel on Climate Change, the IPCC, in their last assessment report, found there were no scenarios that limit warming to 1.5 degrees that don't peak emissions before 2025."