



CLIMATE ENERGY FINANCE

## **\_MONTHLY CHINA ENERGY UPDATE |**

# **As climate change-driven heatwaves and drought impact China’s “dual carbon targets”, longer-term energy transition intact**

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China’s ambition and determination on energy transition is irrefutable. After being an active actor in international environmental dialogue for over a decade, Xi Jinping announced China’s “[dual carbon targets](#)” in September 2020 at the United Nations General Assembly, aiming to achieve peak carbon emissions before 2030, and carbon neutrality before 2060.

2022 saw a drastic increase in renewable energy in China according to the newly [released](#) Blue Book on the Development of New Power System (‘Blue Book’) by China’s National Energy Administration (NEA). By the [end](#) of CY2022, China’s installed power capacity reached 2.56TW, with 48% of total capacity or 1.27TW powered by non-fossil energy.

The Blue Book once again [aims](#) to enhance China’s energy transition. Its main purpose is to meet power demands in China to support “high-quality economic and social development”, and the task is to build the “new energy supply and consumption system”, as well as ensuring “the multi-direction coordination and flexible interaction of the source network”, while emphasising the importance of technological and institutional innovation.

The first 5 months of CY2023 shows that despite thermal power rises amid drought-driven declines in hydropower and [increasing heatwave-driven electricity demands](#), coupled with economic headwinds meaning supply has been prioritised over transition, China’s overall determination on energy transition and rapid deployment of renewable energy remains largely intact, as is evidenced by its massive global leadership in solar, onshore and offshore wind, as well as batteries and electric vehicles. CEF sees an opportunity for China to peak its reliance on yet more coal as it continues to dramatically scale up its renewables and electricity sector decarbonisation ambition.

## Energy Trends as of May 2023

### New capacity installs

Figure 1: New Capacity Installed in China in Jan-May 2023

		Jan-May 2023	Share of new adds (%)	Change (yoy %)	May-23	Share of new adds (%)
Thermal Power	GW	22.0	20%	125%	9.4	36%
Hydropower	GW	4.3	4%	-39%	0.8	3%
Nuclear Power	GW	1.2	1%	3%	0.0	0%
Wind Power	GW	16.4	15%	51%	2.2	8%
Solar Power	GW	61.2	55%	158%	12.9	49%
Other (Biomass, W2E)	GW	5.4	5%		0.9	3%
<b>Total capacity added</b>	<b>GW</b>	<b>110.5</b>	<b>100%</b>	<b>109%</b>	<b>26.1</b>	<b>100%</b>
Renewable Energy adds	GW	87.3	79%	108%	16.8	64%
Zero Emissions Capacity Adds	GW	88.5	80%	105%	16.8	64%

Source: NBS, CEF Estimates

According to China's National Energy Administration ([NEA](#)), the first 5 months of CY2023 has seen a huge [solar boom](#) in newly added capacity in China, reaching 61.2GW, a 158% y-o-y increase as shown in figure 1. Solar power was 55% of newly installed capacity from January to May 2023.

Total newly added zero emissions capacity reached 88.5GW, representing 80% of newly installed capacity overall. Wind power accounted for 15% of the share of newly installed renewable capacity, reaching 16.4GW, a 51% y-o-y increase.

China is reaching its geographic limits to building yet more hydro-electricity capacity. Only 4.3GW of hydropower was newly connected to the grid during the first 5 months of 2023, a 39% y-o-y decrease.

Despite China being equipped with the most advanced hydropower technology with more than four times as much installed capacity as the US (the world's #2), hydropower generation in 2023 is clearly showing the impact of [drought](#) and heatwaves. Rainfall during the first 4 months in 2023 in Yunnan, a major hydropower generating region in the south, dropped 60%, with severe drought sparking concerns on China's economic recovery, as electricity supply struggles to meet demands. Similar climate change impacts are likewise again hitting India in 2023.

### Thermal power installs

Notably, we have witnessed a sharp increase in newly added thermal power during the first 5 months of CY2023. China added a total of 22GW thermal power to the grid, up 125% from last year.

In May particularly, thermal power was 36% of the newly added power share, reaching 9.4 GW.

## Total installed capacity

**Figure 2: National Installed Capacity as of May 2023**

		May-23	Share of Capacity	Change (yoy %)	May-22
Thermal Power	GW	1,351	51%	3.8%	1,301
Hydro Power	GW	417	16%	5.2%	396
Nuclear Power	GW	57	2%	4.3%	54
Wind Power	GW	383	14%	12.7%	339
Solar Power	GW	454	17%	38.4%	328
<b>Total of Installed Capacity</b>	<b>GW</b>	<b>2,672</b>	<b>100%</b>	<b>10.4%</b>	<b>2,421</b>
Renewable Energy Capacity	GW	1,254	47%	17.8%	1,064
Zero Emissions Capacity	GW	1,321	49%	18.0%	1,120

Source: NBS, CEF Estimates

As of the end of May 2023, China's total installed capacity reached 2,672 GW, a 10.4% y-o-y increase, as in figure 2. While zero emissions capacity accounted for 49% of total installed capacity share, reaching 1,321GW, thermal power still takes up 51% of the total share, and with its higher utilisation rates, a 71% share of generation.

Solar power leads renewable energy capacity reaching 454GW, a 17% share of the total capacity, and a staggering, world leading 38.4% y-o-y increase. This is followed by hydropower, with again a world leading total of 417GW installed capacity representing 16% of the share. Wind power represents a 14% share of installed capacity, again a world-leading 383 GW, a 12.7% increase compared to last year. Installed nuclear power capacity has also increased by 4.3%, taking up a 2% share of capacity reaching 57GW, behind the US and closing in on world #2 France at 61GW.

## Electricity generation mix

**Figure 3: China's Electricity Generation Mix in Jan-May 2023**

		Jan-May 2023	Share of Generation	Change (y-o-y %)	May-23	Change (y-o-y %)
Hydropower	TWh	352	10%	-18.9%	82	-32.6%
Thermal Power	TWh	2,421	71%	6.6%	471	16.5%
Nuclear Power	TWh	175	5%	5.1%	37	6.3%
Wind Power	TWh	366	11%	27.4%	74	25.1%
Solar Power	TWh	108	3%	21.4%	24	16.4%
<b>Total Power Generation</b>	<b>TWh</b>	<b>3,422</b>	<b>100%</b>	<b>5.3%</b>	<b>689</b>	<b>7.4%</b>
Renewable Power Generation	TWh	826	24%	1.9%	570	-10.6%
Zero Emissions Power Generation	TWh	1,001	29%	2.4%	607	-8.1%

Source: NBS, CEF Estimates

China generated 3,422TWh of electricity during the first 5 months of CY2023, a 5.3% increase compared to last year, as figure 3 displays. 29% was generated from zero emission resources,

reaching 1,001TWh. Everything is big about China, but when the economy continues to grow 5-6% GDP pa, the scale of the challenge to dilute the nation's dependence on coal via new renewable energy is apparent.

Wind power leads renewable energy generation, reaching 366TWh, which represents 11% of the share of total generation, a 27.4% y-o-y increase.

Hydropower, ranked second among renewable energy resources, generated 352TWh from January to May in CY2023, takes up 10% of the share of generation. However, hydropower displayed a significant decline in May to 82TWh, -32.6% y-o-y. Total hydropower generation for the first 5 months of CY2023 also exhibited a 18.9% y-o-y decline reaching 352TWh.

Thermal power generation was exceptionally strong in May this year, reaching 471TWh, a 16.5% y-o-y increase. It took the total electricity generated from thermal power from January to May to 2,421TWh, 71% share of the total generation, a 6.6% y-o-y increase.

### **Energy security and transition amid economic & climate headwinds**

Sustained economic growth cannot be achieved without energy security, and like most countries, China has shown a political priority for economic growth and development over environmental considerations. When GDP weakens, China's first reaction is to ensure its economic growth gets back on track. Economic recovery means [increasing energy demand](#), and meeting domestic energy demand comes first, which has from time to time subordinated the 'double carbon goals'.

China accelerated [permitting](#) of new coal-fired power plants in 2022 and again in 2023, motivated by ensuring energy security, and turning to thermal power when electricity supply is struggling to meet demand growth.

As this update outlines, recent trends show thermal power still remains a primary option for China even as renewable capacity rapidly ramps up to cover its power needs, and to prevent shortages. This reliance on coal has been exacerbated by the severe global warming-driven [drought](#) across the south of the country, triggering an immense hydropower decline to the [lowest](#) levels for the time of year since 2015.

CEF sees the opportunity for a nearer-term peak to China's reliance on coal as it massively scales up clean energy, particularly solar and wind power, especially its significant solar manufacturing expansion, but this highlights the concurrent need to prioritise ongoing energy efficiency gains and a structural shift in the economy away from construction and heavy industry towards lower energy-intensive consumer and service sectors.

As we detailed in our recent report, [Solar Pivot](#), CY2022 and to-date 2023 saw China expand its solar capacity dramatically. The 2023 to-date run-rate is on track to see China install 120-140 GW of solar in 2023, growth of 37-60% y-o-y, after 60% y-o-y growth in 2022. At the same time, solar manufacturing capacity is expanding at a breath-taking pace. In June 2023 alone, we saw China's Canadian Solar announce a [5GW](#) Texas module factory, and a [12GW](#) Q-Sun module plant in China. This solar manufacturing expansion has driven the price for polysilicon [down](#) by a staggering 76.7% since the end of 2022, as shown in figure 4. This should see solar module prices globally drop

significantly over 2HCY2023, and underpins our double digit annual deflation forecast for this solar module prices over the coming decade.

Figure 4



To maximise this opportunity and realise its “double carbon targets”, China also needs to escalate its efforts to ensure the security and connectivity of its national electricity grids, as well as increasing its battery storage capacity to both firm the grid and enable distribution of energy generated by wind and solar power.

In the Blue Book, China once again [highlights](#) the “源网荷储一体化” model, which means an integrated system of power generation, grids, demand, and storage. Du Zhongming, president of the China Electric Power Planning and Engineering Institute, [highlighted](#) the higher requirements for transmission technology with the development of large-scale new energy bases, also emphasising the importance of both new energy and pumped hydro storage in building a decarbonised power system.

A coordinated effort that links generation with storage and transmission to transform China’s energy sector is especially imperative as the impacts of climate change are becoming more and more evident each day, in heat waves and severe droughts. The climate crisis dictates that China should transition to clean energy more quickly than ever, and accelerate its strategic diversification of its energy mix away from coal to clean energy as it builds out firming and transmission infrastructure.

### EV sales booming continues as China’s EV policy support grows

In addition to the increase in deploying renewable energy power, China’s EV sales continue to boom.

Figure 5: May and 5MYTD 2023 China EV sales

China Automobile Sales	May-23	YoY	Market Share	YTD 2023	YoY	Market Share
<b>Domestic</b>						
Passenger Vehicles	2,051,000	26%		9,001,000	11%	
NEVs	689,000	62%	34%	2,810,000	47%	31%
<i>of which BEV</i>	496,000	52%	24%	2,019,000	35%	22%
<i>of which PHEV</i>	194,000	94%	9%	790,000	91%	9%
<b>Export</b>						
Passenger Vehicles	325,000	66%		1,467,000	97%	
<i>of which EV</i>	106,000	153%	33%	441,000	162%	30%

*Source: China Association of Automobile Manufacturers, Climate Energy Finance calculations*

According to [data](#) released by China Association of Automobile Manufacturers, as Figure 5 shows, the 5th month of CY2023 saw a total of 689,000 EV sales, a 62% y-o-y increase, bringing 2.8million EV sales YTD in 2023, a 108% y-o-y increase.

Solid policy support has contributed significantly to the increase in EV sales. China has implemented EV tax breaks for over a decade now, and most recently, the Ministry of Finance [announced](#) that tax exemptions for New Energy Vehicles (NEVs) due to end this year will be extended through 2027.

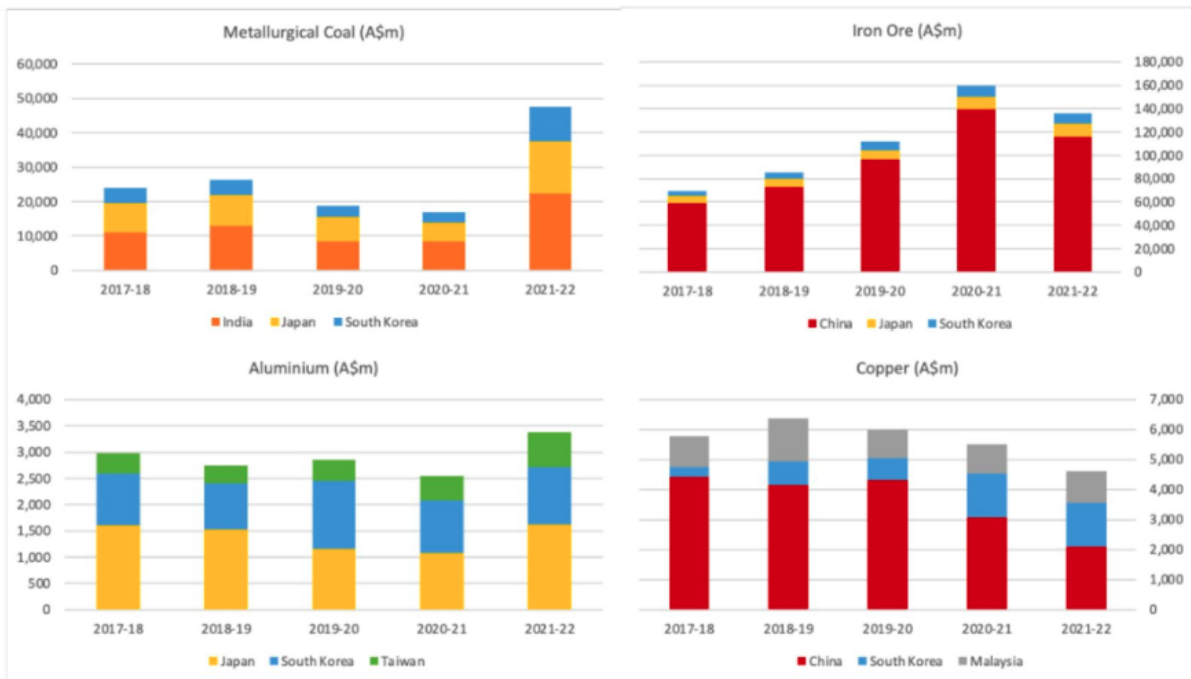
Consumers of NEVs in China in 2024 and 2025 will be exempt from purchase tax up to Rmb30,000 (US\$4,175) per vehicle. This new Rmb520bn (USD\$72.8bn) package will become the largest tax break to date globally for the automotive industry, surpassing the federal EV tax credits [investment](#) in the US.

We certainly have a global policy, technology and investment race opening up at full speed in 2023, which is great, but long overdue, as evidenced by the climate science pressures building.

### **Opportunities for Australia in China as energy transition momentum accelerates**

China’s overall ambition and determination on energy transition also present an opportunity for Australia. As James Laurenceson from Australia-China Relations Institute (ACRI) has [written](#), “They want our Lithium, we want their cars”.

**Figure 6: Top Export Destinations for Key Australian Industries (\$m)**



Source: Office of the Chief Economist, CEF calculations

As shown in figure 6, China is Australia’s top buyer for iron ore, far surpassing our other trade partners. China is also the number one buyer for Australian copper, and number two for Australian LNG.

While China is ramping up its battery production at unprecedented speed, its lithium demands have also climbed rapidly. China is dependent on [foreign lithium](#) imports for 86.5% of its total demand, while nearly 90% of China’s lithium imports were from Australia in 2021.

In the meantime, as Laurenceson [suggested](#), Australian automobile consumers are shifting their preference to EVs. Japan was Australia’s primary EV supplier country, accounting for more than 40% of Australian demand, with China less than 3% of the market share. However, “the two countries’ shares are changing rapidly”. China is [now](#) supplying 17% of Australia’s EV market while Japan’s share has fallen to 31%. Furthermore, the [top](#) 6 EV brands in the Australian market are all “made in China” in 2023.

As the world’s top supplier of lithium, Australia has the natural resources that China needs for its EV supply chain, and the capacity to capture more of the value chain by processing and value-adding these onshore, while China has the manufacturing capacity and technology to boost energy transition with scale and speed, including in electrification of mobility.

With a new [Critical Minerals Strategy 2023-2030](#) launched by the Australian federal government this month, CEF believes that Australia should do far more to seize this opportunity. The Strategy’s commitment of \$500m to the Northern Australia Infrastructure Facility for critical minerals processing is inadequate to seize the scale of the opportunity on offer, and to respond appropriately to investments by our key trade partners and competitors.

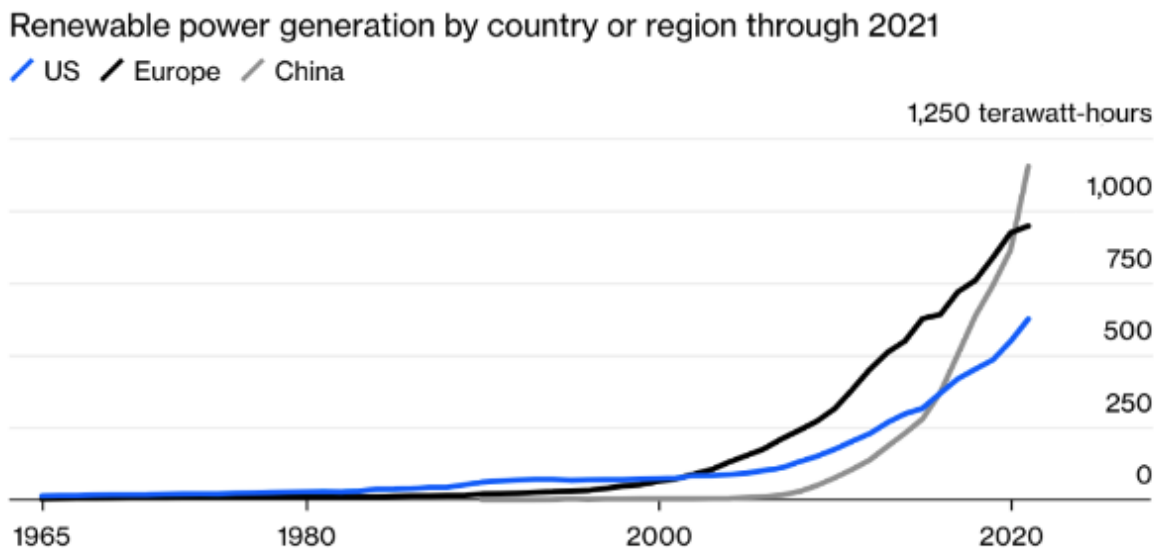
CEF [argues](#) that Australia should urgently mobilise significant energy transition capital into the critical minerals opportunity, for example creating a new \$20bn public interest critical minerals processing equities fund, administered by the Future Fund; and reforming superannuation benchmarks to trigger massive private capital inflow into zero carbon investments including critical minerals, leveraging Australia’s world leading \$3.5tn of pension capital.

Overall, CEF estimates Australia should commit \$100bn in public capital to crowd in the \$200-300bn of private capital needed to position Australia as a global value-added critical minerals supply chain and cleantech leader.

### Greater finance for emerging economies’ decarbonisation is needed

As Carl Pope, former chairman of the Sierra Club has [indicated](#), “per capita, the average inhabitant of China is responsible for only half as much in greenhouse emissions as a US resident. The average Indian uses only one-seventh as much CO<sub>2</sub>, methane and other harmful gases.”

**Figure 7: China’s Renewable Energy Generation has now Overtaken both the US and Europe**



Source: BP Statistical Review of World Energy 2022

Nevertheless, as shown in figure 7, China has been leading the world’s renewable power generation since 2020. China [provides](#) a third of the world’s solar power – 330TWh – which is more than twice as much as the US. And India has also lifted its ambition on renewable expansion. As CEF recently [reported](#), the Government of India (GOI) has announced a goal to treble annual renewable energy to 50GW pa, and to add 250GW of renewable energy by 2027/28.

The International Energy Agency’s latest [report](#), written jointly with the International Finance Corporation – Scaling Up Private Finance for Clean Energy in Emerging and Developing Economies (EMDEs) – calls for more investment in clean energy in emerging and developing economies. While the countries with enough capital and capacity are transitioning fast, developing economies are now [left behind](#). IEA and IFC suggest we need more than triple total investment in clean energy from USD\$770bn in 2022 to as much as USD\$2.8tn by early 2030s to align with the climate goals in the



Paris Agreement. The report calls for greater international technical, regulatory and financial support to boost clean energy in EMDEs.

As rich OECD countries and China, with their considerable economic heft and massive financial capital, pivot their economies towards greener foundations, we should once again be reminded that emerging countries are struggling with a lack of support and capital. Collective action is the precondition for countering the global collective threat of climate change. And the green transition is contingent on [financing for developing countries](#).

China has played an active role in financing EMDEs' development through its Belt and Road Initiative (BRI). Chinese investment [has flowed to 147 nations](#) and amounted to US\$950bn from 2013 to 2022. Investment rose 65% to US\$32.5bn from 2021 to 2022. There is massive [opportunity](#) for China to reinvigorate and green the BRI, aid developing nations in countering rampant fossil fuel import inflation by investing in zero emissions domestic energy alternatives, and leverage its world-leading supply chains, manufacturing capacity and technologies to drive deflationary renewable energy uptake.

Xi's vision of '[community of shared future for mankind](#)' could be beneficial in saving our environment and planet. It seeks to build a future [recognising](#) that "all peoples and all countries in the world are closely linked and that we must stand together through good and bad and work to build a large harmonious global family to realise humankind's aspiration for a better life."

Given its phenomenal zero emissions technology leadership and export potential, China is well placed to back in that lofty aspiration with real action and ambition. And the best way to address concerns about China's dominance in the global renewable supply chain would be for all rich countries to complain less and do more. A developed world race-to-the-top to help developing nations would really put the planet on the trajectory the climate science shows is needed.

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