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## MONTHLY CHINA ENERGY UPDATE |

# China Stays on Track: Declining Hydro, but Stable Variable Renewables Growth

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Inadequate action on countering climate change means extreme weather events are getting more frequent, and more extreme, globally. High emissions firms and nations will have to more seriously address this costly externality, sooner rather than later.

July has given [witness](#) to severe heat waves sweeping across the Northern Hemisphere, causing unacceptable deaths in southern Europe. Extreme heat and fires are impacting widely from the United States to China. [Devastating floods](#) have killed 46 people in South Korea, and there are flash floods, landslides and flooding in northern India.

All the tragedies are a reminder that the clock is ticking - climate change is showing its true colours and causing irreversible damage, highlighting the need for immediate and efficient action now.

China had a tough summer. Hydropower has been severely limited by climate change-led drought, and electricity demands have skyrocketed due to the heatwaves. As a result, China's climate resilience is being [tested](#).

As Bloomberg's David Fickling [points out](#), China is set to "install 154 gigawatts (GW) of solar this year, nearly half the 344GW total worldwide; it will also account for more than half of the wind power connected between now and 2030. China's solar panel supply chain is already approaching the scale needed for the world to hit net zero." However, China has also been accelerating approvals for new coal-fired power plants at its [highest](#) speed since 2015, according to the Centre of Research on Energy and Clean Air.

Fickling argues that the issue goes deeper than China's clinging to coal, it reflects sustained strong economic growth, needing more energy of all forms. China's [rigid](#) structure of

relationships between consumers and producers within the power trading market is also a key issue: “As a result, consumers count upon firm contracts rather than the laws of supply and demand to ensure they have sufficient electricity. The excessive reliability requirements that result make high levels of fossil fuels indispensable as back-up.”

China is aware of the limitations of its grid structure. This month, the Central Commission for Comprehensively Deepening Reform discussed its energy transition strategy, centred on a ['dual-control'](#) initiative to reduce energy intensity and limit total energy consumption, and 'establish the new before abolishing the old'." This includes focusing on improving national oil and gas security capacities.

China is now looking to [upgrade](#) its technology, market mechanisms, and business model innovation in a market-oriented reform of the power sector, as well as aiming for a better combination of an "efficient market" and a "conditionally active government." China has learned lessons from the past few years when 'scaling up' was almost the sole focus, especially since volatility in electricity generation has been highlighted.

### Energy Trends as of June 2023

**Figure 1. New Capacity Installed in China in Jan-June 2023**

		Jan-June 2023	Share of new adds (%)	Change (yoy %)	Jun-23	Share of new adds (%)
Thermal Power	GW	26	18%	97%	4.0	13%
Hydropower	GW	5	4%	-43%	1.0	3%
Nuclear Power	GW	1	1%	-48%	0.0	0%
Wind Power	GW	23	16%	78%	6.6	22%
Solar Power	GW	78	56%	154%	17.2	57%
Other (Biomass, W2E)	GW	7	5%		1.6	5%
<b>Total capacity added</b>	<b>GW</b>	<b>141</b>	<b>100%</b>	<b>104%</b>	<b>30.4</b>	<b>100%</b>
Variable Renewable adds	GW	108	77%	112%	25.4	83%
Zero Emissions Capacity Adds	GW	115	82%	106%	26.4	87%

Source: NBS, CEF Estimates

Ongoing strong economic growth is fueling the need for ever more electricity, and so for now, China is expanding both new zero emissions and coal capacity concurrently.

China added 26GW of thermal power from January to June in 2023, a 97% y-o-y increase.

However, as shown in Figure 1, in 1HCY2023 China also added 115GW of zero emissions capacity, 82% of all newly added capacity in the grid, an 106% y-o-y increase.

June alone saw China add 26.4GW of zero emissions capacity to the grid, accounting for 87% of the share of newly added capacity in the sixth month. Newly added solar power leads the way. A total of 78GW of solar power was added during 1HCY2023, an 154% increase compared to 1HCY2022. 17.2GW of solar was added to the grid representing 57% of the newly installed capacity.

Wind power growth remains strong, with 23GW added during 1HCY2023, a 78% increase y-o-y. 6.6GW of wind power was installed in June, a 22% y-o-y growth.

China is approaching the physical limits to the scope for more hydropower, with only 5GW of hydropower added to the grid during the first 6 months of CY2023 (-43% y-o-y).

**Figure 2. National Installed Capacity as of June 2023**

		Jun-23	Share of Capacity	Change (yoy %)	Jun-22
Thermal Power	GW	1,357	50.1%	4.0%	1,305
Hydro Power	GW	418	15.4%	4.5%	400
Nuclear Power	GW	57	2.1%	2.2%	56
Wind Power	GW	389	14.4%	13.7%	342
Solar Power	GW	471	17.4%	39.8%	337
<b>Total of Installed Capacity</b>	<b>GW</b>	<b>2,708</b>		<b>10.9%</b>	<b>2,441</b>
Variable Renewables Capacity	GW	860	31.8%	26.6%	679
Zero Emissions Capacity	GW	1,351	49.9%	18.9%	1,136

Source: NBS, CEF Estimates

### Installed capacity

Figure 2 showed that half of China's total installed capacity is from thermal as of June 2023, which represents a 4% y-o-y increase.

In the meantime, the momentum toward renewable energy capacity remains strong. In aggregate, 49.9% of China's national installed capacity is from zero emissions sources, up 18.9% y-o-y.

Solar is now the leading zero emissions source of energy capacity as of June 2023; installed solar capacity reached 471GW, a 39.8% y-o-y increase.

With the evident limitations increasingly evident in terms of drought and heatwaves, hydropower follows solar power with the second largest share of capacity, 15.4% at 418GW. Wind power follows in third place at 389GW, a 13.7% y-o-y increase.

## Electricity generation mix

**Figure 3. China's Electricity Generation Mix in Jan-June 2023**

		Jan-June 2023	Share of Generation	Change (y-o-y %)	Jun-23	Change (y- o-y %)
Hydropower	TWh	450	11%	-22.7%	98	-33.7%
Thermal Power	TWh	2,946	71%	8.0%	523	14.8%
Nuclear Power	TWh	212	5%	6.5%	37	13.8%
Wind Power	TWh	425	10%	23.8%	56	6.3%
Solar Power	TWh	135	3%	22.2%	26	26.1%
<b>Total Power Generation</b>	<b>TWh</b>	<b>4,168</b>	<b>100%</b>	<b>5.2%</b>	<b>740</b>	<b>4.4%</b>
Variable Renewable Generation	TWh	560	13%	23.4%	454	11.9%
Zero Emissions Power Generation	TWh	1,222	29%	-1.1%	642	-14.5%

Source: NBS, CEF Estimates

China generated 4,168 TWh of electricity in 1HCY2023 (Figure 3), a 5.2% y-o-y increase.

Notably, thermal power generation represents 71% of total electricity, +8.0% y-o-y, a growth rate well above the total electricity demand growth of 5.2% due to the decline in hydro.

Whilst 29% of power was generated from zero emissions power, a total of 1,222 TWh, this was -1.1% y-o-y. This is largely due to declining hydroelectric power generation. Only 450 TWh of hydropower was generated during 1HCY2023, a 22.7% y-o-y decrease. During the month of June, the impact was even more extreme, with a 33.7% y-o-y decrease in hydropower, reaching only 98 TWh.

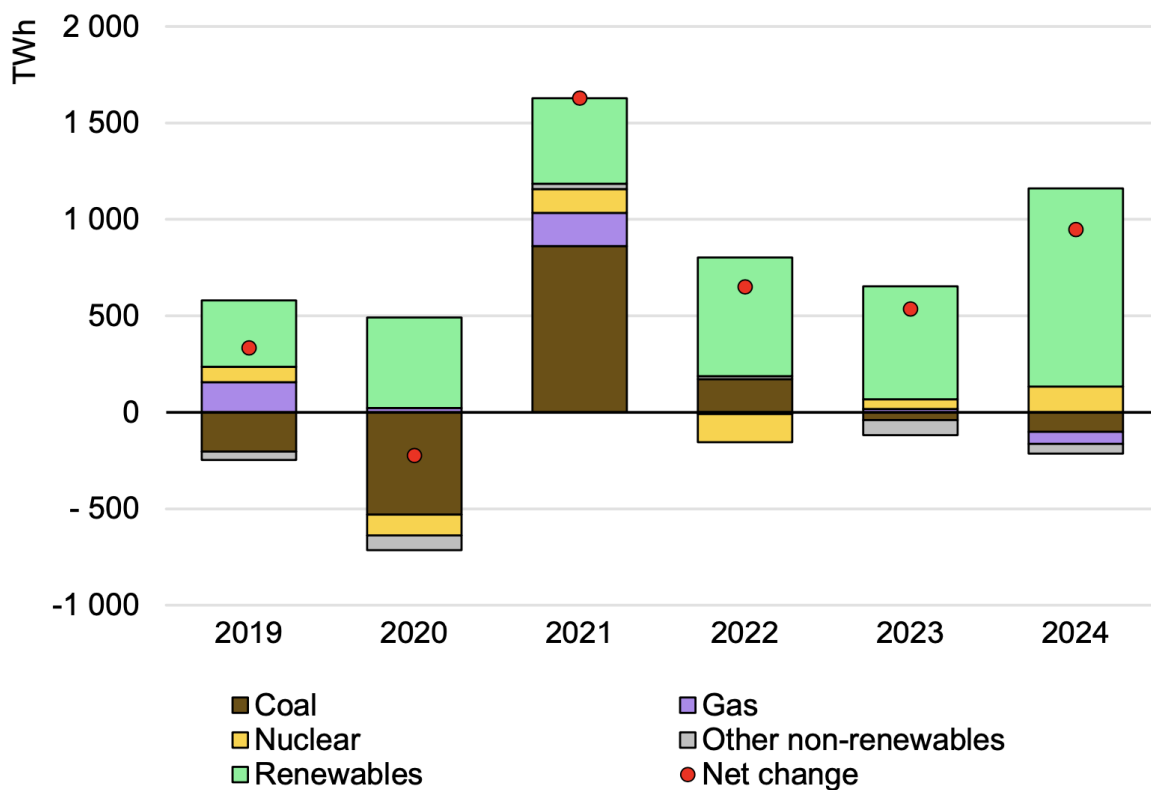
However, hydropower continues to lead zero emissions power generation, followed by wind power generation, reaching 425 TWh and accounting for 10% of power generation during 1HCY2023, a 23.8% y-o-y increase.

Nuclear power generation demonstrated a 6.5% y-o-y increase, reaching 212 TWh, representing 5% of the nation's total power generation.

While solar reached 135 TWh, a 22.2% y-o-y increase, it still only accounts for just 3% of total power generation. The rate of growth in solar deployments is world leading and staggering, but it will be a while yet before solar is sufficient to materially erode China's predominantly coal based grid system.

## The Global Momentum Away from Coal

Figure 4. Year-on-year Global Change in Electricity Generation by Source, 2019-2024



Source: International Energy Agency, *Electricity Market Update*, July 2023

Fickling [suggests](#) that the world could have peaked its coal use in 2018, however it was hindered by China's additional 862 million tonnes of annual production of coal.

As shown in Figure 4, the International Energy Agency (IEA) reports that coal in 2021 showed an aberrant rebound, reversing the drop in 2020. Nevertheless, what is clear is that new electricity generated by renewables is growing and gaining momentum every year.

If the decade-long growth in annual installed renewables continues – as we at CEF and the IEA forecast for both 2023 and 2024 – we could well have already witnessed the peak of thermal power electricity generation back in 2022.

However, this will be impossible to achieve without China continuing to accelerate their cleantech investment trends, including rapid scaling up of global manufacturing supply chains driving dramatic ongoing solar price deflation over 2023 and beyond. Polysilicon prices are -78% year-to-date in 2023, driving solar module prices -20%, so far in 2023.

China prioritises strong economic growth over anything else. This has been the core ideology of China's central government since the establishment of the PRC in 1949. We have witnessed that this is the principal driver of China's energy policy so far, given that increased

energy supply underpins economic growth. China will commit happily to decarbonisation as long as the energy transition benefits its economy. However, when economic resilience is challenged, China has shown it will invest concurrently in coal even as it is massively scaling up its renewable capacity. And the drought in the first half of CY2023 has tested China's energy policy and transition strategy.

While the speed and scale of China's RE buildout is astonishing, it needs to move even faster to reach sufficient scale to fully cover its growing energy demands. As the recent [Blue Book](#) on the Development of New Power System, issued by China's National Energy Administration (NEA) suggests, a stable and well structured integrated system of power generation, grids, demand, and storage (“源网荷储一体化”) needs to follow, and it needs to follow up quickly.

China leads the world in terms of cleantech investing, but the growing global climate crisis shows we all need to accelerate action. China peaking emissions by 2030 is too late. But so too is the West's preoccupation with Net Zero by 2050, which the science shows needs to be achieved by 2040, or earlier. Climate change cannot be effectively tackled by one country. There needs to be a concerted effort by developed world economies. This will also help address developed western economies' concerns around China's dominance in the global renewables supply chains.

Finally, while neglecting attention to China's excessive reliance on coal is ill-advised, so is ignoring China's massive global leadership on renewable energy as a means to drive similar ambition from all developed countries to meet their responsibility to boost their own energy transition – and to concurrently better assist the developing world, which has done the least to cause the climate crisis, to decarbonise.

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