

MONTHLY CHINA ENERGY UPDATE |

China Reaches 2030 Wind & Solar Targets 6 Years Early

New Coal Power Permits Slow Significantly

Xuyang Dong, [Climate Energy Finance](#)

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NEWLY INSTALLED CAPACITY

Figure 1. New Capacity Installed in China in Jan-July 2024

		Jan-July 2024	Share of new adds (%)	Change (yoy %)	Jul-24	Share of new adds (%)
Thermal Power	GW	24.4	13%	-24%	6.1	19%
Hydropower	GW	5.8	3%	5%	0.9	3%
Nuclear Power	GW	1.2	1%	0%	0.0	0%
Wind Power	GW	29.9	16%	14%	4.1	13%
Solar Power	GW	123.5	67%	27%	21.1	66%
Total capacity added	GW	184.8	100%	14%	32.1	100%
Renewable Energy adds	GW	159.3	86%	23%	26.0	81%
Zero Emissions Capacity Adds	GW	160.5	87%	23%	26.0	81%
Investment in Completed Power Grid Project	1 billion yuan	294.7		19%	40.7	

Source: NBS, CEF Estimates

China added a total of 184.8GW of net new capacity into the grid from January to July in CY2024, a 14% y-o-y increase. Of this, 87% is zero-emissions capacity, totalling 160.5GW, representing +23% y-o-y.

During the first 7 months, China also invested a massive RMB294.7bn (US\$41.3bn) in transmission projects, +19% y-o-y, key for connecting new zero-emissions generation to the grid.

July alone saw China add 32.1GW of new capacity, 81% of which was zero-emissions, totalling 26GW. In July, China invested RMB40.7bn (US\$5.7bn) in power grid projects.

Solar power new capacity additions continue to consistently represent the greatest share of new capacity additions. China added 123.5GW of solar capacity into the grid from January to

July, an overwhelming 67% of the total new capacity added and a 27% y-o-y increase. In July, China added 21.1GW of new solar, representing 66% of the month's capacity additions.

China added 29.9GW of wind capacity during the first 7 months, 16% of the total new capacity, +14% y-o-y. July saw China install 4.1GW of new wind, 13% of the month's newly installed capacity.

5.8GW of hydropower capacity was added in January to July, representing 3% of total new capacity, a 5% y-o-y growth.

With no additions in July, only 1.2GW of nuclear capacity was added to the grid from January to July, representing 1% of the total new adds, flat on 2023.

While new thermal power capacity is showing a 24% y-o-y decrease during the first 7 months of CY2024, there was still 24.4GW of new thermal capacity added, accounting for 13% of the total new capacity. This year on year decrease is a result of the slowdown of new thermal power capacity additions during the first 5 months (see our [previous](#) update). However, July alone saw China add 6.1GW of thermal capacity, up 19% y-o-y.

INSTALLED CAPACITY

Figure 2. National Installed Capacity as of July 2024

		Jul-24	Share of Capacity	Change (yoy %)	Jul-23
Thermal Power	GW	1,411	45%	3.5%	1,364
Hydro Power	GW	428	14%	2.4%	418
Nuclear Power	GW	58	2%	2.3%	57
Wind Power	GW	471	15%	19.8%	393
Solar Power	GW	736	24%	49.9%	491
Total of Installed Capacity	GW	3,103	100%	13.3%	2,740
Renewable Energy Capacity	GW	1,634	53%	25.5%	1,302
Zero Emissions Capacity	GW	1,693	55%	23.0%	1,376

Source: NBS, CEF Estimates

As of July 2024, China has a total installed power capacity of 3,103GW, a 13.3% y-o-y increase. 55% is zero-emissions capacity, totalling 1,693GW, +23% y-o-y.

Solar power takes up the majority of zero-emissions capacity, reaching 736GW as of July and representing 24% of China's total installed capacity, a massive 49.9% y-o-y increase.

This is followed by wind. At the end of July, China has 471GW of wind capacity, 15% of total installed capacity, a substantial 19.8% y-o-y increase.

The traditional pillar of China's zero-emissions power – hydropower – has a total installed capacity of 428GW as of July, 14% of total installed capacity, +2.4% y-o-y.

China has a total installed nuclear capacity of 58GW, or only 2% of China's total capacity, a 2.3% y-o-y increase.

45% of China's total installed capacity is thermal power, reaching 1,411GW, a 3.5% y-o-y increase.

ELECTRICITY GENERATION MIX

Figure 3. China's Electricity Generation Mix in Jan-July 2024¹

		Jan-July 2024	Share of Generation Jan-July	Change (y-o-y %)	Jul-24	Change (y-o-y %)
Thermal Power	TWh	3,486	63%	-2.1%	561	-7.2%
<i>Coal</i>	TWh	3,316	60%	1.0%	533	-4.3%
<i>Gas</i>	TWh	160	3%	1.0%	26	-4.3%
<i>Other Thermal</i>	TWh	10	0%	1.1%	2	-4.4%
Bioenergy	TWh	109	2%	1.0%	18	-4.3%
Hydropower	TWh	727	13%	25.1%	168	37.7%
Nuclear Power	TWh	252	5%	0.8%	40	4.3%
Wind Power	TWh	599	11%	9.3%	74	2.9%
Solar Power	TWh	452	8%	38.0%	74	32.4%
TOTAL POWER GENERATION	TWh	5,516	100%	4.8%	917	2.7%
Variable Renewable Generation	TWh	1,051	19%	20.1%	148	15.8%
Zero Emissions Power Generation	TWh	2,030	37%	19.0%	356	23.6%

Source: Ember, CEF Estimates

China generated total electricity of 5,516TWh from January to July in CY2024, a 4.8% y-o-y increase, is in line with CEF's [forecast](#) for China's GDP growth at 4.8% for CY2024. July, however, was modest for power generation, reaching only 917TWh, a relatively low 2.7% y-o-y increase.

37% of China's power generation during the first 7 months came from zero-emissions energy sources, reaching 2,030TWh, a 19% y-o-y increase. July saw China generate 356TWh of electricity from zero-emissions energy, a 23.6% y-o-y increase. However, nearly half of this zero-emissions generation is hydropower.

Only 19% of the total power generation in January-July comes from variable renewable energy (VRE), reaching 1,051TWh, a 20.1% y-o-y increase. This is due to a one-off significant [recovery](#) of hydropower during China's heavy summer rains after years of drought.

Hydropower generated 727TWh of electricity from January to July this year, 13% of total power generation, a 25.1% y-o-y increase. Hydropower's recovery was especially prominent in July, which saw a 37.7% y-o-y increase, bringing the monthly hydropower generation to 168TWh, an increase reflective of the severe drought impacting generation in 2023.

¹ CEF has moved from using generation data from China's National Bureau of Statistic (NBS) to adopting data from [Ember Electricity Data Explorer](#) from this monthly update onwards. This is due to the fact that China's NBS only reports generation from above a certain threshold for revenue, and therefore this data underestimates China's overall power generation, especially distributed zero-emissions energy resources (DER). Ember's data comes from the more comprehensive data for China's power generation provided by China Electricity Council (CEC), which includes DER generation numbers. CEF's adjusted numbers reflect this.

This is followed by wind power generation, reaching 599TWh during the first 7 months, 11% of the total power generation, a 9.3% y-o-y increase. July saw 74TWh of wind power generated, a relatively less windy month bringing only 2.9% y-o-y increase.

After years of massively accelerating deployments of solar power, China's solar power generation is showing significant growth this year. From January to July, total solar power generation increased 38% y-o-y, reaching 452TWh, accounting for 8% of China's total power generation. July saw China generate 74TWh of electricity from solar power, +32.4% y-o-y.

From January to July, China generated 5% of its total electricity from nuclear power, reaching 252TWh, a 0.8% y-o-y increase. July alone saw China generate 40TWh of electricity from nuclear power, up 4.3 % y-o-y.

Bioenergy generated a total of 109TWh of electricity during the first 7 months of CY2024, representing 2% of the total power generated, +1% y-o-y.

Still, a dominant 63% of China's total power generation came from thermal power in January to July, reaching 3,486TWh, a 2.1% y-o-y decrease.

Countervailing this, July is the third month in a row that China's single-month thermal generation decreased. 561TWh of electricity was generated from thermal in July, a 7.2% y-o-y decrease.

China reaches 2030 installed wind & solar target 6 years early

As of the end of July, China has a total installed solar and wind capacity of 1,207GW, achieving China's [14th Five Year Plan](#) 2030 target of 1,200GW of installed solar and wind capacity six years early.

Hitting this energy market decarbonisation target 6 years early showcases China's commitment to global leadership in embracing the energy, economic, investment and climate change mitigation opportunities of the global energy transformation.

Considering the significance and scale of everything China does, and its position as the world's biggest emitter, reaching or exceeding this target has material, gravitational real-world impact. It is CEF's view that this should incentivise other great powers to go faster in the global renewable energy technology and investment race-to-the-top, a geostrategic competition that is good news for the world.

However, simply reaching 1,200GW of installed wind and solar is far from enough. While China leads the world in progressing towards the COP28 pledge of tripling renewables by 2030, our data shows that it will need to continue to accelerate annual installations relative to 2023 rates to deliver on this target.

Likewise, CEF estimates that if China is to reach its double carbon targets – to peak emissions by 2030 and achieve carbon neutrality by 2060 – it will need to add ~330GW of solar, ~80GW of wind capacity and 4GW pa of nuclear to the grid annually until 2040, significantly above the current run rate.

It is also key for China to accelerate its focus on energy efficiency and steel sector decarbonisation – the two key areas where a lot more investment and urgency is needed.

Additionally, there are other challenges beyond accelerating wind and solar utilisation rates, including building out grid connectivity and energy storage capacity; continuing the grid modernisation via smart meters; and incorporating measures such as vehicle to grid charging (V2G), demand response management (DRM) and virtual power plants (VPP), so that that ever-higher shares of intermittent wind and solar power generation, including distributed solar, can be incorporated sufficient to progressively replace existing power generation from thermal power whilst also covering still strong new electricity demand growth over time.

As China's economy continues to grow, and the country's multi-decade-long electrification of almost everything strategy continues, the share of China's electricity demand in final energy demand has been rising, from [13.8% in 2000 to 22.9% in 2023](#). This means more power generation will be needed in upcoming decades, along with the improvements noted above in grid connectivity, energy storage system developments and deployments, and orchestration.

Less new coal to further accelerate decarbonisation

According to a new [report](#) by Qi Qin from the Center for Research on Energy and Clean Air (CREA), China reduced coal power permits by a massive 83% y-o-y during 1HCY2024, to only 9GW. This is extremely encouraging.

However, the Chinese government targets [adding 80GW](#) of coal power in CY2024, reflecting the significant number of previously permitted projects to be completed during 2HCY2024 and 2025.

CEF's view is that this represents a massive risk to the climate.

Our own data analysis in this report (Figure 1) shows that despite a 24% y-o-y decrease in overall thermal power capacity additions during the first 7 months of CY2024, with only 24.4GW added, July saw a surge in thermal capacity additions, with 6.1GW of added. This is a 19% y-o-y increase, and a faster rate than the average monthly installation rate from January to July this year. This trend aligns with Qin's concerns in the CREA report.

So, while China is rolling out renewable energy at a staggering world-record speed and scale, it is becoming increasingly urgent for China to increase its climate ambitions and update its emissions reduction targets. This requires it to cease building new coal-fired power plants and accelerate retirement of existing old coal-fired power plants. CEF agrees with CREA's policy recommendation that China establish ambitious and measurable coal consumption reduction targets and new renewable energy expansion targets in China's next Nationally Determined Contributions (NDCs) and 15th Five-Year Plan.

In the meantime, China this month [approved](#) 5 nuclear projects comprising 11 nuclear reactors and totalling 13GW of new capacity, at a [cost](#) of at least RMB220bn (US\$31bn) and with a construction timeframe of 5 years. CEF has updated our electricity model estimating that China will add 4GW of nuclear capacity p.a. from 2030-2040, increased from our [previous](#) 3GW nuclear new capacity additions p.a. forecast.

This will further assist China's zero-emissions energy rollout in 5-10 years time, and together with the continued acceleration of VRE, storage, and grid decarbonisation and orchestration measures outlined above, will support China's inevitable and urgently-needed transition away from overreliance on thermal power, as the critical shift in the energy landscape that we map increasingly relegates coal to a diminishing back-up role.

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Previous Monthly China Energy Updates [here](#).

Contributing editors: Tim Buckley and Annemarie Jonson, CEF