EuroHub4Sino

European Hub
for Contemporary China

September 2024

Public Predictions about China's Carbon Emissions Peak: Dynamics and Impacts

by Anja Senz & Belinda Uebler

Funded by
the European Union

https://doi.org/10.31175/eh4s.2014.13

KEY TAKEAWAYS

- Optimistic claims that China's carbon emissions may have peaked in 2023 have triggered a public debate recently. Media outlets worldwide have echoed the prognosis since November 2023, although most experts anticipate a later peak for China's emissions.
- Critics argue that predictions based on recent drops in emissions are unrealistic, because they overlook potential fluctuations from economic cycles or extreme events in the near future.
- While setting specific annual emissions targets is common practice globally, it does not take economic cycles and unforeseen events into account. Thus, a proposed observation period of ten years for the emissions peak would provide a more accurate comparison of trends before and after the targeted peak year, accounting for fluctuations.
- The main argument behind optimistic predictions is the rapid increase in renewables capacity. However, not only could there be fluctuations such as rebounds, but the expansion of renewables capacity does not necessarily lead to the ideal reduction of fossil energy. This is due to factors such as not all capacity being connected to the grid, inefficient management, and complex situations involving interest groups that resist or complicate the reduction of fossil energy in China.
- Optimistic predictions about China's environmental development from Western analysts seem intended to encourage Western environmental policymakers to intensify their efforts. However, these forecasts also carry risks for policymaking, as they lead to misunderstandings between the EU and China about the true state of environmental progress and create unrealistic perspectives of China. This might hinder the development of solutions and measures that align with the actual environmental challenges.

Keywords

Carbon Emissions Peak

Renewable Energies

Paris Agreement

Decarbonization

Introduction

Due to concerns about climate and the environment, the global community is increasingly monitoring decarbonization efforts, particularly in high carbon-emitting countries like China. Evaluations of China's environmental progress in the West vary significantly, with some analysts making *optimistic predictions* about China's achievements, even when specific milestones have not yet been met.

This discrepancy is evident in the current debate about whether China has reached its national carbon emissions peak. In recent years, *China committed* to peaking its carbon emissions before 2030 and achieving carbon neutrality by 2060. Historically, China sets its targets conservatively and often surpasses them ahead of schedule, fueling speculation among Western observers that China might achieve its carbon peaking goal earlier than planned. A 2023 *expert poll* conducted by the Centre of Research on Energy and Clean Air (CREA) revealed that a minority of experts believe the peak has already occurred or will occur before the end of 2025, while the majority thinks the carbon peak will happen sometime after. Despite this, speculation that China might have peaked emissions in 2023 has dominated public discourse in recent months.

In fact, speculations about an earlier CO2 emissions peak for China have been around for some time and have varied significantly. In 2018, a *research paper* argued that a CO2 peak before 2030 was not possible. A *journal article* from 2022 suggested that China could peak as early as 2023 under a baseline scenario, but not until 2028 under an industrial structure adjustment scenario. According to the *Climate Action Tracker*, China's emissions peak could occur in 2025. However, the economic crisis exacerbated by COVID-19 caused a *rise in China's*

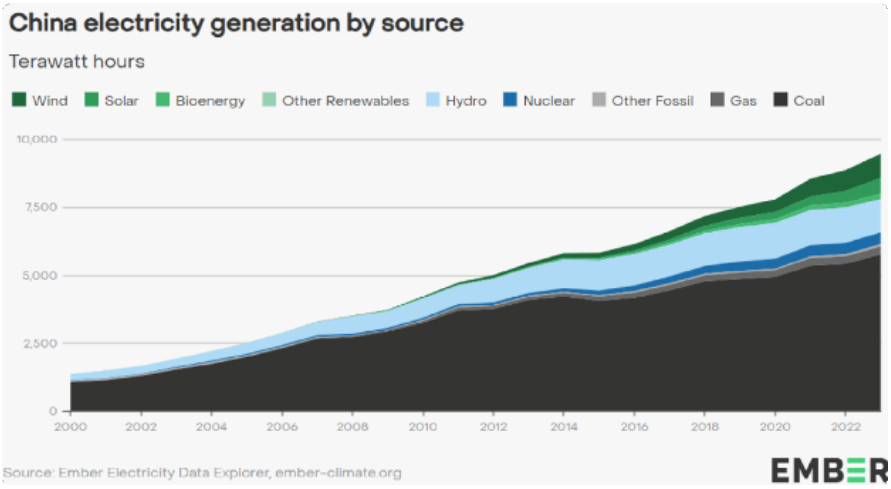
carbon emissions, making it unclear for a long time when a decreasing trend would resume.

Both Chinese and international experts have consistently pointed out ongoing issues, such as the insufficient integration and transmission of renewable energy, ineffective grid management, and delays in delays in decommissioning coal power plants due to complex political and economic factors. These challenges are significant barriers to quickly replacing coal with alternative energy sources. Despite these concerns, their perspectives are increasingly being drowned out by overly optimistic assumptions that seem to dominate the public discourse. Discussions based on unverified information could, however, have a negative impact on the EU's climate negotiations. This is particularly concerning if, due to an overly optimistic assumption about emissions trends in China, the necessary measures for future climate policy are not implemented, potentially jeopardizing the achievement of the Paris Agreement.

Prognoses in late 2023

Towards the end of 2023, the debate about China's possible early achievement of its emissions peak resurfaced. In early November, a European energy think tank published an analysis of China's carbon emissions developments predicting a fall in China's carbon dioxide (CO2) emissions in 2024 and raising the possibility of China's CO2 emissions facing structural decline due to the unprecedented growth in the installation of new low-carbon energy sources.

The argument behind predicting the structural decline in China's carbon emissions centered on the surge in solar, wind, and hydropower expected in 2024. Although emissions climbed in 2023, a historic expansion of low-carbon energy installations occurred as local governments sought alternative investment opportunities following a major debt crisis caused by years of massive infrastructure investment. The biggest growth was in solar power, with installations in 2023 reaching around 217 gigawatts (GW), which is almost equal to the total installed capacity of solar power in the EU and twice the total installed capacity of solar power in the US.



It was argued that if low-carbon energy installations are maintained at the projected 2023 level, the growth in low-carbon power generation would enable China to peak and then decline coal use in the power sector, making 2023 the peak year. At this point, so the argument, the growth of low-carbon electricity would outweigh the overall growth in electricity demand, leading to a decline in the amount of electricity generated using fossil fuels and the associated emissions.

Yet, the prediction also depended on further assumptions such as electricity demand remaining low and hydropower output increasing after experiencing record lows. Thus, the analysis projected that if electricity demand follows its historical trend of rising 5% per year and hydropower utilization returns to historical averages, fossil fuel-based power generation should experience a significant drop during the spring and summer of 2024, with no growth expected thereafter. Power sector emissions which constitute a major component in overall emissions are also anticipated to decline.

However, an *expert survey*, including mainly Chinese and some international experts, revealed that the prediction of China reaching its carbon emissions peak between 2023 and 2024 is supported by only a small minority of experts. Although the overall sentiment regarding emission peaks and decarbonization has become more optimistic in 2023 compared to 2022, 79% of experts still believe that China's carbon emissions peak will not occur before 2026. Only 2% think the peak has already happened, and 19% believe it will occur before the end of 2025.

Nevertheless, when various Western and Chinese online media reported about the carbon emission peak none of the media mentioned the fact that the prediction is not supported by the majority of experts interviewed in the survey. Some *Chinese media* also argued that the findings prove China to be a renewable energy powerhouse poised to lead both Asia and the world in green energy, metals and minerals mining, and clean technology. They credited years of investment and favorable government policies for China's success, suggesting that the country is now reaping the rewards of becoming a global market leader and transforming the energy industry to meet future demands in a more environmentally friendly way. Additionally, they asserted that China's carbon emissions are likely to peak in 2023 and then trend downwards from the following year.

Other media outlets included additional forecasts from various think tanks in their coverage of the analysis. One such prediction came from a UK energy think tank, which projected that China's emissions would peak a few years before 2030, possibly *as early as 2026*. The cited analyst also questioned why China was not publicly sharing the prospect of an earlier emissions peak. He believed that the Chinese government did not realize how important public statements are for winning the overall global debate on climate change, suggesting that it would be a major step forward for the world if they did. Represented by Xie Zhenhua, China

had publicly asserted at recent climate summits that there was no need to adjust its national targets to reflect progress, as the goal remains 'before 2030'; and that the exact year is still being calculated.

Chinese expert suggests a 10-year observation period

Following the ongoing public debate, in February 2024, a renowned *Chinese expert* published an article on the question of when emissions decline in China can be counted as emissions peak. He proposed a 10-year observation period to determine China's carbon emissions peak, covering five years before (2016-2030) and five years after the targeted peak (2031-2035).

As he explained, a lengthy observation period is essential due to fluctuations caused by extreme events and cyclical economic factors, noting that past economic cycles in China have typically lasted 10 to 12 years. [1] He also cites Germany's achievement of its 2020 emissions reduction target, which was largely influenced by the Covid-19 pandemic rather than structural changes. As expected, emissions rose again in the following year with economic recovery. Thus, since setting specific annual emissions targets is a common practice worldwide, but often overlooks cyclical economic factors and unforeseen events, longer observation periods are crucial.

Additionally, recent predictions about China's emissions peak involve the *uncertainty* of whether future patterns will align with or deviate from historical trends. While an increase in renewable energy capacity surpassing the rise in overall energy demand could stabilize fossil fuel use and emissions growth in a given year, real-world changes often defy such predictable patterns. Additionally, any determination on how to judge the carbon peak must be *made in advance*, rather than being interpreted retroactively based on evolving emissions trends.

Furthermore, it was stressed that China may need to *accelerate its efforts* to reduce emissions, especially concerning coal power [2] and power grid reforms [3] . Currently, significant policy changes are not anticipated until 2030 or later, which could result in sudden adjustments. Therefore, the Chinese expert also proposed establishing interim targets for 2025-2035, including specific goals for the energy mix, renewable energy share, and overall energy consumption, to prevent delays and facilitate timely sectoral reforms.

Analysts using current declining carbon levels to validate predicted carbon emissions peak

Despite the critiques, the public debate persists, with energy analysts reinforcing their predictions. *An analysis* published end of May 2024 argued that the recent fall in China's carbon dioxide (CO2) emissions by 3%, which ended a 14-month surge, hints to a carbon emissions peak in 2023. Again, the overall emissions decline and the claim regarding the achieved emissions peak were attributed to the expanding solar and wind generation, which met 90%

of the growth in electricity demand, as well as to declining construction activity. Additionally, the analysis expressed confidence in China's ambition to *shift its economy* from traditional heavy industries to more technologically advanced and cleaner sectors, aligning with its focus on cultivating '*New Quality Productive Forces*'.

While acknowledging the divergent views across the industry and government regarding the outlook for clean energy growth, it was asserted that a 2023 peak in China's CO2 emissions is possible if the expansion of clean energy sources continues at the record levels seen last year. It was also predicted that future excess demand could be entirely met by renewables, with hydropower regaining momentum, thereby reducing reliance on fossil fuels.

However, as the Chinese expert noted, current trends are insufficient to confirm a carbon emissions peak because predictions can only be confidently made for about one year, with long-term trends potentially experiencing significant fluctuations or reversals.

Nevertheless, the prediction—or rather the confirmation of the prediction—was accepted in the public debate, with media reports and other analysts incorporating it into their coverage and forecasts regarding the global emissions peak. For instance, some *institutions have inferred* from existing claims about China's emissions peak that a global trend shift in CO2 emissions is imminent. Thus, optimistic predictions and forecasts regarding China's emissions peak are also influencing subsequent global emissions forecasts, but this poses several risks. On one hand, if institutions or policymakers uncritically rely on these unverified and uncertain claims, it could lead to misunderstandings between China and the EU, especially since China has not officially declared that it has reached its emissions peak. On the other hand, there is also the risk of misjudging not only the situation in China but also the overall global scenario, which could result in misguided political decisions and actions with potentially negative outcomes.

The problem with newly constructed renewables capacity

Another point which has been raised by experts but seems to be overlooked in current optimistic predictions, is the uncertainty about whether expanded renewable capacities will actually replace fossil energy production in China. Apart from the fact that fossil energies are deeply entrenched, with many *Chinese regions and interest groups* depending on them, there are a few more reasons why an immediate replacement of coal with renewables is not a given:

Firstly, China does not currently use an *economic dispatch system* that prioritizes the cheapest generation facilities. This means that when new, more cost-effective renewable energy facilities are introduced, they do not automatically replace more expensive existing facilities. As a result, some coal-fired power plants continue to operate even though they are more expensive than newly constructed renewable options.

Secondly, there is a discrepancy between the installed capacity of renewable energy sources and their actual operating capacity. For example, in the domain of wind power, *several experts* have criticized that China's planning approach is based on capacity building rather than capacity utilization or generation goals. This means that while there is a focus on increasing installed capacity, there are no guarantees if, when, or to what extent this capacity will be utilized. This discrepancy is also the reason why, although the installed wind capacity in China has long been twice that of the United States, it *produced less wind power than the US*. A similar situation exists with solar energy installations, where the utilization rate of newly expanded solar capacity has remained low, particularly in East China, where distributed solar systems are widely deployed. Unlike utility-scale solar, distributed solar consists of small-scale systems typically installed on or near the site of electricity use, such as residential rooftops or commercial buildings. Following the launch of China's "*Whole County PV Programme*" (整县光伏推进方案) in 2021, distributed solar installations surged. However, regional grids and power distribution networks have *struggled to keep up* with this rapid growth. Since late 2023, curtailment and temporary suspension of distributed solar applications have increased significantly in several eastern provinces, potentially hindering future installations unless the grid's capacity to absorb solar power is quickly enhanced. Thus, China's installed renewable capacity figures should be viewed critically, as they do not always reflect actual energy generation, and not all installed capacity is actively used.

Thirdly, under the current energy policy landscape the expansion of renewable capacities has also led to a *net increase* in coal power. The provisions for renewable energy development in the 14th Five-Year Plan require that renewables account for no less than 50% of the "hydro, wind, solar, and coal" mix. Since some transmission lines dedicated to hydropower provide 100% renewable electricity, even a coal power contribution of 70% through other lines can meet the average requirement. Hence, the policy which sought to support investment in renewables has also triggered a net expansion in coal power.

Fourthly, renewables cannot yet replace all the *functions of coal*, as coal is still crucial for ensuring reliable energy, operational flexibility, and heat, as noted by three Chinese experts recently. A significant portion of coal-fired power plants in northern China are combined heat and power plants. Therefore, to fully replace coal in its heating role, innovations in technology for providing heat from clean energy sources are necessary. Additionally, renewable energies like hydropower, wind, and solar are highly dependent on natural conditions such as climate and weather. For example, droughts in regions reliant on hydropower have led to energy shortages in recent years. To address the reliability and flexibility gaps of renewable energy compared to coal, advancements in management and storage technologies are required.

Despite these significant challenges, the international community including Western energy analysts continues to focus too much on the numbers related to the expansion of renewables.

Recent analyses and their *media reports* celebrate the rapid increase of the global and mostly China's installed renewables capacity without taking the above-mentioned challenges in the actual usage of renewables and replacement of fossil energy enough into account.

Past inaccuracies in predicting national or global emissions peaks seem to have little dampening effect on current forecasts, despite the possibility of a strong increase in emissions from primary energy consumption and the construction industry, or continued low energy generation from hydropower. Various Chinese and international experts have repeatedly highlighted ongoing challenges, including inadequate integration and transmission of renewable energy, inefficient grid management, and delays in shutting down coal power plants due to political and economic entanglements, which hinder the immediate replacement of coal with alternative energy sources. Despite these concerns, overly enthusiastic assumptions seem to remain dominant in the public discourse.

Conclusion

The current public debate on the alleged peak of Chinese carbon emissions clearly illustrates how Western think tanks and analysts spread optimistic predictions about Chinese environmental progress that neither China nor the majority of experts confirmed or share. The underlying motivation appears to be to encourage and drive especially Western policymakers and stakeholders to increase their engagement and action on environmental policy. This dynamic persists despite a long history of inaccurate environmental forecasts, both globally and specifically for China. For instance, in 2020 climate scientists and *energy experts predicted* that global fossil fuel emissions, which had dropped dramatically due to the global pandemic, might never again reach the levels of 2019. However, this prediction proved wrong as emissions rebounded stronger than ever in 2022. The relevant climate scientists *later admitted* their predictions were 'overexcited' due to the significant emission drop during COVID. Thus, past cases have highlighted the unreliability of such predictions, which often assume a linear structural development and do not account for unforeseen events.

In times of geopolitical rivalry and global competition for environmental leadership, prematurely predicting a country's carbon emission peak can have serious consequences. It can lead to decisions based on one-sided, unverified or unrealistic claims through which China is often portrayed more favorably than the reality might warrant. This can contribute to misunderstandings between the EU and China and hinder the development of effective measures tailored to the actual environmental situation.

Given the shared goal of achieving the 1.5°C target of the Paris Agreement and the related climate negotiations, the EU should be cautious in its approach to forecasts and claims about China's environmental progress, especially concerning decarbonization and the emissions

peak. Whether China has reached or will soon reach its CO2 emissions peak cannot yet be determined with certainty and the long-term trajectory of China's carbon emissions largely depends on further developments in the renewables sector and energy management. The complex interplay between reducing incentives for coal, curbing coal expansion, increasing the integration of installed renewable capacity, and improving power grid management will remain central to the decarbonization challenge.

[1] His proposal is inspired by the recent agreement on the observation period for global warming. In the UN Intergovernmental Panel on Climate Change's Sixth Assessment Report, a twenty-year period is used, with the midpoint of those two decades designated as the year when 1.5°C is breached.

[2] As of 2023, China still heavily relies on coal, which makes up around 60% of its energy mix. China is also both the world's biggest producer and consumer of coal.

[3] Despite having the largest combined installed capacity of hydro, solar, and wind power globally, China's power grid faces challenges such as inefficiencies in integrating renewable energy, over-reliance on coal, regional fragmentation, and outdated infrastructure, which hinder its ability to fully transition to cleaner energy. Reforms are needed to modernize the grid, improve flexibility, better integrate renewables, and support the country's carbon reduction goals.

EuroHub4Sino
European Hub
for Contemporary China

Funded by
the European Union

The project "European Hub for Contemporary China (EuroHub4Sino)" has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement number 101131737.

Funded by the European Union. Views and opinions expressed are however those of the authors) only and do not necessarily reflect those of the European Union or European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.