From solar panels to super dams: China's clean energy takeover

As Trump turns his back on climate action, China is quietly dominating the global clean tech supply chain. And Australia stands to benefit.

China is planning to build a mega dam in a remote county in Tibet, that could generate three times as much electricity as the Three Gorges Dam.

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The robotic arms at SC Solar's cutting-edge plant in Suzhou whir with precision, sliding gleaming photovoltaic panels along a spotless assembly line. It's a marvel of Chinese engineering and ambition, built to operate around the clock and supply the world's clean energy revolution. But for now, it hums just eight hours a day, six days a week.

4000 km away, on the eastern edge of the Tibetan Plateau, construction began this week on what will become the world's largest hydroelectric dam. Situated on the lower reaches of the Yarlung Tsangpo, which flows from Tibet into India and Bangladesh, the $US170 billion project will dwarf the Three Gorges Dam and generate enough electricity to power all of Britain for a year.

The dual scenes – a below-capacity solar giant and a colossal new dam – capture the immense scale and complex challenges of China's energy transition. While the urgency of climate change has waned in Washington under a second Trump administration and the decision to pull out of the Paris Agreement, Beijing is doubling down on infrastructure-heavy, politically co-ordinated clean energy investments.

And it's working. For the first time ever, this year China's emissions have dipped – 1% from their peak – thanks to renewables. Its clean tech output now fuels the global south as well as domestic demand.

But the transition has been problematic. SC Solar's factory, designed for constant output, currently runs just one shift a day, not due to weak demand, but because of a domestic supply glut and cutthroat price competition that has forced even the most efficient producers to scale back.

"China is going through the energy transition step by step," Michael Zu, chairman of SC Solar, tells *AFR Weekend* on the factory floor. "This new energy phase is already powered by renewable energy, and we are just waiting for the world to catch up."

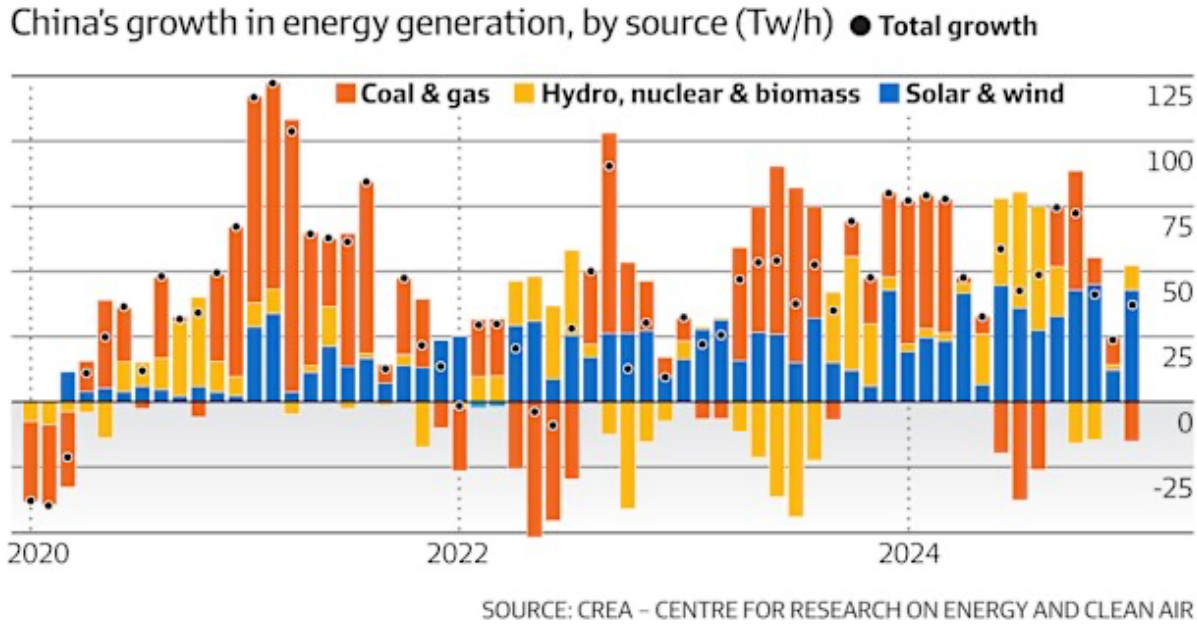
China is now powering much of the world's green transformation. According to the International Energy Agency, nearly 60% of all renewable capacity installed around the world from now until 2030 will come from China. If that pace holds, the country will command almost half of the world's total renewable-power capacity by the end of the decade.

In 2024 alone, Chinese investment in clean energy nearly matched the entire global spend on fossil fuels. The surge is being driven by the so-called "new three" industries – electric vehicles, batteries and solar – which expanded at twice the rate of the broader Chinese economy last year and contributed roughly a quarter of its GDP growth.

Between January and May 2025, China added 198 GW of solar and 46 GW of wind capacity, according to the Asia Society Policy Institute. That's about 100 solar panels every second and the equivalent of 5300 turbines.

China's sprint towards clean energy isn't a climate crusade, it's a sovereignty strategy. At the heart of Beijing's transition is an ironclad policy of self-sufficiency. The Chinese Communist Party has long treated energy security as inseparable from national security, and under Xi Jinping, that doctrine has become even more pronounced.

The country still builds coal-fired power plants – dozens of them – but runs them at record-low capacity. Utilisation rates fell to just 46% in the first half of this year, even as generation from coal dropped 2% year-over-year.



SOURCE: CREA – CENTRE FOR RESEARCH ON ENERGY AND CLEAN AIR

As China weans itself off foreign oil and gas, coal serves as a domestic backup while the real shift is underway: record-breaking deployments of solar, wind and batteries. Visitors to China's tier one cities, from Chongqing to Chengdu to Hangzhou, report back on the millions of green number plates bolted to electric cars, and the neon cityscapes bursting with lights and display screens. Artificial intelligence, which requires enormous computing power to run its underlying models, is already being rolled out as a matter of priority across industries from mining to construction and video games.

The massive build-out is reshaping global markets. The International Energy Agency recently revised forward its estimate for China's peak oil demand, reflecting a faster-than-expected transition away from fossil fuels. Imports of LNG are also falling. It's a signal that the world's largest energy consumer is preparing to dominate the future of energy on its own terms.

That strategy is now being turbocharged by geopolitics. Donald Trump's re-election as US president and renewed tariff blitz have injected fresh urgency into global supply chain realignment. With Washington's credibility as a long-term trade partner in question, many countries – particularly in South-East Asia and Latin America – are turning to Beijing as a more stable source of technology and capital.

Beijing is obliging. Since 2023, Chinese companies have invested more than $175bn in outbound clean tech foreign direct investment, according to data compiled by Climate Energy Finance. Battery giant CATL is leading the charge with a $6bn fully integrated supply chain campus in Indonesia. It spans mining, refining, manufacturing and recycling. That follows a $1 billion facility already up and running. The company has also partnered with Stellantis to build a €4bn battery plant in Spain. Other ventures stretch across Brazil, Vietnam, Laos, Hungary, Germany and Malaysia.

This week, China officially broke ground on the Yarlung Tsangpo hydroelectric project, an ambitious mega dam that will generate 300 million MWh of electricity annually. It will cost about 1.2 trillion yuan and harness the power of the geopolitically sensitive river.

For India and other downstream nations, the dam raises thorny concerns over water sovereignty and environmental disruption in the fragile Himalayan ecosystem.

China's strategy is simple: localise production, secure raw materials, and bypass political risk. In Brazil, BYD is already rolling EV off its new production line despite a high-profile scandal over labour practices. In each case, the outcome is the same: Chinese tech, Chinese capital, and Chinese control, just delivered closer to the customer.

Alex Wang, a professor of law at the University of California, and co-director of the Emmett Institute on Climate Change and the Environment says, for China, this is not about altruism, it's about business. "[China thinks] 'we are making a lot of stuff that we want to sell; we need places to sell it'," Wang said. "And it so happens that lots of countries have these decarbonisation targets, so how perfect is that?"

But, just like the EV industry, SC Solar finds itself caught in the middle of an escalating price war that has shaken China's solar manufacturing sector. Overcapacity has driven solar panel prices to a 13-year low – just 8.7 cents per watt as of July – sparking global accusations that China is dumping ultra-cheap panels onto world markets.

A growing number of countries have rolled out anti-dumping measures. The US has led the charge, recently imposing duties of up to 3500 per cent on solar components routed through South-East Asia, on top of decade-old tariffs on Chinese-made panels. The European Union maintains long-standing trade defences and continues to scrutinise transshipment schemes. India, meanwhile, has slapped anti-dumping duties on Chinese solar glass, while others like Brazil and Mexico have taken similar actions in adjacent sectors.

With Chinese companies controlling more than 80% of global capacity across the solar supply chain, the fallout has been severe: seven of the country's largest solar firms collectively posted a net loss last year for the first time on record.

> ***"The Chinese companies are ready to go. But they're waiting on clarity around incentives, and a signal they're welcome."***
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> — Tim Buckley, director at Climate Energy Finance

For SC Solar, which can produce a module every 12 seconds at its Suzhou plant, the problem isn't efficiency, it's demand. The company is operating well below capacity. Beijing, aware that "there are no winners in a price war", is now stepping in to manage the glut, pledging to curb low-end production and guide underperforming players out of the market.

But where does Australia fit in this great energy transition?

SC Solar is one of several Chinese firms actively considering Australian operations. The company says it can offset high labour costs by automating most of its production.

The challenge is political and logistical, not technical. Canberra's long-awaited $1 billion Solar SunShot initiative – meant to jump-start domestic solar panel production – was announced more than a year ago. But as of July 2025, no winners have been announced. The three public contenders include JA Solar with UNSW, Trina Solar with SunDrive, and Dr Zhengrong Shi's Sunman Technologies, planning a flexible panel plant in Newcastle.

"The Chinese companies are ready to go," says Tim Buckley, director at Climate Energy Finance. "But they're waiting on clarity around incentives, and a signal they're welcome."

Treasury has confirmed that private Chinese firms like CATL, BYD and Trina Solar face no restrictions under FIRB rules – though state-owned enterprises remain sensitive. Still, Buckley warns, "we need to partner with them, bring in their robotics, and leverage our low-cost energy future".

UNSW's Martin Green is often hailed as the grandfather of the modern solar panel. In 1983, the Australian engineer and his team developed the PERC solar cell – a breakthrough that today powers more than 90% of all solar panels worldwide.

For Australia, the opportunity is bigger than jobs or panels. With China leading on clean tech – robotics, battery storage, and advanced manufacturing – strategic collaboration could be the bridge back to industrial relevance. The country's manufacturing share of GDP has sunk to 6%, one of the lowest in the OECD. But with the right technology partnerships, low-cost renewables, and a reformed regulatory environment, Canberra could begin clawing its way back.

https://www.afr.com/world/asia/from-solar-panels-to-super-dams-china-s-clean-energy-takeover-20250723-p5mhb4