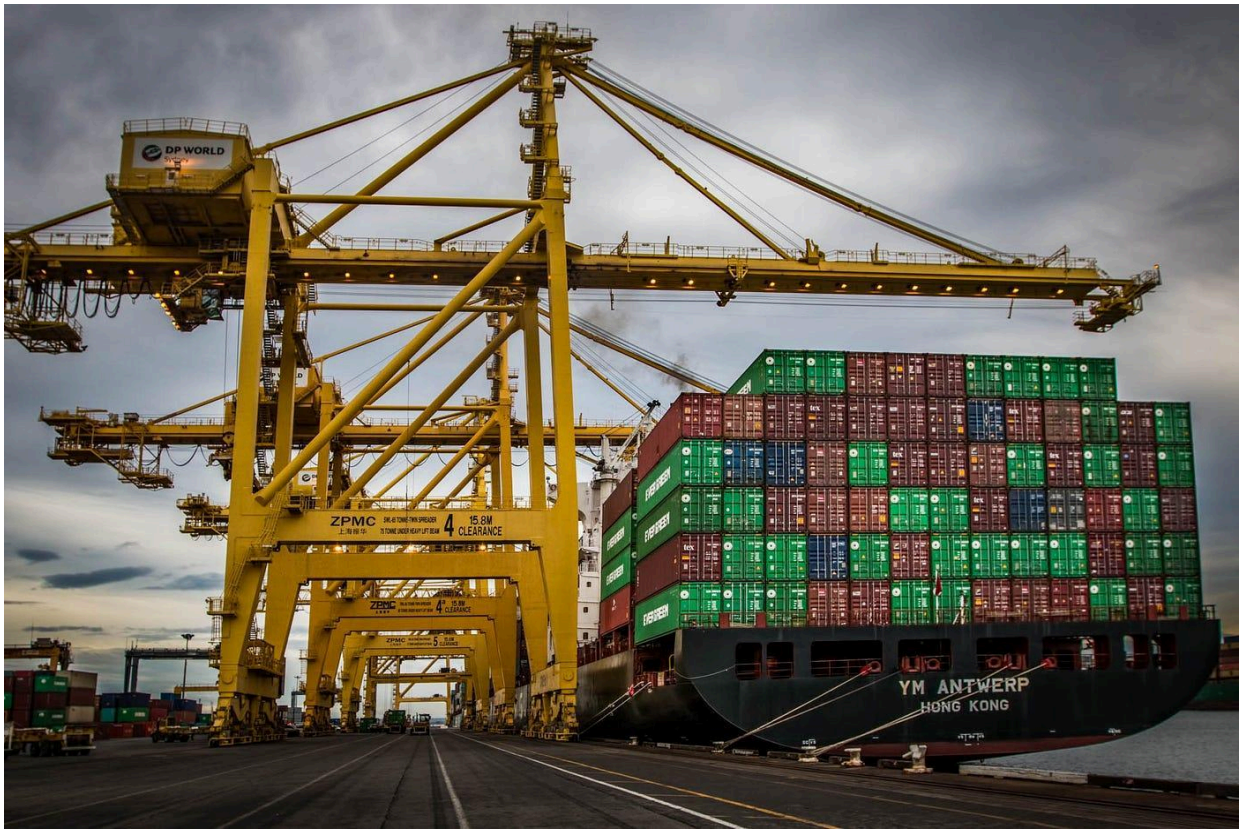
CLIMATE ENERGY FINANCE

Green capital tsunami:

China's >$100 billion outbound cleantech investment since 2023 turbocharges global energy transition

Unparalleled opportunities for enhanced Australia-China collaboration in zero-emissions trade & investment – with the right policy settings.

Foreword by the Chair of the Australia China Business Council



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October 2024

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Tim Buckley, CEF's founder, has 35 years of financial market experience covering the Australian, Asian and global equity markets from both a buy and sell side perspective. Before starting CEF as a public interest thinktank in 2022, Tim founded the Australia and Asian arms of the global Institute for Energy Economics and Financial Analysis in 2013 and was Australasian Director until 2022. Prior to this, Tim was a top-rated equity research analyst over 2 decades, including as head of equity research in Singapore at Deutsche Bank; MD and head of equity research at Citigroup for 17 years; and head of institutional equities at Shaw & Partners. From 2010-2013, Tim was co-MD of Arkx Investment Management, a global listed clean energy investment start-up jointly owned with Westpac Bank. Tim is widely recognised and extensively published as an expert on Australian and international energy transition and the accelerating shift of global capital to decarbonisation, and is a sought after commentator and advisor.

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Xuyang Dong, CEF's China Energy Policy Analyst. She focuses on unpacking China's decarbonisation trajectory and the investment trends in China's energy market. Her research aims to inform investors and policymakers on China's development in the energy market and global supply chain, and therefore to accommodate energy cooperation between Australia and China, as well as across the APAC region.

Dr. Annemarie Jonson is the chief of staff of CEF.

Established in 2022, Climate Energy Finance (CEF) is an Australian based, philanthropically funded think tank. We work pro-bono in the public interest on mobilising capital at the scale needed to accelerate decarbonisation consistent with climate science. Our analyses focus on global financial issues related to the energy transition, and the implications for the Australian economy, with a key focus on the threats and opportunities for Australian investments and exports. Beyond Australia, CEF's geographic focus is the greater Asian region as the priority destination for Australian exports. CEF also examines convergence of technology trends in power, transport, mining and industry in accelerating decarbonisation. CEF is independent, non-partisan, and works with partners in the NGO, finance, business, research, and government sectors.

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We pay our respects to the Traditional Owners of the unceded lands on which we live and work.

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FOREWORD – David Olsson, Australia China Business Council

Australia's capacity to meet its ambitions for zero-emissions trade and investment opportunities – now accelerated by the Future Made in Australia Act – requires collaboration and co-investment with our key trading partners, in particular China.

China leads the world in every aspect of decarbonisation – in R&D, investment, innovation, manufacturing, installation and exports of key clean energy technologies spanning solar, wind, batteries, new energy vehicles (NEVs), grids, hydro and green hydrogen. Its domestic cleantech investment is double that of the EU and the US.

As detailed in this CEF report, China is also increasing its outbound foreign direct investment (ODI) into cleantech globally. This unprecedented capital flow spans Europe, Asia, Africa and the Americas, leveraging China's financial strength and technical expertise in projects that include energy transition materials supply chain, clean energy manufacturing and generation, and NEVs. CEF identifies over US$100bn in Chinese cleantech ODI since 2023.

China's global investment presents enormous potential to build partnerships with the world's green economic powerhouse and simultaneously strengthen Australia's sovereign capabilities in the new economic and energy world order, placing us higher up the supply chain and capturing value onshore. This requires investment capital.

However, as this report notes, Chinese ODI into Australia was at a multi-decade low at only US$613m in 2023. While 2024 has seen a promising rise in proposed and underway Chinese corporate investments in greenfield renewable energy and battery projects in Australia, there is much more potential.

This report underscores a pivotal moment. Australia's relationship with China can either unlock vast opportunities or see them slip away to other regions.

The relationship between our nations is critical to the global energy transition and presents an unparalleled opportunity to collaborate as global zero-emissions leaders.

For example, as the world's top exporter of iron ore, Australia could produce green iron pre-export using our abundant firmed renewables. This would provide long-term export revenue while helping China, the world's top steel producer, decarbonise its steel supply chain – an increasingly urgent imperative as carbon pricing mechanisms escalate, and the climate crisis deepens.

There is also potential to co-invest with Chinese private investors in clean energy infrastructure, onshore value-adding of energy transition materials such as critical minerals, and cleantech supply chain manufacture, with appropriate safeguards such as foreign ownership limits to mitigate risk.

China's leadership in cleantech offers Australia a chance not only to secure investment but also to work together to address the climate challenge, benefitting both nations and the world.

The time to act is now. Australia has the resources and capability, but if we don't create the right environment to attract these technologies and solutions, those investments will go elsewhere.

This report makes a number of recommendations key to incentivising Chinese private investment into Australia while protecting and securing our national strategic interests.

Our shared ambition to lead the global energy transition should drive Australia and China to explore new frontiers of cooperation. By aligning our strengths in cleantech and renewable energy, we can tackle climate change together and unlock immense opportunities for both our economies, securing Australia's future economic prosperity in a decarbonising world.

David Olsson is the President and Chairman of the Australia China Business Council and an International Director of law firm King & Wood Mallesons. He is a passionate advocate for strengthening economic ties between Australia and China, with a focus on fostering collaboration in clean energy investment. His leadership is driven by a deep commitment to finding innovative solutions to climate change and advancing the global energy transition.

EXECUTIVE SUMMARY

This report tracks China's pivot from ever larger domestically-focussed investment and deployment of energy transition technologies to a new program of huge, historically unprecedented outbound capital flows encompassing the globe, as China's world-leading corporates operating across every key decarbonisation sector increasingly "go global".

Based on our tabulation of investments currently proposed and confirmed, we estimate that Chinese firms have committed more than US$100bn in outbound foreign direct investment (OFDI) across at least 130 major cleantech transactions since 2023 that we have tracked in this report. The technology and geographic diversity of this investment program is striking, spanning Europe, greater Asia, Africa and South America. Chinese cleantech investment initiatives into North America are being undermined by increasingly adverse China-specific rules.

OVERVIEW

China leads the world in R&D, investment, innovation, manufacturing, deployment and exports of cleantech – including solar, wind, batteries and new energy vehicles (NEVs) – by an astonishing margin, with its investments into cleantech more than double those of the US or the EU. China's decarbonisation leadership is a key driver of its GDP growth. Equally, its aggressive domestic energy transition program underpins strong climate progress, with the emerging prospect that China - in both its electricity sector and nationally - will peak emissions this year and could achieve net zero possibly a decade earlier than targeted.[1]

China's industry policy focus and massive capital commitments into cleantech, coupled with its globally-dominant buildout of domestic manufacturing capabilities, have led to overcapacity of production of technologies critical to global decarbonisation, triggering rapid and staggering price deflation and discounting. Solar module prices are down 60% yoy, while battery prices are down 50% yoy, and lithium is down 80% from its recent peak.

This scenario is having significant domestic, regional and global impacts, driving:

1. A reconfiguration of global trade dynamics in the context of rising geopolitical tensions, including sanctions against China's cleantech exports from key global powers the US and the EU, but also increased import tariffs from Turkey to India to Brazil. The US has imposed tariffs on China's technology exports such as solar modules (of 40%) and EVs (100%), as they seek to protect onshore industry and domestic interests, accusing China of unfair subsidies resulting in low-cost, high-quality products flowing into global markets. This is the subject of a separate forthcoming CEF analysis.
2. A time-critical opportunity to convert 'under-deployment' of the massive scale of China's low-cost cleantech production capacity into increased demand via a faster rollout of decarbonisation technologies across the globe, including in emerging and developing economies (EMDE) in the Global South. China's research and development (R&D) and manufacturing scaling-up, which have slashed the cost of green technologies, are arguably the key enabler of accelerated global

[1] Nature, What does peak emissions mean for China — and the world? 19 September 2024

decarbonisation – an existential necessity as the climate challenge escalates – and of the capacity for nations to secure their energy independence, including EMDE.

3. Enormous potential for bi- and multilateral partnerships and collaborations on innovating and building new and emerging future-facing energy transition industries, as nations leverage Chinese capital and expertise in localised contexts to value-add domestically and derive mutual benefit. Recent announcements in Saudi Arabia, Morocco, Hungary and Brazil all illustrate a potential game-changing shift in China's strategic direction to better ensure more sustainable win-win collaborations.
4. Increased momentum in Chinese outbound foreign direct investment (OFDI) in cleantech into economies worldwide, including in the Global South, greater Asia, Africa and Central and Eastern Europe, as China navigates a complex international environment and leverages its financial and technological firepower via clean energy statecraft. OFDI is a key strategic pillar of China's project to globalise its footprint, extend its geopolitical influence, circumvent tariffs, secure its supply chains, and build new and developing domestic markets for its massive output of cleantech production. This was a key Global South ask in the Paris Agreement back in 2015.

QUANTIFYING THE SCALE OF CHINA'S OFDI

Across all sectors, China invested some US$1trn in 152 countries via the Belt and Road Initiative (BRI), its flagship outbound investment program, in its first 10 years to 2023.[2]

Yet the BRI represents only a small portion of China's overall OFDI, and non-BRI OFDI shows a faster growth than BRI investment.

Based on our compilation of publicly reported Chinese OFDI across cleantech sectors, CEF estimates that Chinese companies have invested over US$100bn from the start of 2023 to the time of writing.

Further, Chinese investments across Eastern Europe, north Africa and Central Asia have far outpaced those from the US, as Beijing seeks to circumvent US trade sanctions and ameliorate growing EU concerns, with China representing 39% of greenfield investment in 2023 in the 36 countries in which the European Bank of Reconstruction and Development operates, up eightfold from 5% in 2022 (the US and Germany each accounted for just 8%).

Figure 1 lists 40 of the largest cleantech outbound direct foreign investments (DFI) by value from 2023 to the time of writing identified by CEF, indicating the spread of investment across every major sector and the geographic diversity of China's outbound capital commitments around the globe. The complete table is here and at Appendix A.

There has also been increased evidence of China focusing on industry precinct hubs across various key markets with access to major centres of consumer and industry demand, be that Thailand, Indonesia, Brazil, Hungary or Morocco. Saudi Arabia in July 2024 saw major upstream and downstream solar and wind turbine manufacturing facility investment partnerships announced, along with co-investments in major renewable energy and storage infrastructure projects, and most recently suggestions of EV manufacturing partnerships.[3]

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[2] Green Finance & Development Centre, China Belt and Road Initiative (BRI) Investment Report 2023, 5 February 2024
[3] Bloomberg, Chinese Takeout in Saudi Arabia? You Bet, 24 September 2024

CHINA OFDI TRENDS ACROSS KEY CLEANTECH SECTORS

Wind

China now dominates the global wind industry, in onshore and offshore deployments, manufacturing supply chains and technology development. 2024 has seen China increase its ODFI in EPC and financing/owning new wind farm projects globally, and propose new manufacturing capacity outside of China. China is now making considerable headway into countries in the BRI and other nations globally, with significant investment into wind farms and more recently proposals for local manufacture (for further details see Section 3).

Figure 1: Top 40 Major ODFI Announcements from China since 2023

Investment US$m	Technology	Company	Investment Partner	Location	Date of news	Product	Expected start of production	Confimed / FID
8,100	Battery	CATL	n.a.	Debrecen, Hungary	May'2024	Battery Mfg, 100GWh	2025	Yes
5,600	NEV	Human Horizons	Ministry of Investment	Saudi Arabia	Jun'2023	NEV Mfg - MoU	n.a.	No
4,200	Hydro	Power China	n.a.	Tanzania	Feb'2024	Hydro-electricity - 2,115MW	2024	Yes
3,300	Grid T&D	China State Grid	n.a.	Brazil	Apr'2024	2*1,500km grid transmission lines	n.a.	Yes
2,600	Solar Farms	CEEC	ACWA & Aramco	Saudi Arabia	Feb'2024	2,600MW of solar farm	2024	Yes
2,450	Wind Farm & BESS	Goldwind	Omni Energy	NSW, Australia	Aug'2024	1.4GW wind, 200MW-2hr BESS	2028	No
2,360	Battery	Gotion	n.a.	Michigan, US	Aug'2024	Battery Mfg	n.a.	No
2,200	Battery	CALB	n.a.	Portugal	Jan'2024	Battery Mfg, 15GWh	2026	No
2,100	Solar Mfg	TCL Zhonghuan	RELC & Vision	Saudi Arabia	Jul'2024	20GW solar wafers pa	n.a.	No
2,000	Wind Farms	CEEC	ACWA Power	Uzbekistan	Aug'2024	to construct a 1GW wind farm	2026	Yes
2,000	Solar Farms	CGN	n.a.	Laos	Aug'2024	2,000MW of solar across 3 farms	2026	Yes
2,000	Hydro	CEEC	China Energy	Pakistan	Aug'2024	Hydro-electricity - 884MW	2025	Yes
2,000	BESS	Sungrow	Algihaz	Saudi Arabia	Jul'2024	BESS - 7,800MWh	2025	No
1,575	Battery	EVE Energy	n.a.	Coventry, UK	Mar'2024	Battery Mfg	n.a.	No
1,550	Battery Materials	Huayou Cobalt	n.a.	Acs, Hungary	Jul'2024	Cathodes, 100,000tpa	2026	Yes
1,500	Solar Farms	Jinko Solar	EDF & TAQA	Dhafrah UAE	Aug'2024	1,500MW solar farm	2024	Yes
1,500	Grid T&D	Southern Power Grid	Chilean partners	Chile	Apr'2024	1,342km grid transmission line	n.a.	No
1,500	Battery Materials	Shanghai Putailai	n.a.	Sundsvall, Sweden	May'2023	Graphite anodes, 100,000tpa	n.a.	No
1,500	BESS	BYD	Grenergy	Atacama, Chile	Sept'2024	BESS - 3,000MWh	2025	Yes
1,450	Battery	Envision AESC	n.a.	Kentucky, US	Sep'2023	Battery Mfg, 30GWh	2024	Yes
1,450	Battery	Envision AESC	n.a.	Douai, France	Nov'2023	Battery Mfg, 9GWh	n.a.	Yes
1,400	Battery	EVE Energy	n.a.	Debrecen, Hungary	Nov'2023	Battery Mfg, 28GWh	2025	Yes
1,400	Battery Materials	CATL	YLB Mining	Bolivia	Jan'2024	Lithium hydroxide, 50,000tpa	n.a.	Yes
1,350	Battery Materials	Shanghai Shanshan	n.a.	Finland	Oct'2023	Graphite anodes, 100,000tpa	n.a.	No
1,332	NEV	Geely's Volvo	n.a.	Kosĭce, Slovakia	Jul'2022	NEV Mfg - 250,000 units pa	2026	No
1,300	Wind Farms	China Southern Grid	ACWA Power	Uzbekistan	Jul'2024	Acquiring a 35% stake in 1GW wind	n.a.	Yes
1,300	Battery	Gotion	n.a.	Morocco	Jun'2024	Battery Mfg, 100GWh	n.a.	No
1,300	NEV	BYD	n.a.	Indonesia	Jun'2024	NEV Mfg - 150,000 units pa	2026	Yes
1,200	Hydro	Power China	n.a.	Uganda	Jun'2024	Hydro-electricity - 600MW	2024	Yes
1,100	Battery	Envision AESC	n.a.	Cáceres, Spain	Jul'2024	Battery Mfg	2026	No
1,020	Hydro	Power China	n.a.	Indonesia	Aug'2024	Hydro-electricity - 510MW	2024	Yes
1,000	Solar Farms	CEEC	TotalEnergies	Basra, Iraq	Aug'2024	1,000MW solar farm construction	2027	Yes
1,000	Solar Farms	CEEC	n.a.	Uzbekistan	Jul'2024	1,000MW of solar across 2 farms	2024	Yes
1,000	Battery	Gotion	InoBat	Surany, Slovakia	Jun'2024	Battery Mfg, 20GWh	2027	Yes
1,000	Battery	EVE Energy	Cummins, Paccar	Mississippi, US	Jul'2024	Battery Mfg for trucks, 21GWh	2026	Yes
1,000	Battery	SVOLT	n.a.	Finland	Oct'2023	Battery Mfg, 100GWh	n.a.	No
1,000	NEV	BYD	n.a.	Szeged, Hungary	Feb'2024	NEV Mfg - 200,000 units pa	n.a.	Yes
1,000	NEV	BYD	n.a.	Camaçari, Brazil	Mar'2024	NEV Mfg - 150,000 units pa	2025	Yes
1,000	NEV	BYD	n.a.	Turkey	Jul'2024	NEV Mfg - 150,000 units pa	n.a.	No
1,000	NEV	BYD	n.a.	Mexico	Aug'2024	NEV Mfg - 150,000 units pa	n.a.	No

Source: Company reports, media sources, CEF estimates

Solar

China totally dominates 80-90% of the technology development and manufacturing supply chains for the global solar industry. With increased tariffs on Chinese exports of solar modules and increasing prevalence of procurement policies preferencing domestic supply chain development, China has spent 2023/24 significantly ramping up offshore solar cell and module manufacturing capacity. Chinese solar majors have commissioned 17GW of module capacity across four new facilities in the US in 2023/24.

China achieved a record 40% yoy increase in solar exports by volume in 2023, even as the total value declined by 6% yoy to US$49bn (a ~46% decline in per unit prices).

China has also been going global in the overseas development of new solar farms, building the largest to-date in a range of new markets, particularly in the developing world spanning Morocco, Algeria and Zambia in Africa to the UAE, Iraq and Saudi Arabia in the Middle East, to Indonesia, Laos, Bangladesh and Vietnam in Asia, to Argentina, Chile and Brazil in South America (For further details see Section 4).

Grid

China's two-decade domestic energy policy focused on progressively electrifying everything has built a national electricity grid more than twice the size of the US grid, with China pioneering ultra-high voltage direct current (UHVDC) grid transmission projects of well over 1,000km length.

2024 has seen China continue to export this world-leading grid technology and EPC capacity into South America (Brazil and Chile) and ASEAN (Laos and Philippines), as well as smaller developments in Africa. For example, China's State Grid Corporation, the world's largest utility, has a majority interest in Brazil's biggest power distribution corporation, and will construct a new 1,500 km twin line of transmission infrastructure connecting renewable energy supply across several of Brazil's states (For further details see Section 5).

Hydro

Over the last two decades, China has quadrupled its domestic installed hydro capacity to lead the world at 420GW, four times the US in second place, built the world's leading EPC firms in hydro, and now constructs the majority of hydroelectricity dams globally.

Outside of its domestic market, China is also the world's largest developer and operator of hydro projects globally with projects across Africa and the greater Asian region, and 54.4GW of operational assets as at June 2024 (For further details see Section 6).

Batteries

China totally dominates the entire global battery supply chain. Domestically China has a >80% global share of battery manufacturing capacity and six of the top 10 largest battery manufacturers, with a combined 60% global market share, underpinning China's global leadership in EV manufacturing and the development of battery energy storage systems (BESS), critical to firming solar power.

Chinese manufacturers have collectively announced ~900GWh of battery manufacturing capacities globally, 80% for EVs and 20% for BESS (China's very modest 2GWh of foreign BESS investment in 2023 is rapidly evolving due to ongoing price deflation and enhanced value of solar-BESS installations).

Chinese battery leaders are rapidly globalising their footprint in foreign battery-materials-to-EV precincts as a response to growing trade barriers. China's dominance is set to grow massively into 2025 with planned manufacturing plants in Hungary, Morocco, Indonesia, Thailand, Vietnam, Malaysia, the US, Spain, Portugal, the UK, Finland, Sweden, Germany, France, Turkey, and Oman (For further details see Section 7).

NEVs

China has become the world's largest market for new energy vehicles (NEVs), with a 60% global share. August 2024 saw NEV sales reach a record high 54% share of domestic passenger vehicle sales, with year-to-date sales +35% yoy. In 2023 China overtook Japan to become the world's largest exporter of cars.

Chinese NEV leaders continue to enhance technology and supply chain collaboration with western counterparts globally, making significant new investments in building NEV manufacturing capacity in Eastern Europe, Asia and South America.

Market leader BYD is a case in point, growing its revenue fivefold since 2018 to US$83bn in CY2023, and outselling Tesla globally by volume in 4QCY2023. BYD is expanding its footprint with major investments into Turkey (a US$1bn factory, to avoid a proposed 40% EU import tariff), Indonesia, Thailand, Uzbekistan and Brazil, and possibly also Mexico, Peru and Hungary. In Asia, Chinese NEV makers are developing Thailand as a precinct hub with major capital commitments from BYD, Hozon, Changan, Gotion, CATL and EVE Energy into manufacturing and assembly (Further details at Section 8).

Green Hydrogen

China dominated electrolyser deployments in 2023, accounting for a 75% global share according to the IEA, and reports continue of the very significant capital cost advantage Chinese hydrogen equipment manufacturers hold. We are yet to see this Chinese domestic manufacturing and installation activity translate into material ODFI, but recent announcements in Malaysia and Spain suggest this might be changing (Refer to Section 9).

IMPLICATIONS FOR AUSTRALIA

Current positioning with respect to Chinese firms' investment into Australia disincentivises investors, meaning Chinese private investment in Australia is weak relative to the rest of the world, putting at risk the enormous opportunity for partnership with Chinese companies where there is potential for significant onshore value-adding and technology sharing. This is key to enhancing Australia's economic pivot to zero-emissions trade and investment, and to its future prosperity.

China's rise as an energy transition superpower coincides with a global power shift from the developed countries, predominantly in the north, to emerging economies, including those in the Global South. The greater Asian region and blocs such as the BRICS alliance are now far less dependent on old western spheres of influence, represent a critical mass of population and global GDP, and present an opportunity for China to both extend its influence and investment, and tap into these burgeoning markets.

China's growing global technology and manufacturing leadership across cleantech sectors, its OFDI firepower, and the scope for Australia to help China decarbonise, present immense potential for Australia to collaborate and partner with leading private Chinese corporations. It makes geopolitical and economic sense for Australia to find a strategic way to work with our biggest trading partner and the region's major power, while navigating the challenges and risks Chinese technology and manufacturing expansion and its global critical minerals supply chain dominance pose.

Partnership with Chinese firms would enhance bilateral trade and economic ties and consolidate our strategic relations with the world's great green economic superpower, allowing us to build our sovereign capabilities, advance our national strategic interest in energy and supply chain security, pivot our export profile and future-proof our economy.

CEF sees potential to build opportunities for Chinese investment into Australia in clean energy infrastructure, onshore value-adding of future-facing energy transition materials such as critical minerals and strategic metals, and cleantech supply chain manufacturing, with appropriate foreign ownership limits, for example requirements for majority Australian ownership to mitigate risks around control, influence and national security. Important to see improved engagement prioritised in Treasurer Jim Chalmer's September 2024 visit to China.[4]

The investment focus should be on where private Chinese companies propose to deploy their strengths in technology, capital and automation in the Australian context.

We are uniquely positioned to value-add our world-scale reserves of critical minerals and strategic metals onshore using our abundant firmed renewables, so we export 'embodied decarbonisation' – e.g. green iron instead of unprocessed iron ore, of which we are the world #1 exporter – including into China. This would assist it to decarbonise its globally-dominant steel industry, now starting to be disadvantaged by carbon penalties in international trade, e.g. the EU CBAM.[5]

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[4] Treasurer Chalmers, Opportunity comes from engagement, not estrangement, 27 September 2024

[5] In our separate forthcoming analyses on the escalating trade wars, and on green iron, we elaborate the case for an Asian CBAM to provide an international green premium price signal for trade in decarbonised products, such as green iron and minerals.

We note that China's accelerated investment into new global strategic supply of critical minerals, and its leveraging of its globally dominant buying power, has driven oversupply and hence destructive commodity price outcomes, impacting some of Australia's key commodity exports. There is a case for a calibrated domestic response in this market sector to protect Australia's economic and national interests. In September 2024, Prime Minister Anthony Albanese, at a meeting of the QUAD alliance, urged US President Joe Biden to classify Australia's critical minerals as "American made" to win favourable treatment under the IRA.[6]

The significant improvement in bilateral relations with China since the election of Albanese Federal Government in 2022 is now set against the geopolitical backdrop of increasing US trade sanctions against China, as noted above. This brings into further focus new and emerging opportunities for China-Australia investment partnerships.

Domestically, CEF sees the extension in June 2024 of the critical minerals production tax credits to all investors in Australian value-adding as an important milestone, differentiating Australia's approach to collaborating equally with all our partners relative to the increasing trade barriers to China being erected by the US.

However, Chinese OFDI into Australia was at a multi-decade low at only US$613m in 2023, down from US$1.42bn in 2022, and has totalled only US$6.7bn since 2006.

While Figure 2 details CEF's compilation of over A$6bn of total investment proposals in the Australian cleantech space since the start of 2023, we note that regulatory and grid access approval delays in Australian energy developments can be pronounced, such that proposals do not equal likely investment.

2024 has seen a material step-up in proposed and underway Chinese corporate investments in greenfield renewable energy and BESS projects in Australia, mostly by way of greenfield project developments rather than acquisition. Whilst this is a promising trend, it is still far below what other countries are enjoying.

Figure 2: DFI Announcements from China in Australian Cleantech since 2023

Technology	Company	Investment Partner	Location	Investment (A$m, Est.)	Date of news	Product	Expected commencement	Confimed / FID
Wind Farm & BESS	Goldwind	Omni Energy	NSW, Australia	2,450	Aug'2024	1.4GW wind, 200MW-2hr BESS	2028	No
BESS	Trinsolar	n.a.	Kemerton, WA	1,000	Sept'2024	660MW/2,640MWh BESS	n.a.	No
Wind Farm	Shenhua Clean Energy	Hydro Tasmania (25%)	Mortlake, VIC	1,000	Feb'2023	Proposed Mt Fyan Wind farm	n.a.	No
Solar Farm	BJEI	Lightsource bp	various	813	Dec'2023	Acquisition of 5 solar farms	operating	Yes
BESS	Trinsolar	n.a.	Kiewa Valley, Victoria	600	May'2024	500MW/1,000MWh BESS	n.a.	No
Solar	Pacific Blue (SPIC)	n.a.	Townsville, Qld	500	n.a.	500MW solar farm, in stages	2026	Yes
BESS	Valent Energy	GAW Capital & BW ESS	Morington Pen., VIC	300		240MW/480MWh Mornington BESS	2025	Yes
Solar Farm	BJEI	n.a.	Mudgee, NSW	280	n.a.	280MW Wollar Solar Farm	2024	Yes
Wind Farm	Shenhua Clean Energy	Hydro Tasmania (25%)	Tasmania	280	Feb'2024	Proposed 140MW wind repowering	n.a.	No
Wind Farm	BJEI	Goldwind	Victoria	197	2023	Acquired a 26% equity stake	operating	Yes
BESS	CEEC	ZEN Energy	Adelaide, SA	138	May'2024	EPC for a 138MW/330MWh BESS	2026	Yes
BESS	Pacific Blue (SPIC)	n.a.	Clements Gap, SA	100	Sep'2024	60MW/130MWh BESS	2026	No
BESS	China Light & Power	n.a.	Hallett, SA	100	Sep'2024	Won CIS Tender underwrite	n.a.	No
BESS	e-Storage	FRV Australia	Victoria	100	Aug'2024	EPC for a 100MW/200MWh BESS	2026	Yes
Energy Retailer	BJEI	TPC Consolidated	n.a.	100	Apr'2024	Acquisition of CovaU	operating	Yes
Solar Farm & BESS	Shanghai Electric	APA Group	Port Headland, WA	80	Sept'2024	EPC for 45MW solar + 35MW BESS	2024	Yes
BESS	Shenhua Clean Energy	Hydro Tasmania (25%)	Tasmania	50	Jan'2024	40MW/80MWh Derby BESS	2025	No

Source: Company reports, media sources, CEF estimates

[6] AFR, Critical mineral exporters edge closer to US breakthrough, 22 September 2024

This is in part a product of a lack of regulatory transparency around rules applying to new private Chinese investment in Australia.

Australia's current formal posture with respect to Chinese firms' investment is opaque, disincentivising investors, meaning investment into Australia is weak relative to the rest of the world, and putting at risk the enormous opportunity for partnership with private Chinese companies where there is potential for significant value-adding onshore, leveraging Australia's Future Made in Australia strategy.

We need to see a further elucidation of the government's position on private Chinese investment into Australia in value-adding partnerships to leverage Chinese expertise and technology, otherwise capital will increasingly look elsewhere – a process which this report demonstrates is already well underway and accelerating.

Welcoming, stable, predictable and transparent policy frameworks for foreign investment are critical for Chinese private investor confidence. In CEF's view, these should be complemented by appropriately calibrated mechanisms to expand the diversity of global demand for Australia's key commodity exports, given China's dominant market power in these sectors.

We therefore recommend that the Federal Government:

- **As a strategic national-interest priority, clarify the rules of engagement with the Foreign Investment Review Board (FIRB), so that Chinese firms looking to co-invest in Australia in partnership with local investors on value-added energy transition materials and cleantech projects are incentivised to do so by transparent, stable, welcoming investment policy frameworks and guidelines.** This would ameliorate any doubt about the role of Australia's foreign investment regime in protecting national security versus restricting foreign investment from specific countries, particularly our #1 trade partner and the global leader in most cleantech sectors.

- **Improve and streamline engagement by tasking federal and state investment bodies to communicate the FIRB rules and regulations to prospective Chinese investors, assisting them with market entry strategies and suitable domestic equity partners, enhancing their confidence in Australia's regulatory posture toward China-Australia energy transition materials and cleantech partnerships.** We note Shenhua Clean Energy's Woolnorth partnership with Hydro Tasmania, and China Baowu's Western Ranges Pilbara iron ore joint venture with Rio Tinto as examples of successful collaborations.

- **Establish a strategic critical minerals reserve trading fund** to provide long term floor and ceiling price guarantees to underwrite new investment in mining and extraction, but also protect Australia's national interests.

- **Strongly advocate for a clear carbon emissions price signal for international trade to incentivise Australian miners to export embodied decarbonisation. Encouraging the development of an Asian Carbon Border Adjustment Mechanism (CBAM) to extend the EU CBAM should be a key geopolitical priority.** This would extend Australia's comparative advantages in renewables-powered processing of critical minerals and strategic metals, energy transition materials including green iron, accelerating investment into these opportunities and helping foster public-private partnerships with Australia's key resources trading partner – China.

SECTION 1 INTRODUCTION

To deliver on the global energy transition and net-zero in the timeframe the science requires, the world needs dramatically more capital investment into the zero-emissions sector. And the capital needs to be invested across the world, not just in the global north.

The International Energy Agency (IEA) World Energy Investment report highlights the world will invest over US$2 trillion in cleantech sectors in 2024, reflecting continued double digit annual growth, to a level double the world spend on fossil fuels in 2024.

The IEA also notes China continues to lead the world, investing annually in cleantech more than double either of the US or EU. And from 1995 to 2020, China's total R&D outlay soared from US$18bn to US$620bn – a 3,299% increase compared to America's 227%.[7] BNEF outlines how this technology and investment leadership is so advanced that China could well achieve Net Zero Emissions a decade earlier than their 2060 target.[8]

But the IEA has consistently warned of energy investment flow imbalances, particularly insufficient clean energy investments in developing countries.

The IEA reports there are tentative signs of a pick-up in developing country investments: clean energy investments are set to approach US$320 billion in 2024, up by more than 50% since 2020.

This is similar to the growth seen in developed economies (+50%), but significantly trailing China as the world leader in outbound cleantech investments (+75%).[9]

The UN estimates that US$2.4 trillion of investments per year is needed by 2030 in developing countries – excluding China. This would be a fourfold increase from current levels, and includes public as well as private finance and funding from sources including development banks.

Whilst China is still holding out on formally acknowledging it is now the world-leading renewable energy superpower, it is significant that China's special envoy for climate change in June 2024 stated that China's investment into technology innovation and manufacturing had slashed green energy costs globally, and that it stands ready to collaborate with developing countries to help them to decarbonise.[10]

This imperative is heightened by China's trade surplus reaching an all time high in June 2024 at US$99bn for the month,[11] Figure 1.1, underpinning the need for China to accelerate outbound investment for capital flows balance.

As we detail in this report, this set of dynamics represents a key opportunity for China to support emerging markets' growth, deploying its world-leading manufacturing, engineering, procurement and construction (EPC), technology and financial capacities – preeminently in the clean energy technology the world needs to rapidly decarbonise, such as solar, batteries, and NEV.

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[7] Rathenau Instituut, China: a scientific superpower in the making, 13 August 2024

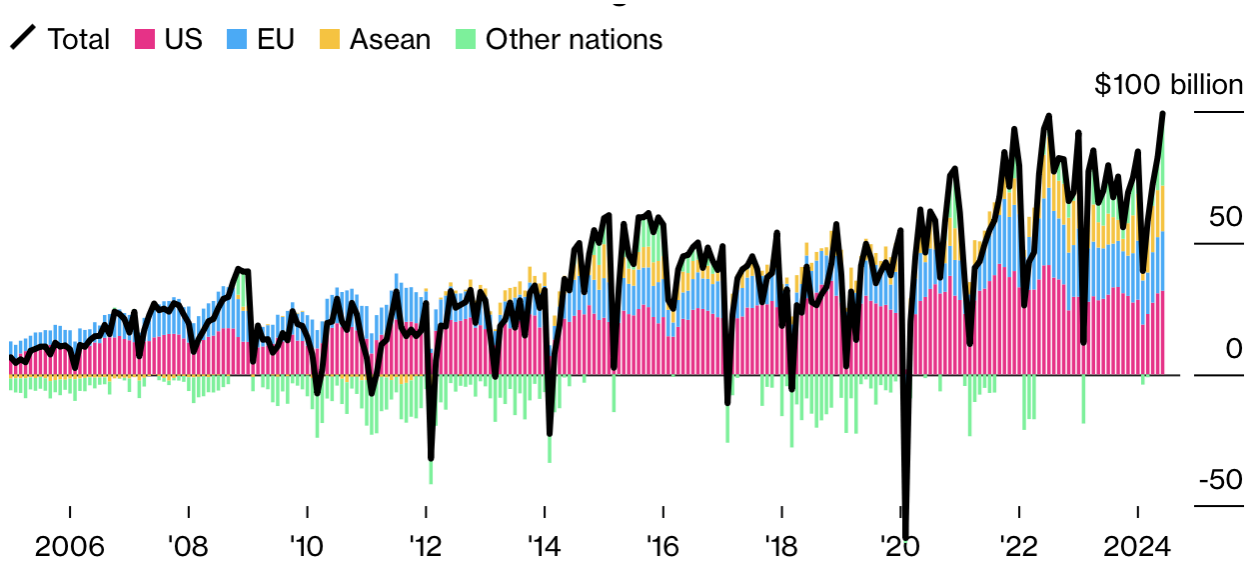
[8] Bloomberg, Faster Scale-Up of Clean Technologies Could Get China on Track for Net-Zero Emissions by 2050, 4 September 2024

[9] IEA, World Energy Investment 2024, 6 June 2024

[10] Straits Times, COP29 must reach new finance deal, China's climate envoy says, 27 June 2024

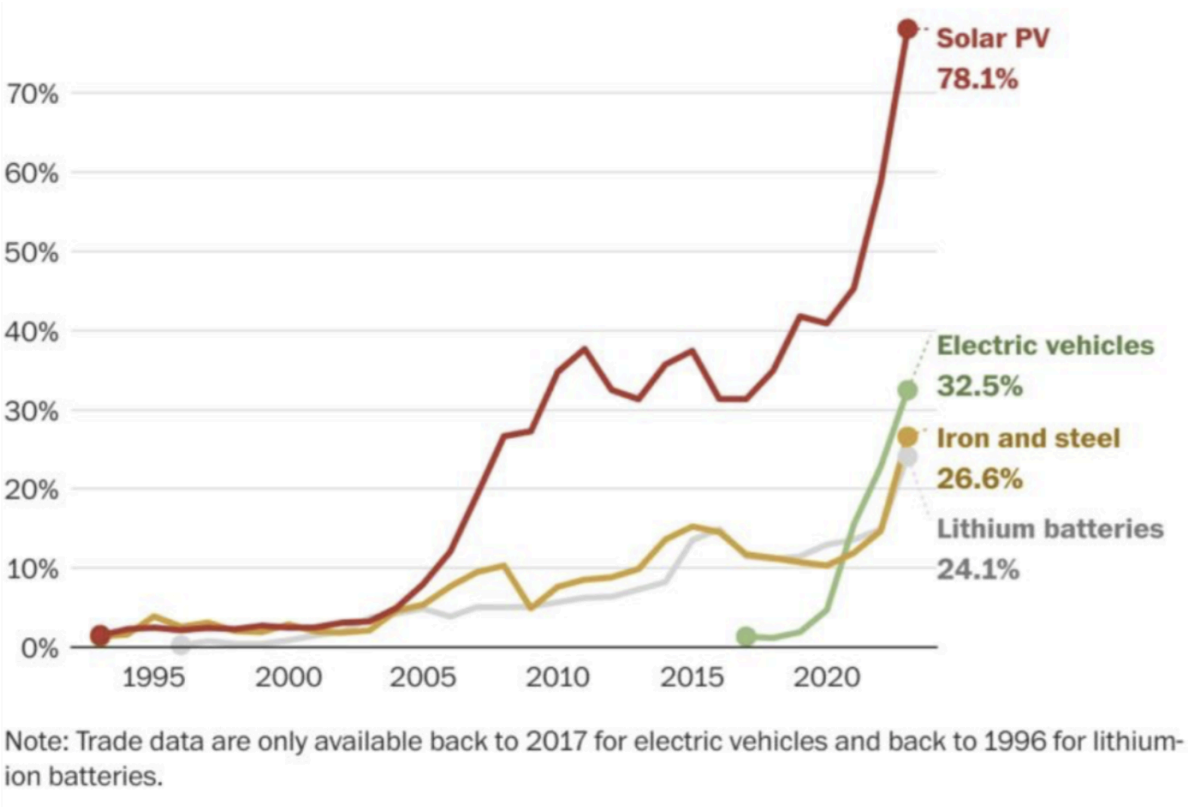
[11] Bloomberg, China's Record Trade Surplus Risks Further Straining Ties, 12 July 2024

Figure 1.1: China's 1HCY2024 Trade Surplus and Exports Continue to Grow



Source: China General Administration of Customs, Bloomberg

Figure 1.2: China's Share of Global Cleantech Exports Continue to Grow



Source: UN Comtrade database

Geopolitical trends & China's challenge and opportunity

The key geopolitical trend of this century is the shift of global power from the developed countries, predominantly in the north, to emerging economies, such that the greater Asian region from India to China to Indonesia is now far less dependent on old spheres of influence. This is underpinned by the fact that the region is continuing to report significantly higher collective GDP growth over the last decade, with this trend expected to continue over the coming decade.[12]

The BRICS economic bloc co-founded in 2009 by Brazil, Russia, India, China and later South Africa illustrates this shift. BRICS expanded in January 2024 to include other Global South nations Iran, Ethiopia, Egypt, and the United Arab Emirates and now represents 42% of the world's population and 36% of global GDP. Malaysia, Vietnam, Indonesia and Thailand are all reported to be considering joining. The bloc provides an alternative to western-led institutions like the World Bank and the International Monetary Fund (IMF), offering a more localised understanding of the region and the Global South countries – where the region is, what the region needs, and how the region wants to move forward.[13]

This set of circumstances presents an opportunity for China to extend its influence, upscale its foreign investment, and develop massive new markets for its decarbonisation products.

The latter is critical to China's economic performance. Much of China's export growth in solar, batteries, EVs, and steel – sectors in which it leads the world – is accompanied by massive capacity expansions. And as a result of under-deployment to date, especially in the emerging markets and developing economies (EMDEs), this overcapacity is driving aggressive price discounting. Solar module prices are down 60% yoy, battery prices down 50%, and steel prices down 30-40% yoy.

The rapid descent into losses in the Chinese solar sector in 1HCY2024 has seen massive share price underperformance from many Chinese cleantech firms. The result is a flight of foreign capital from the Chinese equity markets. For China to continue to access foreign capital, Chinese firms have to deliver adequate risk-adjusted returns to shareholders over time beyond global market share gains. The underperformance of Chinese stock markets over 2023/24 suggests that foreign investors are not convinced this lesson is yet to be heeded.[14]

A key solution to overcapacity is to accelerate market development in emerging economies.

In August 2024, The Economist estimated that Chinese firms are pursuing the 5 billion consumers who live in the developing world. It noted that since 2016, listed Chinese firms have quadrupled their sales in the Global South to US$800bn in 2023. Sales by Chinese companies in the Global South have already overtaken those of Japanese multinationals. On current trends, they will pull ahead of European firms and be on par with American ones by 2030. For the West, that holds uncomfortable lessons as it attempts to deal with China's rise and simultaneously surrenders ground in the world's fastest-growing and most populous markets.[15]

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[12] Bloomberg, A Self-Confident Asia Is Charting Its Own Course, 24 June 2024
[13] Bloomberg, A Self-Confident Asia Is Charting Its Own Course, 24 June 2024
[14] FT, Temasek to prioritise US deals and stay cautious on China, 9 July 2024
[15] The Economist, Chinese Companies are Winning the Global South, 3 August 2024

There is also a clear economic imperative underpinning continued investment in new technology sectors in China. The headwinds to GDP growth in 2024 from the ongoing property slowdown and the resulting weakening of consumer demand means China needs to keep investing in growth sectors.

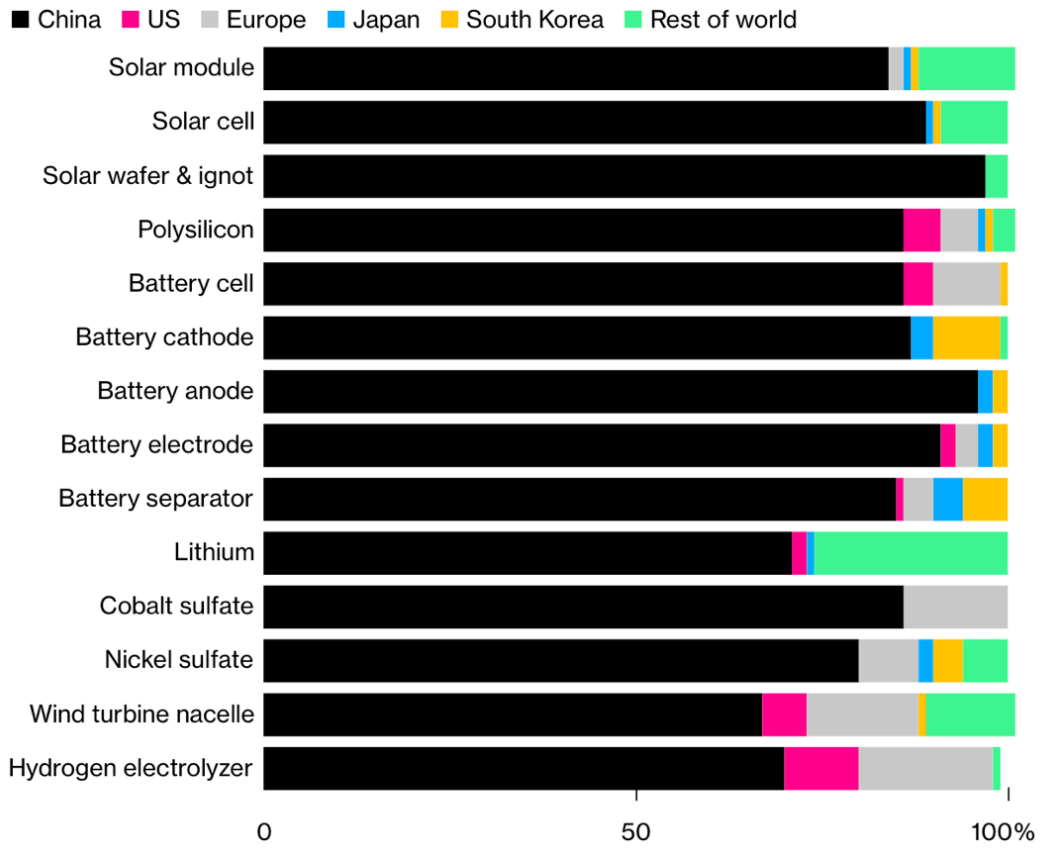
July 2024 saw President Xi Jinping host China's quinquennial third plenum and expound on his vision of heavy investment in advanced manufacturing, "new quality productive forces", and a focus on technology, talent, science and innovation rather than fiscal stimulus, promoting "scientific and technological self-reliance" amid a "complex" international situation.[16]

Bloomberg Economics forecasts that China's hi-tech sector will account for 19% of GDP by 2026, up from 11% in 2018. Combining what Beijing has dubbed the "new three" – EVs, batteries and solar panels – the proportion of GDP will swell to 23% by 2026, more than enough to offset the ailing real estate sector, set to shrink from 24% to 16%.

China's global cleantech leadership & the new trade wars

CEF has long studied the emerging global manufacturing, technology and innovation leadership of China in the cleantech sectors of solar, wind, batteries and EVs, along with the supply chains required to support this.

Figure 1.3: China Dominates Clean Technology Supply Chains



Note: Capacity is for physical facility location, not manufacturer headquarters. Lithium refers to lithium hydroxide and carbonate.

Source: BloombergNEF

[16] FT, China's Xi Jinping bets on high tech for 'great rejuvenation', 24 July 2024

This is built on the country's sometimes stunning lead in high-impact research across the majority of critical and emerging technology domains (often producing more than five times as much research as its closest competitor), including in such crucial fields as energy and environment, as tracked by the Australian Strategic Policy Institute.[17]

China is now a world leader in cleantech, in terms of technology, manufacturing, domestic deployments and exports. Figure 1.3 details BloombergNEF's estimate of China's global market share by clean technology beyond 80% in many sectors, including the upstream refining of critical minerals and strategic metals. Even with the resurgence in onshore manufacturing driven by the US IRA, China's global dominance has extended into 2024.[18]

August 2024 saw a review of how China has come to have such a strategically important and dominant role in global cleantech manufacturing supply chains. China's unique innovation system involves state–industry cooperation and investment to give a 'whole-of-nation' approach. This drives its world-leading prioritisation of technology investment.

China also has an enormous domestic market of 1.4 billion people, which is ultra-competitive. This results in only the strongest surviving, which in turn become global technology leaders, such as in solar (Tongwei, LONGi: Section 4), wind (Goldwind, Mingyang: Section 3), wind, solar and hydro EPC (Power China, China Energy Engineering Corporation: Sections 3-6), grid transmission development (China State Grid: Section 5), battery materials (Huayou Cobalt, BTR) and batteries (CATL, Gotion: Section 7), as well as EVs (BYD: Section 8).

Domestically, strong and supportive government policies and state-mandated investment have been central to the ongoing rise of Chinese dominance in these cleantech sector supply chains.

This is likely to continue as climate change policy achieves greater prominence and ambition. In August 2024 we saw climate rising up in the agenda in China following a hiatus of several years. A spate of new policy announcements— including hard targets for carbon emissions, ambitious goals for clean-power consumption and a plan to beef up the grid — all point to change.[19] It is also becoming more probable that 2024 will mark peak emissions in China's electricity sector, and hence nationally.[20]

Against this backdrop, the ongoing R&D, commercialisation and manufacturing scaling-up of clean technologies gives China dramatic new opportunities to boost both cleantech sector domestic deployments and exports, as well as to collaborate with other countries to jointly build out new industries at speed and scale.

We have seen regular allusions by the EU and US to massive Chinese state subsidies for clean industries, and claims of dumping, a key bone of contention with Western countries concerned about low-cost Chinese products flooding the market and displacing domestic investment, manufacturing capacity and jobs.

It is worth noting here both that reduced subsidy support over time is evident, and also that there is fierce competition within the domestic Chinese market, meaning prices are often

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[17] ASPI, ASPI's Critical Technology Tracker, The global race for future power, February 2023

[18] Bloomberg, China Extends Clean-Tech Dominance Over US Despite Biden's IRA, 16 April 2024

[19] Bloomberg, China's Policy Pendulum Swings Back Toward Climate, 8 August 2024

[20] Carbon Brief, China's CO2 falls 1% in Q2 2024 in first quarterly drop since Covid-19, 8 August 2024

higher in the export markets, undermining claims of dumping in the conventional trade sense.

Further, huge state-funded and sponsored decarbonisation policy interventions – the US$1trillion in public support for domestic cleantech industries via President Biden's landmark Inflation Reduction Act (IRA), the biggest spend in US history, and the EU's Green Industrial Plan – suggests a major element of hypocrisy in these accusations.

Rather than re-litigating the view that China has created massive manufacturing over-capacity globally, this should be seen as an opportunity that benefits all: despite being at record highs, global deployments of cleantech capacities remain far too low to bring the world's emissions trajectory in line with Paris agreements limits.

The dramatic price deflation of cleantech is arguably the #1 enabler of the acceleration of the global energy transition in line with climate science, and is a product of China's efforts. This is a remarkable achievement of global importance.

CEF's view is that the climate emergency means that energy transformation is a paramount goal globally. Fostering global cooperation and sharing of innovations and technology, plus leveraging the almost unbelievable manufacturing scaling-up that China has already achieved, would mean the world can deploy many of the key technology solutions available at the scale required.

Other rich countries can also learn a lot from China, including the massive value of building out strong supply chains and industrial precincts to cluster and foster expertise. On a global scale, this includes the export of the entire supply chain, technology and expertise via each product, to the regions that needed them the most.

Collaboration and enhanced trade would be far preferable to the alternative of distrust and self-interest.

Nevertheless, China's overwhelming dominance across every sector of cleantech is playing out in a geopolitical landscape in which nation states are racing to secure sovereign supply chains, reindustrialise, ensure domestic energy security and protect and grow local industries, with more than 1,800 new industrial policy measures alone around the world this year. This has ramped up trade, economic and political tensions between the great powers and blocs, namely China and the US, and China and the EU.

The result is growing US and EU trade barriers to China, including tariffs on Chinese cleantech products.

As geopolitical tensions rise,[21] China is playing a far more significant role in global investment flows from the leading developed countries into developing countries.

This leverages the availability of low-cost labour in the developing world, while, as noted above, strategically for China, it also looks to build access to their growing domestic markets of significant size as US and EU sanctions on trade from China escalate.

We explore these tensions, mapping the various constraints on trade and emerging responses in a separate forthcoming paper.

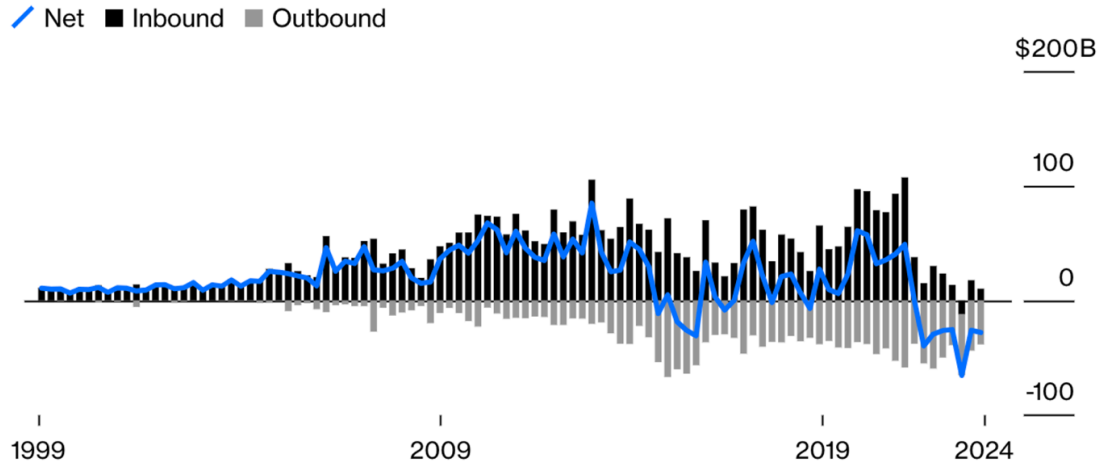
[21] Lowy Institute, Economic diplomacy: Looking beyond a 30-year anomaly, 25 July 2024

China's investment "going global"

With a still-expanding trade account (Figure 1.1), and a reduction in holdings of US Treasury bills, China has recently become a net exporter of investment capital – Figure 1.4.

Outbound foreign direct investment (FDI) rose 19% in the first four months of 2024 relative to its level a year earlier, to more than 343 billion yuan (US$47bn).[22] Chinese firms increased their overseas assets by US$71bn in 2QCY2024 +80% yoy, according to the State Administration of Foreign Exchange.[23]

Figure 1.4: China Has Become A Net Exporter of Investment Capital (US$bn)



Note: Based on foreign Direct Investment
Source: State Administration of Foreign Exchange of China, Bloomberg Opinion

This CEF report highlights that a significant and increasing portion of this involves China's cleantech leaders "going global". We examine the pivot in China from a focus largely on domestic cleantech deployments to a vision extending well beyond its own borders to encompass the world.

The signature of this strategy is a ramping up of outbound foreign direct investment (OFDI), as China actively and strategically extends its statecraft into emerging clean energy markets including in the Global South where investment, capacity, employment and technology opportunities are significant, and rapidly growing.[24]

China's ODFI has globally significant implications, as it dramatically enhances not only emerging markets' development and infrastructure, but also their connectivity to the global economy.[25]

In this context, China's manufacturing overcapacity could be read more accurately and in a more nuanced way as under-deployment – a massive global opportunity to drive energy security, deflation and decarbonisation by rolling out cleantech systems across the globe, including the south, at a speed and scale commensurate with the climate crisis. This is a

[22] Bloomberg Opinion, China Needs a Green Marshall Plan for the Global South, 18 June 2024

[23] Bloomberg, China's Investment Abroad Surges to Record With $71Bn Jump, 30 September 2024

[24] Harvard Business Review, The 4 Key Strengths of China's Economy — and What They Mean for Multinational Companies, 26 August 2024

[25] SCMP, Nobel-winning economist Michael Spence on China's tech-driven future, 12 Aug 2024

critical concern, since the world cannot effectively address the climate challenge without slashing emissions in EMDEs.

China both exporting low-cost, world-leading cleantech capacities and increasingly investing globally in deploying manufacturing capacities is a win-win-win: A win for Chinese corporate leadership, a win for new investment, employment and energy security for recipient countries, and a win in the race against the climate emergency.

SECTION 2 CHINA'S OUTBOUND DIRECT FOREIGN INVESTMENT GOING GREEN

Outbound FDI is a key priority in China's domestic growth program and statecraft that addresses the complexities and challenges around the trade and energy dynamics outlined above.

It also has material benefits beyond China for a global economy in which nation states are racing against the clock to address the existential threat of climate change, and leverage the extraordinary economic opportunities of the accelerating trajectory to global net zero, as they secure their domestic interests in energy independence and supply chains.

As outlined above and explored in further detail below, China's ODI extends its staggering leadership on domestic cleantech manufacturing and deployment, shoring up its influence around the world in a monumental exercise of soft power.

It enables it to build new markets for its cleantech manufacture, reframing the contention that it is flooding markets with cheap green technologies as an opportunity to convert underdeployment to accelerated implementation of decarbonisation technologies globally.

Undoubtedly, offshoring its world-leading technology and manufacturing capacities is also a strategic response to escalating trade barriers from the major powers and blocs that enables it to circumvent tariffs.

While this protects China's interests, it also brings profound positives to the rest of the world, helping nations secure their energy independence and mitigating cost barriers to energy transition – especially in EMDEs in the Global South.

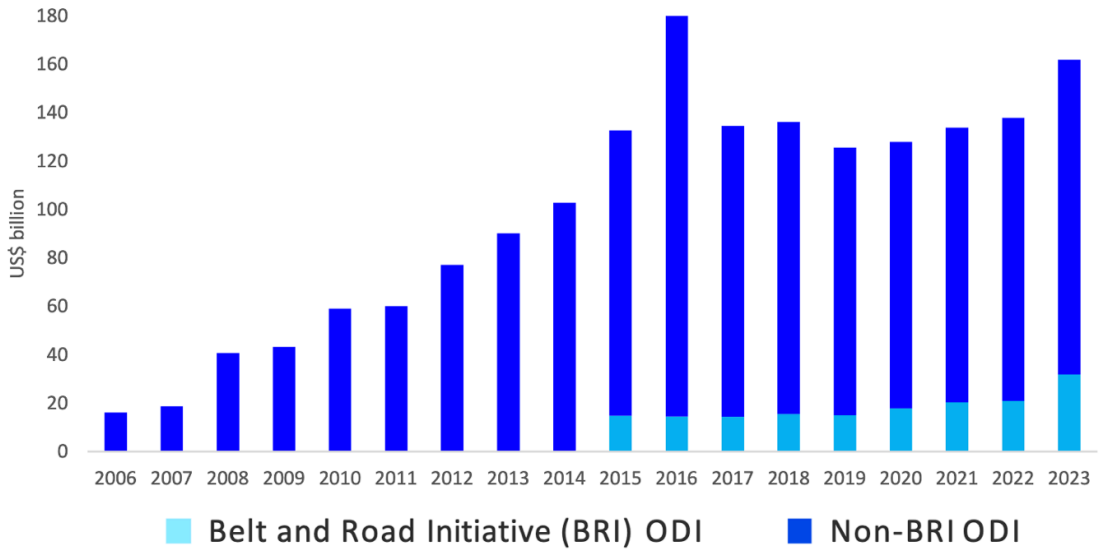
Critically, it also opens up untold potential for bi- and multilateral partnerships and collaborations on building new and emerging industries, including for Australia, as we address in Section 11.

Quantifying China's outbound capital flows

For more than a decade, the world has witnessed a massive flow of capital from China to the rest of the world, reaffirmed in the paper released by the Ministries of Commerce and Foreign Affairs in 2019, 'Vision and Actions on Jointly Building the Silk Road Economic Belt and the 21st Century Maritime Silk Road[26].

[26] Belt and Road Portal, Vision and Actions on Jointly Building the Silk Road Economic Belt and the 21st Century Maritime Silk Road, 29 March 2019

Figure 2.1: China's Global ODI 2006-2023



Source: Statistical Communiques of the People's Republic of China on the National Economic and Social Development[27]

China invested US$1.3trn in 165 low- and middle-income countries via the Belt and Road Initiative (BRI) in its first 10 years to 2023 alone.[28]

Yet while the BRI is best known as the flagship of China's OFDI program, as shown in Figure 2.1 it represents only a small portion of China's overall ODI since 2015, and the non-BRI ODI shows a faster growth than BRI investment.

In 2023, China's State Council reported non-BRI OFDI totalled some US$130bn.[29]

Based on our compilation of publicly reported Chinese OFDI across cleantech sectors, CEF estimates that Chinese companies have invested over US$100bn from the start of 2023 to the time of writing.

In 2023, China's energy related engagements were the greenest in absolute and relative terms in any period since the BRI's inception, with green energy investing reaching a 27% share at US$7.9bn – excluding solar exports – a very significant mix shift from the fossil fuel heavy focus a decade earlier, according to a study by the Griffith Asia Institute.[30]

Further, Chinese investments across Eastern Europe, north Africa and Central Asia have far outpaced those from the US, as Beijing seeks ways to circumvent US trade sanctions, according to the European Bank of Reconstruction and Development in May 2024, which notes that "China has tried to diversify production locations in terms of potential trade barriers".[31] In the 36 countries the EBRD operates, China represented 39% of their combined greenfield investment in 2023, up eightfold from 5% in 2022 and just 0.6% 20 years ago.

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[27] University of Sydney / KPMG, Demystifying Chinese Investment in Australia, April 2024

[28] The Diplomat, Has China's $1 Trillion Foreign Investment Paid Off?, 3 June 2024

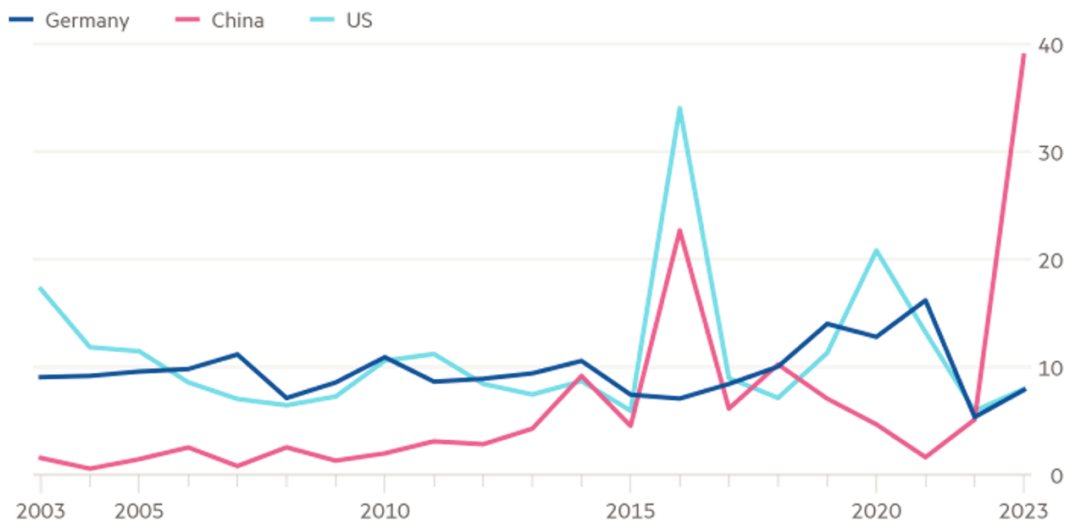
[29] University of Sydney / KPMG, Demystifying Chinese Investment in Australia, April 2024

[30] Griffith Asia Institute, China Belt and Road Initiative (BRI) Investment Report 2023, February 2024

[31] FT, China 'dwarfs' US investments in EU neighbourhood countries, 15 May 2024

The US and Germany each accounted for just 8% of new 2023 greenfield outbound foreign direct investment (OFDI) in these regions – as per Figure 2.2 below.

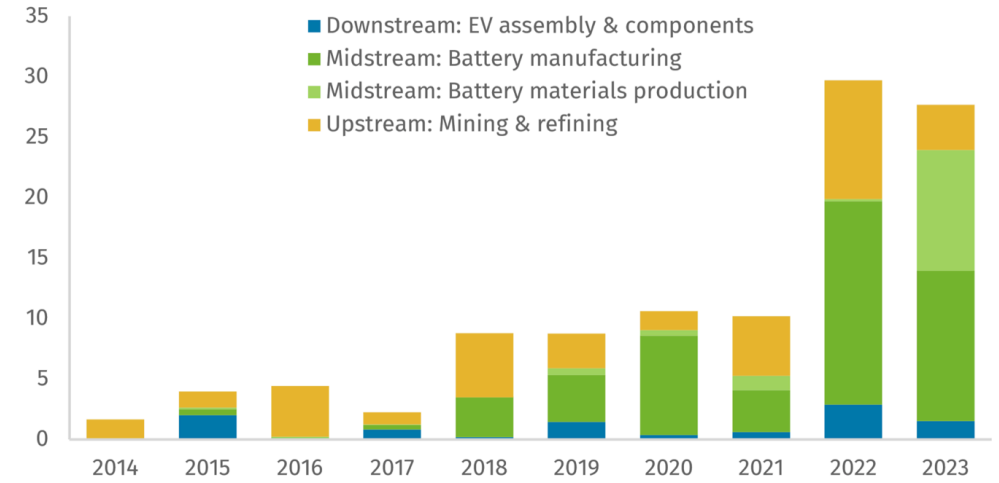
Figure 2.2: Greenfield OFDI capital investments by country of origin (%)



Source: EBRD, Financial Times, 15 May 2024

A case in point we note here is that Chinese OFDI along the electric vehicle (EV) value chain, which has also been booming in recent years, as Rhodium has tracked. It found China's global investments in EV-related industries were US$30bn in 2022 and $28bn in 2023.[32] Chinese EV OFDI shifted away from North America (share down 10% in 2023) toward Europe, the Middle East, and Asia. More localised battery manufacturing is driving investment, with 2024 seeing the same trend in upstream critical minerals mining, battery materials processing (anodes and cathodes), battery manufacturing and EV manufacturing – Figure 2.3.

Figure 2.3: New Chinese EV-related OFDI, by Supply Chain Step US$bn



Source: Rhodium Group, China Cross-border Monitor

[32] Rhodium Group, Pole Position: Chinese EV Investments Boom Amid Growing Political Backlash, 29 February 2024

On a related note, China's use of the renminbi in cross-border transactions has reached record highs, as the government seeks to internationalise the currency in global trade to shore up its strategic ambitions and reduce vulnerabilities, including reliance on the US dollar.

While trade in renminbi is still only 4.7% of global payments, well behind the US, Euro and sterling, July 2024 saw 53% of China's inbound and outbound transactions use the Chinese currency, up from 40% for the same month in 2021 (in part boosted by US sanctions against Russia) – Figure 2.4.[33]

Figure 2.4: Outbound Payments, by Currency (%)

Source: State Administration of Foreign Exchange via Financial Times, 29 August 2024

In the Sections that follow, we track China's staggering progress on foreign direct investment across a range of cleantech sectors including wind, solar, grid, hydro, batteries, electric and NEVs and green hydrogen, and across economies as diverse as Thailand, Morocco and Brazil.

[33] Financial Times, China's international use of renminbi surges to record highs, 29 August 2024

SECTION 3 ONSHORE WIND

China now dominates the global wind industry, in onshore and offshore deployments, manufacturing supply chains and technology development. 2024 has seen China increase its ODFI in EPC and financing/owning new wind farm projects globally, and propose new manufacturing capacity outside of China.

China installed 77.1GW of onshore and offshore wind in CY2023, representing 75% of global capacity additions – Figure 3.1.

Figure 3.1 Global Wind farm Installation Rates (2023, GW)

Source: BNEF, Goldwind CY2023 Investor Presentation[34]

China has the world's largest offshore wind turbine prototype in operation, at 18MW. And for the larger onshore market, China has the largest prototype grid-forming wind turbine in operation, at 10MW.[35]

Chinese OEMs represent six of the top 10 wind turbine manufacturers globally, ranked by 2023 installations – Figure 3.2.

However, despite two decades of patient strategic investment, China's Goldwind and China Mingyang have been largely unsuccessful relative to their world leadership in the domestic Chinese context with the rising trade tensions globally.[36]

To-date Chinese wind turbine OEMs have been primarily domestic market oriented, given the massive growth and size of the world-leading Chinese domestic market. But with China's

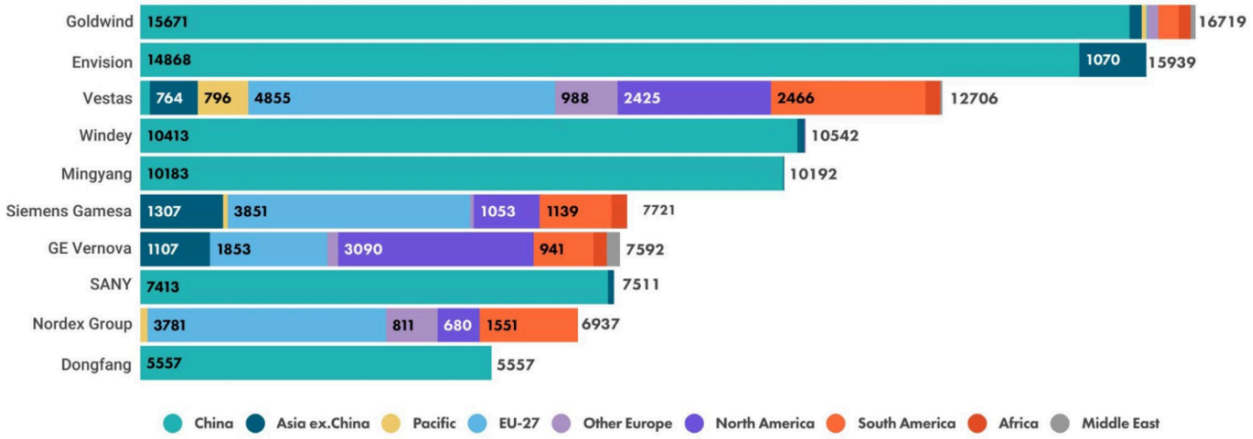
[34] Goldwind, CY2023 Results Investor Presentation, 2 April 2024

[35] Shanghai Electric press release, The World's Largest 10 MW Grid-Forming Wind Turbine Rolls Off Production Line, 16 May 2024

[36] CleanTechnica, China Dominates Global Wind Market … But Not Per Senior IEA Official, August 2024

mantra of going global, China's wind turbine manufacturers are logical candidates to lead overseas FDI and collaboration.

Figure 3.2 To 10 Global Wind Turbine Suppliers (2023, MW)



Source: Global Wind Energy Council Market Intelligence, via CleanTechnica

China is now making considerable headway into BRI countries and other nations globally, with significant investment in wind farms and manufacturing.

For further details of China's overseas direct investment in wind, led by China Longyuan, Goldwind and Power China, see below.

3.1 ODFI Wind - China Longyuan Power

China Longyuan Power - Canada

2011 saw Longyuan Power, China's largest developer of onshore wind farms, enter the Canadian market. China Longyuan bought a majority share in the 100MW Dufferin wind farm from Farm Owned Power, located at Melancthon, 120km north of Toronto. The project was underwritten by a 20-year feed-in tariff by the Ontario government, leaving the developer with a claimed 16% post-tax IRR. The Dufferin wind farm is the first overseas project to be funded, built and operated by a Chinese power company, using General Electric 1.6MW turbines.[37]

China Longyuan Power – South Africa

2017 saw Longyuan commission its 70% owned 245MW De Aar onshore wind farm, located in Northern Cape, South Africa. The project is supported by a 20 year PPA with Eskom and is equipped with turbines from China's Guodian United Power Technology UP86/1500 turbines (1.5MW nameplate capacity).[38]

China Longyuan Power - Ukraine

Longyuan commissioned the Ukraine 76MW Yuzhny project in 2019, China's first in Europe.[39]

[37] Wind Power Monthly, Longyuan commissions first project outside China, 25 November 2014

[38] Global Energy Monitor Wiki, Longyuan Mulilo De Aar Maanhaarberg wind farm

[39] CNN, Group to Launch First Greenfield Wind Power Project in Europe, 23 August 2019

3.2 ODFI Wind - Goldwind

Goldwind Science & Technology Co. (Goldwind) was the largest manufacturer of wind turbines globally in 2023 - Figure 2.2.

In 1HCY2024, Goldwind has achieved business breakthroughs in Morocco, the Philippines, Georgia and Namibia, expanding its business operations to a total of 42 counties. As of June 2024, Goldwind's cumulative installation in overseas markets is 7,421MW, of which the installation in North America, Australia, Asia (excluding China) and South America has exceeded 1GW; the order backlog in overseas market totalled 5,173MW.[40]

Goldwind reports strong growth in exports of turbines to Canada as a key new market.[41]

June 2023 saw Goldwind win the turbine supply contract for the 500MW Tractebel wind project on the Red Sea Coast in Egypt for Red Sea Wind Energy SAE. RSWE is a collaborative venture involving ENGIE, France (35% stake), Toyota Tsusho Corporation & Eurus Energy Holdings Corporation, Japan (collectively holding 40%), and Orascom Construction, Egypt (25%) and reached financial close in June 2023.[42]

May 2024 saw Goldwind sign an MoU with The Blue Circle, a leading renewable energy firm in Southeast Asia, to undertake the 101MW Kalayaan 2 Wind Power Project (equipped with 17 GW165-6.0MW wind turbines), Goldwind's first foray into the Philippine market.[43]

August 2024 saw Goldwind win a 206MW wind farm contract in Georgia.[44]

August 2024 saw Goldwind and the privately owned Australian Omni Energy file their EIS for a 1.4GW wind farm and 200MW/400MWh BESS at the proposed Baldon Wind Farm, which would be built within NSW's South West Renewable Energy Zone (REZ). The proposal features Goldwind's first deployment in Australia of its new 8MW onshore wind turbine.[45]

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[40] Goldwind 1HCY2024 Results Presentation

[41] RechargeNews, China's Goldwind sees Canada as new turbine growth market, 24 May 2024

[42] RSWE press release, Financial Close Gala Dinner Celebration, 12 June 2023

[43] Goldwind press release, Goldwind Secures First Project in the Philippines: Expanding Operations to 40 Countries, 6 May 2024

[44] Windtech International, Goldwind wins wind power project in Georgia, 7 August 2024

[45] RenewEconomy, China's Goldwind files EIS for massive wind and battery project featuring biggest turbines to date, 12 August 2024

3.3 ODFI Wind - Power China

POWERCHINA (Power China) has carried out the construction and implementation of solar and wind energy projects in Pakistan, Thailand, Vietnam, Ukraine, Argentina, Kazakhstan and other countries around the world as detailed below, with a total installed capacity of 9GW.[46]

Power China - Ukraine

Power China has a 288MW wind power project in Ochakiv in southern Ukraine.

The US$1bn 800MW Nikolsky onshore wind farm is planned in Donetsk, Ukraine. The proposal includes EPC by Power China with turbines supplied by Vestas Wind Systems. The project, the largest proposed wind farm in Europe, is on-hold due to Russia's invasion of Ukraine.[47]

Power China - Egypt

March 2024 saw the completion of Power China's first turbine at its US$709m 500MW Amunet wind power project in the Gulf of Suez, Egypt, using 70 of the largest turbines installed to-date in Africa, at 6.5MW each, supplied by China's Envision Energy. Power China and Huadong Power China Engineering Corporation are undertaking the EPC on behalf of the UAE's independent power producer (IPP) Amea Power. The wind farm is supported by a 25-year PPA with the Egyptian Electricity Transmission Company (EETC) grid. The wind farm is underpinned by an International Finance Corporation (IFC) facility.[48]

Power China - Ethiopia

Power China's Adama Wind Farm in Ethiopia, with a total installed capacity of 204MW, is the first overseas new energy project using Chinese technology, standards, capital and equipment.

Power China - Pakistan

Power China's 49.5MW Sapphire Wind Farm is the first wind power EPC project in Pakistan, and was connected to the grid in 2016. Power China's 49.5MW Dawood Wind Farm in Pakistan is one of the first batches of projects along the China-Pakistan Economic Corridor.

Power China - Bangladesh

June 2024 saw the commissioning of Power China's 66MW Cox's Bazar Wind Farm, its first wind power EPC project in Bangladesh, and the first utility scale wind project in the country. Cox Bazar Wind farm is owned by China's SPIC and built by PowerChina Chengdu Engineering Corp, training up to 1,500 local staff during construction.[49]

Power China - Laos

November 2023 saw the successful installation of the first wind turbine at Power China's 600MW Monsoon Wind Project in Sekong and Attapeu, Southern Laos.[50] As of May 2024, 64 of the 117 turbines have been installed. The US$950m project is being developed by Monsoon Wind Power, which was established by a group of companies including Mitsubishi,

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[46] Power China, Wind, 29 September 2022
[47] Ukraine Invest, A $1 billion wind farm to be built in Ukraine
[48] Power China, Egypt wind power project achieves major milestone, 18 March 2024
[49] Power China, Large-Scale wind farm cleared to operate in Bangladesh, 13 June 2024
[50] Power China, Laos wind power project achieves crucial milestone, 13 November 2023

ACEN Renewables International, Impact Electron Siam, STP&I, BCPG and SMP Consultation. Power China has the EPC contract. The Monsoon wind farm will export power to Vietnam's electricity grid through a 65km 500kV cross-border transmission line.[51]

A group of financing institutions including the Asian Development Bank (ADB), the Japan International Cooperation Agency (JICA) and Sumitomo Mitsui Banking provided a US$692m financing package under an agreement signed with the developers in April 2023.

Power China - Argentina

Power China's 350MW Helios Wind Farm is the largest wind power program built by POWERCHINA in Argentina.

Power China - Vietnam

Power China's 48MW Tra Vinh V1-2 48 MW Offshore Wind Power Project in Vietnam.

Power China - Kazakhstan

November 2023 saw China Power International, in partnership with Visor International DMCC, complete a US$36m loan agreement with the Asian Infrastructure Investment Bank (AIIB) supported by concessional financing of US$10m from the Green Climate Fund and US$6m from the Clean Technology Fund. This supported the development, construction and operation of a 100MW wind power plant in the Zhambyl region of Southern Kazakhstan. The AIIB used the announcement to recommit its target that 50% of all overall approved financing will be directed toward climate finance by 2025. AIIB approved its first 100MW Zhanatas wind farm project in 2019, and all its 40 turbines have been fully operational since 2021.[52]

Power China - Bosnia and Herzegovina

September 2024 saw the pre-commissioning of Power China's 84MW Ivovik Wind Power Project. This is the first new energy project invested in and built by a Chinese company in Bosnia and Herzegovina.[53]

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[51] Monsoon wind farm, Laos

[52] AIIB Press Release, AIIB Finances Second Wind Power Project in Southern Kazakhstan, 7 Nov 2023

[53] Power China, Ivovik Wind Power Project passes pre-commissioning acceptance by govt, 2 September 2024

3.4 ODFI Wind - Other International Wind Projects

China Energy Engineering Corporation – Japan

May 2024 saw CEEC sign a framework contracting agreement with Japan's Clean Energy Factory Co., Ltd. for a 66MW onshore wind farm project in Tsuyama, Japan owned by Thailand's B Grimm Power.[54]

China Energy Engineering Corporation – Philippines

September 2024 saw CEEC and Philippines' Power Beacon Renewable Solutions sign an EPC contract for the 400MW San Quinting wind farm project in Pangasinan Province, Luzon, Philippines.[55]

China Energy Construction Guangxi Engineering Bureau – Philippines

August 2024 saw China Energy Construction Guangxi Engineering Bureau commence construction of a 64MW onshore wind farm project in Arabat, Philippines, using 8MW turbines.[56]

State Power Investment Corporation (SPIC) - Brazil

June 2024 saw SPIC Brazil invest US$147m to acquire two under construction wind farms in Rio Grande do Norte state of Brazil with a combined capacity of 105MW.[57]

Mingyang - Brazil

August 2024 saw China's Mingyang reach an agreement to install 30 of its MySE 4.0-156 and 19 of its MySE 6.25-172 model turbines at a 240MW onshore wind farm owned by Brazilian utility COPEL for delivery in 2025, its first supply contract in South America.[58]

China Southern Power Grid - Uzbekistan

China Southern Power Grid International (HK) is the global investment and development arm of China Southern Power Grid.

July 2024 saw China Southern Power Grid International (HK) acquire a 35% stake in Saudi Arabia-listed ACWA Power's two Asian units, ACWA Power Bash Wind Project Holding and ACWA Power Uzbekistan Wind Project Holding. Together, the projects represent a combined wind capacity of 1GW (the largest two wind projects in Central Asia to-date), with an investment of over US$1.3bn. ACWA noted that the deal is a result of framework agreements signed in December 2022 to enhance financing, investment, and construction of its clean and renewable energy projects in Saudi Arabia and in other 'China Plus One' countries. The transaction marks the first co-investment between the two companies in Central Asia's renewable energy sector.[59]

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[54] China Energy Engineering Corp., CEEC Signs Tsuyama Onshore Wind Farm Project, 24 May 2024
[55] 国际能源网, 签约！菲律宾圣金庭400兆瓦风电项目EPC合同, 14 September 2024
[56] China Energy Construction Guangxi Engineering Bureau, China Energy Construction Guangxi Engineering Bureau's first overseas wind power project officially started, 21 August 2024
[57] Reuters, China's SPIC invests $147 million in Brazil wind farms, launches solar parks, 6 June 2024
[58] Power Mag, China's Mingyang Will Install Wind Turbines in Brazil, 16 August 2024
[59] Power Technology, ACWA Power sells 35% stake in two Asian units to Chinese firm, 18 July 2024

China Energy Engineering Construction - Uzbekistan

August 2024 saw the 1GW Bukhara wind power project in Uzbekistan reach a significant milestone as the final turbine foundation was poured at the Dzhankeldy Wind Farm in a project owned by ACWA and built by CEEC.[60]

Shanghai Electric - Vietnam

February 2024 saw Shanghai Electric Power secure a supply order for 8 WH5.25-172 turbines for the 40MW Hai Anh Wind Farm Project onshore in Quang Tri Province, Vietnam for completion by November 2024.[61]

Shanghai Electric - Indonesia

May 2024 saw Shanghai Electric Power sign a contract with Tsingshan for a demonstration 5MW wind power project in the Weda Bay Industrial Park in Indonesia. The total new energy developable capacity of the park exceeds 2 GW, and the two sides will take the project as an opportunity to further explore the subsequent new energy planning and development cooperation in the industrial park, and strengthen the international cooperation and demonstration of green supply chain.[62]

CK Infrastructure - UK

August 2024 saw Hong Kong-listed CK Infrastructure Holdings (CKI) acquire 32 UK onshore wind farms with a combined capacity of 175MW for £350m (US$450m) from Aviva Investors.[63] CKI acquired UU Solar in May 2024 for £90m (US$114m) with a total solar, wind and hydro capacity of 69MW.[64]

Sany Renewable Energy - Sembcorp - India

March 2024 saw China's Sany Renewable Energy win its first 52MW turbine supply deal with Sembcorp's Green Infra Clean Wind Power Limited in Karnataka, India.[65]

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[60] CEEC, 158 WTGs of CEEC Bukhara Wind Power Project in Uzbekistan Complete Foundation Pouring, 8 August 2024

[61] Renewables Now, Shanghai Electric unit to supply turbines for 40-MW Vietnam wind project, 27 February 2024

[62] Shanghai Electric press release, Fostering new quality productive forces through practical milestone, 5 May 2024

[63] SCMP, Li Ka-shing's CK Infrastructure Holdings acquires 32 UK wind farms for US$448.5 million, 14 August 2024

[64] SCMP, Li Ka-shing's CK Infrastructure buys US$113.5 million of renewable-energy assets in second UK deal in 2 weeks, 7 May 2024

[65] Sembcorp awards 52 MW Wind Turbine order to SANY in India, 13 March 2024

3.5 Offshore Wind Installations

Mingyang Smart Energy – Going Global

Mingyang Smart Energy, the world's leading offshore wind turbine supplier in 2023, has expanded its project portfolio into China's strategic alliance countries and other emerging overseas markets. Mingyang's business operations now cover Southeast Asia, East Asia, Latin America, Europe, and the Middle East and North Africa. In the past five years, Mingyang has secured orders in Italy, the UK, Serbia, Japan, South Korea, Vietnam, and the Philippines.[66]

Mingyang - South Korea

November 2023 saw Mingyang Smart Energy, in collaboration with South Korea's Unison, secure its first South Korean order from Woori Technology to supply 6.5MW offshore wind turbines for the Aphae 80 MW offshore wind project in South Korea.[67]

June 2024 saw Mingyang win the contract to supply 6.0MW turbines for the 70MW Gochang Project with Dongchon Wind Power.[68]

Goldwind - South Korea

June 2024 saw Goldwind win the contract to supply 64 turbines to the 365MW Yeonggwang Nakwol Korean offshore wind farm under construction with an investment of 2.5 trillion won (US$1.8bn), underpinned by the 2023 Korean Government auction. Heongtong Group, China's largest power and fiber optic cable manufacturer, will provide the submarine cables for the project.[69]

Shanghai Electric / Macquarie Group – South Korea

October 2023 saw Shanghai Electric enter the South Korean offshore wind market by signing a turbine contract with Macquarie Group's Corio Generation and South Korea's Hyosung Heavy Industries for the South Korean project Dadaepo. Regardless of the small size of the contract, with only 12 turbines, it is a big step for Shanghai Electric to expand its footprint outside China for offshore wind turbines. The turbine model for the project is the SEW8.5-230, which has a capacity of 8.5MW.[70]

China Energy Engineering Corporation – South Korea

January 2024 saw CEEC and its Korean partner consortium win the bid for South Korea's 365MW offshore wind power EPC in South Jeolla Province. The project will start construction in January 2024 and is expected to be connected to the grid by the end of 2025. This project is the fourth project signed by China Energy Engineering in South Korea.[71]

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[66] Global Offshore Wind Report, June 2024
[67] OffshoreWind.Biz, Mingyang to Supply 6.5 MW Turbines for Wind Project Offshore South Korea, 29 November 2023
[68] Korea Economic Daily, S. Korea may join offshore wind alliance to take on China, 8 July 2024
[69] Blue Cluster, Offshore Wind in South Korea: state of affairs as of June 2024, 14 June 2024
[70] ESGIAN, Shanghai Electric is expanding its horizons by entering the South Korean market by signing a turbine contract with Corio Generation and Hyosung Heavy Industries, 26 October 2023
[71] China Energy Engineering Corporation, China Energy Engineering won the bid for South Korea's 365 MW offshore wind power project, 9 January 2024

3.6 Wind Turbine Manufacturing Offshore

China's global wind turbine manufacturing expansion and technological advancement have been impacting the landscape for non-Chinese competitors in the industry.

May 2024 saw Siemens Energy CEO Christian Bruch say Siemens Gamesa won't compete with rival Chinese wind turbine manufacturers in markets where the "sole decision criteria of the customer is price."[72] Siemens Gamesa has begun restructuring and downsizing as part of a re-prioritisation into European and US markets after a string of net losses over 2023/24.[73]

August 2024 saw Germany's EnBW confirm it would consider Chinese wind turbines given the small pool of global suppliers available.[74]

And August 2024 saw Green Giraffe's MD Clement Weber confirm the bankability of Chinese wind turbines continues to improve in European markets due to ongoing technical and commercial advances, despite the political headwinds.[75]

August 2024 saw Mingyang successfully install in Hainan, China its world-leading MySE18.X, at 20MW, this is the world's largest to-date single-capacity offshore wind turbine, trumping Dongfeng Electric's commissioning of an 18MW turbine earlier in 2024.[76]

Mingyang - Italy

July 2024 saw China's Premier Li Qiang and Italy's Prime Minister Giorgia Meloni reconfirm the Global Strategic Partnership between China and Italy and commit to maintaining bilateral relations, particularly relating to the economic issues of trade cooperation and investment, market access and sustainable growth, particularly for collaboration in the field of renewable energy and associated technologies. Financial cooperation was noted as a priority, with respect to enhanced implementation of the G20 Sustainable Finance Roadmap and strengthened efforts to implement the UN Framework Convention on Climate Change and the Paris Agreement.[77]

July 2024 saw Mingyang in discussions to be a supplier to Renexia – the renewables arm of Italy's Toto construction group – for the planned 2.8GW Med Wind project off the coast of Sicily. This was confirmed by Italy's minister of economic development, Adolfo Urso.[78] Were Mingyang to supply Med Wind, it could give the OEM a chance to use its new 16.6MW

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[72] Recharge News, Siemens Energy CEO: 'We won't compete with Chinese wind turbines solely on price', 22 May 2024

[73] Recharge News, Eickholt out as CEO as wind giant Siemens Gamesa faces major shake-up, 9 May 2024

[74] Recharge News, Germany's EnBW 'could use Chinese wind turbines', 9 August 2024

[75] Recharge News, Banks are shifting from 'no' to 'maybe' when it comes to Chinese turbines, 21 August 2024

[76] RenewEconomy, World-first 20MW offshore wind turbine installed in China, 2 September 2024

[77] Government of China, Chinese premier holds talks with Italian prime minister, 29 July 2024

[78] Recharge News, Chinese turbine giant in line for massive European floating wind project, 16 July 2024

OceanX twin-rotor floating wind platform. April 2022 saw Renexia complete a 30MW Beleolico pilot array off Taranto with MingYang 3MW turbines.[79]

July 2024 also saw the announcement that Mingyang was chosen to supply its world-leading 18.5MW turbines to a 270MW offshore wind project in the German North Sea. German clean energy asset manager Luxcara said it has signed a preferred supplier deal with Mingyang for a project due for installation around 2028. The prospect of Chinese turbine OEMs making major inroads into Europe has had the continent's wind sector up in arms recently, amid doomsday warnings they could outcompete homegrown OEMs by offering turbines at as little as half the price.[80]

August 2024 saw Mingyang announce an MoU with Italian developer Renexia to form a JV to build the plant with an investment of around €500m to set up an offshore offshore wind turbine factory in Italy that will produce the Chinese OEM's 18.8MW floating models to supply a 2.8GW floating wind project near Sicily.[81]

Mingyang - South Korea

September 2024 saw Mingyang announce plans to build an offshore wind turbine factory in South Korea in JV with South Korea's Union.[82]

Mingyang - Scotland

April 2024 saw Mingyang announce plans to build an offshore wind turbine factory in Scotland.[83] It has faced an immediate outcry from the incumbent EU wind turbine industry about unfair competition, despite the influx of investment, technology and employment to Scotland in the process. The geopolitical barriers to China are growing in the EU, and India, like in the US.

May 2024 saw the head of global developer Corio Generation and GWEC chair say that the 'divisive language' over China and shunning of Chinese suppliers is not helping the industry, which needs every resource to meet massive targets.[84]

Goldwind - Brazil

August 2024 saw Goldwind conclude the acquisition of a former GE Renewable Energy plant in Camacari, Brazil, to take ownership of its first overseas wind turbine manufacturing facility.[85] Goldwind has an accumulated installed capacity of 662MW in Brazil, and plans to expand its installed capacity to exceed 1GW.

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[79] Recharge News, First Chinese offshore turbines turning in Europe as Mediterranean joins wind era, 25 April 2022

[80] Recharge News, China's Mingyang lined up by EU developer to supply 18MW offshore wind turbines, 3 July 2024

[81] Recharge News, China's Mingyang to set up Italian factory and supply 18.8MW turbines for floating project, 9 August 2024

[82] Recharge, China's Mingyang to make wind turbines in South Korea in breakthrough deal, 5 September 2024

[83] Recharge, 'A Chinese factory in Scotland is bad for the entire European wind power supply chain': industry chief, 10 May 2024

[84] Recharge, Corio chief Cole warns 'ostracising' Chinese wind turbines puts energy transition at risk, 16 May 2024

[85] Goldwind press release, Goldwind's Wind Equipment Manufacturing Base in Brazil Officially Launched, 28 August 2024

Goldwind - Spain

June 2024 saw reports that Vensys, a division of Goldwind is planning to produce an 86-metre wind turbine blade model at its factory in Ferreira, Spain.[86]

France offshore wind

May 2024 saw a consortium between Belgium-based Elicio and BayWa r.e. win the AO5 tender in France to develop and operate the country's first floating offshore wind farm, the 250MW Pennavel project, off the south coast of Brittany. The tender awards the project with a €86/MWh long-term Contract for Difference (CfD).[87] But the suggestion has been put forward that the winning bid in France's first floating offshore wind tender might only be economically viable with the use of cheaper Chinese turbines.[88]

Envision - PIF & RELC - Saudi Arabia

July 2024 saw an agreement with China's Envision Energy, the Saudi Arabian PIF, and the private Saudi renewables firm Vision Industries to transform Saudi Arabia into a manufacturer of 4GW pa of wind turbines and components. The PIF's subsidiary Renewable Energy Localization Company (RELC) focuses on creating partnerships between leading global manufacturers and the Saudi private sector to meet growing local and export demand for renewable energy, and secure and strengthen local supply chains.[89]

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[86] Reuters, Chinese Wind Turbine-makers Move into Europe as Trade Tensions Flare, 19 July 2024

[87] Offshorewind.biz, France Names Winner of Country's First Large-Scale Floating Offshore Wind Tender, 16 May 2024

[88] Windpowermonthly, Will France need Chinese turbines to make first floating offshore wind tender viable?, May 2024

[89] PIF Press Release, PIF strengthens renewable energy localization in Saudi Arabia with three new JV, 16 July 2024

SECTION 4 SOLAR

China totally dominates the technology development and manufacturing supply chains for the global solar industry.[90] With increased tariffs on Chinese exports of solar modules and procurement policies preferencing domestic supply chain development, China has spent 2024 significantly ramping up offshore solar cell and module manufacturing capacity. Chinese solar majors have commissioned 17GW of module capacity in the US in 2023/24.

China has also been going global in the overseas development of new solar farms, building the largest to-date solar developments in a range of markets, particularly in the developing world - spanning Morocco, Algeria and Zambia in Africa to the UAE, Iraq and Saudi Arabia in the Middle East, to Indonesia, Laos and Vietnam in Asia, to Argentina, Chile and Brazil in South America.

September 2024 saw Bloomberg NEF forecast global solar installs in 2024 of 592GWac, +33% yoy, and then continued global growth to 996GW by 2035.[91] CEF is more optimistic about the disruption of global energy markets by solar and BESS combined and expects this target to be reached by 2030.

China's Overseas Development of Solar

China has driven massive ongoing deflation and technology development in the booming global solar industry, surpassing all forecasts for solar installs and cost reductions. Whilst China is by far the largest installer of solar farms globally, the benefits to the rest of the world in terms of energy security, capex deflation and decarbonisation are profound. This is probably best illustrated in Pakistan in 2024, where BloombergNEF forecasts solar installs of 10-15GW will occur, increasing the nation's installed electricity capacity by 20-30% in just one technology in one year.[92]

China achieved a record 40% yoy increase in solar exports by volume in 2023, even as the total value declined by 6% yoy to US$49bn (implying a near 46% decline in per unit prices), according to WoodMac.[93] And this occurred despite the development of local content requirements (LCR), such as: 40% in the EU, 60% for financial support in Brazil, 40% for Saudi Arabia, 100% local ownership for large-scale solar in Malaysia, 100% for Turkey to access VAT waiver; and 100% LCR for public tenders in India.

Import tariffs against Chinese sourced solar products in the US and India, the two largest solar markets outside of China itself.

Chinese solar manufacturers are increasingly globalising their manufacturing capacity in the US, EU, South America, the Middle East and ASEAN to circumvent country-specific sanctions against Chinese products.

Chinese state-owned enterprises (SOEs) are spearheading China's involvement in greenfield solar installations globally, both directly and in partnership with private firms.

We illustrate just some of the global solar projects evident in the last year by Chinese corporate leaders below.

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[90] Bloomberg, How the US Lost the Solar Power Race to China, 30 September 2024
[91] PV Magazine, Solar module installed capacity will reach 592 GW in 2024, 2 September 2024
[92] Bloomberg, Pakistan Sees Solar Boom as Chinese Imports Surge, BNEF Says, 9 August 2024
[93] Wood Mackenzie, Looking overseas: global reach of China's solar and storage industry, April 2024

4.1 Solar ODFI - Power China

Power China – Morocco

Power China was involved in the development of the 200MW Noor Phase II CSP Project in Morocco, deployed through a parabolic trough CSP system.[94]

Power China was then involved in the development of the 150MW Noor Phase III CSP Project in Morocco, the largest CSP unit capacity in the world. The Project won the 2019 China International Sustainable Infrastructure Award, the 2020 China Power Quality Project (Overseas) Award, and the Social Responsibility Award Certificate issued by the Moroccan government.

Power China – Algeria

March 2024 saw Power China hold a signing ceremony for the construction of two photovoltaic projects between POWERCHINA and Sonelgaz-EnR in Algeria. The two solar projects have a capacity of 220MW and 150MW respectively. The two projects are part of the 15GW photovoltaic network planned and constructed for Algeria by 2035.[95]

Power China was involved in the development of the 233MW SKTM Photovoltaic Project as the first large-scale photovoltaic power plant in Algeria.

April 2024 saw Power China commence construction of the 220MW Biskra solar project located in Biskra Province in southeastern Algeria.[96]

Power China – UAE

March 2024 saw Power China secure the US$755m EPC contract for the 1.5GW Al Ajban PV3 solar power plant in Al Ajban city in the Abu Dhabi Emirate of United Arab Emirates.[97]

Power China – Zambia

February 2024 saw Power China's Kabwe 100MW Solar PV Project break ground in Zambia. Once completed, this will be Zambia's largest solar power plant.[98]

April 2024 saw Power China commission the 50MW Itimpi Solar Farm in Zambia.[99]

Power China – Tanzania

March 2024 saw Power China hold a signing ceremony for the construction of the 50MW Shinyanga Solar Power Plant project, the first in Tanzania.[100]

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[94] Power China, Solar, 29 September 2022

[95] Power China, POWERCHINA to promote solar power development in Algeria, 18 March 2024

[96] Xinhua Silk Road, China Power Construction Corporation starts construction of Algeria solar project, 24 April 2024

[97] Yicaiglobal, PowerChina Gains After Securing USD755m EPC Contract for PV Power Station in UAE, 26 July 2024

[98] Power China, Zambia's largest solar power plant breaks ground, 2 February 2024

[99] Power China, Zambian president attends grid-connection ceremony of POWERCHINA-built solar plant, 11 April 2024

[100] Power China, Tanzania deputy PM attends groundbreaking ceremony for local solar power plant, 15 March 2024

July 2024 saw Power China sign an EPC contract with a British solar power station developer for the 113MW Kahama Phase II solar project, located in the south of Kahama City, Shinyanga Province, Tanzania. It includes 22MW of energy storage. This follows the completion of the company's 10MW Kahama PV Phase I project in July 2024. It is impressive to see Power China state that this lays a solid foundation for the company to continue to deepen its presence in Tanzania's new energy market.[101]

Power China – Vietnam

Power China was involved in the development of the 500MW Dau Tieng Photovoltaic Solar Power Project in Vietnam, the biggest solar project in Southeast Asia and the world's largest semi-immersed photovoltaic project. The Project won the 2019 Asian Power Awards, the 2020 China Power Quality Project (Overseas) Awards, and the 2020-2021 China Construction Engineering Luban Award (Overseas Engineering).

Power China built the 47.5MW DAMI Solar Power Project, located in Dami Reservoir, Binh Thuan Province, as the first floating photovoltaic power plant in Vietnam.

Power China – Philippines

January 2024 saw Power China and the Ayala Group in the Philippines sign the EPC contract for the San Marcelino Solar Farm Phase III Project in Manila, Philippines, the largest of its kind in the country. The Phase III project is an expansion of the Phase I and Phase II projects undertaken by POWERCHINA. Upon completion of Phase III, the total installed capacity will reach 584MW. The project marks the third collaboration between POWERCHINA and Ayala Group. Power China is the largest new energy power contractor in the Philippines.[102]

June 2024 saw Power China commission the 64MW Tanauan Solar Power Plant in the Philippines.[103]

Power China – Argentina

Power China was involved in the development of the 315MW Argentina Cauchari Jujuy Solar PV Project, the world's highest large-scale photovoltaic power station. March 2024 saw Power China commission another 18MW San Carlos Photovoltaic Power Station project.

Power China – Chile

April 2024 saw Power China commission the CEME1 480MW Solar Farm in the Atacama Desert in Chile using solar modules supplied by China's JA Solar. This is the largest solar project in Chile, to-date.[104]

Power China – Colombia

POWERCHINA currently has 10 solar projects under construction in Colombia, with a total installed capacity of 567MW.

April 2024 saw Power China commission a 23MW Solar Farm in Colombia.[105]

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[101] Power China, China Power Construction signs contract for 100MW Kahama Phase II photovoltaic project in Tanzania, 31 July 2024

[102] Power China, POWERCHINA to further develop solar power in Philippines, 2 January 2024

[103] Power China, Tanauan Solar Power Plant completed in Philippines, 4 June 2024

[104] Power China, Chile 480MW solar farm connected to grid with full capacity, 20 May 2024

[105] Power China, Colombian president witnesses completion of solar park, 15 April 2024

April 2024 saw Power China commission a second 108MW Solar Farm in Colombia in collaboration with Medellin Electric Company.[106]

Power China – Brazil

Power China has 7 projects under construction across Brazil.

April 2023 saw Power China win the tender to construct a US$344m 343MW Solar Farm in Mauriti, Brazil, due for commissioning in February 2025.[107]

Power China – Oman

February 2023 saw Power China confirm the 2022 completion of the 575MW IBRI II Solar Project, currently the largest photovoltaic project in Oman.[108]

Power China – Serbia

May 2024 saw Power China commission the 10MW Saraorci Photovoltaic Project in Serbia, the largest in the country to-date.[109]

Power China – South Africa

September 2024 saw Power China commission the 100MW Redstone Solar Thermal Power Project in South Africa, Sub-Saharan Africa's first molten salt solar thermal power plant in a tower configuration.[110]

Power China – Indonesia

September 2024 saw Power China commission the Karawang 100MW Solar Project in Bukit Indah, West Java Province, Indonesia.[111]

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[106] Power China, Colombia PV project connected to grid, 7 April 2024

[107] Power China, PowerChina invests in new Brazilian solar plant, 25 April 2023

[108] Power China, POWERCHINA-built solar PV project boosts Oman's green aims, 27 February 2023

[109] Power China, Serbia's largest under-construction PV power plant connected to grid, 27 May 2024

[110] Power China, Redstone Solar Thermal Power Project achieves first grid connection, 18 September 2024

[111] Power China, Indonesia's biggest onshore PV project starts operating, 2 September 2024

4.2 Solar ODFI - CEEC

China Energy Engineering Corporation (CEEC) is one of China's top enterprises for overseas new energy project contracts, accounting for some 50% of the total contract value delivered in 2023.

China Energy Engineering Corporation - Saudi Arabia

February 2024 saw CEEC complete the 2.6GW Al Shubach solar plant in Mecca Province, Saudi Arabia. It uses the world's most advanced N-type bifacial photovoltaic modules and flat single-axis automatic tracking covering an area of about 52 square kilometres. The project is jointly invested by Saudi International Electricity and Water Company (ACWA Power), Saudi Arabian Sovereign Wealth Fund's subsidiary Water and Power Holding Company (Badeel), and Saudi Aramco Power Company (SAPCO).[112]

August 2024 saw CEEC secure a US$972m contract to construct a 2GW solar power station near Taif in Saudi Arabia under the Buraiq Renewable Energy partnership, a CEEC JV with ACWA Power, Saudi Arabia's Public Investment Fund, and Saudi Aramco Power.

CEEC had previously secured a major contract in Saudi Arabia to build the 300MW Rabigh Solar PV plant in 2021.[113]

China Energy Engineering Corporation - Iraq

August 2024 saw CEEC win a 1GW PV plant EPC contract from TotalEnergies in the Basra province, Iraq to power the Artawi oilfield, the country's first major solar development.[114]

September 2024 saw Energy China International sign a contract for a 125 MW solar project in Erbil, Iraq, with Bros Energy Company of Turkey and Ster Group of Iraq. This project, which is part of the initial phase of the 1 GW Erbil solar plant, will involve designing, procuring, installing, and commissioning a 125 MW solar power plant and a 132 kV substation.[115]

China Energy Engineering Corporation - Uzbekistan

July 2024 saw CEEC commission 1GW of solar in Uzbekistan, comprising two PV plants, each with 500 MW of capacity, in the Bukhara and Kashkadarya regions.[116]

July 2024 saw CEEC commence construction of a US$140m,150MW/300MWh BESS in Oz, Uzbekistan. This project was invested by China Energy Overseas Investment Co., Ltd and is due for commissioning by December 2024.[117]

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[112] CEEC, The Alshubah photovoltaic power station booster station project in Saudi Arabia undertaken by China Energy Construction Group has been fully capped, 27 February 2024

[113] Yicai Global, Energy China Consortium Wins USD972 Million Deal to Build Solar Power Farm in Saudi Arabia, 14 August 2024

[114] Taiyangnews, Iraq's '1st' Large-Scale Solar PV Power Station Moves Forward With EPC Contract, 9 August 2024

[115] CEEC, CEEC Signs EPC Contract for 125MW PV Project in Iraq, 23 September 2024

[116] CEEC, Largest PV Project by Chinese-funded enterprises in Central Asia Fully Connected to Grid, 10 July 2024

[117] CEEC, Uzbekistan Holds Ceremony Dedicated to Launching and Construction of Key Energy Projects, 19 July 2024

China Energy Engineering Corporation - Mexico

July 2024 saw CEEC commission the Biskra 220MW solar project located in Puerto Peñasco, Sonora Province, Mexico.[118]

China Energy Engineering Corporation - Tunisia

June 2024 saw CEEC commence construction of a 100MW solar project on 200ha in Kairouan Province, Tunisia, the first utility solar project in the country for the UAE's AMEA Power.[119]

China Energy Engineering Corporation - Indonesia

August 2024 saw CEEC commission a 50MW solar project in East Kalimantan Province, Indonesia.[120]

China Energy Engineering Corporation - Philippines

May 2024 saw CEEC commence construction of the Labrador 160MW solar in the Philippines, a significant contribution to achieving the country's 2030 renewable energy development goals.[121]

China Energy Engineering Corporation - Malaysia

June 2024 saw CEEC near completion of the EPC of the 69MW Batang AI Floating Solar Project in Malaysia, as well as a 275kV booster station.[122]

China Energy Engineering Corporation - Thailand

June 2024 saw CEEC sign contracts for the development of a 35MW rooftop solar system located at the ZC Rubber Factory within the AMATA Industrial Park in Rayong Province, Thailand, for B. Grimm Group. Once deployed, it will be the largest rooftop system in Thailand.[123]

China Energy Engineering Corporation - Egypt

April 2024 saw CEEC sign an EPC contract for the 200MW solar power project in Kom Ombo, Egypt with ACWA Power. The project is located 805km south of Cairo.[124]

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[118] CEEC, Mexican President Visit CEEC-Contracted PV Project in Mexico, 17 July 2024

[119] CEEC, Construction of Tunisia solar project undertaken by Chinese enterprises begins, 20 May 2024

[120] CEEC, The First Key Renewable Energy Power Project in New Capital Region of Indonesia Started, 22 August 2024

[121] CEEC, Labrador 160MW Photovoltaic Project Commenced in the Philippines, 20 May 2024

[122] CEEC, Sarawak Premier Abang Johari Visited the Batang AI Floating Solar Project Site, 26 June 2024

[123] CEEC, CEEC SEPEC Signs 35 MW Rooftop Photovoltaic Power Generation Project, 26 June 2024

[124] CEIC, China Electric Power Engineering signs EPC contract for Egypt's Kang Ombo 200MW photovoltaic power station project, 11 April 2024

4.3 Solar ODFI - Other Firms

Jiangxi International Corporation - Namibia

September 2024 saw Jiangxi International Corporation and Zhejiang Chint New Energy Development Co., Ltd along with the National Electricity Company of Namibia sign a 100MW solar PV power station EPC project contract during the Beijing Summit of the Forum on China-Africa Cooperation.[125]

SPIC - Brazil

SPIC Brazil, headquartered in São Paulo, is responsible for the development, construction, and operation of SPIC's projects in Brazil. The operational assets include the 1,710MW Sao Simao Hydropower Station in Minas Gerais, with the 63MW Ventos wind farm under development in Paraíba.

June 2024 saw SPIC Brazil commission both the Panati Solar Power Station in Ceará and the Marangatu photovoltaic power plant in Piauí, with a combined capacity of 738MW, owned 70% SPIC and 30% Recurrent Energy.[126]

Dongfang Electric Corporation – Uzbekistan

March 2024 saw the combined 511MW Samarkand and Jizzakh solar power plants in Uzbekistan connected to the grid for power generation. The two plants were developed and built by Abu Dhabi Future Energy Co, also known as Masdar, and contracted by Dongfang Electric Corporation.[127]

Dongfang Electric Corporation – Floating Solar & BESS - Thailand

March 2024 saw the Electricity Generating Authority of Thailand (EGAT)'s 24MW floating solar / BESS hybrid project at Ubol Ratana Dam commence operation, constructed by Dongfang Electric International Corporation. The solar panels cover less than 1% of the total reservoir surface area. This is EGAT's second floating solar hybrid project developed in accordance with Thailand's Power Development Plan, which involves EGAT developing 16 floating solar projects at nine dams with a total installed capacity of 2,725MW.[128]

Sungrow – India (with Hero Future Energies)

July 2024 saw Sungrow secure an 850MW inverter supply contract with Hero Future Energies, a leading Indian solar EPC firm.[129] China has not been invited by the Indian government to undertake significant investment in cleantech in India, but this very significant export order shows the need for collaboration and leverage of global supply chains, particularly given the price competitiveness of Chinese solar equipment majors.

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[125] 国务院国有资产监督管理委员会, 签约纳米比亚最大光伏电站项目！江西国际公司为中非绿色能源合作注入动能, 14 September 2024

[126] SPIC's Overseas Photovoltaic Project Group Completed in Brazil, 26 June 2024

[127] Trinasolar, As phase I of 511MW project is connected to grid, TrinaTracker's Vanguard 1P makes Uzbekistan greener, 4 March 2024

[128] HydroReview, EGAT announces commercial operation of hydro-floating solar hybrid at Ubol Ratana Dam, 8 March 2024

[129] PV Magazine, Sungrow secures 850 MW inverter supply contract with Hero Future Energies, 18 July 2024

China Harbour - Botswana

July 2024 saw China Harbour Engineering Co., Ltd sign a PPA with the Botswana Electricity Authority for the Botswana Jwaneng 100MW solar power station, the largest clean energy project to-date in the country.[130]

Envision – Acquisition of France's QOS Energy

July 2022 saw Envision Digital, a unit of China's Envision Group, the largest manager of renewable energy in the world with over 400GW under management and the creator of the EnOS net zero platform, announced the US$1.95bn acquisition of QOS Energy of France, a global leader in the fast-growing renewables Asset Performance Management category. QOS Energy is a leading energy management software supplier to the Commercial & Industrial (C&I) market segment and has a strong presence in solar energy in 23 countries across Europe, the US and India, with a client portfolio totalling more than 10GW across 8,000 power plants and more than 10 million of sensors.[131]

Canadian Solar - Canada

June 2024 saw Canadian Solar's subsidiary Recurrent Energy commission its 160MW North Fork solar project in Oklahoma City, with Oklahoma Municipal Power Authority taking 100% of the offtake under a 15 year PPA.[132]

China North Industries Group Corporation (CNGC) - Bosnia-Herzegovina

June 2024 saw China North Industries Group Corporation (CNGC) announce plans to invest US$115m in total to acquire an 80% stake in Bosnia-Herzegovina's Aurora Solar, and then fund the development of a 125MW solar power plant near Stolac in Herzegovina-Neretva province.[133] CNGC's subsidiary Norinco has built the largest wind farm in Croatia with an installed capacity of 156MW. The Senj wind farm was commissioned in 2021 with an investment of €200m.

Yunnan Energy Investment Group - Laos

July 2024 saw Yunnan Energy Investment Group sign a development agreement for the Laotian Khammouane Sebangphi solar power project with the Lao government. The planned capacity of this first phase is 50MW, with a storage capacity of 10MWh and a total investment of US$38m.[134]

China Energy International - Iraq

September 2024 saw Energy China International sign a contract for a 125 MW solar project in Erbil, Iraq, with Bros Energy Company of Turkey and Ster Group of Iraq. This project, which

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[130] China Harbour, China Harbour signed a PPA agreement for the 100MW photovoltaic power station investment project in Jwaneng, Botswana, 29 July 2024

[131] PR Newswire, Envision Digital Acquires Global Asset Performance Management Leader QOS Energy, 12 July 2022

[132] Canadian Solar press release, Recurrent Energy Closes US$103m PTC transfer agreement with Bank of America for North Fork Solar Project, 27 June 2024

[133] Bosnia and Herzegovina: Northern International intends to acquire 125MW solar project, 26 June 2024

[134] Yunnan Energy Investment Group signs cooperation agreement on PV project in Laos, 30 July 2024

is part of the initial phase of the 1 GW Erbil solar plant, will involve designing, procuring, installing, and commissioning a 125 MW solar power plant and a 132 kV substation.[135]

China General Nuclear - Laos

August 2024 saw China state-owned power company China General Nuclear (CGN) sign an agreement with Laos to expand a planned renewable energy base in the country's northern region. Phase 2 of the Laos Northern Interconnection Clean Energy Base wind and solar project in Vientiane includes a 580MW wind and solar plant in Luang Namtha province and a 420MW solar plant in Oudomxay province.[136]

This follows an initial agreement signed by the two sides in September 2023 to build a renewable energy base in the north of the country. Preparations have started for construction on the first phase, a 1,000MW solar plant in Oudomxay province. The first phase of the project will see the power generation exported via an existing power line that transfers power generated in Laos to China's southern Yunnan province.

United Energy Group - Bulgaria

March 2024 saw United Energy Group and Bulgarian Green Profit hold the signing ceremony of the equity acquisition agreement for the Poly-Sime 250MW solar PV project in Sofia, the capital of Bulgaria. With a proposed investment of €300m, the project is set to be the largest single solar photovoltaic project in Bulgaria. Completion is expected by mid-2026. This is also the largest investment by China into Bulgaria to-date.[137]

Jinko Solar / China Huadian – Spain

July 2024 saw China's Jinko Power sell a 175MW solar farm in Spain to China Huadian for US$190m. Construction commenced in April 2024.[138]

Jinko Solar / EDF / TAQA / Masdar – UAE

August 2024 saw the 2.1GW$_{DC}$ (1.5GW$_{AC}$) Dhafrah PV2 Energy Company solar project in the UAE commissioned, one of the largest in the world to-date. The project is owned 60% by a local JV (TAQA and Masdar) and 40% by a second foreign JV of France's EDF Renewables and Jinko Solar. The project is 100% underwritten by a 30-year PPA with EWEC at a world record low US1.32c/kW signed back in 2020.[139]

China Power Engineering Consulting Group - Tunisia

May 2024 saw China Power Engineering Consulting Group and Tianjin Electric Power Construction Co., Ltd jointly commence construction of a 100MW solar project in Kerouan, Tunisia, the country's first large scale solar project, helping alleviate energy shortages in the Tunisian electricity grid, driving decarbonisation and improving energy security.[140] Wael Chouchane, secretary of state to the Tunisian minister of industry, said Tunisia would benefit from the cooperation with Chinese companies regarding talent training and technology.

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[135] PV Magazine, Chinese PV Industry Brief: Risen, Sungrow, Arctech reveal H1 results, 10 September 2024

[136] Reuters, CGN advances deal with Laos to build renewable power base, 12 August 2024

[137] UEG Signs Acquisition Agreement For Bulgaria's Largest Single PV Project, 29 March 2024

[138] Yicai Global, China's Jinko to Sell Solar Farm in Spain for Up to USD190 Million, 29 July 2024

[139] Dhafrah Energy, THE PROJECT: Empowering the UAE

[140] Seetao, Tunisia's First Large Ground Photovoltaic Power Station Starts Construction, 11 May 2024

Shanghai Electric - Romania

May 2024 saw Shanghai Electric Power sign a contract for a 56MW EPC photovoltaic project in Skurtu, Romania, marking the first EPC order in the European market in 2024.[141]

Tongwei - ACWA Power -Saudi Arabia

September 2024 saw Tongwei win a 1.17GW module supply contract with ACWA Power for the fourth phase of the Muwahy solar project in Saudi Arabia for delivery in 2025.[142]

[141] Shanghai Electric press release, Fostering new quality productive forces through practical milestone, 5 May 2024

[142] PV Magazine, Chinese PV Industry Brief: Tongwei secures 1.17 GW order in Saudi Arabia, 27 September 2024

4.4 China's Overseas Solar Manufacturing

The dramatic decline in solar module export prices, down 60% over the last 1-2 years (Figure 3.1), is a product of the massive capacity expansion of solar polysilicon-wafer-cell-module manufacturing capacity globally, led by China. Amid the dramatic growth in solar module demand, the global supply doubles every 1-2 years.

The US and India imposed 40% module import duties on Chinese supplied modules (25% for Chinese cells) as a protectionist measure for domestic manufacturers. As a consequence, this saddled solar project developers with 40% higher module costs, transferring the capex premium to consumers through higher electricity prices to recover investor returns.

May 2024 saw the US Commerce Department respond to US manufacturer complaints of dumping and open an investigation into allegations that solar cells and panels imported from four Southeast Asian countries (Cambodia, Malaysia, Thailand and Vietnam) are being unfairly subsidised and priced below their production costs. However, the US solar industry is divided in this action. As one of the biggest buyers and installers of solar modules in the US, NextEra Energy urged the Commerce Department to reject the allegations.[143]

Figure 4.1: Solar panel prices have plummeted

Source: Financial Times

The US Inflation Reduction Act has significantly advantaged solar installations using modules, trackers and inverters made in America, but this has seen one inadvertent consequence that the US Department of Energy has been reluctant to address.

Many world-leading Chinese solar manufacturers have invested in onshore US manufacturing to access the 10% domestic content bonus, particularly for assembly of modules using upstream components manufactured in China or ASEAN. China has such a competitive scale and technology lead in the whole solar supply chain that rebuilding US capacity needs to be done in cooperation with Chinese solar corporate leaders. LONGi has a

[143] Bloomberg, Asian Solar Imports Are Subject of New US Commerce Probe, 16 May 2024

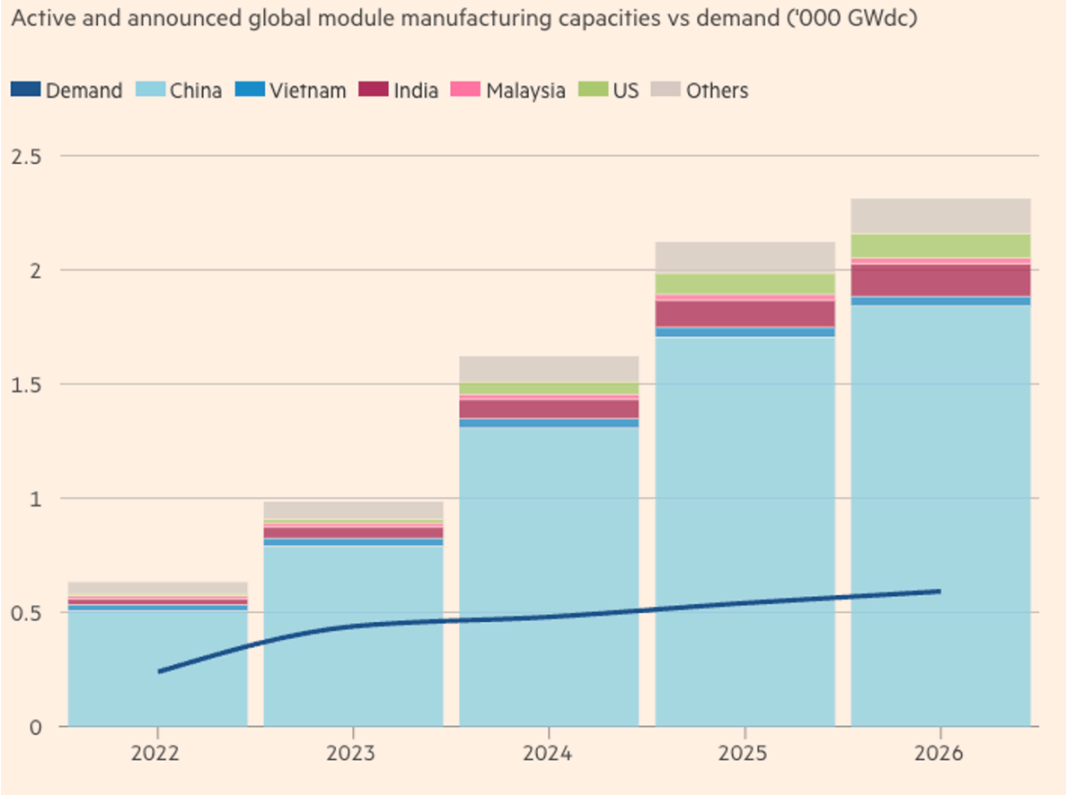
5GW pa solar module factory in Ohio in JV withUS solar developer Illuminate USA. Jinko Solar has a 2GW pa solar manufacturing plant in Florida. Tongwei / Runergy is building a 5GW pa solar panel assembly plant in Alabama, and JA Solar has a 2GW pa module facility in Arizona. In addition, Trina Solar is establishing a 5GW solar panel factory in Texas.[144]

The EU had set ambitious targets for increased solar module self-sufficiency, but failed to deliver protection against the scale and technology lead of Chinese competitors, and so the EU has felt the full weight of this 60% price decline.

In July 2024 the European Solar Manufacturing Council admitted "we are in a crisis," noting that Europe's solar panel manufacturing capacity has halved to 3GW pa since November 2023 as companies have failed, mothballed facilities, or shifted production abroad.[145]

Even the Chinese companies are facing the consequences. We note the level of extreme competition and massive oversupply has also seen most Chinese firms report losses in 1HCY2024, and a number have slowed capacity expansion plans as global capacity is set to exceed 2,000GW pa by 2025 (80% of this is in China) – Figure 4.2.

Figure 4.2: Solar module manufacturing capacity far exceeds demand (TW pa)



Source: Financial Times, Rystad Energy

This is currently viewed as a massive oversupply problem, but the world does have a long running climate and energy security crisis, so CEF would suggest we see this as a shortage of demand. This is a massive opportunity to deploy low-cost zero emissions domestic energy supply at a speed and scale no energy expert could have predicted even just two years ago.

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[144] Environment + Energy Leader, Chinese Firms Set to Control Nearly Half of U.S. Domestic Solar Panel Production by Next Year, 20 August 2024

[145] FT, Can the solar industry keep the lights on?, 22 July 2024

4.5 Canadian Solar Overseas Manufacturing

Canadian Solar's 2QCY2024 results highlight the firm's ongoing rapid expansion of capacity – from 26GW pa of cell manufacturing capacity in June 2023 to a target of 61GW pa by December 2024, a 135% expansion of manufacturing capacity in just 18 months. Canadian Solar expects CY2024 revenues guidance of US$6.5-7.5bn, an approximate 8% decline yoy, on 32-36GW of solar module shipments.

Canadian Solar also highlights the firm's efforts to diversify its manufacturing facilities to circumvent US trade barriers. Canadian Solar aims to double its US module manufacturing capacity to 5GW by the end of 3QCY2024, building on its 11GW pa of integrated wafer-cell-module capacity in Thailand. Canadian Solar has focussed on globalisation and market diversification, with 71% of revenues from markets outside of China in 2QCY2024.[146]

Canadian Solar is also shifting to a hybrid solar-BESS project development model that has expanded aggressively, and globally. Of the firm's 27GW of solar and 63GW of BESS proposed, 90% of these are outside of China.

Canadian Solar has a 6.1GW development portfolio of solar in North America, with 261MW under construction, and has developed a 19GWh portfolio of BESS project proposals.

Canadian Solar has a 5.6GW solar development portfolio in South America, with 450MW under construction, supported by a 1.8GWh portfolio of BESS proposals.

Canadian Solar has a 10.4GW development portfolio of solar in EMEA, supported by a 32.8GWh BESS portfolio of proposals.

February 2024 saw BlackRock announce a US$500m investment in Canadian Solar's Recurrent Energy, a utility-scale solar and energy storage project developer, for a 20% stake in a bid to expand its renewable energy portfolio. The transaction marks the inaugural investment for BlackRock's fourth climate infrastructure fund. The investment will allow Recurrent to grow its project development pipeline and transition into being a developer and long-term owner and operator of assets in markets including the United States and Europe. Recurrent expects to have 4 GW of solar and 2 GWh of storage in operation in theUS and Europe by 2026.[147]

August 2024 saw Canadian Solar raise US$200m of 5-year 6.0% coupon convertible bonds from PAG, a global investor with AuM of US$55bn to strengthen its balance sheet.[148]

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[146] Canadian Solar, 2QCY2024 investor briefing, 22 August 2024

[147] Recurrent Energy press release, BlackRock commits $500M to energy storage and solar project developer Recurrent Energy, 16 February 2024

[148] Canadian Solar Press Release, US$200m Private Placement of secured CN with PAG, 19 August 2024

4.6 Trinasolar Overseas Manufacturing

Trinasolar is a world-leading solar module manufacturer, with CY2023 revenues of Rmb113bn (US$16bn, +27% yoy), Net Profit of Rmb5.5bn, 43,031 staff (8% outside of China), a Return on Net Assets of 19% and investment in R&D of Rmb5.5bn (4.9% of revenues). Annual module shipments were 65GW +51% yoy in CY2023.

September 2024 saw Trinasolar report its 1HCY2024, with revenues of US$6.05bn and attributable net profit of US$74m, delivering 34GW in PV modules (+26% yoy), 1.7GWh of BESS, and 3.2GW of solar mounting systems.[149]

Globalisation is Trinasolar's strategy, stating it is “fully committed to promoting a higher level of globalisation and the integration of the innovation chain, industrial chain, capital chain and talent chain," with regional headquarters in Zurich, Fremont (Silicon Valley), Miami, Singapore, Dubai and UAE.[150]

Trinasolar – Thailand & Vietnam

By the end of 2023, Trinasolar had 6.5GW of integrated production capacity for polysilicon slicing, cells, and modules in Thailand and Vietnam, plus battery manufacturing capacity, mainly focussed on supplying the US markets.

June 2024 saw Trinasolar enter a shutdown of its Thai factory due to low module prices. This timing reflects the expiry of the June 2022 US two year exemption to tariffs on Chinese module imports produced in Thailand, Vietnam, Cambodia and Malaysia.[151] [152]

Trinasolar – PLN/Sinar Mas/Agra Surya - Indonesia

October 2023 saw Trinasolar announce a US$100m, 1GW pa Indonesian solar cell and module manufacturing plant (with a phase 2 plan to expand to 2-3GW pa), in a JV with the Southeast Asian country’s state-owned power supplier PLN, Sinar Mas, and Agra Surya Energi – via the JV entity PT Trina Daya Agra Energy. The factory targets a 3QCY2024 commissioning to both supply the growing Indonesian domestic market and circumvent the US import tariffs.[153]

Trinasolar – Vena Energy / Shell / Gurin Energy - Indonesia / Singapore

September 2024 saw Trinasolar in a consortium of Vena Energy, Shell and Gurin Energy developing a 2 GW solar and 8 GWh battery energy storage system on the Riau Islands, expected to deliver 2.6 TWh of green energy to Singapore annually, via a 400MW subsea cable connection.[154]

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[149] Trinasolar press release, Trinasolar reports revenues of $6 billion, 3 September 2024

[150] Trinasolar, 2023 sustainability report

[151] Moomoo, Trina Solar's factory in Thailand has stopped production, with its main products supplying the European and American markets, 5 June 2024

[152] Yicai Global, [Fact Check] Trina Solar Denies Shutdown, Says Thai, Vietnamese Plants to Start Routine Maintenance, 5 June 2024

[153] SolarQuarter, PLN And Partners Embark On Renewable Energy Manufacturing Venture In Indonesia, 17 October 2023

[154] PV Magazine, Singapore signs deals to import 400MW of Indonesian renewables, 6 September 2024

Trinasolar - Brazil

September 2023 saw Trinasolar open its first tracker manufacturing unit TrinaTracker in Brazil, with a 2.5GW annual capacity.[155]

Trinasolar – US

November 2023 saw Trinasolar announce a planned US$200m investment to build a 5GW solar module manufacturing facility in Wilmer, Texas, US, generating 1,500 local jobs, due for commissioning in 2HCY2024.[156]

[155] PVTech, TrinaTracker opens 2.5GW tracker manufacturing plant in Brazil, 4 September 2023

[156] Renewable Energy World, Trina Solar investing $200M to build 5-GW PV manufacturing facility in Texas, 9 November 2023

4.7 Other Companies Overseas Manufacturing

Jinko Solar & PIF – Saudi Arabia

July 2024 saw an agreement with China's Jinko Solar (40%) and the Saudi Arabian PIF's RELC (40%) and Vision Industries (20%) to transform Saudi Arabia into a manufacturer of 10GW pa of solar cells and modules, with a total investment estimated at US$985m.[157] Jinko has a 50% market share of solar modules delivered into the Middle East in 1HCY2024.

Jinko Solar - US

Jinko Solar has a 2GW pa solar manufacturing plant in Jacksonville, Florida that was expanded fivefold from 400MW in capacity over 2024 with a US$150m investment.[158] [159]

Jinko Solar - Malaysia

August 2024 saw ongoing downsizing of Jinko Solar's solar module manufacturing plant in Penang, Malaysia as the US Department of Commerce ramps up import duties on solar panels shipped from Malaysia, Cambodia, Thailand and Vietnam. These four countries collectively exported US$10bn in solar products to the US in 2023 from Chinese owned solar firms under a two year exemption from the US import duties imposed on Chinese factories.[160]

Tongwei / Jiangsu Runergy New Energy (Runergy) - Vietnam

China's Runergy is the #5 solar cell manufacturer globally. August 2024 saw Tongwei announce a US$699m investment to acquire a 51% stake in Runergy.[161]

July 2024 saw Runergy announce a strategic partnership with Bigbang Solar, a prominent player in solar energy solutions in Vietnam. Runergy has steadily increased its presence in the Vietnamese solar market. In 2023, Runergy further expanded its operations, establishing a 7GW ingot and wafer facility in Vietnam, a strategic decision to strengthen its foothold in the country.[162]

TCL Zhonghuan Renewable Energy & PIF – Saudi Arabia

July 2024 saw an agreement with China's TCL Zhonghuan Renewable Energy (40%) and the Saudi Arabian PIF's RELC (40%) and Vision Industries (20%) to transform Saudi Arabia into a manufacturer of 20GW pa of solar ingots and wafers, with a total investment estimated at US$2.1bn.[163]

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[157] PIF Press Release, PIF strengthens renewable energy localization in Saudi Arabia with three new JV, 16 July 2024

[158] Energy Trend, U.S. solar capacity Expansion Fierce, But Upstream Industry Layout Slightly Inadequate, 8 May 2024

[159] YouTube

[160] SCMP, Malaysia's 'China plus one' gold rush stumbles over a US tariff threat, 31 August 2024

[161] Yicai, China's Tongwei to Take Over World's #5 Solar Cell Supplier for Up to USD699m, 14 August 2024

[162] Runergy press release, Runergy And Bigbang Solar Join Forces To Deliver Reliable And Efficient Solar Power In Vietnam, 19 July 2024

[163] SCMP, 3 Chinese clean-energy firms to set up solar, wind manufacturing in Saudi Arabia, 17 July 2024

JA Solar – US

3QCY2024 saw JA Solar's US$60m 2GW pa solar module manufacturing facility commissioned in Arizona, creating 600 jobs.[164]

Flat Glass Group - Indonesia

November 2023 saw Flat Glass Group, China's second-largest supplier of photovoltaic glass by market share, plans to invest US$290m to build a PV glass plant in Indonesia to cut production costs and improve its overseas business positioning. Located in Jawa Tengah, the plant will have a production capacity of 1Mtpa of highly transparent glass panels. Flat Glass Group has three plants in Zhejiang, Anhui province, and Vietnam, with the fourth under construction in Nantong, in China's eastern Jiangsu province.[165]

Longi - Illuminate – Invenergy - US

September 2024 saw China's Longi complete the commissioning of its new Illuminate USA solar module manufacturing plant in Pataskala, Ohio through a JV majority owned by US clean-energy developer Invenergy.[166] The US$600m, 5GW plant is among the largest announced since the introduction of the US IRA, employing 1,000 staff. Invenergy will be the anchor client of Illuminate. Longi is reported to be considering vertical integration through the addition of a cell manufacturing unit,[167] but this is likely to be on hold until the US elections resolve political headwinds.[168]

Longi - Malaysia

October 2023 saw China's Longi announce a US$250m plan to build 3 solar panel factories in Serendah, Malaysia, for commissioning in March 2024. Total capacity is 8.8GW pa.[169]

Tongwei - Runergy – US

In 2023, China's Runergy (via subsidiary Runergy USA) commenced construction of a 5GW pa solar module assembly plant in Huntsville, Alabama.[170]

August 2024 saw China's Tongwei take a controlling stake in Runergy for US$698m.[171]

Risen Energy - Malaysia

May 2024 saw Risen Energy Technology Co., Ltd. (Malaysia), reveal the company's factory in Malaysia has a 4GW cell and 4GW module manufacturing capacity, and has recently put into production the first phase of the 2GW battery module project.[172]

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[164] PV Magazine, JA Solar to bring US manufacturing testbed facility online in Q3 2024, 16 July 2024

[165] Yicai, China's Flat Glass to Invest USD290 Million to Build PV Glass Plant in Indonesia, 14 Nov 2023

[166] Longi press release, 2024 H1 Performance: LONGi achieved a revenue of 38.529 billion yuan, 29 August 2024

[167] Reuters, Many US solar factories are lagging. Except those China owns, 18 July 2024

[168] Bloomberg, US Senators Move to Deny China Solar Firms Lucrative Tax Credits, 1 August 2024

[169] Investment Monitor, China's LONGi to build three solar panel factories in Malaysia, 18 October 2023

[170] Runergy Alabama

[171] Reuters, Chinese solar firm Tongwei plans to take controlling stake in Runergy for $698m, 14 August 2024

[172] EnergyTrend, LONGi, Jinko and Risen Energy are vying to build factories in Malaysia, 16 May 2024

Zhongrun Solar - Laos

China's Zhongrun Solar is building a 4GW cell and 3GW module production capacity in Laos, which will gradually come online starting in 2024.[173]

Arctech

Arctech is a leading Chinese manufacturer of mounting systems for large-scale solar installations, with a strategic focus on increasing its market share outside China, particularly in the Middle East, Asia and Latin America. Arctech is trying to balance local requirements and technology sharing demands from overseas partners without giving up intellectual property. Arctech already has a factory in India, a partnership with the Adani conglomerate, and is building a new factory in Saudi Arabia. In Spain, the company has an R&D facility and is planning to build another factory in Brazil.[174]

[173] Yicai Global, The world's third largest photovoltaic cell leader will debut, 18 December 2023

[174] FT, Protectionism will 'haunt' renewable energy industry, says China solar executive, 22 May 2024

SECTION 5 GRID

Over the last two decades, China has pursued a domestic energy policy focused on progressively electrifying everything, in the process building a domestic electricity grid that is more than twice the size of the US. This has seen China pioneer the development of ultra-high voltage direct current (UHVDC) grid transmission projects of well over 1,000km in length.

2024 has seen China increasingly exporting this world-leading grid technology and EPC capacity into South America and ASEAN, as well as smaller developments in Africa.

The footprint of China's export of this technology is monumental in reach and scale, as China's grid companies operate across multiple continents.

For example, China's State Grid Corporation, the world's largest utility company, has a majority interest in Brazil's biggest power distribution corporation, and will construct 3,800 km of transmission infrastructure in the country, connecting renewable energy supply across several states.

In another example, in Laos in the Southeast Asian region, this year saw the construction of a key node in the Laotian power grid by a subsidiary of Power China, underpinning the construction of a UHVDC grid in partnership with China, and furthering the strategic goal of building a "Southeast Asian battery", opening up a transmission channel encompassing China, Laos, Thailand and Vietnam.

We detail a range of China's grid projects across multiple continents below.

5.1 China's Overseas Grid Projects

China State Grid – Brazil

In 2017, the State Grid Corporation of China, the world's largest utility company, concluded a deal for a 54.6% stake in Brazil's largest power distributor, CPFL Energia, bringing advanced power generation technology and management experience to Brazil.

April 2024 saw China State Grid secure the majority of the largest power transmission auction in Brazil worth BRL21.7bn (US$3.9bn), gaining rights to construct 85% of the 4,471km total of new transmission lines and two substations across the states of Goiás, Maranhão, Minas Gerais, São Paulo, and Tocantins to unlock inter-state flows of renewable energy. China State Grid's share of capex is expected to be BRL18.1bn (US$3.3bn).[175]

Beyond this US$3.3bn grid project, China State Grid announced plans to invest an extra BRL200bn (US$38bn) in the Brazilian electricity sector, the details of which are not publicly available. State Grid is already managing the 2,500km Belo Monte UHVDC transmission project, one of the 19 grid transmission line concessions State Grid holds in Brazil (along with another 5 in JV).[176]

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[175] Gov.br, Brazilian government signs energy transmission contracts expecting BRL 21.7 billion in investments, 5 April 2024

[176] Gov.br, In a meeting with Alexandre Silveira, State Grid announces its intention to invest another R$200 billion in Brazil, 4 April 2024

5.2 Power China

Power China - Brazil

In 2019, Power China commissioned Brazil's Belo Monte +800kV UHVDC Transmission Project, the first project that echoes the "go global" strategy in the field of UHV power transmission technology, as well as the first one in Latin America.

Power China – Ethiopia

March 2024 saw Power China complete the construction and commissioning of a remote 36km line of the Butajira-Worabe Power Transmission Project in Ethiopia.[177]

Power China – Congo

February 2024 saw Power China complete the construction and commissioning of a remote 190km line in the Lualaba Province and Upper Katanga Province of the Congo.[178]

Power China – Philippines

May 2023 saw the energisation of the PhP52bn (US$925m) Visayas-Mindanao Interconnection Project, the first overseas submarine 184km circuit HVDC transmission project of Power China. The client is National Grid Corporation of the Philippines (NGCP), with a 450MW capacity, expandable to 900MW for Phase I and II of the project respectively.[179]

[177] Power China, Ethiopia project successfully transmits power, 14 March 2024

[178] Power China, Transmission line and new substations begin operating in DR Congo, 27 February 2024

[179] NGCP, NGCP energizes Mindanao-Visayas Interconnection, 3 May 2023

5.3 Southern Power Grid

Southern Power Grid – Chile

As of April 2024, China Southern Power Grid is working with two local Chilean partners to build the country's longest power line after winning the contract in 2021, yet to commence from permitting delays. The Kimal-Lo Aguirre 1,342km line of 3,000MW capacity spans Chile from the northern border with Peru, to the capital Santiago.[180] [181]

Southern Power Grid – Power China – Laos

January 2024 saw Southern Power Grid officially commence operations of a new 90% owned entity, Électricité du Laos Transmission Company (EDL-T), created in 2020 with Électricité du Laos (EDL) owning the 10% balance. EDL is the heavily indebted state-owned energy utility in Laos. EDL-T runs the Laos transmission grid. This media report speculates that EDL is preparing to sell major generation assets in Laos to Southern Power Grid as a way of reducing excessive financial leverage.[182]

Laos is on the southern border of China and as per Section 4.3, is working with China General Nuclear to build a two-phase 2GW renewable energy base to export clean electricity north to China.

April 2024 saw the 500kV Napa substation, the core node of the newly built 500kV backbone power grid in Laos, constructed by Hubei Engineering Company, a subsidiary of Power China. This will play a key role in the stability of the Laotian power grid, with the Laotian National Electricity Company able to fast-track the development of an ultra-high voltage power system in partnership with China.

The project will optimize the regional power structure and promote the economic and social development of related regions, but also help Laos establish a large-capacity, high-efficiency cross-border power transmission channel, achieve the strategic goal of building a "Southeast Asian battery", and provide services for opening up an efficient power transmission channel running through China, Laos, Thailand and Vietnam.[183]

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[180] China Daily, State Grid to undertake Brazil's new push for clean energy, 16 April 2024

[181] Dialogue Earth, Chile's longest power line could speed up the shift to renewables, 21 March 2024

[182] The Diplomat, Is Laos Planning to Sell Off More of Its Energy Sector to China?, 2 July 2024

[183] Power China, Hubei Engineering Company successfully delivered power to 500 kV Napa substation in Laos, 9 April 2024

5.4 Other Grid Companies

China Energy Engineering Corporation – Egypt

June 2024 saw CEEC complete a 220kV booster station of Egypt's 200MW Kom Ombo solar power plant project with project owner ACWA Power and Egyptian Electricity Transmission Company (EETC), located in a desert area of Kom Ombo.[184]

China Harbour – Malaysia

May 2024 saw China Harbour complete construction of the first double-limb tower of a 275kV cross-sea transmission line project in Penang, Malaysia.[185]

China Aerospace Construction Group Company – Kenya

In February 2024, it was reported that the 37km 400kV Isinya-Konza Transmission Line under construction by the China Aerospace Construction Group Company, financed by the EXIM Bank of China and the Government of Kenya, will be finalised by March 2024.[186]

The August 2024 China-Africa Digital Financial Inclusion Summit 2024 highlighted the opportunities for energy connectivity and cooperation.[187]

China-Cambodia Metrology Cooperation – Cambodia

May 2024 saw the announcement of the China-Cambodia Metrology Cooperation agreement to promote key metrology capabilities for EV charging piles as an important project for the implementation of Lancang-Mekong Metrology Cooperation to support the healthy development of Cambodia's new energy vehicle industry in terms of safety and quality.

This was referenced as jointly building the "Belt and Road" to go deeper and more practical, and will continue to provide a good platform for the implementation of "small and beautiful" technical assistance projects, bringing a real sense of gain to the people of the co-building countries.

This builds on the August 2023 cooperation agreement: "Action Plan on Promoting Mutual Recognition and Development of Metrology in the Lancang-Mekong Region (2023-2028)", jointly signed by the National Metrology Institutes of China, Cambodia, Laos, Myanmar, Thailand and Vietnam. The Action Plan was written into the "Nay Pyi Taw Declaration" and the "Strengthening Metrology Cooperation among Lancang-Mekong Countries" was written into the "Five-Year Action Plan for Lancang-Mekong Cooperation (2023-2027)", with new energy being identified as one of the five key areas of the Lancang-Mekong Metrology Cooperation.[188]

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[184] CEEC, Backfeeding Performed Successfully for 220kV Booster Station of Egyptian Kom Ombo 200MW Solar Power Plant Project, 21 June 2024

[185] South Pacific Regional Management Center, The first double-limb tower of the 275kV cross-sea transmission line project in Penang, Malaysia was successfully closed, 28 May 2024

[186] Transformers Magazine, New substation and transmission line to power Kenya technopolis, 2 Feb 2024

[187] China Daily, Energy connectivity, cooperation key to Africa's financial inclusion, 23 August 2024

[188] The State Administration for Market Regulation promotes the signing of the China-Cambodia EV Measurement Cooperation Agreement to deepen Lancang-Mekong measurement cooperation and promote high-quality development of the "Belt and Road", 25 May 2024

SECTION 6 HYDRO

Over the last two decades China has quadrupled its installed hydro-electricity capacity to 420GW, four times the capacity in the US, the second largest nation globally. In doing so, China has built up the world's leading EPC firms in hydro, and now builds the majority of hydroelectricity dams globally.

Outside of its domestic market, China is also the world's largest developer of hydro projects globally with projects across Africa and the greater Asian region and 54.4GW operational as of the end of June 2024.[189]

6.1 Hydro ODFI - Power China

Power Construction Corporation of China (branded as Power China), is a wholly state-owned enterprise (SoE) administered by the State-owned Assets Supervision and Administration Commission centred globally on hydroelectricity and electric power. As an integrated construction group Power China provides investment and financing, planning design, engineering construction, equipment manufacturing, and operations management for clean and low-carbon energy, water resources, environmental construction and infrastructure, and is active across the globe as detailed below.

Power China - Uganda

June 2024 saw Power China complete the design, construction, and handover of Uganda's largest hydropower plant. The 600MW hydropower plant is located on the Nile River, 270km from Kampala – the country's capital. [190]

Power China - Tanzania

February 2024 saw Power China complete the last of nine units at the Julius Nyerere Hydropower Plant in Tanzania, with a total installed capacity of 2,115MW.[191]

Power China - Cote d'Ivoire

June 2024 saw Power China complete the design, construction, and commissioning of the first unit of the Cote d'Ivoire's 113MW Popoli hydropower plant in the Sassandra River Basin.[192]

Power China - Nepal

April 2024 saw Power China complete the headrace tunnel for the 150MW Tanahu Hydroelectric Project.[193]

May 2024 saw Power China sign an EPC contract for the 100MW Tamakoshi V Hydroelectric Project with the Nepal Electricity Authority.[194]

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[189] National Energy Administration, Transcript of the National Energy Administration's press conference in the first half of 2024, 31 July 2024
[190] Power China, Uganda's largest hydropower plant successfully handed over, 14 June 2024
[191] Power China, Tanzanian hydropower plant connected to grid, 22 February 2024
[192] Power China, Popoli Hydropower Plant connected to grid ahead of schedule, 7 June 2024
[193] Power China, Nepal hydropower project completes headrace tunnel, 2 May 2024
[194] Power China, POWERCHINA continues to develop hydropower in Nepal, 11 May 2024

Power China - Laos

February 2024 saw Power China start the water filling of the Nam Ngum 4 Hydropower Plant in Laos with a total installed capacity of 240MW.[195]

Power China - Indonesia

February 2024 saw Power China reach construction milestones ahead of schedule on the Batang Toru HEPP Hydropower Station in Indonesia, with a total installed capacity of 510MW.[196]

May 2024 saw Power China grid connect Indonesia's 110MW Jatigede Hydropower Station, located in Jatigede Town, Suangmutan City, West Java Province after 50 years of failed attempts by multiple countries to get this project underway. It is a water conservancy project that mainly focuses on farmland irrigation and flood control, water supply, tourism, and power generation.[197]

Power China - Philippines

July 2024 saw a 22km 230kV transmission line built by Power China's Hydropower Bureau No.7 on Bohol Island, Philippines, successfully energised and put into operation. This is an important expansion of the Philippine National Grid.[198]

Power China - Mali

March 2024 saw the 140MW Gouina Hydroelectric Power Plant commissioned. Situated on the Senegal River within Mali, the project was invested in by the Senegal River Basin Organization (OMVS), established by three countries: Mali, Mauritania, and Senegal.[199]

Power China – Solomon Islands

June 2024 saw Power China commence construction of the 15MW Tina Hydropower Project in the Solomon Islands. From a global perspective, this definitely fits the "Small and Beautiful" category. However, this one project alone can supply 68% of the electricity demand of the Solomon Islands' capital. The project has been long in gestation, with the Abu Dhabi Fund for Development providing US$15m back in January 2017, then the World Bank in August 2017 (US$34m), the Australian Government (US$13m), the Green Climate Fund (US$86m) and Korea EXIM Bank (US$32m) and ADB (US$30m).[200] However, at a cost of US$200m, this 15MW of capacity taking over a decade to complete shows the power of the massive ongoing deflation in solar and BESS to deliver solutions at much greater speed and much lower cost, hence being eminently more scalable.

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[195] Power China, Laos hydropower station achieves major milestones, 2 February 2024
[196] Power China, Indonesia hydropower sees milestones 2 months ahead of schedule, 26 January 2024
[197] Indonesia's Water and Electricity Bureau, All units of Indonesia's Jatigede Hydropower Station are connected to the grid to generate electricity, 17 May 2024
[198] Hydropower Bureau Press Release, Bohol power transmission line project in the Philippines is energized, 19 July 2024
[199] Power China, Mali hydroelectric power plant passes final inspection, 25 March 2024
[200] Power China, China Power Construction signs contract for Tina Hydropower Station project in Solomon Islands, 13 June 2024

6.2 Hydro ODFI - China Harbour

China Harbour (CHEC), is another example of a Chinese SOE diversification strategy. China Harbour, a subsidiary of China Communications Construction Company (CCCC), is CCCC's arm to expand its overseas market. CHEC primarily builds harbours, buildings, bridges and railways, but is now expanding into electricity generation projects like hydroelectricity, as well as supporting grid and power system infrastructure.

China Harbour - Nepal

China Harbour is the contractor to construct, and 92% shareholder in, the 78MW Sanjen Khola hydropower station on the Sanjen river/basin in Bagmati, Nepal, working with Sinohydro of China and Andritz Hydro, with an estimated completion in 2026.[201]

6.3 Hydro ODFI - China Energy Engineering Corporation

China Energy Engineering Corporation - Pakistan

August 2024 saw the first unit of the US$2.0bn 884MW Suki Kinari Hydropower project officially connected to the grid for power generation. The project was among the first under the China-Pakistan Economic Corridor (CPEC) framework and the largest overseas greenfield hydropower investment project by a Chinese company, built by CEEC and owned by China Energy Overseas Investment Co., Ltd.[202]

China Energy Engineering Corporation - Angola

July 2024 saw CEEC commission the 34MW Luachimo Hydroelectric Power Station in Lunda Norte Province, Angola, in cooperation with Angola's Ministry of Energy and Water.[203]

China Energy Engineering Corporation - Malaysia

September 2024 saw CEEC partner with Malaysia's Water Engineering Technology sign an EPC contract for a 24.5MW hydropower station. Located in the city of Hokkien, Perak, Malaysia, the expected annual power generation is 168.8GWh. The project has started construction and is scheduled to be put into commercial operation in April 2027.[204]

[201] Power Technology, Power plant profile: Sanjen Khola, Nepal
[202] CEEC, First Unit of Largest Overseas Hydropower Project of CEEC Connected to Grid, 19 August 2024
[203] CEEC, Luachimo Hydroelectric Power Station Built by CEEC in Angola, 24 May 2024
[204] China International Contractors Association, Signed contract + won the bid, new developments in China Energy Engineering's international business, 18 September 2024

SECTION 7 BATTERIES

Over the last few years China has massively expanded its battery manufacturing capacity, gaining a >80% global share. These batteries are underpinning China's global domination of the EV manufacturing sector, and the development of battery energy storage systems (BESS) for enhancing grid reliability and time-shifting low-cost intermittent renewable energy, progressively eroding the expected role of methane gas in the peaking power sector. China has six of the top 10 largest battery manufacturers globally, and each of these has spent 2023/24 rapidly globalising their manufacturing footprint, building out foreign battery materials-to-EV precincts to shorten supply chains and in part to circumvent growing anti-China trade barriers in North America, the EU and South America.

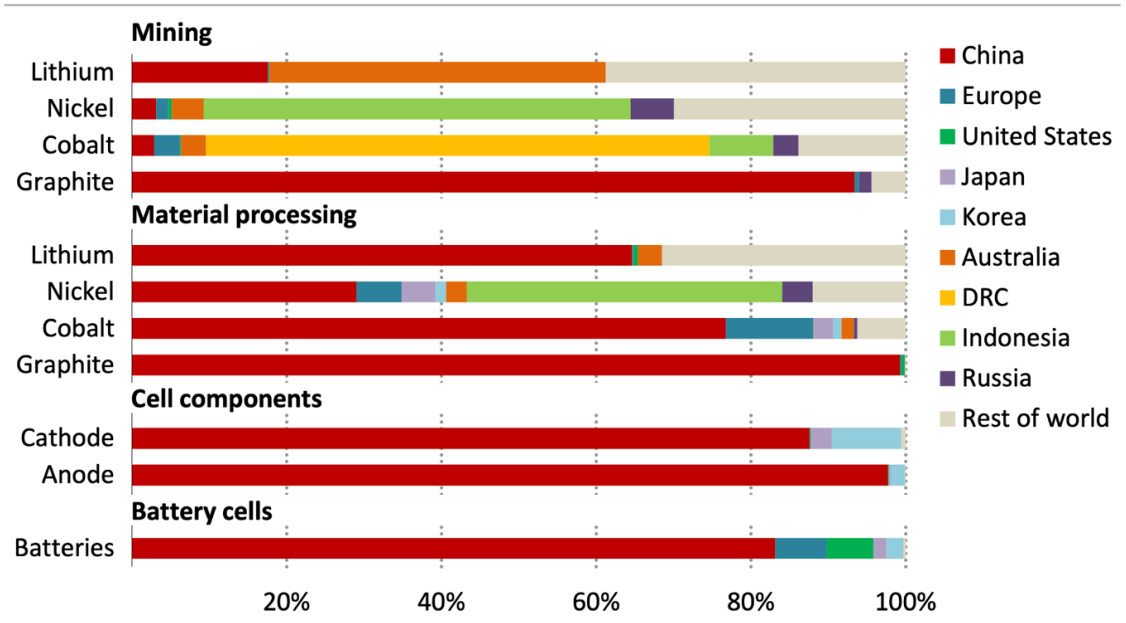
China has invested hugely over recent years in new battery manufacturing capacity, as well as in research, development and deployment (RD&D).[205]

This has boosted China's export of batteries while the global demand increases.

China's 2023 exports of lithium-ion batteries were US$65bn, +28% yoy. Chinese battery manufacturers signed over 170GWh of multi-year supply agreements, with the EU accounting for 40% of Chinese battery exports in 2023. This has seen Chinese firms dominate virtually all aspects of the global battery manufacturing supply sectors. China represents nearly 90% of global installed cathode active material manufacturing capacity and over 97% of anode active material manufacturing capacity in 2024 – Figure 6.1.

China currently has six of the top ten firms globally, representing a combined market share of over 60% in 1HCY2024. The two stand out global battery leaders are CATL and BYD, as well as battery component suppliers - BTR New Material Group, Gotion, EVE Energy, Envision AESC, SVOLT and Sunwoda. We discuss each below.

Figure 6.1: China dominates the entire global battery supply chain



Source: IEA, Batteries and Secure Energy Transitions, May 2024

[205] CEF, China's Massive Investment into Cleantech R&D and Manufacturing is Catalysing the Global Energy Transition, 7 June 2024

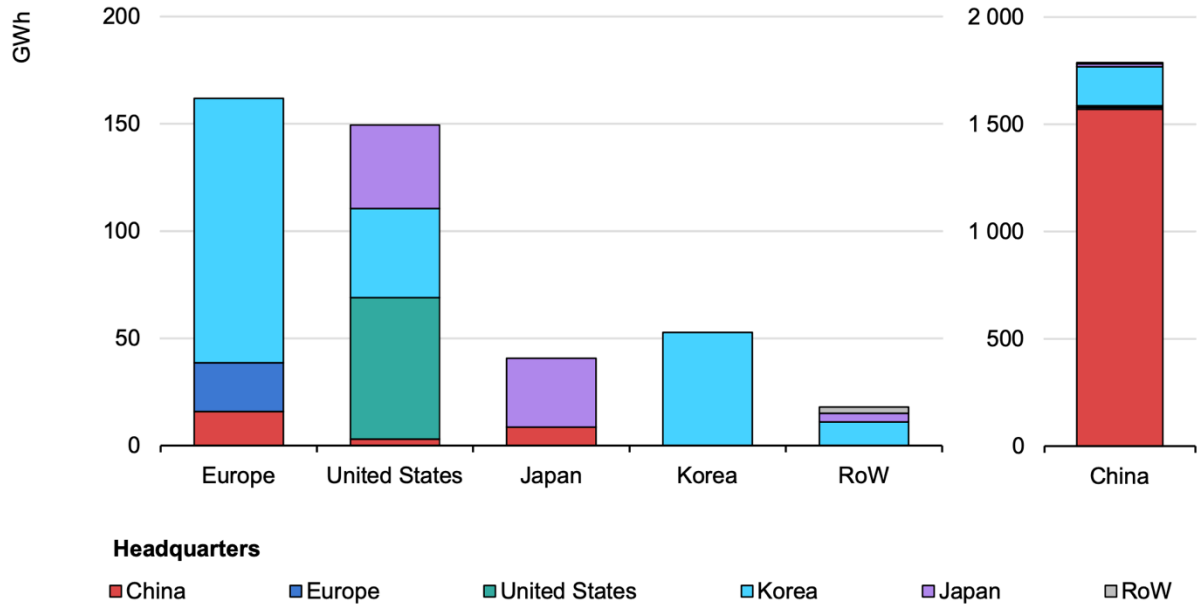
Chinese battery manufacturers have collectively announced approximately 900GWh of battery manufacturing capacities globally, albeit 80% of this is for supply of the EV sector – refer to Section 8 – and just 20% for developing the global BESS sector – Section 7.10. Whilst this globalisation is driven by the need to reduce geopolitical headwinds to Chinese battery and EV exports, there is a clear capital construction cost penalty for Chinese firms moving offshore, as well as longer lead times to commissioning – Figure 6.3.[206]

Chinese firms were estimated to have invested in just 2GWh of BESS outside of China through 2023, but CEF's study suggests that is rapidly evolving in 2024 due to the ongoing price deflation and enhanced value of hybrid solar-BESS installations.

The expansion of Chinese solar companies' overseas investment is also driven by China's dominance in the global lithium-ion battery manufacturing capacity, with ~80% of all global battery manufacturing based within China (and Chinese owned firms having a >85% domestic Chinese market share). Chinese firms own >70% of global manufacturing capacity, including their expanding bases in Europe and Japan – Figure 6.2.

China's dominance will only grow massively into 2025 if even half the battery material manufacturing plants China has in planning across the following nations are built: Hungary (CATL, EVE Energy, Sunwoda, Huayou Cobalt), Morocco (CATL, BTR, Gotion, GNGR), Indonesia (CATL, BTR, Gotion), Thailand (CATL, Gotion, EVE, SVOLT, Sunwoda), Vietnam (Gotion, Growatt), Malaysia (EVE Energy) America (CATL, Gotion, EVE, AESC, Guangzhou Tinci Materials), Spain (CATL, Gotion, AESC), Portugal (CALB), Slovakia (Gotion), India (Gotion), UK (EVE, AESC), Japan (AESC), Finland (SVOLT, Shanshan), Sweden (Shanghai Putailal), Germany (Gotion, SVOLT), France (AESC), Turkey (Ganfeng Lithium, Farasis Energy) and Oman (Junda Shares).

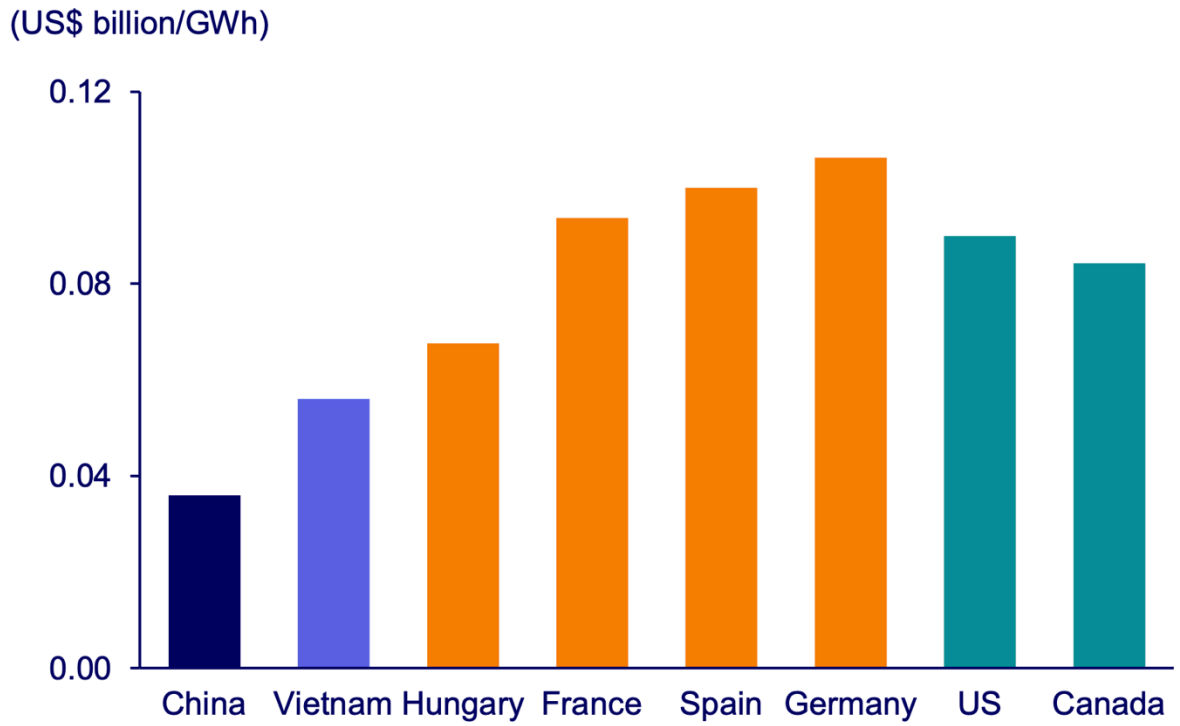
Figure 6.2: China dominates the downstream global battery supply chain.



Source: IEA, Global EV Outlook, September 2024

[206] Wood Mackenzie, Looking overseas: global reach of China's solar and storage industry, April 2024

Figure 6.3: Chinese Manufacturers' Battery Facility Unit Cost (US$Bn/GWh)



Source: Wood Mackenzie[207]

Research institute EVTank reported on the internationalisation of China's lithium battery sector's shift from exports to direct overseas investment and local production, estimating that by June 2024, total overseas investment by Chinese lithium battery companies had reached Rmb565bn (US$80bn), with Europe as the main destination, followed by Southeast Asia and the US representing just 10% of total investment.[208]

Battery technologies have evolved at phenomenal speed in recent years. Combined with the massive scaling up of manufacturing technologies, which turbocharged the electrification, decarbonisation and convergence of energy and transport sectors. The critical minerals reliant nature of battery manufacturing has combined with rising geopolitical tensions over supply chain concentration to see a wider geographic dispersion of manufacturing, along with the growth of regional precincts concentrating capacities, including Hungary, Brazil (Section 8.10), Thailand (Section 8.9) and Morocco (Section 7.9).[209]

[207] Wood Mackenzie, Looking overseas: global reach of China's solar and storage industry, April 2024
[208] China Daily, Ganfeng Lithium inks JV deal in Turkiye, 23 August 2024
[209] BloombergNEF, Batteries Are the 'Next Solar' for Investors, Says KKR, 27 August 2024

7.1 Batteries - CATL

Contemporary Amperex Technology Co. Limited (CATL) was founded by Zeng Yuqun in 1999 and in 1HCY2024, was the world #1 lithium-ion battery manufacturer with a 38% global share.[210] CATL installed nearly 300GWh of battery manufacturing capacity in 2023, with sales of 260GWh, up 41% year-over-year.

CATL has developed world-leading battery technology, and continues to invest in building its RD&D lead, investing Rmb18.4bn (US$2.6bn) in R&D in 2023.[211] [212] September 2024 saw CATL launch new power batteries with a world-leading extra-long lifespan for electric buses of an expected 15 years or 1.5 million kilometers and a warranty of 10 years or 1 million km.[213]

As CATL outgrows China's own surging but increasingly price competitive domestic EV market, the company is looking overseas for further growth opportunities, leveraging its world-leading battery technologies.[214]

July 2024 saw reports CATL was looking to raise a US$1.5bn new investment fund to be managed by Hong Kong-based Lochpine Capital (for now, a new subsidiary of CATL). The media report suggested CATL would provide a ~15% stake in the fund and raise western capital from sovereign wealth funds and western venture capital, so that this fund could circumvent the growing EU and US restrictions to majority Chinese controlled outbound investment capital. The reports also suggested CATL was seeking to circumvent Chinese government approval delays for outbound FDI from China.[215]

May 2024 saw reports that CATL aims to add two new overseas factories in Spain and Morocco in addition to its previously announced six: Germany, Hungary, Indonesia, Thailand and two in the US (with Ford and Tesla). CATL is also looking to fuel its global growth through licensing its technology. The company has been in talks with some 10 OEMs to license its world-leading technology (including General Motors).[216] This was in response to the excessively competitive domestic Chinese market and CATL's already dominant market share.

June 2024 saw CATL announce a strategic cooperation agreement with Rolls-Royce for the deployment of an integrated BESS EPC solution by Rolls Royce in the UK and EU markets. In 2023, Rolls-Royce and CATL signed a long-term supply agreement to collaborate on more than 10GWh of storage capacity.[217]

CATL Germany

[210] Cnevpost.com, Global EV battery market share in Jan-May 2024, 3 July 2024
[211] CATL, Pursuing sustainable growth through a value-centered approach, 27 June 2024
[212] CEF, China's Massive Investment into Cleantech R&D and Manufacturing is Catalysing the Global Energy Transition, 7 June 2024
[213] Cnevpost.com, CATL launches battery with 15-year lifespan for electric buses, 14 September 2024
[214] Electrek, CATL successfully powers EV plane with 1,800-mile civil aircraft expected, 25 June 2024
[215] FT, China's battery giant taps Europe's elite to expand supply chain, 12 July 2024
[216] Electrek, CATL accelerates overseas expansion as it outgrows China's EV market, 22 May 2024
[217] Rolls-Royce Press Release, Rolls-Royce and CATL agree strategic cooperation for TENER products in the EU and UK, 19 June 2024

December 2022 saw CATL's first European plant open in Arnstadt, Germany, with an investment of €1.8bn to deliver an initial 8GWh of annual battery capacity, with plans to upgrade to 14GWh and create up to 2,000 new jobs.[218]

September 2023 saw CATL announce it would produce its fast-charging Shenxing battery in both Germany and Hungary, as well as in China.[219]

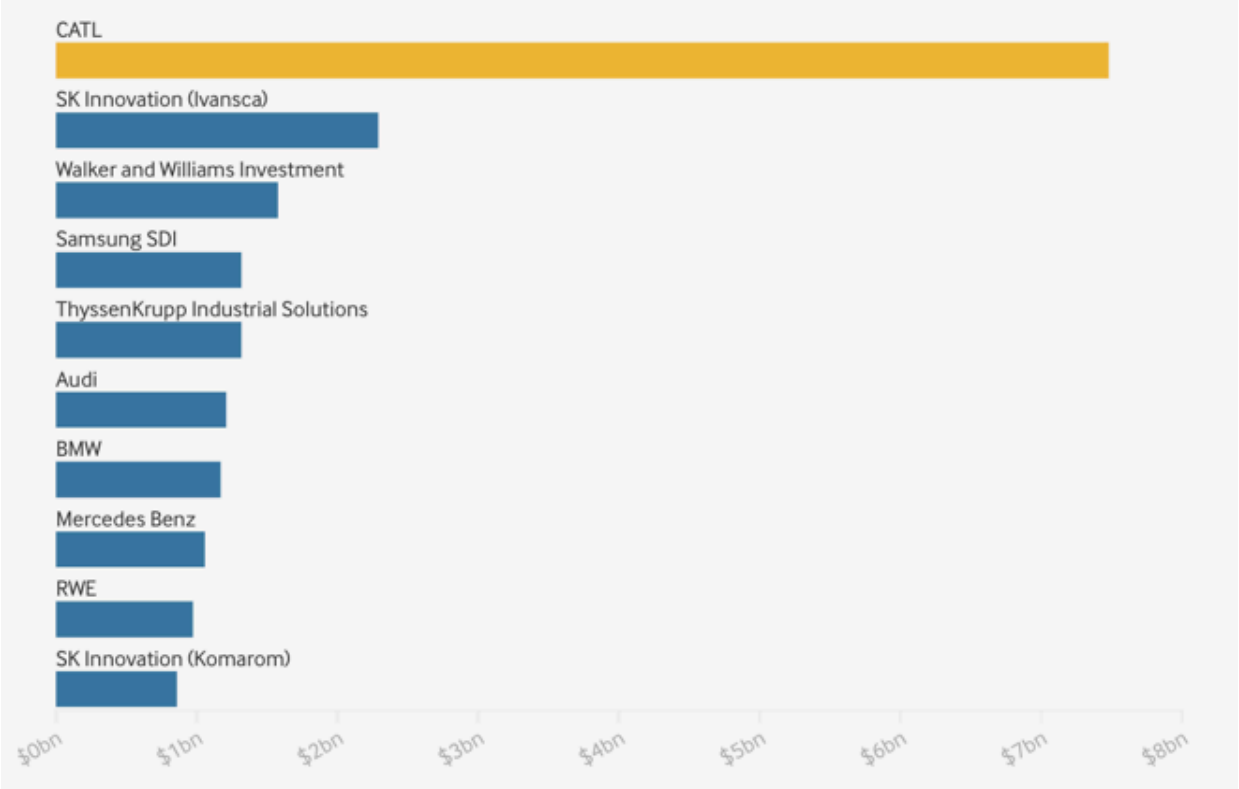
July 2024 saw CATL sign a European battery supply agreement with Renault's EV unit Ampere.[220]

CATL Hungary

In 2022 CATL announced a massive battery manufacturing plant of 100GWh with an investment of €7.3bn in Debrecen, Hungary, which will thus be able to supply EV batteries for the Volkswagen Group, BMW, Stellantis and others. Plant commissioning is due in 2025. The Hungarian Investment Promotion Agency offered a reported €845m in state support for this, the largest foreign investment into Hungary.[221]

May 2024 saw confirmation phase 1 of this plant is under construction, with a target of 3,000 employees by 2026 ramping up to 8-9,000 employees after all 3 phases are built.[222]

Figure 6.4: CATL's plans dwarf previous mega-projects in Hungary (capex, US$bn)



[218] CATL Press Release, CATL's German plant kicks off cell production, 21 December 2022
[219] Reuters, CATL to produce fast-charging Shenxing battery in Germany, Hungary, 4 September 2023
[220] Reuters, Renault's EV unit Ampere teams up with LGES, CATL on battery technology, 2 July 2024
[221] China Observers, *From Zero to Hero? Chinese Investment in EV Supply Chains in the Visegrád Four, January 2024*
[222] China Daily, Building of battery factory on schedule, 10 May 2024

Source: Financial Times, FDi Intelligence[223]

CATL Indonesia

December 2023 saw reports by Indonesian Investment Minister Bahlil Lahadalia stating CATL is set to invest US$420m and start construction on an EV battery plant in East Halmakera, North Maluku, Indonesia in January 2024, in a JV with the state owned nickel and gold mining firm, PT Aneka Tambang (Antam).[224]

July 2024 saw South Korea's Hyundai and LG Energy open Indonesia's first battery cell factory, with an initial US$1.1bn investment to create 10GWh pa of manufacturing capacity in the city of Karawang as Indonesia starts to build out and move up the EV value chain. At the opening ceremony, Indonesian President Joko Widodo said: "We have an abundance of natural resources but for decades we only exported them as raw materials with no added value. Now with the construction of smelters and the EV battery cell factory, we will become an important global player in the EV global supply chain." Hyundai and LG aim to invest a total of US$9.8bn in Indonesia's EV ecosystem in stages.[225]

CATL, along with BYD (see section 8.1) and China's Huayou Cobalt and Tsingshan in nickel refining (see section 7.8), are all ensuring China is playing a leading role in Indonesia's EV supply chain development.

CATL Thailand

June 2023 saw CATL announce it will build a US$100m EV cell-to-pack battery assembly factory in partnership with Arun Plus, a subsidiary of Thai state owned oil and gas giant PTT to serve local EV producers in Thailand. PTT's Arun Plus set up a new subsidiary to manufacture its own EV model in November 2022.[226]

CATL US (General Motors, Ford, Tesla)

February 2023 saw Ford announce a US$3.5bn investment to build a 35GWh LFP battery plant with CATL in Michigan. Ford and its battery tech collaborators have announced US$17.6bn in investment in EV and battery production in the US since 2019.[227] November 2023 saw Ford downscale the plant to 20GWh / US$2bn due to US political pressure on the use of Chinese technology, rising US labour costs and slower expansion of EV sales.[228]

March 2024 saw reports that CATL was in negotiations with Tesla to licence its battery technology for deployment in the US to build 10GWh pa of manufacturing capacity of battery cells to Tesla's small Sparks, Nevada Megapack battery plant, allowing domestic US cell sourcing rather than relying on CATL imports from China.[229] [230]

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[223] Financial Times, FDi Intelligence, CATL announces Hungary's largest ever investment, 16 August 2022
[224] The Jakarta Post, China's CATL to start building EV battery plant in January, 7 December 2023
[225] FT, Hyundai and LG Energy open Indonesia's first battery cell factory, 3 July 2024
[226] Nikkei Asia, CATL to develop EV batteries with Thailand's Arun Plus, 9 June 2023
[227] Ford Press Release, Ford Taps Michigan for new LFP battery plant, 13 February 2023
[228] CNBC, Ford to scale back plans for $3.5 billion Michigan battery plant as EV demand disappoints, labor costs rise, 21 November 2023
[229] Reuters, CATL in talks with Tesla, global automakers for US licensing, 25 March 2024
[230] Bloomberg, Tesla to Open US Battery Plant With Equipment From China's CATL, 31 January 2024

September 2024 saw reports General Motors Co. was in discussions to buy EV batteries that would licence technology from China's CATL and be assembled at a new plant slated to be built in the US South and employ more than 1,000 staff. The factory would be funded and operated by Japan's TDK Corp. Any decision would be subject to the US Presidential election. This builds on a long history of association between CATL and TDK.[231]

CATL Spain (with Stellantis)

November 2023 saw CATL announce an MoU with Stellantis to evaluate a joint venture LFP battery manufacturing factory in Zaragoza, Spain to supply Stellantis' European EV manufacturing plants as part of a long term European collaboration agreement for the local supply of battery cells and modules in support of Stellantis' European EV plans.[232]

Tesla already has a long-standing partnership with CATL for its made-in-China vehicles, as well as the Model 3 Standard Range vehicles built and sold in the US.[233]

CATL Morocco

Media reports say CATL is also considering a fully owned battery cathode materials facility in Morocco, which would supply its European battery plants.[234]

CATL Bolivia (with Bolivia's YLB Mining SOE)

January 2024 saw CATL announce progress on a 2023 announced US$1.4bn investment in Bolivia's to-date untapped but world-leading lithium reserves in a Chinese consortium (called CBC, including CATL, CMOC Group, and Brunp Recycling) in a 49:51 partnership with Bolivia's state-run lithium company, Yacimientos del Litio Bolivianos (YLB). Bolivian President Luis Arce confirmed the commitment to build two lithium plants to extract minerals from the country's Uyuni and Oruro salt flats with a plan for two 25,000tpa capacity facilities. The longer term ambition is to invest up to US$10bn.[235]

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[231] Bloomberg, GM Looks to Japan's TDK to Make US Batteries with China Tech, 13 September 2024
[232] Stellantis Press Release, Stellantis and CATL Sign Strategic MoU for the Local Supply of LFP Batteries for European Market, 21 November 2023
[233] Inside EVs, CATL Could Be Tesla's Secret Weapon For Its $25,000 EV, 27 March 2024
[234] CNEVPOST, CATL makes overseas expansion top priority as domestic competition intensifies, 22 May 2024
[235] Reuters, China's CBC increases stake in Bolivia lithium mining, 17 January 2024

7.2 Battery Materials - BTR New Material

BTR New Material Group Co., Ltd., is a Chinese battery cathode and anode manufacturing firm with revenues of Rmb25bn pa. It is a subsidiary of the Beijing Stock Exchange listed China Baoan Group Co., Ltd.

BTR New Material Group - Morocco

March 2024 saw the Moroccan government confirm a US$350m 50,000tpa battery cathode manufacturing facility located in the Mohammed VI Tangier Science and Technology City to be owned by BTR New Material Group. The media reports say BTR has clients including BYD, CATL, Volkswagen and Tesla and that this investment will create 2,500 new jobs.[236]

August 2024 saw BTR New Material announce a second US$366m 60,000tpa battery anode manufacturing facility located in the Mohammed VI Tangier Science and Technology City to be completed within 2 years. Minister of Industry Riyad Mezzour said he hopes to see Morocco as the world's most competitive platform for electric car manufacturing and Morocco's commitment to advancing the ongoing transformation of the EV industry, "which will transition to 100% by 2030 with an integrated industrial system. [237]

Refer to Section 7.9 below.

BTR New Material Group - Indonesia

April 2023 saw BTR start construction of a US$478m 80,000tpa anode production facility at the Indonesia Morowali Industrial Park (IMIP) in Central Sulawesi Province. This investment is a 70:30 JV with China's Tsingshan.[238]

[236] Morocco World News, Morocco Signs MAD 3 Billion Deal with Chinese Group to Boost EV Sector, 29 March 2024
[237] Morocco World News, China's BTR Group Announces $366 Million Lithium-ion Battery Plant in Morocco, 15 August 2024
[238] Petromindo, BTR has started construction of battery anode production facility in RI, 20 April 2023

7.3 Batteries - Gotion High Tech

2020 saw Volkswagen announce a strategic alliance with China's Gotion High Tech (Gotion), a leading Chinese battery manufacturer, taking a 26% equity stake with its €1.1Bn investment.[239]

May 2023 saw Gotion become Volkswagen's designated battery supplier for markets outside of China, having become the anchor supplier for Volkswagen within China in 2022.[240]

Gotion is one of the world's top 10 battery manufacturers with a 1HCY2024 global share of 2.3%.[241]

Gotion reported CY2023 revenues of Rmb31.6bn (+37% yoy) and net profits of Rmb939m (+201% yoy) on battery deliveries of 40GWh, +40% yoy into the EV and BESS sectors. Gotion reported this was after an R&D investment of Rmb2.77bn, +14.6% yoy. Total assets are reported at Rmb93bn (net assets Rmb25bn) and return on equity of 3.9% (up from just 1.5% in CY2022). Key customers are Volkswagen, Geely, Chery, SGMW, Tata of India, Chana, CAC, Hozon, NETA of Indonesia and VinFast.[242]

Gotion reports four pack plants in Germany, Indonesia, Thailand and Silicon Valley in the US. launching their products, and production bases under development in Vietnam, Chicago, US, Michigan, US, Slovakia, Argentina and Indonesia. Gotion initially formed the layout of ten overseas bases covering materials, cells, and packs, and realised localisation of production and R&D. In CY2023, Gotion achieved overseas revenue of Rmb6.4bn, a growth of +116% yoy.

Gotion was reported in March 2023 to be the eighth-largest EV battery supplier in the world based on volume, and the fourth largest in China with a then battery manufacturing capacity expanded to 100GWh, mostly in China, which had expanded to 150GWh pa by the end of 2023. BNEF rates Gotion as one of the top 25 battery technology firms globally in 1QCY2024. Chairman Li Zhen flagged the intention to treble global capacity by 2025: "We'll raise to 300GWh, of which 100GWh will be overseas." Europe and the Americas will each host 40GWh while the remaining 20GWh will be located in Asia.[243]

May 2020 (ratified in 2021) saw Volkswagen take a 26% equity stake in Gotion through a buy-in of €1.1bn as part of a strategic cooperation framework. A first step was for both sides to team up for fast cell industrialization at the Volkswagen-owned Salzgitter plant in Germany with Gotion acting as a technology partner for the cell factory layout, machinery, and production processes. Volkswagen at the time had announced a European strategy for Volkswagen Group to establish six gigafactories with a total production capacity of 240 GWh pa together with partners.[244]

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[239] Volkswagen, Volkswagen intensifies e-mobility activities in China, 29 May 2020
[240] Cnevpost.com, Gotion becomes VW's designated battery supplier for markets outside of China, 11 May 2023
[241] Cnevpost.com, Global EV battery market share in Jan-May 2024, 3 July 2024
[242] Gotion Press Release, Gotion High-tech's operating profit up 391% in 2023, 19 April 2024
[243] Nikkei Asia, China battery maker Gotion plugs into VW for global expansion, 31 March 2023
[244] Volkswagen Press Release, Volkswagen Group and Gotion High-Tech team up to industrialize battery cell production in Germany, 13 May 2021

July 2024 saw Volkswagen recognise Gotion with its global battery supplier award.[245]

Gotion – Germany

September 2023 saw the first battery pack produced at Gotion Germany Battery GmbH in Göttingen, Gotion's first European factory aimed to localise production for EV and BESS. Gotion stated: "The current battery pack capacity plan for the Göttingen factory is 20GWh pa, which is expected to be completed in four phases. Once fully operational, it is estimated to generate an annual output value of EUR2bn."[246] This builds on MoUs signed by Gotion with BASF and Siemens for strategic cooperation (both in July 2023).

Gotion – Vietnam (with VinGroup)

November 2022 saw Gotion break ground on a new US$275m 5GWh pa LFP battery factory in the province of Ha Tinh in a 51:49 joint venture with Vietnam's VinGroup to supply into Vingroup's EV and BESS manufacturing division. VinGroup is Vietnam's largest private company, a conglomerate.[247]

Gotion – Thailand (with PTT Group)

December 2023 saw Gotion's first battery pack product officially rolled off the production line at Siam Eastern Industrial Park, Rayong, Thailand. This facility has a 2GWh pa capacity to supply Thailand's Neto Auto and the wider new energy vehicle market. Gotion plans to expand to 8GWh capacity. NV Gotion is a joint venture between Gotion and Nuovo Plus, a new energy solution provider in Thailand (a subsidiary of PTT Group, Thailand's largest state owned energy company).[248]

Gotion – Indonesia (with Wuling Motors)

November 2022 saw Gotion and PT SGMW Motor Indonesia (a subsidiary of China's Wuling Motors) sign an MoU to use Wuling's factory located in Cikarang, West Java to develop EV batteries for the Indonesian automotive market.

Gotion – Indonesia (with Anugrah Neo Energy Materials)

September 2023 saw Indonesia's Anugrah Neo Energy Materials and Gotion agree to build a high-pressure acid leaching (HPAL) plant to produce materials used in batteries for EVs, Indonesia's industry ministry said. The HPAL plant will be built on Sulawesi Island with a production capacity of 120,000tpa of nickel in mixed hydroxide.[249]

Gotion – Slovakia (with InoBat)

September 2023 saw China's Gotion acquire a 25% stake in Slovak EV battery startup InoBat. The move by Gotion, partly owned by Volkswagen, is the first investment by a Chinese battery maker in a European startup. InoBat highlighted the partnership would give it access

[245] Gotion Press Release, Gotion High-tech Won Volkswagen Group Battery Supplier Award, 2 July 2024
[246] Gotion Press Release, Gotion High-tech's Battery Achieves "Made In Germany", 18 September 2023
[247] Nikkei Asia, Vietnam's Vingroup builds battery plant with China's Gotion, 23 November 2022
[248] Gotion Press Release, The First Battery Products Officially Rolled Off the Production Line in Gotion's Plant in Thailand, 7 December 2023
[249] Reuters, Indonesian company, China's Gotion to build HPAL plant, 14 September 2023

to Gotion's raw material supply chain, recycling and R&D efforts, as well as providing the capital to accelerate the startup's path to mass production.[250]

June 2024 saw confirmation of Gotion's partnership with Slovak's InoBat to build a 20GWh pa EV battery factory located in the Šurany strategic eco park in Slovakia, with commissioning due 2027. Gotion is already a battery supplier to Volkswagen. The MoU suggested a phased ramp up to 60GWh pa capacity.[251]

Gotion – California, US

December 2023 saw Gotion's first battery pack product officially rolled off the production line at the Fremont factory in California, marking the official start of Gotion's "Made in USA" initiative. This facility has a 1GWh pa BESS capacity. [252]

Gotion – Michigan, US

May 2024 saw Chinese battery maker Gotion make progress with its plans to build a US$2.36bn lithium battery components manufacturing plant near Grand Rapids in Michigan when a US judge ordered an injunction against the local community to stop impeding this development.[253]

August 2024 saw Gotion targeted by the Republicans[254] because it has received strong State government support, including the promise of US$715m in incentives to create 2,350 high value manufacturing jobs, but anti-China sentiments have been railing against the proposal, first raised in 2022.[255] [256]

Gotion – Spain

June 2024 saw Gotion sign a cooperation agreement with Spain's Phi4Tech Technology Group and Unicorn RE Investment Group (an investment subsidiary of the Abu Dhabi Royal Family) to progress plans to establish energy storage stations in Spain, Europe and Africa.[257]

Gotion - Argentina

June 2022 saw Gotion sign an MoU with Argentina's state-owned mining company Jujuy Energía y Minería Sociedad del Estado (JEMSE) for the establishment of a joint venture, named Gotion Jujuy Mining, to build a 10,000tpa capacity refinery for battery-grade lithium carbonate in the Perico free trade zone in Jujuy province. The MoU had the possibility of expanding by a further 50,000tpa based on market demand, as well as a downstream expansion into cathode materials at a future date.[258]

Gotion - Morocco

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[250] Reuters, China's Gotion buys 25% stake in Slovak EV battery startup InoBat, 1 September 2023
[251] InoBat Press Release, GIB to build an Advanced Gigafactory in Slovakia, 20 June 2024
[252] Gotion Press Release, Gotion High-tech's First Battery Pack Rolls Off the Line at Fremont Factory in the U.S., 29 December 2023
[253] CBS, Judge allows Chinese EV battery maker to continue to develop Michigan factory, 20 May 2024
[254] The Detroit News, Vance uses Michigan's China-linked battery plant project to slam Harris, 27 August 2024
[255] The Guardian, The China-linked EV battery mega factory dividing a US township, 15 May 2024
[256] Bloomberg, US Senators Move to Deny China Solar Firms Lucrative Tax Credits, 1 August 2024
[257] Gotion Press Release, New Breakthrough in European-African Operations: Gotion High-Tech and Spain's Phi4Tech Establish Comprehensive Collaboration, 3 June 2024
[258] Electrive, Gotion High Tech signs lithium plant deal in Argentina, 27 June 2022

June 2023 saw Gotion announce an MoU with the Moroccan Government to consider setting up a massive 100GWh pa EV battery plant in Morocco with a potential investment of up to US$6.4bn and potentially create 25,000 jobs as part of the development of a wider integrated industrial ecosystem for EV and BESS.[259]

June 2024 saw confirmation that the Moroccan government and Gotion had signed a US$1.3bn deal to build a gigafactory for the manufacture of EV batteries.[260]

Refer to Section 7.9 below.

Gotion – Tata - India

November 2023 saw Tata Group's Tata AutoComp's JV with China's Gotion commission its 6GWh BESS manufacturing facility in Pune, Maharashtra. The first BESS deployments will be in the construction of the 120MW Energy Storage Park in Chhattisgarh.[261]

[259] Bloomberg, When will Africa get its first gigantic battery factory? 5 June 2023

[260] Arabian Gulf Business Insight, China picks Morocco for Europe's EV battery supply, 21 June 2024

[261] India's Economic Times, TATA AutoComp opens Battery Energy Storage System plant in Pune, 18 November 2023

7.4 Batteries - EVE Energy

Shenzhen Stock Exchange listed EVE Energy as one of the world's top 10 battery manufacturers with a 1HCY2024 global share of 2.4%.[262] EVE's LFP lithium battery manufacturing capacity is reported at 73GWh pa in Jingmen, Hubei province, as of February 2023, but is set to double with the ground-breaking of a Rmb16.6bn 60GWh pa new factory in Jingmen as part of its strategic goal to lift capacity to 200GWh pa.[263]

EVE Energy - Hungary

November 2023 saw EVE Energy announce construction has started for its new US$1.4bn 28GWh pa battery cell plant in Hungary with 1,000 staff to supply BMW's new EV factory nearby in Debrecen, Hungary.[264] March 2024 saw reports the factory is due for commissioning by the end of 2025.

EVE Energy - Malaysia

January 2024 saw an MoU signed between EVE Energy Malaysia and INVEST KEDAH BHD, proposing to establish EVE Malaysia Energy Storage Company and purchase a new Phase II plot to start the construction of energy storage factories to meet Malaysia's energy storage needs.[265]

May 2024 saw EVE Energy update the market following the commencement of construction in August 2023 of its new battery manufacturing facility in Kedah, Malaysia, with an initial investment of US$422m to produce cylindrical batteries for power tools and electric two wheelers, due for commissioning 1QCY2025.

June 2024 saw media reports that Chinese executives have been meeting top government officials in Malaysia to seek assurances they can avoid US tariffs if they relocate manufacturing to the Southeast Asian country. This is particularly pertinent to EVE, which sends 20% of its exports to the US.[266]

EVE Energy - American Energy Storage Innovations - Malaysia

September 2024 saw EVE Energy expand its technology partnership to supply 20GWh of cells over three years to American Energy Storage Innovations (AESI), who also announced a new BESS manufacturing plant for Malaysia to be commissioned by the end of 2025.[267]

EVE Energy - UK

[262] Cnevpost.com, Global EV battery market share in Jan-May 2024, 3 July 2024
[263] EVE Energy Press Release, EVE Energy to Increase the production Capacity of Power and Energy Storage Batteries to Meet the Rapid Growth of the Industry, 24 February 2023
[264] Electrive, Groundbreaking ceremony for Eve Energy's Hungarian battery factory, 30 November 2023
[265] EVE Energy Press Release, The first stop of global layout, the construction of EVE's Malaysia factory is steadily advancing! 15 May 2024
[266] FT, Chinese companies seek assurances from Malaysia on avoiding US tariffs, 25 June 2024
[267] AESI Press Release, American Energy Storage Innovations Announces New Manufacturing Plans for Malaysia; Expands Partnership with EVE Energy, 11 September 2024

March 2024 saw media reports speculating that EVE Energy was looking to invest £1.2bn in the West Midlands Gigafactory project in Coventry, UK. This reflects the 2027 EU Rules of Origin that mandate a significant proportion of a battery pack to be locally built.[268]

EVE Energy - Aksa - Turkey

January 2024 saw EVE Energy announce a new JV with Aksa in Turkey to manufacture battery modules, and cabinets as well as build BESS in Turkey.[269] This follows the announcement that the government of Turkey would institute 30% duties on imported LFP even as Turkey's Energy Markets Regulatory Authority (EMRA) said that it had given pre-licensing status to 493 project applications representing 25.6GW of BESS planned for deployment at wind or solar PV plants across Turkey.[270]

EVE Energy – Energy Absolute - Thailand

July 2023 saw EVE Energy announce an MoU with Energy Absolute Public Co. (one of Thailand's largest auto, motorbike and boating EV firms) to build a JV in Thailand to construct an advanced manufacturing battery cell production facility in Thailand with a capacity of at least 6GWh for phase I. Energy Absolute will hold a 51% share, EVE 49%.[271]

EVE Energy – US (in JV with Cummins, Daimler and Paccar)

July 2024 saw Amplify Cell Technologies, a JV between Indiana-based engine maker Cummins Inc. US and two truck manufacturers, Daimler and Paccar, with EVE Energy as the technology partner, began construction of a new 21GWh battery cell plant in Mississippi, US, creating an estimated 2,000 local manufacturing jobs.[272] [273]

EVE Energy – Powin US

June 2024 saw EVE Energy sign a multi-year 15GWh deal for the supply of battery cells to US-headquartered battery storage system integrator and manufacturer Powin. This follows a 10GWh supply agreement by Powin with EVE in June 2023. It marks the third publicly announced multi-gigawatt-hour deal with Chinese battery makers in 2024 for Powin, following a 5GWh agreement with Hithium, announced in January, and a 12GWh framework agreement with Rept Battero in April.[274]

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[268] Edie, West Midlands Gigafactory set to secure £1bn investment from Chinese EV battery maker, 25 March 2024

[269] Cnevpost.com, Eve Energy to set up JV in Turkey to produce batteries, 16 January 2024

[270] Energy-Storage.news, Turkey pre-licenses 25.6GW of colocated energy storage, slaps 30% duties on imported LFP, 18 January 2024

[271] EVE Energy, EVE Energy and Energy Absolute signed a MoU, 31 July 2023

[272] FT, Chinese battery industry faces consolidation wave, 7 August 2024

[273] Paccar Press Release, Amplify Cell Technologies Begins Construction of Mississippi Battery Cell Factory, 1 July 2024

[274] Energy-Storage.News, Powin signs 15GWh master supply agreement with Eve Energy, 21 June 2024

7.5 Batteries - Envision AESC

AESC was a battery JV between Nissan and Japanese electronics group NEC before being acquired by China's Envision in 2019 (Nissan retained a 20% stake). The Chinese Envision Group is the majority owner of AESC but raised over US$1bn in new equity from Sequoia Capital, Singapore's GIC and Primavera Capital in November 2021.[275]

Envision AESC has a small global market share but is quickly expanding, having unveiled plans to build 13 plants across China, Ibaraki in Japan, Tennessee, Kentucky and South Carolina in the US, Sunderland in the UK, Douai, France and Extremadura Spain, with a combined production capacity tipped to reach 400GWh by 2026.[276]

Envision AESC - Japan

May 2023 confirmed AESC was nearing completion of its new EV battery factory in Ibaraki Prefecture Japan with an investment of ¥50bn. The plant is expected to start mass production in spring 2024 to supply Nissan, Honda and Mazda.[277]

Envision AESC - US

December 2022 saw reports Envision AESC intended to build a US$810m 30GWh EV battery cell factory[278] to supply BMW's EV factory in Florence, South Carolina, US. [279]

September 2023 saw AESC nearing completion of its 30GWh plant in Bowling Green, Kentucky.[280] This takes AESC's total plant capacity to more than 70GWh in the US, including to supply Mercedes' EV produced in Alabama, US.

October 2023 saw Envision announce a strategic agreement with Umicore for the supply of cathode active materials (CAM) at an annual capacity of 50GWh by the end of this decade. The supply agreement commences in 2026 from Umicore's factory in Cheonan, Korea, followed by additional supplies to be delivered from Umicore's plant in Loyalist, located in Ontario, Canada, once the plant begins production.[281]

Envision AESC - UK

December 2022 saw AESC announce it had broken ground on a second 12GWh gigafactory in the International Advanced Manufacturing Park in Sunderland, UK. It forms part of a wider £1bn partnership with Nissan and Sunderland City Council to create EV36Zero, an electric vehicle hub supporting next generation EV production.[282] AESC has an existing 1.9GWh battery factory in Sunderland.

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[275] Sequoia Capital, GIC, Primavera Capital Explore Net Zero Economy through USD$1 Billion Investment In Envision, 1 November 2021
[276] China Daily, Envision AESC to make EV cells for BMW in US, 8 December 2022
[277] The Japanese Times, Electric Vehicle Battery Maker Envision AESC Aims to Boost Output Capacity to 20 Times Current Level, 9 May 2023
[278] AESC Press Release, AESC Breaks Ground on Electric Vehicle Battery Factory in Florence County, 13 June 2023
[279] AESC Press Release, AESC and BMW Group Announce New Partnership in Battery Cell Production and Supply, 19 October 2022
[280] AESC Press Release, AESC Celebrates Structural Completion Milestone at State-of-the-art Gigafactory in Bowling Green, 14 September 2023
[281] AESC Press Release, AESC Strengthens U.S. Manufacturing Operations with Long-term Supply Agreement with Umicore, 16 October 2023
[282] AESC Press Release, First Pillar Ceremony Unveils Start of Construction on AESC's Second UK Gigafactory, 9 December 2022

January 2024 saw AESC's Sunderland gigafactory secure a £200m loan from UK Infrastructure Bank (UKIB), and confirmation the plant was due for commissioning in 2025, creating over 1,000 new jobs and 100% powered by renewable energy.[283]

Envision AESC - Spain

July 2024 saw AESC commence construction of its gigafactory in Navalmoral de la Mata, Cáceres, Spain. The plant is scheduled to begin production in 2026 and be among the first facilities to develop and manufacture advanced LFP batteries in the EU. The factory involves an investment of over €1bn for its first phase, creating up to 900 direct jobs upon completion.[284]

Envision AESC - France

November 2023 saw confirmation that AESC's new €1.3bn Douai plant will create 1,200 direct jobs and supply batteries for the new all-electric Renault 5, due to launch in 2024 with a capacity of 9GWh, with a target to grow to 24GWh by 2030. The new "battery valley" in the Hauts de France region spanning Dunkirk, Douai and Douvrin has become the leading automotive OEM region in France.[285] This investment was supported by a €450m loan package from the European Investment Bank (EIB).[286]

[283] BusinessGreen, Sunderland gigafactory secures £200m loan from UKIB, 30 January 2024
[284] AESC Press Release, AESC Spain celebrates the laying of the first stone of the battery gigafactory in Cáceres, 8 July 2024
[285] Societe Generale Press Release, A new gigafactory in the French "Battery Valley", 22 November 2023
[286] Electrive, EIB grants AESC funds for battery factory in France, 13 October 2023

7.6 Batteries - SVOLT

SVOLT Energy Technology Co. (SVOLT) is a leading battery manufacturer for EVs and BESS, headquartered in Jintan District, Changzhou, Jiangsu Province in China, a spin-off from Great Wall Motor. At the end of 2023, SVOLT employs 15,000 people worldwide, including 3,000 in R&D.

SVOLT – Germany

September 2022 saw SVOLT announce it will build another 16GWh battery cell factory for the European market in Lauchhammer in the German State of Brandenburg, doubling its German battery annual manufacturing capacity to 40GWh. The Lauchhammer site is available at short notice as Vestas, a Danish manufacturer of wind turbines, had only recently ceased production of rotor blades there. The battery cells produced in Lauchhammer will be further processed for use in EU EVs, including at the future SVOLT site in Heusweiler, Saarland, Germany.

May 2024 saw SVOLT announce it was abandoning its plan to build a battery plant in the German state of Brandenburg, citing uncertainty over planning, tariffs and subsidies, as well as the loss of a leading customer, in the face of excessive global capacity expansions and rapid deflation. Meanwhile, its plans for a second 16GWh battery cell factory in Saarland, southwest Germany, continue to be delayed, and a strategic pivot to give a stronger focus on catering to stationary storage demand in Europe in response to current market developments in the EV sector. The site was previously used by Vestas to manufacture blades for wind turbines. At the time of the original announcement in September 2022, the start of production was expected by 2023, and then delayed to the beginning of 2025 given ongoing delays to planning approvals.[287]

SVOLT – Finland

October 2023 saw SVOLT announce it was considering construction of another battery cell factory with 50 GWh capacity, stating: “Finland is among the shortlisted locations which include countries both within and outside of the European Economic Area (EEA). Significant raw material deposits, a competitive green energy infrastructure as well as a sustainable supply chain for the battery industry have been key arguments to include Finland in the shortlist. Any investment in the EEA requires substantial financial support in the form of public funding.”[288]

SVOLT – Banpu Thailand

February 2024 saw the commissioning of SVOLT’s new battery manufacturing plant in Sriracha Chonburi, Thailand for use by Great Wall Motor and Hozon New Energy Automobile’s NEV models. This facility is a JV with Banpu Group’s Banpu NEXT subsidiary. The JV has initiated a feasibility study on the production of battery cells to meet Thailand's policy requirements in preparation for localized battery production in Thailand from 2026.[289]

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[287] PV Magazine, Svolt abandons plans to open battery factory in Germany, 29 May 2024
[288] SVOLT Press Release, SVOLT considering construction of another battery cell factory with 50 GWh capacity, 25 October 2023
[289] CNEVPOST.com, Svolt Energy's battery plant in Thailand begins mass production, 28 February 2024

7.7 Batteries - Sunwoda

Shenzhen Stock Exchange listed Sunwoda Electronic Co. (Sunwoda) is one of the world's top 10 battery manufacturers with a 1HCY2024 global share of 2.1% according to South Korea's SNE Research. Sunwoda's global installed capacity of power batteries totalled 7.5GWh in 1HCY2024, +62.4% yoy.[290] 1HCY2024 revenues of Rmb24bn, +8% yoy, and Sunwoda reinvested Rmb1.4bn in R&D, representing 5.9% of sales.[291] Based in Shenzhen, Sunwoda has established multiple production and manufacturing bases in China's Guangdong, Jiangsu, Zhejiang, Shandong, Jiangxi, Sichuan and Hubei provinces, and internationally in New Delhi, India, Bac Giang, Vietnam and Nyiregyhaza, Hungary.

Sunwoda - Hungary

July 2023 saw Sunwoda announce a US$275m EV battery manufacturing facility in Nyiregyhaza, 50km from Debrecen in Hungary for commissioning by the end of 2025.[292] [293]

Sunwoda - Vietnam

July 2024 saw Sunwoda announce an Rmb2bn (US$275m) investment to expand its battery manufacturing facility to produce consumer battery cells, system-in-package and batteries in the northern province of, first established in April 2023. This capacity expansion would see Sunwoda employ 5,000 local staff with a targeted US$1bn pa revenue and target green energy and energy efficiency initiatives to make this a smart green facility.[294] [295]

[290] Cnevpost.com, Global EV battery market share in Jan-May 2024, 3 July 2024
[291] Sunwoda, 2024 Interim Report, August 2024
[292] Investment Monitor, Sunwoda Electronic to open first eastern European plant in Hungary, 31 July 2023
[293] Sustainable Bus, Hungary – the future paradise for EV battery manufacturers? 28 June 2024
[294] Vietnam Investment Review, Chinese battery manufacturer Sunwoda to pour US$300m into Bac Giang, 17 July 2024
[295] Argus, China's Sunwoda plans $275mn battery plant in Vietnam, 18 July 2024

7.8 Batteries - Other Companies

CALB - Portugal

China Aviation Lithium Battery Technology (CALB) is one of the world's top 10 battery manufacturers with a 1HCY2024 global share of 4.5%. CABL targets a 2030 battery production capacity of 1,000GWh.

January 2024 saw CALB announce a plan to build a €2bn 15GWh pa battery factory in Sines Industrial and Logistics Zone in Portugal that would create 1,800 direct jobs. Commissioning is due at the start of 2026. This proposal was designated a Portuguese Project of Potential National Interest in 2022, and a phase II plan could see expansion from 15GWh to 45GWh by 2028.[296]

CNGR Advanced Material - Morocco

CNGR Advanced Material, a Chinese battery components manufacturer, signed an agreement in 2023 to build a cathode materials plant in Jorf Lasfar, 100 km south of Casablanca, Morocco to leverage Morocco's free trade agreements to supply the US and European markets, investing in partnership with Al Mada, a conglomerate owned by the Moroccan royal family, to invest MAD20bn (US$2bn).[297]

February 2024 saw confirmation CNGR is moving ahead with permitting and expects construction of this facility to commence shortly.[298]

Shinzoom - Morocco

May 2024 saw reports Shinzoom, part of Hunan Zhongke, announce plans to invest US$460m in a battery anodes plant in Morocco.[299]

Growatt - Vietnam

February 2023 saw China's Growatt establish its first offshore manufacturing facility in Vietnam. The Haiphong located facility produces solar inverters, storage inverters and battery storage products and is equipped to be expanded to achieve an annual production capacity of 500,000 inverter units and 100,000 battery units.[300]

Huayou Cobalt - Hungary

June 2023 saw China's Huayou Cobalt confirm it will build its first European factory in Acs, near the city of Gyor in Hungary to produce 100,000tpa of a nickel-rich ternary lithium cathode material for EV batteries with a total investment of €1.4bn. Huayou Cobalt is a key supplier of cathode materials in China with JVs with both VW and BMW.[301]

July 2024 saw confirmation the cathode factory is under construction.[302]

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[296] The Portugal News, Chinese invest €2 billion in factory in Portugal, 22 January 2024
[297] FT, China 'dwarfs' US investments in EU neighbourhood countries, 15 May 2024
[298] Benchmark Materials, "Morocco is a sweet spot for the time being." Q&A with CNGR's Thorsten Lahrs, 6 February 2024
[299] Reuters, China's Hailiang, Shinzoom to build auto battery plants in Morocco, 15 May 2024
[300] Taiyangnews, China's Growatt Expands Into Vietnam With New Factory, 21 February 2023
[301] Electrive, Huayou Cobalt to build cathode plant in Hungary, 23 June 2023
[302] Huayou Cobalt, One Full Year! B&M Hungary Takes Another Forward Step! 8 July 2024

Shanshan - Finland

October 2023 saw China's anode producer Shanghai Shanshan Lithium Battery Material Technology Co. Ltd (Shanshan) announce a US$1.35bn synthetic graphite anode factory in the GigaVaasa industrial zone on the western coast of Finland with a capacity of 100,000tpa built over two phases (sufficient to supply 100GWh of batteries) and creating 1,000 new jobs.[303]

Shanghai Putailai - Sweden

May 2023 saw China's Shanghai Putailai announce its plans to build Europe's largest anode production facility in Sundsvall, Sweden. The leading anode player is targeting a US$1.5bn investment for a nameplate capacity of 50,000tpa of synthetic graphite anode materials to supply NorthVolt, with a phase 2 plan to double this output, and employing 1,900 workers. This was reported in April 2024 as still in train, but NorthVolt's financial issues and strategic consolidation in 2024 could put this at risk.[304] [305]

Tianqi Lithium - Europe

July 2024 saw Frank Ha Chun-shing, CEO of the global giant Tianqi Lithium flag plans to produce lithium battery materials in JV in a European country with strong battery-to-EV supply chains to avoid import duties and other trade barriers like the EU CBAM, and to comply with the EU Battery Passport requirements.[306]

Pylon Technologies – Energy SpA - Italy

June 2024 saw Energy confirm its first gigafactory for BESS is due for commissioning in 2024, with first product testing finished in 1QCY2024.[307] May 2023 saw China's Shanghai Stock Exchange listed Pylon Technologies Co. announce a JV with Energy SpA to set up an entity called Pylon LiFeEU S.r.l to build a €43m gigafactory at Energy's existing facility in Sant'Angelo di Piove di Sacco, Italy to produce 1-1.4GWh pa of LFP batteries for energy storage with.[308]

June 2023 saw Energy SpA announce a phase II expansion to more than double capacity at the facility by 2025 and ensure 100% renewable energy for its ZeroCO_2 consistent with the EU's Net Zero Industry Act (NZIA) objective to boost to the green transition: Legislation to increase productivity of strategic zero-emission tech to support the transition towards clean energy and ensure the EU objective for strategic production capacity for net-zero emissions technologies to reach at least 40% of the annual deployment needs by 2030.[309]

November 2023 saw Energy SPA win a €7m Invitalia government Strategic Production Chain Development Contract grant to cover 16% of the capex involved in this phase I gigafactory.[310]

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[303] Benchmark Materials, China's Shanshan to build €1.28 billion synthetic anode plant in Finland, 6 October 2023
[304] Benchmark Materials, Europe's anode supply chain converges on Sweden, 11 March 2024
[305] FT, Chinese group Putailai to build Europe's largest anode factory in Sweden, 4 May 2023
[306] SCMP, China's Tianqi is looking at a lithium plant in Europe to supply electric car batteries, 12 July 2024
[307] Energy SpA Investor Presentation, June 2024
[308] Energy-Storage.news, Pylontech in JV with system integrator for ESS battery gigafactory in Italy, 18 May 2023
[309] Energy Press Release, Obtained Construction permit to start phase II, 23 June 2023
[310] Energy Press Release, €7M from NRRP for the Italian Gigafactory, 15 November 2023

Ganfeng Lithium – Turkey

August 2024 saw Ganfeng announce a strategic partnership with Turkish battery maker Yigit Aku to establish a US$500m 5GWh pa lithium battery cell and pack manufacturing JV in Turkey. This marks a downstream vertical integration effort by Ganfeng into battery manufacturing, a world-leading lithium mining and refining entity. Ganfeng reported CY2023 lithium battery product revenues of Rmb7.7bn (US$1bn), accounting for 23% of total company revenue. In 2023, production of lithium batteries and energy storage products reached 10.6GWh.[311]

Farasis Energy – Togg - Turkey

April 2023 saw Chinese based battery manufacturer Farasis Energy and Turkey's Togg commence production at battery modules and packs factory in Gemlik, Turkey with an initial capacity of 8GWh pa. The JV aims for a production capacity of 20 GWh pa by 2026 with local battery cell production.[312]

April 2024 saw reports a new battery plant is also being built in Gemlik, Turkey with the establishment of the Siro joint venture between Turkish EV car manufacturer Togg and Farasis Energy.[313]

Junda Shares - Oman

July 2024 saw China's Junda Shares announce a US$280m 5GW pa battery manufacturing facility in Oman as an extension of its solar module manufacturing business.[314]

Guangzhou Tinci Materials Technology - US

June 2023 saw Chinese electrolyte producer Guangzhou Tinci Materials Technology announce plans to invest in a new lithium battery electrolyte factory with a production capacity of 200,000tpa in Texas.[315]

March 2024 saw reports this proposal was being held up by the headwinds of changing rules relating to Chinese firms investing in the US.[316]

September 2024 saw a new process technology licencing agreement between Guangzhou Tinci Materials Technology Co. and the US TexPower EV Technologies Inc., a fast-growing company specializing in lithium-ion battery cathode development. This new material will be manufactured by TexPower in Houston, TX where TexPower has a 15tpa pilot line currently operating. This site is being evaluated for up to 20 GWh of cathode production by 2027 with production beginning in 2026. The material will be compliant with the requirements of the Inflation Reduction Act.[317]

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[311] China Daily, Ganfeng Lithium inks JV deal in Turkiye, 23 August 2024

[312] Farasis Energy Press Release, Farasis Energy and Togg: Joint venture Siro laid the foundation stone of the cell factory, 26 April 2023

[313] Farasis Energy Press Release, Innovations for electromobility: Farasis Energy presents pioneering battery technology at AABC Europe 2024, 29 April 2024

[314] China Power, Another photovoltaic company enters the Middle East. Junda shares plans to invest US$280m to build a production base in Oman, 26 July 2024

[315] Yicai Global, China's Tinci to Build Lithium Battery Material Plants in US, Morocco, 28 June 2023

[316] Chemical & Engineering News, Electrolyte makers chase opportunities in US battery industry, 21 March 2024

[317] TexPower Press Release, TexPower EV Technologies Inc. Announces Addition of LFP in Collaboration with Guangzhou Tinci Materials Technology Co., 10 September 2024

7.9 Case Study – Morocco Battery Supply Chains

Morocco is Africa's largest auto manufacturer with a significant EU export profile.[318] September 2022 saw Morocco's government announce plans to double the country's EV manufacturing capacity to 100,00 units pa by 2024/25 and facilitate the development of the local supply chains to support this.

In 2022, the sector led the country's industrial exports, earning US$11.5bn, up 33% yoy. With an annual capacity of 700,000 vehicles and numerous car part suppliers, Morocco's auto industry hosts international manufacturers like Renault and Stellantis, makers of brands like Peugeot, Citroën, and Opel.[319]

This track record has attracted an increasing number of Chinese manufacturers to set up factories in Morocco. At least eight Chinese battery makers have announced new investments in Morocco since President Joe Biden signed the US Inflation Reduction Act and increased trade barriers to Chinese exports to the US.[320] [321]

Morocco's automotive manufacturing sector holds another advantage for EV battery manufacturers.

Morocco's massive phosphate reserves (70% of the global total) are a critical factor in its attractiveness as a globally significant battery materials-to-EV production hub. A growing trend in the EV industry is to replace NMC Li-ion batteries with LFP batteries, substituting expensive cobalt and nickel as well as manganese for relatively cheaper phosphate and iron.

Morocco also has significant cobalt reserves of interest to global critical mineral miners.

June 2023 saw Chinese electrolyte producer Guangzhou Tinci Materials Technology, reveal plans to invest US$280m for the production of lithium-ion battery materials in Morocco.[322]

June 2023 saw Gotion announce an MoU with the Moroccan Government to consider setting up a massive 100GWh pa EV battery plant in Morocco with a potential investment of up to US$6.4bn and potentially create 25,000 jobs as part of the development of a wider integrated industrial ecosystem for EV and BESS.[323]

Should the full $6.4bn capital pledge in June 2023 be realised by Gotion, this would be the second-largest foreign direct investment project ever announced in Morocco, behind Total Eren's planned Dh100bn (US$10bn) hydrogen and green ammonia project announced in 2022 – Figure 6.5.[324]

September 2023 saw CNGR, one of China's largest battery cathode producers, announce a US$2bn plan to build what it called a "base in the world and pan-Atlantic region" in a JV with

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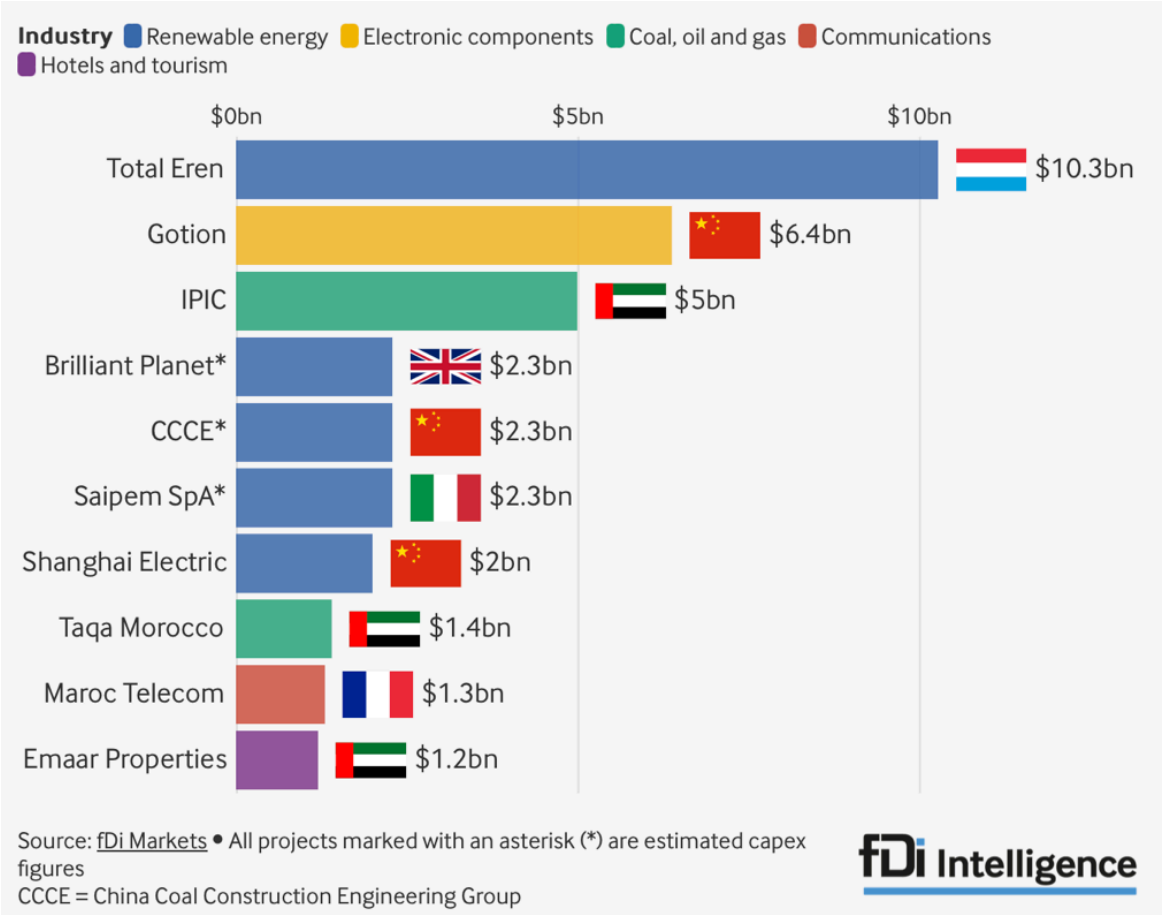
[318] Morocco World News, Morocco to Scale Up Electric Car Production Over Next Two Years, 9 Sept 2022
[319] Nanyang Technological University Singapore, Morocco rises as an EV manufacturing hub, 20 July 2023
[320] The Hindu, Chinese firms eye Morocco as way to cash in on U.S. electric-vehicle subsidy, 4 July 2024
[321] Nanyang Technological University Singapore, Morocco rises as an EV manufacturing hub, 20 July 2023
[322] Yicai Global, China's Tinci to Build Lithium Battery Material Plants in US, Morocco, 28 June 2023
[323] Bloomberg, When will Africa get its first gigantic battery factory? 5 June 2023
[324] Financial Times FDi, Gotion explores Africa's first gigafactory in Morocco, 9 June 2023

the Moroccan royal family's investment group, Al Mada, located in the Jorf Lasfar Park near the OCP Group Park in El Jadida, Morocco.[325]

September 2023 saw a JV of Korea's LG Chem and China's Huayou Cobalt sign an MoU to build a 50,000tpa LFP plant in Morocco with mass production targeted for 2026. The partners also flagged plans to build a conversion plant to transform lithium concentrate into lithium for cathode materials. LG Chem said the Morocco base means their cathodes "will be supplied to the North American market and subsidised by the US Inflation Reduction Act as Morocco is a signatory to the US Free Trade Agreement." LG Chem said the venture would adjust ownership shares as necessary to comply with US rules under the US IRA. The investment should also gain from the EU's Critical Raw Materials Act, a similar legislation concerning mineral supply chains. Morocco maintains FTAs with both the US and the EU.[326]

Figure 6.5: Largest Investments into Morocco



March 2024 saw the Moroccan government announce a US$300m 50,000tpa battery cathode manufacturing facility located in the Mohammed VI Tangier Science and Technology City to be owned by BTR New Material Group. The media reports say BTR has clients

[325] CNGR press release, A Contract Signed for Jointly Building a New Energy Battery Material Base in the Pan-Atlantic Region by CNGR and Al Mada Group, 18 September 2023
[326] LG Chem press release, LG Chem Teams Up with Huayou Group to Build LFP Cathode Plant in Morocco, 24 September 2023

including BYD, CATL, Volkswagen and Tesla.[327] BTR's press release noted Morocco was the first North African nation to sign on to the Belt and Road cooperation plan with China.[328]

August 2024 saw BTR New Material announce a second US$366m 60,000tpa battery anode manufacturing facility located in the Mohammed VI Tangier Science and Technology City. Minister of Industry Riyad Mezzour said he hopes to see Morocco as the world's most competitive platform for EV manufacturing and Morocco's commitment to advancing the ongoing transformation of the EV industry, "which will transition to 100% by 2030 with an integrated industrial system.[329]

[327] Morocco World News, Morocco Signs MAD 3 Billion Deal with Chinese Group to Boost EV Sector, 29 March 2024

[328] BTR Press Release, A new milestone in the globalization strategy, 29 March 2024

[329] Morocco World News, China's BTR Group Announces $366 Million Lithium-ion Battery Plant in Morocco, 15 August 2024

7.10 Battery Energy Storage Systems (BESS)

China's world leadership in battery manufacturing is underpinning accelerated technology development, leveraging the convergence of trends in power and automotive markets. From Canadian Solar (refer to Section 4.5) to Trina Solar, Chinese solar manufacturers are increasingly pursuing horizontal integration opportunities by adding both BESS manufacturing and project development capacities at speed and scale.

July 2024 saw China's Sungrow sign a landmark energy storage contract with Saudi Arabia's Algihaz Holding, amounting to possibly the world's largest BESS storage order to-date. Each project will have a capacity of 2.6GWh, totalling 7.8 GWh.[330]

Trinasolar

Trinasolar, one of the world's largest solar manufacturers with a staggering 95GW pa of module manufacturing capacity, expects to exit 2024 with a staggering 20GW pa of BESS manufacturing and integration capacities. Trina was ranked in the Top 5 bankable energy storage providers in 2023 and as a global Tier 1 storage supplier in 2024 by BNEF.[331]

Whilst the vast majority of this BESS capacity is likely to be deployed within China, Trina is expanding its UK, EU and US distribution footprint. June 2024 saw Trina launch in the US its new fully integrated liquid-cooled Elementa 2 Elevate solution, a cell-to-AC 10MWh battery storage product.[332] Given the US in May 2024 announced it would increase the tariff on batteries imported from China from 7% to 25% by 2026,[333] it is likely Trina will evaluate US domestic battery sourcing as its market share builds.

February 2024 saw Trinasolar win a tender to supply BESS for four UK sites operated by international Independent Power Producer Low Carbon totalling 95MW/190MWh, coupled with a 15-year maintenance agreement.[334]

May 2024 saw Trina Storage sign an MoU to supply 1,500MWh integrated BESS to Pacific Green, an energy storage developer. Pacific Green has a 6GWh portfolio of BESS proposals across the UK, Italy, Poland and the 2.5GWh Portland Energy Park in Victoria, Australia.[335]

September 2024 saw Trinasolar complete 4 BESS in Massachusetts, US with a combined capacity of 16MW/64MWh.[336]

Trinasolar - Germany

Trinasolar is due to commission its first German BESS in 4QCY2024, a 16MW/35MWh BESS Tangermünde in the Saxony-Anhalt region of Germany in partnership with Obton.

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[330] PV Magazine, Sungrow secures 7.8 GWh battery storage deal from Saudi Arabia, 16 July 2024
[331] Trina Solar Press Release, Trina Storage recognised as Tier 1 energy storage manufacturer by BNEF for second consecutive quarter, 7 May 2024
[332] Energy Storage News, Trina Storage launches cell-to-AC BESS solution in US, signs first Germany project deal, 27 June 2024
[333] Energy Storage News, US increases tariffs on batteries from China to 25%, 14 May 2024
[334] Trina Solar Press Release, Trina Storage partners with Low Carbon to deliver energy storage systems for four UK sites, 6 February 2024
[335] Trina Solar Press Release, Trina Storage and Pacific Green sign Letter of Intent for 1,500 MWh energy storage system, 19 April 2024
[336] Energy Storage News, Trina completes company's first US utility-scale BESS projects in Massachusetts,10 September 2024

August 2024 saw Trina selected by Aquila Clean Energy to supply a 50MW/100MWh BESS in the Strübbel municipality in the state of Schleswig-Holstein. It is the first of 14 projects planned in Germany with a total power capacity of 900MW.[337]

Sungrow – Chile

June 2024 saw China's Sungrow reach an agreement with Atlas Renewable Energy, the largest independently-owned renewables power producer in Latin America, to exclusively utilize Sungrow's liquid cooling storage system, PowerTitan, for its 200MW/880MWh BESS del Desierto project in Northern Chile, showing the growing role of BESS to reduce curtailment of renewables due to grid constraints. Sungrow's technology leadership in BESS utilizes advanced grid-forming technology to deliver millisecond-level active and reactive power responses, frequency modulation, voltage regulation, and harmonic suppression, critical to stabilising power grids, actively enhancing the strength of the local grid and addressing the challenges of long-distance and complex grid dispatch.[338]

Sungrow – Saudi Arabia

July 2024 saw China's Sungrow sign a supply deal with Saudi Arabia's Algihaz for three energy storage projects each with a capacity of 2.6GWh, totaling 7.8 GWh. The projects in Najran, Madaya and Khamis Mushait, expected to be delivered this year, will improve the stability and reliability of Saudi Arabia's power grid and realise Saudi Vision 2030.[339]

Sungrow – US

August 2024 saw China's Sungrow sign a supply deal with US developer Spearmint Energy for a proposed 1GWh+ of BESS projects in the Texas ERCOT market by 2025. The agreement between Spearmint and Sungrow follows their completion working together on Spearmint's inaugural project, Revolution, a 150MW/300MWh BESS project in Crane, West Texas.[340]

Sungrow – UK

September 2024 saw China's Sungrow sign a supply deal with UK developers for the proposed Hams Hall, UK 350MW/1,750MWh BESS project by Penso Power and Luminous Energy, funded by BW ESS.[341]

Envision - UK

May 2024 saw China's Envision agree to develop the 300MW/624MWh Cellarhead BESS, three times the largest currently in operation in the UK. Grid connection is due 2026.[342] This builds on Envision Energy Storage's strong position in the UK BESS market, with new orders in 2023 reaching 1.5GWh. Envision Energy has participated in more than 200 BESS projects around the world, with orders in hand exceeding 15 GWh. This is part of the wind firm's diversification into storage, similar to many of China's solar manufacturing giants.[343]

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[337] Energy Storage News, Aquila building 100MWh Germany project with Trina BESS, 28 August 2024
[338] Sungrow press release, 880MWh! Sungrow Powers Atlas Renewable Energy in LATAM's Largest Standalone Energy Storage Plant, 28 June 2024
[339] Reuters, China's Sungrow signs deal with Saudi Arabia's Algihaz for energy storage project, 16 July 2024
[340] Energy Storage News, Sungrow in 1GWh+ BESS deal with US developer Spearmint Energy, 27 August 2024
[341] Energy Storage News, Sungrow signs supply deal with UK developers for 1.7GWh BESS project, 6 September 2024
[342] Recharge News, Chinese wind giant Envision to build one of UK's biggest batteries, 24 May 2024
[343] Recharge, Chinese wind giant Envision to build one of UK's biggest batteries, 24 May 2024

Canadian Solar - Global

Since entering the project development business in 2010, Canadian Solar has developed, built, and connected over 10GW of solar power projects and 3.3GWh of BESS projects across the world.

As of July 2024, Canadian Solar has 1.2GW of solar power projects in operation, 6.5GW of projects under construction or in backlog (late-stage), and an additional 21GWp of projects in advanced and early-stage pipeline. In addition, Canadian Solar has 600MWh of BESS in operation and a total BESS development pipeline of 63GWh, including 8.4GWh under construction or in backlog, and 54GWh at advanced and early-stage development.

Canadian Solar - Canada

July 2024 saw Canadian Solar's e-STORAGE subsidiary secure a contract from Nova Scotia Power to develop flagship energy storage projects across three locations in Nova Scotia, Canada. The three BESS projects at Bridgewater, Waverley, and White Rock total 150MW/705MWh of capacity and will play a role in enhancing grid reliability and stability. Construction will be completed by the end of 2026, with the first site expected to be operational in 2025. e-STORAGE will provide comprehensive EPC services along with long-term service agreements (LTSA). To-date, e-STORAGE has shipped more than 5GWh of BESS solutions across North America, Europe, and Asia Pacific markets.[344]

Canadian Solar - Australia

August 2024 saw Canadian Solar's e-Storage win the EPC contract for the Terang 100MW/200MWh BESS in Victoria, Australia owned by FRV, a subsidiary of Jameel Energy.[345]

China Energy Engineering Corporation - Uzbekistan

January 2024 saw CEEC sign an MoU for a 1.8GWh BESS project cluster of 8 facilities with Uzbekistan's Ministry of Investment, Industry and Trade and JSC National Electric Grid.[346]

April 2024 saw CEEC commence construction of the 150MW/300MWh Rocky BESS Project in Andijan Province, Uzbekistan, with completion due at the end of 2024. [347]

Harbin Electric Group Co. - Progresiva Energy Investment Co. - Turkey

February 2024 saw Harbin Electric Group International Company and Turkey's Progresiva Energy Investment Company sign the EPC contract for the Progresiva 250MW/1000MWh BESS project. The project is located in Tekirdag, west of Istanbul. The province is only 35km away from the access point of the power exchange centre between Turkey and Europe.[348]

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[344] Canadian Solar press release, Canadian Solar's E-STORAGE To Deliver Nova Scotia's First Grid-Scale BESS Facilities, 8 July 2024
[345] Canadian Solar, Canadian Solar's e-Storage to Power 200MWh BESS, 7 August 2024
[346] CEEC, CEEC Signs Concession Agreement for 1.8 GWh Energy Storage Project Cluster with Uzbekistan, Strengthening Power Sector Cooperation, 4 January 2024
[347] CEEC, China Energy Construction's Uzbekistan energy storage project starts construction, 3 April 2024
[348] Harbin Electric Group Co., Turkey's first gigawatt-level energy storage power station is built by Harbin Electric Group, and the "Belt and Road" initiative once again plays the song of light, 23 February 2024

Huawei Digital Power - Saudi Arabia

September 2024 saw China's Huawei completely operationalise a 400MW solar project plus a 1.3GWh BESS hybrid off-grid facility in Red Sea New City, Saudi Arabia.[349]

Shanghai Electric - UK

January 2024 saw Shanghai Electric's first large-scale overseas energy storage project enter commercial operation. The 100MW/100MWh REP1&2 BESS in Kent in the UK ("REP1&2"), is followed by another milestone, which marks the grid connection of the Fiskerton II-A 22MW solar project in Lincolnshire, the final of eight solar projects in the UK connected over 2022-2023. The REP1&2 project is equipped with high-performance lithium iron phosphate batteries produced by the Nantong factory of Gotion New Energy. The project was developed by Pacific Green and purchased by a subsidiary of Generali, Italy's largest and the world's third-largest insurance company. The project is now officially operated by Shell.[350]

BYD - Grenergy - Chile

September 2024 saw BYD and Independent Power Producer Grenergy extend a supply agreement for the Oasis de Atacama project in Chile, which will have one of the world's largest BESS at 3GWh, three times the size of the 1GWh BESS proposal of January 2024. The overall agreement with Grenergy comprises 537 BESS containers, which adds to 3GWh of total capacity at 5MWh capacity per container. As part of the collaboration, BYD will provide its MC Cube BESS for Grenergy's separate Victor Jara solar and storage project, also in Chile, without disclosing details.[351]

CATL - Hecate Energy - US

September 2024 saw CATL batteries selected for a 310MW/1,240MWh BESS project in Massachusetts by Hecate Energy.[352]

[349] PV Magazine, Huawei unveils world's largest microgrid, 18 September 2024

[350] Shanghai Electric press release, Shanghai Electric's Energy Storage and PV Projects in the UK Hit New Milestones, 4 January 2024

[351] Energy Storage News, Grenergy and BYD extend supply deal for 'world's largest BESS project' in Chile to 3GWh, 13 September 2024

[352] Energy Storage News, Hecate Energy in permitting for 1.2GWh Massachusetts BESS, picks CATL battery tech, 25 September 2024

SECTION 8 ELECTRIC VEHICLES

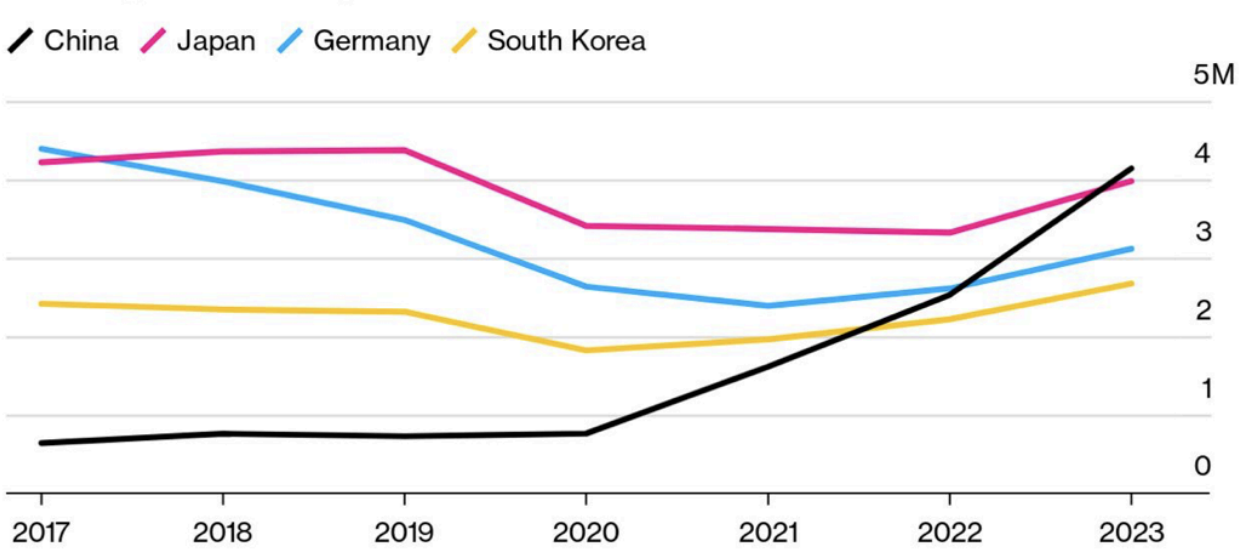
Global new energy vehicle (NEV) momentum continues strongly in 2024 to-date to August, being +18% yoy. China has become the world's largest market for NEVs, with a 60% global share. In August 2024, NEV sales reached a record high 54% share of all passenger vehicle sales, and year-to-date NEV sales in China are +35% yoy. 2023 saw China overtake Japan to become the world's largest exporter of cars. 2024 has seen Chinese auto majors undertake very significant new investments in building out NEV manufacturing capacity in Eastern Europe, Asia and South America.

Chinese NEV leaders continue to enhance technology and supply chain collaboration with their western counterparts globally.

10 years ago, President Xi Jinping delivered a speech detailing that developing an NEV industry was the only way for China to become a global automobile manufacturing powerhouse.[353] This speech marked the pivotal moment in China's trajectory of developing its new energy vehicles industry.

The delivery has followed quickly. Fast forward a decade, through strategic industry and energy policy, and a core focus on R&D, China has become the largest NEV manufacturer in the world, and in 2023, overtook Japan as the world's largest auto exporter – Figure 8.1.[354] Chinese EV exports rose 30% yoy in 1HCY2024 to 2.8 million units.[355]

Figure 8.1: China became the world's largest Car Exporter in 2023



Source: China Association of Automobile Manufacturers, Japan Automobile Manufacturers Association, Association of German Automotive Industry, Korea Automobile Manufacturers Association, Bloomberg

In 2023, energy transition investment reached a new record of ~US$1.8 trillion globally, surging 17% from the year prior. 2023 marked the 10th consecutive year of positive clean

[353] 新华网, 习近平:发展新能源汽车是迈向汽车强国的必由之路, 24 April 2014

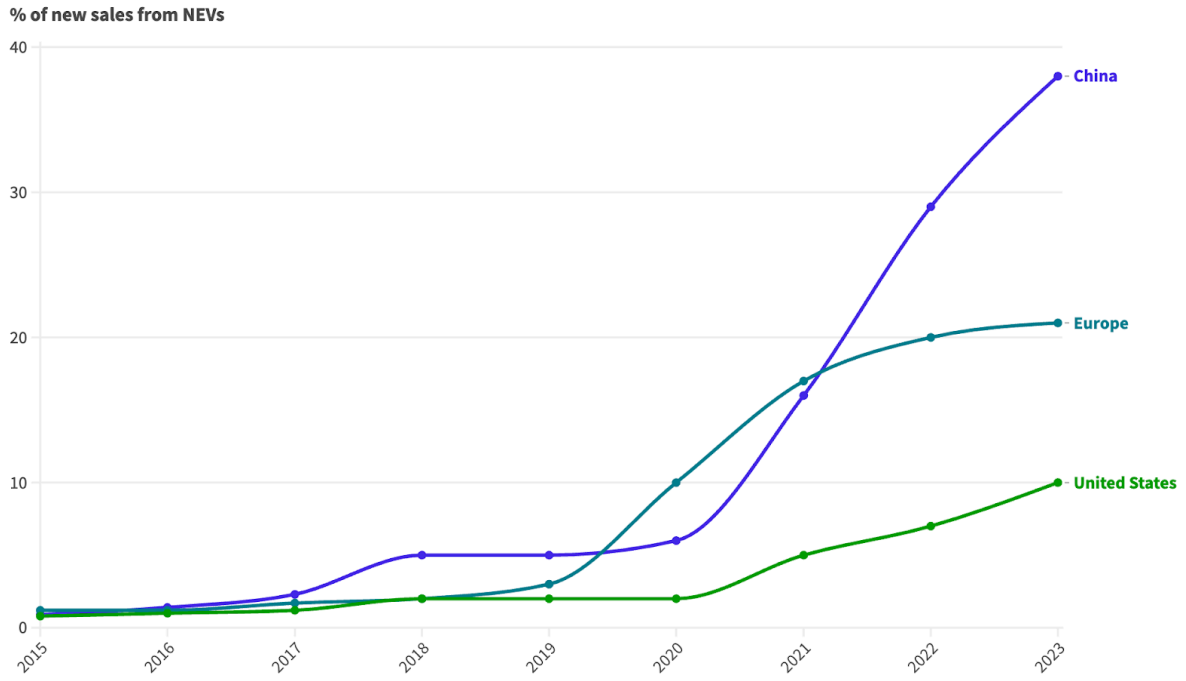
[354] Reuters, China's EV Export Boom Fuels Surge in Demand for New Car-Carrying Ships, 10 April 2024

[355] SCMP, China's EV, battery firms bolt to emerging markets as trade remains caustic, 3 August 2024

energy investment growth, with a compound annual growth rate of 24% since 2013.[356] China's energy transition investment is world-leading, with US$676bn, or ~38%, of all global investment directed into cleantech manufacturing, renewable energy generation capacity, batteries and EVs.

China dominates the global EV market, and continues to expand its leadership,[357] leveraging its world leadership in battery manufacturing, and technology development, thanks to the leadership of CATL and BYD. China in 2023 overtook Japan as the world's #1 passenger vehicle exporter globally, having overtaken Germany the year before. And China's lead is set to grow in 2024, with a forecast of 6.0 million auto exports, +15% yoy.[358]

Figure 8.2: The Pivot to Electric Vehicles Manufacturing and Use in China is world-leading



Source: CEF Calculations, IEA[359]

China's growing auto export dominance is also a clear function of the success of their leading auto firms in the domestic Chinese market. With Chinese firms holding a 43% share of their domestic market in 2020, they are collectively set to achieve a 62% share in 2024 as their dominance of the booming NEV sector continues to drive overall sales – Figure 8.3.

With China increasingly shut out of North American auto vehicle markets by the dramatic increase in tariffs to 100% on Chinese imports, and building threats against indirect imports from manufacturing facilities in Mexico, and with pressure building in the EU market as well, Chinese EV manufacturers are increasingly turning to major emerging market opportunities. This strategy is being accelerated by the growing number of plans for the commissioning of manufacturing facilities globally, be that in Brazil, Hungary or Indonesia.

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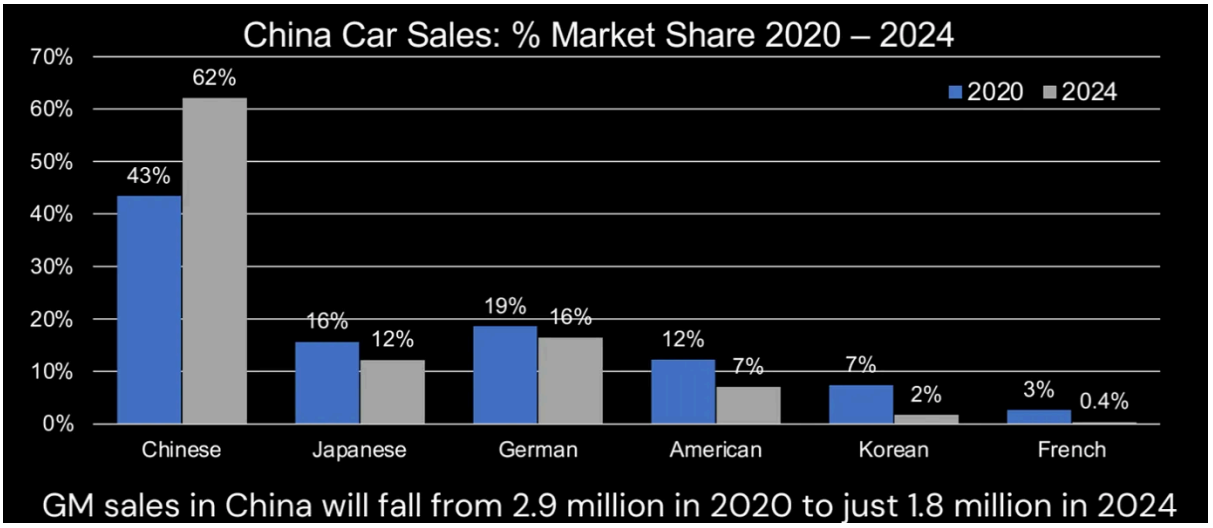
[356] BNEF, Global Clean Energy Investment Jumps 17%, Hits $1.8 Trillion in 2023, 30 January 2024

[357] Asia Nikkei, China's BYD beats Honda and Nissan in April-June vehicles sold, 23 August 2024

[358] Dunne Insights, The Great China Car Blitzkrieg, 18 September 2024

[359] IEA, Global EV Outlook 2024, April 2024

Figure 8.3: The Collapse of Foreign Brands in the Chinese Auto Sector



Source: DunneInsights.com[360]

Rhodium Group estimates that Chinese foreign outbound investment along the EV value chain set a record above US$30bn in 2023.[361]

July 2024 saw Yasuhide Mizuno, CEO of Sony Honda Mobility (the Honda and Sony JV established in 2022), state that Chinese competitors were moving faster than he had anticipated, leveraging very rapid speed to market capabilities that are leading the world in EV developments. Japan is clearly strategically lagging in its pursuit of evolving to reflect the inevitable global shift to EVs in the passenger vehicle market.[362]

Honda Motor Co. has dominated the global motorbike segment for decades. Honda dominates the biggest motorcycle markets in developing Asian countries, including Indonesia (4.8 million sales in FY2024), India (4.6 million) and Vietnam (2.1 million). In India, EV motorbike sales are +28% yoy in FY2023/24, yet three years after Honda's CEO Toshihiro Mibe announced plans to go fully EV, Honda still has zero product offerings in this booming sector, leaving Ola Electric Mobility to seize half the Indian market. Japan's auto industry, the global leader just a few years ago, has been entirely flat-footed and slow to respond.[363]

July 2024 also saw western auto firms confirm the increased price competition has significantly eroded profitability, with Stellantis and Nissan both reporting significant downward revisions to earnings.[364]

In the January to August 2024 period, the EV market (BEV & PHEV) has grown +20% yoy, with BEVs growing by 10% yoy and PHEVs by 46% yoy. The Chinese NEV market has grown by 33% yoy as PHEVs drive the majority of this expansion with 74% growth yoy compared to BEVs with +13% yoy.[365]

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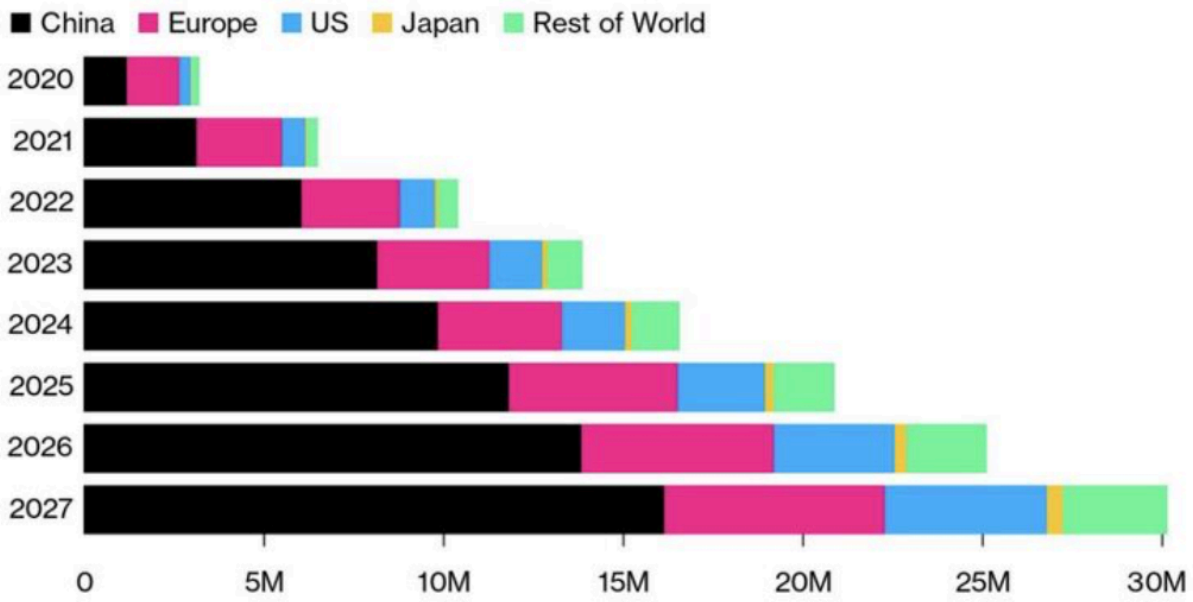
[360] DunneInsights.com, China Is Done With Global Carmakers: "Thanks For Coming", 6 August 2024
[361] Rhodium Group, Pole Position: Chinese EV Investments Boom Amid Growing Political Backlash, 29 February 2024
[362] FT, Japanese carmakers 'very scared' by China's rapid EV development, 21 July 2024
[363] Bloomberg, Honda's Two-Wheel Indian Rivals Leave It in the Dust, 31 July 2024
[364] FT, Stellantis and Nissan deepen fears over auto industry downturn, 25 July 2024
[365] Rho Motion, 13 September 2024

Figure 8.4: China leads the world in NEV adoption



Source: Bloomberg NEF

August 2024 saw foreign branded EVs drop from 64% share of the Chinese domestic auto market to just 38% in 1HCY2024, reflecting the growing brand development lead of Chinese car manufacturers.

April 2024 saw the IEA release its 2024 Global EV Outlook, highlighting the likely sale of 17 million EVs globally in 2024, a 20% global penetration, led by a 45% penetration in China, a 25% penetration in the EU and a lagging 11% share in the US. The IEA also concludes that almost all new car sales globally will be EVs by 2035 in alignment with the climate science and technology trends.[366] BloombergNEF reaches a similar conclusion, that China continues to lead and dominate the global adoption of NEVs – Figure 8.4.

[366] IEA, 2024 Global EV Outlook, April 2024

8.1 NEV - BYD

BYD has grown its revenue fivefold since 2018 to Rmb602bn (US$83bn) in CY2023, and in 4QCY2023 BYD globally sold more NEVs than Tesla. BYD's rapid growth has played a leading role in China's rise as the world's cleantech superpower. BYD sold nearly 1 million fully electric and hybrid cars in 2QCY2024 and EV sales January-July 2024 were +23% yoy to 772,000 units, giving BYD a domestic China market share of 27%.

In 2023, BYD achieved a 337% yoy increase in exports, reaching 243,000 vehicles. In 1HCY2024, BYD sold 1.607 million new energy vehicles globally, a 28% yoy increase. Of these, over 203,000 were exported, showing a 174% yoy growth. BYD's NEVs are present in 88 countries and regions worldwide, with electric vehicle production bases established in Thailand, Brazil, Hungary, and Uzbekistan.

The company states: "BYD will continue to expand its global market presence, leveraging its advanced technology and innovative products to meet the diverse needs of consumers worldwide. As more overseas factories come into operation, BYD's global production capacity will progressively strengthen, further solidifying its leading position in the global new energy vehicle market."[367] BYD has turned its attention to markets with receptive EV policies, and is unfazed by the rise of tariffs and other obstacles blocking access to American consumers.[368]

BYD's advantage in batteries is not the result of one breakthrough, but the accumulation of a series of competitive strengths it has built up over two decades in access to resources, sustained investment in R&D, vertical integration (BYD became the world's second largest battery manufacturer in 2023 with a 16% global share) and manufacturing economies of scale. The FT reports that BYD employs close to 100,000 people in R&D based at 11 different locations in China and on average, its researchers apply for 19 new patents every working day.[369] BYD in June 2024 announced its new plug-in hybrid car model has a range of over 2,000km on a single refuel/recharge. BYD has also shown its massive manufacturing economies of scale, allowing new models to sell for under Rmb100,000 (US$13,750). The two BYD models featuring the latest technology, the Seal 06 DM-i and Qin L DM-i, have a starting price of Rmb99,800, showcasing BYD's ability to keep down costs.

BYD's overseas growth potential is a key point boosting investor confidence. The automaker has been ramping up efforts to make a breakthrough into Europe, including making a marketing push at the current European Football Championship, and opening a new flagship showroom on the Champs-Elysees in Paris in June 2024. BYD is betting that higher-margin exports will help cushion the impact on its profits from the long-term price war in China. BYD has a goal of selling 500,000 NEVs outside China in 2024, and doubling that in 2025. BYD was less affected by the European Union's preliminary tariff increases as it was given a lower-than-average tariff rate by EU regulators in June 2024. The export growth outlook for its plug-in hybrids was unaffected as the additional levies are only being imposed on pure EVs. [370]

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[367] BYD press release, BYD Thailand Factory Inauguration and Roll-off of Its 8 Millionth NEV, 4 July 2024
[368] Australian Financial Review, BYD shrugs off planned US ban of Chinese smart car software, 23 September 2024
[369] FT, The ambitions of China's BYD stretch well beyond electric vehicles, 25 April 2024
[370] Bloomberg, BYD Plays Winning Hand in China EV Market With Hybrid Models, 3 July 2024

May 2023 saw reports that Tesla's new Berlin EV gigafactory started production of the Model Y SUV with an LFP Blade battery from BYD, while the imported China-made Model 3 will feature an LFP battery from CATL.[371]

December 2023 saw BYD Electronic announce the completion of the Rmb14.3bn (US$2.0bn) acquisition of the mobile electronics manufacturing business located in Chengdu and Wuxi from Jabil Inc, one of the world's largest electronics manufacturing service and solution providers.[372]

BYD sees opportunities across southeast Asia, South America, the Middle East and Europe and in March 2024 confirmed the company's plan to expand its manufacturing operations in those markets.

BYD has vowed to "go global", rapidly leveraging up its global brand profile via exports. BYD has told investors that they believe they can increase overseas sales from nearly 243,000 cars in 2023 to 2-3m cars in the coming years, reflecting around 10% of the market, excluding Europe and the US. This export growth strategy is to be followed by establishing manufacturing capacity offshore, with factories in operation or proposals to build in Indonesia, Thailand, Mexico, Brazil, Hungary and Turkey.

July 2024 saw BYD announce a multi-year strategic partnership with Uber to bring 100,000 new BYD EVs onto the Uber platform across key global markets, beginning first in Europe and Latin America. The partnership will assist in acquisition pricing, financing and servicing of EVs.[373]

July 2024 saw BYD sign an MoU with Ayvens, a global leader in sustainable mobility solutions. Ayvens' European clients will benefit from a suite of tailored electric fleet vehicle solutions, from advisory services and operational leases, to fleet management and end-to-end charging services.[374]

BYD - Turkey

July 2024 saw BYD announce an intention to build a US$1bn EV factory and R&D centre in Turkey with an annual capacity of 150,000 EVs. This investment will allow BYD to avoid the recent imposition by Turkey of a 40% import duty on China made vehicles and avoid the cost of shipping from China. BYD cars produced in Turkey can also continue to access the EU market and avoid the new punitive 27.4% import duty on Chinese made BYD imports, given Turkey is part of the EU's Customs Union, meaning vehicles can be exported to the bloc without additional duties. Turkey's industry minister, Mehmet Fatih Kacır, said the BYD deal was a sign of Turkey's "potential to be not only a centre for international investments, but also a centre for innovation and advanced green technology", given this investment will leverage the large existing domestic auto manufacturing base and associated supply chains.

The Turkish Prime Minister is reported to have requested Tesla likewise consider building a new factory there.[375]

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[371] Carnewschina.com, Tesla started production of Model Y with BYD battery in German Gigafactory, according to a report, 4 May 2023
[372] BYD press release, BYD Completes the Acquisition of Jabil's Mobile Electronics Manufacturing Business, 29 December 2023
[373] BYD press release, BYD and Uber Partner to Accelerate Global EV Transition, 31 July 2024
[374] BYD Press Release, BYD and Ayvens partner to support the shift to EV in Europe, 2 July 2024
[375] FT, BYD agrees $1bn deal to build electric vehicle plant in Turkey, 9 July 2024

September 2024 saw China respond to growing EU trade barriers by strongly advising its carmakers to make sure advanced EV technology stays within China, even as they build factories around the world to escape punitive tariffs on Chinese exports. Beijing is encouraging Chinese automakers to export knock-down kits to their foreign plants, meaning key parts of a vehicle would be produced in China and then sent for final assembly in their destination market in retaliation to the elevated threats of EU trade barriers to Chinese NEV imports.[376]

BYD Thailand (Rever Automotive)

Having launched the sale of BYD cars in Thailand in November 2022, BYD made up 40% of the 76,000 EVs sold in Thailand in 2023, making it the market leader in the segment. BYD is set to become the leading car brand in Thailand, commanding a 46% share of the EV sector in 1QCY2024.

July 2024 saw BYD commission its new EV manufacturing facility in Thailand, a US$486m investment that employs 10,000 workers and a capacity of 150,000 vehicles annually, built in just 16 months. The facility encompasses processes of stamping, painting, welding, final assembly, and producing car components.[377]

July 2024 saw BYD acquire a 20% stake in Thailand's Rever Automotive, a leading distributor with 100 showrooms.[378]

BYD Uzbekistan

June 2024 saw BYD commission its plug-in hybrid factory in Uzbekistan with a 50,000 units pa capacity in a joint venture with the dominant local auto manufacturer UzAuto. BYD entered the Uzbek market in 2023 and is already the best selling NEV brand there.[379]

Brazil

March 2024 saw BYD commence construction in Camaçari, Brazil of a new US$1bn, 150,000 units pa EV and hybrid factory, with completion reported as due mid-2025,[380] involving a reported US$1bn investment.[381] This facility could also produce chassis for electric trucks and buses. BYD is also considering a possible lithium and iron phosphate JV with Brazil's Sigma Lithium.[382]

Refer to Brazil Section 8.10 below.

BYD Mexico

In 2023, Chinese cars accounted for 19.5% of all car sales in Mexico, compared with only 6.4% in 2019, making Mexico the second-largest Chinese car importer, after Russia.[383]

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[376] Bloomberg, China Asks Its Carmakers to Keep Key EV Technology at Home, 12 September 2024
[377] Reuters, China's BYD opens EV factory in Thailand, first in Southeast Asia, 5 July 2024
[378] Reuters, China's BYD acquires 20% stake in Thai dealer Rever Automotive, 7 July 2024
[379] CNEVPOST, BYD Uzbekistan plant sees 1st mass-produced cars roll off line, 28 June 2024
[380] Bloomberg, Chinese EV Giants Hammered by Biden Tariff Are Welcome in Brazil, 17 May 2024
[381] FT, China's plan to sell cheap EVs to the rest of the world, 5 June 2024
[382] The Macro News, BYD holds talks with Brazilian lithium producer, 19 January 2024
[383] SCMP, As Chinese businesses launch operations in Mexico, managers learn cross-cultural lessons, 4 April 2024

September 2023 saw BYD launch its Dolphin EV brand in Mexico. August 2024 saw BYD launch its Song Pro plug-in hybrid SUV.

August 2024 saw continued speculation that BYD is getting close to choosing a site for a new 150,000 units pa manufacturing facility in Mexico, with support from the state governments. Jorge Vallejo, BYD's Mexico director general, is reported saying that phase II could see production capacity rise to 400-500,000 units pa to serve the Mexican market.[384]

With the US having put a 100% tariff on direct Chinese EV imports, increased barriers will likely see the US undermine China's Mexico EV manufacturing efforts.[385] But China will continue to focus on Mexico as a key emerging domestic market in its own right.

September 2024 saw reports that BYD has put its Mexican plans on hold till after the US Presidential election in November.[386]

BYD - Peru

June 2024 saw reports BYD was invited to build a new EV assembly factory in Peru by the government, leveraging the country's new Chancay port under construction by China's Cosco Shipping Ports. China has become the largest investor in Peru in recent years, and is the top buyer of the nation's copper and lithium.[387]

BYD Indonesia

May 2024 saw BYD announce an agreement with the Indonesian government to localise the production of its cars. BYD expects the factory to commence production in January 2026 with an annual capacity of 150,000 units with an investment of US$1.3bn.[388]

September 2024 confirmed BYD is busy hiring staff for its new factory.[389]

BYD - Hungary

In Europe, BYD's first wholly-owned bus factory is located in Komárom, Hungary. The investment was originally a brownfield FDI project, that is the factory – which used to be in a Korean company's ownership and supplied microchips to the nearby Nokia factory – was taken over in 2008 and converted into an EV bus factory in 2016 to support a local bus supply tender BYD won in 2015.[390]

December 2023 saw reports BYD was evaluating a new EV and plug-in hybrids factory with a phased ramp up to a capacity of 200,000 units pa in the southern city of Szeged in Hungary to supply the EU market. Foreign Minister Peter Szijjarto said Hungary will provide subsidies for the BYD plant.[391]

February 2024 saw BYD confirm consideration of a new NEV passenger car manufacturing and production centre to be established in Szeged, Hungary, to serve the European market.

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[384] Reuters, Chinese EV maker BYD eyes state incentives for Mexico plant, 22 August 2024
[385] CleanTechnica, USA Pulls Mexico Into Its Anti-Chinese EVs Policies, April 2024
[386] Bloomberg, China's BYD Pauses Mexico Factory Plans Until After US Election, 4 September 2024
[387] Reuters, Peru trying to lure BYD auto plant with industrial park incentive, 27 June 2024
[388] TechinAsia, BYD to set up $1.3b EV plant in Indonesia, targets operations by 2026, 2 May 2024
[389] Nikkei Asia, In Indonesia, BYD and Hyundai lure workers from Japan rivals, 15 September 2024
[390] *From Zero to Hero? Chinese Investment in EV Supply Chains in the Visegrád Four, January 2024*
[391] Bloomberg, BYD Car Investment Affirms Hungary as China's EU Bridgehead, 22 December 2023

BYD, which will create thousands of new jobs, will set up its entire manufacturing process locally, with the exception of battery production and chemical activities.[392]

BYD EV factory rejected by India

But as a clear sign of growing global geopolitical tensions at China's growing technology leadership, in July 2023 BYD's offer to build a US$1bn battery and EV factory in partnership with India's Megha Engineering and Infrastructures Ltd was rebuffed by India on national security concerns.[393]

March 2024 saw BYD launch its third EV model, the Seal, into the Indian auto market.[394]

BYD - Pakistan

August 2024 saw BYD launch its first 3 NEV models into Pakistan. At the launch, BYD also indicated it might open a factory in Pakistan, perhaps in Karachi near Port Qasim, where other automakers are based.[395] Tesla is creating a JV with Hub Power subsidiary Mega Motors to enter the market. Hub Power is Pakistan's largest Independent Power Producer (IPP). September saw further speculation that BYD would build a new NEV factory.[396]

BYD EV Bus - California

BYD leads the world in EV bus manufacturing and export, and established assembly factories in Lancaster, California and Brazil a decade ago. BYD is reported to have rebranded its US bus unit under a new name, Ride, to distance the business from its Chinese owners as it starts to bid for more public bus contracts in the US.[397] [398]

November 2023 saw BYD selected to participate in the California Department of General Services (DGS) statewide electric school bus contract, with the Los Angeles Department of Transportation ordering 130 of BYD's battery-electric K7M buses, the largest single order of battery-electric buses to date in the United States.[399]

BYD EV Bus - Brazil

November 2023 saw BYD announce it will build three EV production facilities on a former Ford industrial site in the Brazilian state of Bahia with a Real 3bn (€570m) investment. The first vehicles could roll off the production line by the beginning of 2025. One of these facilities is for the manufacturing of chassis for e-buses and trucks.[400]

BYD – BESS

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[392] Electrive, BYD plans to open its Hungarian EV factory within three years, 6 February 2024
[393] NDTV, India Rejects $1 Billion Bid By Chinese Carmaker To Set Up EV Factory: Report, 24 July 2023
[394] SCMP, China's BYD launches third EV model in India, starts work on Brazil plant as it revs up overseas expansion, 6 March 2024
[395] Cleantechnica, BYD, Zeekr, & NIO Enter Pakistan, Japan, & UAE, 23 August 2024
[396] FT, China's BYD raises car export hopes in Pakistan after being spurned by India, 22 September 2024
[397] FT, The ambitions of China's BYD stretch well beyond electric vehicles, 25 April 2024
[398] Carnewschina.com, BYD's 70,000th EV Bus Rolled Off, New School Bus Announced, 28 January 2022
[399] BYD Press Release, BYD Receives Largest Battery-Electric Bus Order In U.S. HISTORY, November 2023
[400] Electrive, BYD starts building EV factory in Brazil, 10 November 2023

According to SNE Research, a Seoul-based analysis group, BYD has more than 10% of the global energy storage system market. Privately, BYD has told investors it is winning as much as a 30% share of the utility-scale US market.[401]

BYD – BESS - Chile

September 2024 saw Spain's Grenergy Technologies extend the strategic agreement signed in January 2024 with BYD, for the supply of large-scale BESS for Oasis de Atacama. The agreement now also includes phase 3, bringing the total capacity to 3GWh and making it BYD's largest agreement to date. This initiative is a continuation of the first and second phases of the Oasis de Atacama project. Located in northern Chile, Oasis de Atacama is one of the world's largest storage projects to-date. The project already has 75% of its energy contracted through PPAs and the first phase is expected to be connected by the end of 2024, with the remaining phases mostly connected by 2025.[402]

BYD - Lithium Australia - Australia

September 2024 saw BYD announce an MoU with Lithium Australia to collaborate on battery recycling technology development. BYD holds a 14% share of the Australian EV market. Lithium Australia's subsidiary Envirostream's battery recycling technology uses a combination of mechanical and hydraulic separation techniques to recover around 95% of the materials that make up a battery, without the need for incineration.[403]

BYD Lithium Cathodes - Chile

BYD owns stakes in mines in at least six countries across three continents, guaranteeing long-term access to lithium, the material crucial to its batteries.

August 2024 saw BYD confirm it is negotiating with the Chilean government to build a US$290m factory to produce 50,000tpa LFP cathodes,[404] one of the core building blocks of a battery, using lithium mined by Chile's SQM, 23% owned by China's Tianqi Lithium.

[401] FT, The ambitions of China's BYD stretch well beyond electric vehicles, 25 April 2024

[402] Grenergy Technologies, Grenergy and BYD extend their battery agreement to 3GWh for Oasis de Atacama, 13 September 2024

[403] PV Magazine, Australian battery recycler inks deal with Chinese electric vehicle giant BYD Auto, 5 September 2024

[404] Bloomberg News, BYD says fate of lithium project is in hands of Chile government, 27 August 2024

8.2 NEV - Chery

State-owned Chery Automotive Co. (Chery) is China's third largest auto manufacturer.

Chery - Thailand

April 2024 saw the Thai Board of Investment confirm Chery's plans to build an EV and hybrid factory in Thailand with a capacity of 50,000 units pa for both the domestic and export markets, with production slated to begin in 2025, ramping up to 80,000 units pa by 2028. This will be the tenth Chinese auto manufacturer with plants in Thailand, including BYD, Great Wall Motor and Changan.[405] Chery flagged ASEAN as a strategic market of focus, with the intent to possibly build factories in Indonesia and Malaysia.

Chery – Spain

In April 2024 Chery acquired a former Nissan factory in Barcelona in a JV majority owned by Spanish car manufacturer Ebro-EV Motors, with EV production due to commence by the end of 2024 with the aim of investing €400m to bring 1,250 new jobs to the region and initial production capacity of 50,000 units pa (aiming for 150,000 units pa by 2029) as well as an R&D centre.[406] [407]

Chery – Italy

August 2024 saw reports Chery was considering a plant in Italy to overcome increased protectionism from auto imports by the Italian government, with the UK detailed as a second alternative.[408] [409]

Chery – Mexico

December 2023 saw reports Chery was considering a plant in Mexico.[410]

[405] Bangkok Post, China's Chery Automobile to set up Thai assembly plant, 22 April 2024
[406] Electrive, Chinese car manufacturer Chery kicks off production in Barcelona, 22 April 2024
[407] Euronews, China's EV exports slow in June as EU imposes tariffs, 9 July 2024
[408] Bloomberg, Italy Issues €6M Fine Over Chinese Cars Badged as Italian, 20 June 2024
[409] FT, China's Chery bets on continuing petrol car demand as it enters UK market, 30 August 2024
[410] FT, US concern over Mexico attracting Chinese electric vehicle factories, 17 December 2023

8.3 NEV - Geely

Formally known as Zhejiang Geely Holding Group, Geely was founded in 1986 by Li Shufu, in Hangzhou, China. The company has over forty manufacturing and assembly plants, eight R&D centres, and six design centres across North America, Europe, China, and Southeast Asia and manages several car brands, including Geely Auto, Volvo Cars and Lotus. Geely sells EVs in China under multiple brands, including Zeekr.

Geely reported 1HCY2024 sales of 1,493,715 units, +25% yoy, with NEV accounting for 586,480 units +49% yoy. Sales of vehicles in markets outside of China also saw significant growth reaching 587,271 units in 1HCY2024, +22% yoy. In 1HCY2024, Geely expanded its global footprint by adding 120 new sales and service outlets. The company now operates more than 650 sales and service points across 76 countries.[411]

February 2024 saw Volvo's ownership of Polestar diluted from 48% to 18% when Polestar did a €850m equity raise, transferring majority ownership of Polestar to Geely (rather than the previous indirect ownership in Polestar that Geely had via its 79% stake in Volvo).[412]

June 2024 saw Geely unveil their latest generation of LFP Short Blade EV battery technology. The New EV Battery Technology underwent a 5.8mm infantry rifle bullet penetration test, with no thermal ignition events.[413] This technology was developed by China's SVOLT. [414] CEF views Chinese cleantech firms as R&D global leaders.

This collaboration between Stellantis and SVOLT in developing the new low price point Citroën ë-C3 is described as an "Electric-Car Game-Changer".[415]

Geely – Aston Martin UK

May 2023 saw Geely invest £234m to double its equity ownership of Aston Martin Lagonda Global Holdings plc (UK) to 17%.[416]

Geely – Zeekr - US

May 2024 saw Geely successfully IPO its premium branded Zeekr EV subsidiary on the NY Stock Exchange (NYSE) at a valuation of US$7bn, raising US$441m. Zeekr owns Sweden's Volvo and the UK's Lotus brands.[417]

Geely - Polestar – South Korea

August 2024 saw Polestar confirm it is also taking additional steps to diversify its wider manufacturing footprint, with production of Polestar 4 set to start in South Korea from the middle of 2025.[418] Geely-controlled Polestar is doing this to avoid the 25% US tariff on China-built cars.

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[411] Geely, Geely Holding Brands Half Year 2024 Sales Reach 1,493,715 Units, 8 July 2024
[412] Electrive.com, Volvo to reduce its stake in Polestar from 48 to 18 per cent, 23 February 2024
[413] Geely Press Release, Geely Auto Unveils its New Short Blade EV Battery Technology, 28 June 2024
[414] SVOLT Press Release, SVOLT presents Short-Blade-Series with fast-charging capability at the In-house Battery Day 2023, 12 December 2023
[415] SVOLT Press Release, New Citroën ë-C3 comes with traction battery from SVOLT, 19 January 2024
[416] Geely Press Release, Geely Increases Equity Stake in Aston Martin to 17%, 18 May 2023
[417] Reuters, Chinese EV maker Zeekr soars nearly 35% in stellar US market debut, 11 May 2024
[418] Charleston Business, Swedish luxury electric SUV manufacturer begins production in Ridgeville, 14 August 2024

Geely - Polestar - US

August 2024 saw Nasdaq-listed Polestar begin producing its luxury SUV, Polestar 3, at Volvo's US factory in Ridgeville, South Carolina, employing 2,000 staff, articulating how important it is that it is a US-made car for US and EU customers.[419]

Geely – Volvo - US

April 2024 saw Volvo launch the EX30 compact SUV in the US domestic market, using its South Carolina US manufacturing base to both avoid Chinese import duties and access the US IRA US$7,500 tax credit for EV purchases.[420]

Geely – Volvo - Mexico

August 2024 saw Volvo announce a new US$700m heavy duty truck manufacturing plant in Monterrey, Mexico to supplement Volvo's US production and provide additional capacity to support the growth plans of both Volvo Trucks and Mack Trucks in the US and Canadian markets, and Mack truck sales in Mexico and Latin America. The plant is expected to be operational in 2026.[421]

Geely – South Korea (SK Group))

June 2024 saw Geely sign a framework agreement that targets cooperation in multiple areas including automotive electronics components, batteries, EV charging and green energy with South Korea's SK Group.[422]

Geely - Slovakia

July 2022 saw Geely's Volvo subsidiary announce plans to build a new facility in Kosˇice, Slovakia exclusively to manufacture 250,000 Volvo EVs annually, supported by a €1.2bn greenfield investment for planned commissioning in 2026, leveraging Slovakia's existing auto manufacturing supply chains.[423]

Geely Renault – Horse Powertrain

May 2024 saw the finalisation of the Geely joint venture with Renault of France in creating Horse Powertrain, a JV to lead the global manufacturing for hybrid and combustion powertrain components and systems. HORSE Powertrain expects to reach €15bn in annual revenues and a production of 5 million powertrain units per year, from 17 global plants, with 9 customers in 130 countries, 5 R&D centres and 19,000 employees.[424]

July 2024 saw Saudi Aramco take a €740m, 10% stake in Horse Powertrain. Saudi Aramco seems to be betting that as the traditional internal combustion engine (ICE) industry stops designing and developing its own combustion engines, it will start buying them from third parties, particularly while hybrid EVs remain a key feature of the passenger vehicle market

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[419] Polestar Press Release, The first Polestar manufactured in the USA: Production of Polestar 3 starts in South Carolina, 14 August 2024
[420] Reuters, How Volvo landed a cheap Chinese EV on U.S. shores in a trade war, 25 April 2024
[421] Green car Congress, Volvo Group to build new heavy-duty truck manufacturing plant in Monterrey, Mexico, 24 August 2024
[422] Geely, Geely Holding and SK Sign Strategic Cooperation Agreement, 12 June 2024
[423] Volvo Car Switzerland AG, Volvo Cars gears up for long-term sustainable growth with new Slovakia electric car manufacturing plant, 1 July 2022
[424] Renault Group Press Release, Renault Group and Geely announce the creation of leading Powertrain Technology Company, "HORSE Powertrain Limited", 31 May 2024

for the next decade or so.[425] Aramco continues to consolidate its global fossil fuel position, building on the 2023 acquisition of US lubricant brand Valvoline for US$2.65bn.

Geely - Malaysia (Smart Automobile, in JV with Mercedes-Benz)

November 2023 saw Smart Automobile, a JV of Geely with Mercedes-Benz, announce an MoU with Malaysian partner Proton Holdings for a proposed US$10bn investment in Malaysia. The agreement aims to assemble Smart Automobile EVs at Proton facilities in Malaysia. Since 2017 Geely has owned 49.9% of Proton, with Malaysian conglomerate DRB-Hicom owning the balance of the once-state owned national car manufacturer.

This development was part of a strategic plan to expand Geely's presence in ASEAN, with Chairman Li Shufu stating: "We're confident in the market prospects of Southeast Asian countries, and we'll jointly build regional economic integration through high-quality development."

July 2023 saw Malaysian Prime Minister Anwar Ibrahim state that Geely will invest around US$10bn in Malaysia's main automaking hub of Tanjung Malim, in the state of Perak. Geely said it will transform Tanjung Malim into an "automotive high-tech valley," with both manufacturing and R&D capabilities. Geely's strategy aligns with the Malaysian government's industrial agenda. In September 2023, the state unveiled the New Industrial Master Plan 2030 that includes EVs as a priority.[426]

June 2024 saw Geely's 49% owned Proton Holdings Bhd. (the 51% balance is owned by Malaysia's DRB-Hicom Bhd), unveil Malaysia's first homemade NEV brand, e.MAS, with the first cars expected to roll off the production line by the end of 2025. The vehicles will be made at Proton's existing factory in Perak, north of the capital.[427]

[425] FT, World's largest oil company bets on the enduring power of petrol, 9 July 2024
[426] Asia Nikkei, Geely eyes EV foothold in Southeast Asia with $10bn Malaysia hub, 8 November 2023
[427] Bloomberg, Geely's Proton Unveils Malaysia's First Local Electric Car, 12 June 2024

8.4 NEV - NIO

NIO is a Chinese start-up based in Shanghai founded in 2014 by Li Bin. The company specialises in the design and manufacture of EVs and is now a world leader in battery swapping infrastructure. Nio's EV sales from January to July in 2024 were +44% yoy to 108,000 units, giving a domestic China market share of 4%.[428]

November 2023 saw NIO announce a tie-up with China state-owned Changan Automobile to jointly design standards for swappable batteries, build and share their battery swapping networks.[429]

December 2023 saw Nio receive a US$2.2bn equity investment from Abu Dhabi's CYVN Holdings, an investment vehicle based in Abu Dhabi.[430]

August 2024 saw Nio announce it has installed more than 23,000 charging stations and 2,480 battery swap stations across China. It has completed more than 51 million battery swaps to date.[431]

September 2024 saw NIO commit to continue exporting its premium China made EVs to Europe and expanding its charging and battery swap network investment, despite the punitive import tariffs imposed by the EU. For NIO these were applied at a 38% rate. [432]

NIO Hungary

In July 2022 NIO commemorated plans for its first European plant in Biatorbágy, near Budapest, Hungary to start operations by the end of 2022 to cover manufacturing for battery swapping stations with an initial investment of €14m. [433] As of May 2024, Nio has 43 battery swap stations in Europe, compared to the 2,420 battery swap stations in China.

[428] NIO press release, NIO Inc. Provides July 2024 Delivery Update, 1 August 2024
[429] SCMP, Chinese EV maker Nio ties up with Changan Automobile to promote battery swapping technology, 21 November 2023
[430] Reuters, China's Nio to get $2.2bn investment from Abu Dhabi's CYVN, 18 December 2023
[431] CNBC.com, EV company Nio aims to build battery chargers and swap stations in every Chinese county, 21 August 2024
[432] CNEVPost, Nio starts deliveries of new ES8 in Europe, 18 September 2024
[433] Nio Press Release, NIO Power Europe Plant to Commence Operation, 29 July 2022

8.5 NEV - Great Wall Motor

April 2024 saw Great Wall announce a target to sell 1 million units annually in new overseas markets by 2030, a major step up from the annualised 300-400,000 units rate achieved in the six months to April 2024, but this run-rate is up 100% relative to just 1-2 years ago. [434]

July 2024 saw Great Wall announce 1HCY2024 net profit expectations of Rmb6.5-7.3bn, up some 400% yoy.[435] Total passenger vehicle sales 7MCY2024 to-date were 651,000 units, of which NEV sales were 157,000 units.

Great Wall - Thailand

In 2020, Great Wall acquired General Motors' Rayong Thailand manufacturing plant.[436] January 2024 saw Great Wall produce its first NEV in Rayong.[437]

Great Wall - Indonesia

August 2023 saw Great Wall launch its brand in Indonesia, presenting models including the Tank 500 HEV, Haval H6 HEV, Haval Jolion HEV, and Ora Funky Cat. [438] June 2024 saw Great Wall announce it would establish an Indonesian auto assembly facility.[439]

Great Wall - Malaysia

June 2024 saw Great Wall Motors say it was collaborating with Malaysia's EP Manufacturing to assemble products in Malacca, with production expected to begin as early as July 2024.[440]

Great Wall - Vietnam

June 2023 saw Great Wall say it will establish a plant in Vietnam in 2025 to assemble pure electric and hybrid vehicles.[441] June 2024 saw Great Wall Motors say it would commence production in Vietnam in 2025, having launched imported NEW brands in April 2024.[442]

Great Wall - Germany

May 2024 saw Great Wall announce it would close its European Head Office in Germany, transferring the work back to China. Great Wall had previously considered building a manufacturing facility in Europe, but punitive tariffs clearly have driven a strategic pivot.[443]

Great Wall - Brazil

September 2023 saw Great Wall acquire a Mercedes Benz factory in Iracemápolis in the state of São Paulo with plans for a 50,000 car pa EV factory and an investment projected to reach US$776m by 2025.[444]

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[434] CNEVPOST, Great Wall Motor to close European headquarters, report says, 30 May 2024
[435] Great Wall Motors, Announcement of estimated results for 1HCY2024, 10 July 2024
[436] Reuters, Great Wall says to buy GM's Thailand car plant, 17 February 2020
[437] China Daily, Chinese firms' new-age ventures elevate BRI, 15 July 2024
[438] CNEVPOST, GWM becomes latest Chinese automaker to tap into Indonesian market, 11 August 2023
[439] ChinaVehicle.org, GWM to Establish Factories in Malaysia, Indonesia, and Vietnam, 26 June 2024
[440] ChinaVehicle.org, GWM to Establish Factories in Malaysia, Indonesia, and Vietnam, 26 June 2024
[441] SCMP, State-owned carmaker Changan joins likes of BYD and Great Wall Motors in Southeast Asia foray, to build factory in Thailand, 25 August 2023
[442] ChinaVehicle.org, GWM to Establish Factories in Malaysia, Indonesia, and Vietnam, 26 June 2024
[443] CNEVPOST, Great Wall Motor to close European headquarters, report says, 30 May 2024
[444] SCMP, Chinese investment in Brazil hits 13-year low after economic slowdown, regulatory hurdles: report, 2 September 2023

8.6 NEV - Dongfeng Motor

Wuhan's Dongfeng Motor (manufacturer of 1.72 million cars in 2023) is the Chinese partner of Japan's Honda and Nissan Motors, and also manufactures Stellantis' branded Peugeot and Citroen cars in China and France's Renault.

From January to May 2024, Dongfeng sold 545,000 self-owned brand vehicles, up 46% yoy. The number of vehicles exported by Dongfeng increased +71% yoy.

Dongfeng Motor - Italy

April 2024 saw reports Dongfeng is in talks with the Italian government to establish a factory with an annual capacity of 100,000 units.[445]

Dongfeng Motor - Kazakhstan

July 2024 saw Dongfeng announce the opening ceremony for Dongfeng Motor's Kazakhstan dealership, launching passenger vehicles, tractors, trucks and dump truck brands in the country as part of its wider strategic plan for Central Asia. At the ceremony Dongfeng announced first time fleet orders to Kazakhstan, Uzbekistan, Kyrgyzstan and Mongolia. Dongfeng referenced the pending completion of the China-Kyrgyzstan-Uzbekistan Railway as a key to opening up this region to "continuously expand the scope and range of green cooperation with overseas partners in the construction of the Green Silk Road, adding new impetus to the cooperation between China and Central Asian countries in jointly building the "Belt and Road"."[446]

[445] Bloomberg, China's Dongfeng Mulls Making 100,000 Cars a Year in Italy, 16 April 2024
[446] Xinhua, Dongfeng Motor steps up efforts to expand the Central Asian market to help build the "Belt and Road" with high quality, 8 July 2024

8.7 NEV - SAIC Motor Corp

SAIC Motor Corp (SAIC) reported revenues of US$105bn in CY2023. Over the past decade, SAIC Motor has invested nearly US$21bn in research and development in the core area of intelligent electric technology. SAIC leads the Chinese auto industry in the first half of 2024, with vehicle deliveries of 2.12 million units. Of this, self-owned brands reached 1.26 million units, accounting for 59% of SAIC's total sales; NEV deliveries reached 522,000 units, +29.5% yoy (and up 700% since 2018); and deliveries to the overseas markets hit an industry-leading 554,000 units, +13.9% yoy (up 300% since 2018).[447]

SAIC - Thailand

May 2023 saw China's SAIC announce it has started construction of the SAIC Motor-CP New Energy Industrial Park in Thailand to focus on the localised production of key auto parts for SAIC's NEVs.

November 2023 saw the first EV roll off the production line. The entire park will be completed in 2025.[448]

October 2023 saw SAIC Motor-CP open its new power battery plant in Thailand with an annual production capacity of 50,000 battery packs.[449]

In 2013, SAIC Motor teamed with Thailand's Charoen Pokphand Group to establish the SAIC Motor-CP joint venture, to tap into the huge ASEAN market and to advance the internationalisation process of its MG brand vehicles. An important overseas production and sales base of SAIC Motor, the total production and sales volume of SAIC Motor-CP reached 32,000 units in 2022, with the MG brand becoming one of the top three most popular brands in Thailand.

SAIC - Mexico

August 2024 saw SAIC Motor's MG reported to be considering plans to build a US$1.5-2bn factory and R&D centre in Mexico.[450]

SAIC - JSW Group - India

March 2024 saw SAIC Motor's MG announce a new JV with Indian steelmaker JSW Group to create JSW MG Motor India Pvt Ltd (SAIC 65%, JSW 35%) to produce 300,000 units pa of MG-branded EVs at Halol, Gujarat.[451] SAIC invested US$454m in 2017 to build a wholly-owned factory for all cars in India, while this new JV will focus on EVs.

SAIC - Indonesia

April 2023 saw SAIC Motor also announce that its SAIC-GM-Wuling joint venture had "signed an MoU with the Indonesian government on the development of the NEV sector in the country. As a result, SAIC-GM-Wuling will expand its investment in Indonesia and introduce

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[447] SAIC press release, SAIC Motor delivers 2.12 million vehicles in first half of the year, 11 July 2024

[448] SAIC press release, SAIC Motor expands its global footprint, 11 May 2023

[449] CNEVPOST, SAIC's MG brand sees 1st Thailand-made MG4 EV roll off line, 6 November 2023

[450] CNEVPOST, SAIC's MG Motor to build plant and R&D center in Mexico, 8 August 2024

[451] CNEVPOST, SAIC forms JV with Indian steelmaker JSW to produce MG-branded EVs, 22 March 2024

more NEV models to the local market of 280 million people, as part of its efforts to promote the high-quality development of the Belt and Road Initiative."

SAIC-GM-Wuling is a joint venture between SAIC and the US's General Motors and Indonesia's Liuzhou Wuling Motor and it has been producing cars in Indonesia since 2017 after a US$1bn investment with an annual production capacity of 120,000 units.[452]

1HCY2024 saw SAIC-GM-Wuling's deliveries of NEVs reach 249,000 units, +32.2% yoy and accounted for 68% of the NEV market in Indonesia.[453]

SAIC - Europe

August 2023 saw reports SAIC's MG Motor was considering an EV manufacturing plant in Europe. SAIC still owns a site in Longbridge near Birmingham, UK which is currently used as MG Motors' R&D centre. Vehicles have not come off the production line there since 2016, and the old factory has been demolished.[454]

June 2024 saw SAIC Motor sign a new product technology cooperation agreement with Volkswagen to jointly develop three plug-in hybrid models and two pure electric models.

SAIC – Volkswagen's Audi

May 2024 saw SAIC sign an official cooperation agreement with Audi, the premium auto brand of Germany's Volkswagen to develop EV models in China using the Audi brand.[455]

[452] People's Daily, Indonesia, Chinese firms combine to drive EV growth, 15 August 2024
[453] SAIC press release, SAIC Motor expands its global footprint, 11 May 2023
[454] Electrive, SAIC to manufacture the MG4 in Europe, 4 August 2023
[455] VW Press Release, Audi and SAIC further strengthen partnership, 20 May 2024

8.8 NEV - Other companies

Human Horizons

Human Horizons Technology is a Chinese electric car manufacturer company based in Shanghai, manufacturing EVs under the HiPhi brand.

While the relationship between Saudi Arabia, the world's top oil exporter, and China remains anchored by energy ties, there has been a push to boost investments in non-oil sectors as part of the kingdom's diversification agenda. Part of the Saudi plan is to develop a domestic EV manufacturing industry.

June 2023 saw Saudi Arabia's Ministry of Investment sign a US$5.6bn deal with Human Horizons to collaborate on the development, manufacture and sale of vehicles.[456]

China Poland Comprehensive Strategic Partnership in EVs

June 2024 saw Chinese President Xi Jinping meet Polish President Andrzej Duda. China and Poland agreed to a joint action plan for 2024-27 to "strengthen the comprehensive strategic partnership" in EVs despite the European Union's recent decision to raise tariffs on Chinese imports.

The announcement also made reference to the June 2024 meeting of China's Geely with Minister of State Assets Jakub Jaworowski to discuss the "role that Poland can play in the dynamically changing automotive market in Europe".[457]

Leapmotor – Stellantis Poland

October 2023 saw Stellantis invest €1.5bn to acquire a 21% stake in China's Leapmotor, making it the largest outside shareholder in the EV maker in order to make inroads into the Chinese auto market. [458]

June 2024 saw Leapmotor International, a JV between Chinese EV maker Leapmotor (49%) and Europe's second-largest carmaker by sales, Stellantis NV (51%), begin EV production at Stellantis' Tychy plant in Poland. The JV is producing the T03 small EV brand, but also plans to start production of its second model, the Leapmotor A12 SUV (sport utility vehicle) starting in 1QCY2025. This JV gives Stellantis exclusive rights to build, export and sell Leapmotor products outside China[459]

September 2024 saw Leapmotor confirm new EU brand launches, and NEV assembly in Poland starting later this year.[460]

Sanhua Automotive - Poland

December 2023 saw updates on China's Sanhua Automotive's plans to build a factory in Tychy, Poland to produce components for NEVs. It will invest between €37-48m in the plant, and employ 350 people.[461]

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[456] Reuters, Saudi Arabia signs $5.6 billion deal with Chinese EV company, 12 June 2023
[457] SCMP, China and Poland agree to boost cooperation on electric vehicles, 25 June 2024
[458] Stellantis press release, Stellantis to Become a Strategic Shareholder of Leapmotor with €1.5 Billion Investment and Bolster Leapmotor's Global Electric Vehicle Business, 26 October 2023
[459] CNEPOST, Leapmotor reportedly begins EV production at Stellantis' Polish plant, 17 June 2024
[460] Financial Times, Leapmotor jumps into Europe's troubled auto market, 25 September 2024
[461] Notes from Poland, China's Sanhua to build electric vehicle parts plant in Poland, 1 December 2023

Xpeng – Volkswagen - Europe

July 2023 saw Volkswagen (VW) announce it would invest US$700m to acquire a 5% stake in the US listed but Chinese-based EV manufacturer Xpeng in a move designed to boost the German car manufacturer's lagging sales in China. Including the Xpeng stake, VW has in 2023 alone announced investments worth nearly €5bn in China, the world's largest car market and where VW makes roughly half of its profits.

August 2024 saw Xpeng announce plans to build an NEV factory in the EU to avoid the newly imposed import duties on Chinese cars to Europe and continue its global growth strategy.[462]

Hozon New Energy Automobile

Hozon New Energy Automobile is a Shanghai start-up in 2014 behind the Neta EV brand, and has to-date raised Rmb26.4bn yuan (US$3.6bn) in venture capital funding over 11 rounds.

September 2024 saw Hozon update plans for its IPO on the HKSE to raise up to US$1bn in new equity, stating it would apply the funds raised to support its "internationalisation strategy", where it plans to "localise" its production facilities in different markets, prioritising Brazil and Mexico: "The company will continue to expand sales, service and charging networks worldwide."[463]

Hozon New Energy Automobile - Indonesia

In July 2023 Hozon signed a preliminary pact with PT Handal Indonesia Motor to build an assembly plant in Indonesia, expected to be operational by 2QCY2024. [464]

[462] SCMP, Xpeng aims to assemble EVs in EU to blunt impact of import tariffs, CEO says, 27 August 2024
[463] SCMP, Hozon's Neta X hits Hong Kong market as IPO plans progress amid upbeat sentiment, 22 September 2024
[464] SCMP, Chinese EV maker Hozon kicks off operations at its first overseas factory, in Thailand, as it steps up push for Southeast Asian market share, 1 December 2023

8.9 Case Study - China's NEVs in Thailand

Thailand has developed into an eMobility hub in Southeast Asia, primarily as an expansion base for Chinese manufacturers including BYD, Hozon, GAC Aion and Changan, and Geely's MG4 has also been in production in Thailand since November 2023. There are also a number of battery projects, including EVE Energy, SVOLT and Gotion High-Tech.

In 2023 NEV sales in Thailand quadrupled year-on-year to 90,000 units and reached a 10% national market share, even as total vehicle sales declined. Chinese companies account for more than a 50% market share in Thai NEV sales.[465]

BYD Thailand (Rever Automotive)

July 2024 saw BYD commission its new 150,000 units pa EV manufacturing facility in Thailand, a US$486m investment.

Hozon New Energy Automobile - Thailand

March 2024 saw Hozon commence assembling vehicles in Bangkok, Thailand at its first overseas factory as it steps up efforts to tap the Southeast Asia market. Hozon said it had delivered 12,000 of its Neta-branded cars in Thailand since it started exporting Chinese-made vehicles there in August 2022. The factory, built in partnership with Bangchan General Assembly's PT Handal Indonesia Motor, has an annual Completely Knocked Down (CKD) capacity of 20,000 units of its NETA V right-hand drive vehicle model.[466] [467]

Changan Automobile – Thailand

November 2023 saw Changan Automobile start construction of a new US$250m 100,000 units pa EV factory in Thailand due for completion 1QCY2025 (with a phase II to double production capacity) saying it will use Thailand as a base to enter more Southeast Asian countries and other right-hand drive car markets, targeting Australia, New Zealand, the United Kingdom and South Africa. This is Changan's first overseas investment.[468]

Changan Chairman Zhu Huarong at the time said he aims to sell 5 million units globally by 2030 to become one of the top 10 largest carmakers in the world. By 2030, Changan targets investment overseas to top US10bn and its annual overseas sales will top 1.2 million vehicles, [469] relative to its 1HCY2024 total sales volumes of an annualised 2.66 million, +10% yoy, including annualised overseas sales of 0.41 million units, +75% yoy (and ~130,000 unit NEV sales in CY2023).[470]

GAC Aion - Thailand

[465] IEA, 2024 Global EV Outlook, September 2024
[466] SCMP, Chinese EV maker Hozon kicks off operations at its first overseas factory, in Thailand, as it steps up push for Southeast Asian market share, 1 December 2023
[467] Neta Auto, Neta Auto's First Thailand Factory officially commences mass production, 22 March 2024
[468] CNEPOST, Changan aims to get its Thailand plant into production by Q1 2025, 27 November 2023
[469] SCMP, State-owned carmaker Changan joins likes of BYD and Great Wall Motors in Southeast Asia foray, to build factory in Thailand, 25 August 2023
[470] China Daily, Chongqing autos eye bigger market in China, world, 31 July 2024

January 2024 saw GAC Aion commence construction on its US$65m 50,000 units p.a. Thailand factory, in the Rayong Industrial Park in Rayong Province. GAC Aion is supporting this with an expansion of its Thai showrooms from 34 to 70 by the end of 2024.[471]

[471] CarNewsChina, GAC Aion Thailand factory officially started construction, 31 January 2024 |

8.10 Case Study - China's Brazil NEV Investment

Brazil offers a useful case study of China's strategy to extend its new position as the top auto exporter globally.

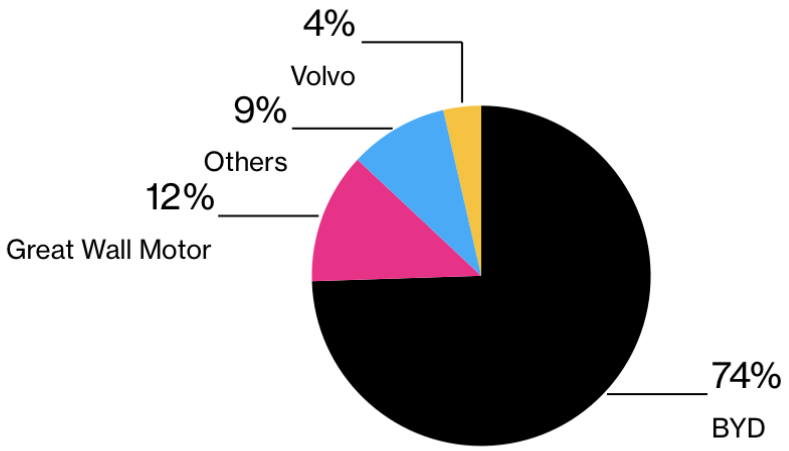
September 2024 saw a study by the Brazil-China Business Council estimate that Chinese investment in Brazil grew by 33% in 2023 to US$1.73bn, with 39% of this investment going into the Brazilian electricity sector to generate wind, solar and hydro-electricity, while a third went into EV manufacturing.[472]

2023 saw EV sales in Brazil triple year-on-year to more than 50,000 units, despite reaching only a 3% national market share. This was boosted by the Brazilian government's launch of a BRA19bn (US$3.8bn) Green Mobility and Innovation Program.[473]

Over the course of 2023, the value of Chinese BEV exports to Brazil surged eighteen-fold to US$735m as automakers like BYD and Great Wall Motor expanded their presence in the country. Chinese BEVs accounted for 92% of Brazil's total BEV imports in this period. As of April 2024, Brazil has surpassed Belgium as the top export market for China's EVs. BYD dominates the imported Chinese EV brands in Brazil – Figure 8.5. In the first five months of 2024, BYD's shipments to Brazil were +43% yoy to over 25,500 units[474] and BYD has expanded its Brazilian dealerships to 100 now in operation.[475]

Great Wall Motor Co is the #2 Chinese EV importer into Brazil. May 2024 saw reports Great Wall Motor Co is also building a 50,000 car pa EV factory in Iracemapolis near Sao Paulo, Brazil due for completion 1HCY2025 to reduce fears of political backlash against just relying on exports from China.[476]

Figure 8.5: Chinese EV Brands in Brazil, Share, First Four Months of 2024

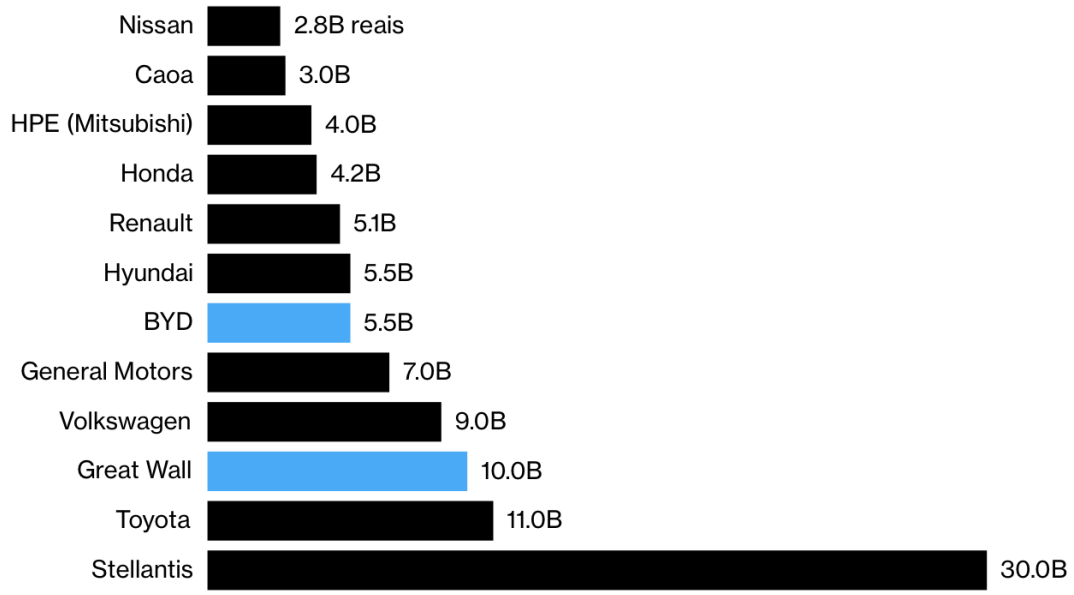


Source: Brazil's National Federation of Automotive Vehicle Distribution, Bloomberg

[472] SCMP, Chinese investment in Brazil's EV and electricity sector soars, 4 September 2024
[473] IEA, 2024 Global EV Outlook, September 2024
[474] BYD press release, BYD's EXPLORER NO.1 Docks in Brazil, Elevating Sustainable Logistics, 1 June 2024
[475] BYD press release, BYD Brazil keeps on expanding and celebrates the opening of its 100th dealership, 23 May 2024
[476] Bloomberg, Chinese EV Giants Hammered by Biden Tariff Are Welcome in Brazil, 17 May 2024

There has been a significant step up in global investment by carmakers into the very significant Brazilian auto market over 2023/24 in support of President Luiz Inacio Lula da Silva's attempts to re-industrialise the country – Figure 8.6, with increased collaboration with China.[477] Brazil is the sixth largest car market globally. Lula is using sticks, as well as carrots, to pull in investment. President Lula put a 10% tariff on EV imports earlier in 2024, and flagged this will ratchet up to 35% by 2026.

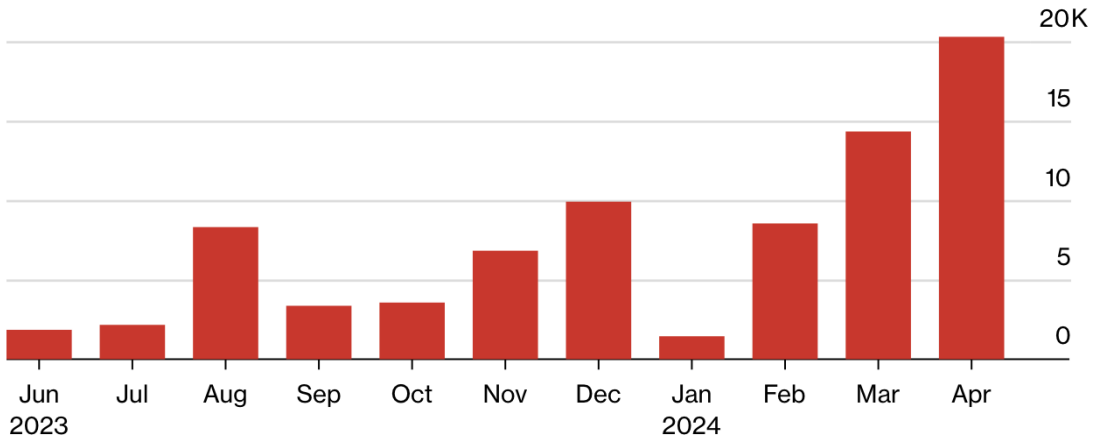
Figure 8.6: Carmakers Investing 97bn Reais (US$19bn) in Brazil in 2023/24



Source: Bloomberg [478]

As per Figure 8.7, Chinese EV exports to Brazil are soaring, ahead of the commissioning of the new manufacturing facility there. [479]

Figure 8.7: Chinese Exports of EVs to Brazil Are Soaring



Source: China Customs International Import and Export Commodity Data

[477] Bloomberg, Brazil's Lula Seeks Even Closer Ties China, in Slap to Biden, 20 April 2023
[478] Bloomberg, Chinese EV Giants Hammered by Biden Tariff Are Welcome in Brazil, 17 May 2024
[479] Bloomberg, Waves of Chinese Electric Vehicles Are Pouring Into Brazil, 3 June 2024

China’s decision to expand its export-driven manufacturing sector is causing hand wringing in target markets. The Brazilian government has opened a number of probes into China’s alleged “dumping” of goods.[480]

Beyond EVs, we note the State Grid Corporation of China, the world's largest utility company, acquired a 54.6% stake in 2017 in Brazil's largest power distributor CPFL Energia, bringing advanced power generation technology and management experience to Brazil. In April 2024, China State Grid secured a US$3.3bn tender to construct 2 transmission lines of 1,500m across the states of Goiás, Maranhão, Minas Gerais, São Paulo, and Tocantins to unlock inter-state flows of renewable energy. Beyond this, China State Grid announced plans to invest an extra US$38bn in the Brazilian electricity sector, without elaboration.[481]

Power China in 2019 commissioned Brazil’s Belo Monte +800kV UHVDC Transmission Project, the first project that echoes the "go global" strategy in the field of UHV power transmission technology, as well as the first one in Latin America.

China Three Gorges and SPIC also each own major hydro, wind and solar projects in Brazil.

[480] REGlobal, Brazil is buying lots of Chinese EVs. Will that continue? 24 June 2024
[481] Gov.br, In a meeting with Alexandre Silveira, State Grid announces its intention to invest another R$200 billion in Brazil, 4 April 2024

SECTION 9 GREEN HYDROGEN

China dominated electrolyser deployments in 2023, accounting for a 75% global share according to the IEA, and reports continue of the very significant capital cost advantage Chinese hydrogen equipment manufacturers hold. We are yet to see this Chinese domestic manufacturing and installation activity translate into any material ODFI.

China leads the world in terms of the development and deployment of green hydrogen (GH2). The IEA estimates China installed 75% of the world's electrolyser capacity in 2023 and operates >50% global share in total, with ~37% of global electrolyser manufacturing capacity.

This is an inevitable outcome of China's clear government policy signals. March 2024 saw Beijing release its maiden national hydrogen strategy in 2022 up to 2035, with the suggestion hydrogen can be the "fourth pillar" of China's economy, following the country's success in solar panels, EVs and lithium-ion batteries.[482]

July 2024 saw 20 key EU green hydrogen groups launch a campaign demanding the EU prioritise EU manufacturing of electrolysers in response to China's technology and scale leadership in green hydrogen development. This follows the May 2024 statement by Thierry Breton, the EU's single market commissioner: "I will push to ensure that the next auctions give no possibility for subsidised technologies to unfairly compete with European products, and that European funding effectively leads to decreased dependencies, and not the other way around."[483]

We note much of the hydrogen hype of 2021-22 has deflated as the sector has moved into industrial scaling up of capacities, and as the technology moves across the valley of death from expectations to commercial deployment realities.

The EU was exceptionally excited by the scope of GH2 to drive heavy industry decarbonisation and provide greater energy security post Putin's Ukraine invasion, but announcements by the likes of ArcelorMittal in 2024 have flagged GH2 is far from commerciality, even with the EU ETS and CBAM and strong policy support.

Middle Eastern countries are diversifying their oil-dependent economies through green technology. The UAE has approved a hydrogen strategy with the goal of becoming one of the world's top green producers of the commodity. By 2031, the UAE plans to produce 1.4Mtpa of GH2, increasing to 15Mt by 2050.

While the rest of the world is maturing its GH2 market, Chinese companies have already seized the opportunities to be the first to establish themselves in the EMDEs and in developed countries.

Late in 2024, in Abu Dhabi, the capital of the United Arab Emirates (UAE), 3 hydrogen powered buses will be deployed by the Chinese technology start-up Wisdom Motor.

June 2024 saw another Chinese start-up, Jiangsu Guofu Hydrogen Energy Equipment sign an agreement with the Abu Dhabi government to build a hydrogen energy equipment factory in the emirate.[484]

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[482] SCMP, GH2: can China replicate its success in EVs, batteries and solar panels? 15 June 2024
[483] FT, European groups urge action to stop threat of cheap Chinese imports, 1 July 2024
[484] SCMP, Green hydrogen: will China, US or EU dominate the global clean energy race? 8 June 2024

November 2023 saw Jiangsu Guofu Hydrogen Energy Equipment, also referred to as Guofuhee, unveil plans to build a 1GW electrolyser factory in Germany in partnership with Germany's RCT Group. The two companies have signed an MoU under which they intend to invest jointly in the construction in Brandenburg by the end of 2026,[485] according to a news release from Guofuhee.

China-Egypt-Morocco Green Hydrogen & Ammonia Proposals

April 2024 saw reports that China Energy Engineering Group signed MoUs on green hydrogen projects with Egypt and Morocco respectively, and plans to build solar & wind power and 1.4Mtpa of green ammonia (~320,000tpa of green hydrogen) projects in Morocco, and 140,000tpa of green hydrogen projects in Egypt.[486]

February 2024 saw China State Construction Engineering Corp. and South Korea's SK Ecoplant Co sign a MoU with the Egyptian New and Renewable Energy Agency, the Egyptian Electricity Transmission Company, the Egyptian Suez Canal Economic Zone Authority and the Egyptian Sovereign Fund in the form of a consortium to develop green hydrogen and green ammonia in Egypt. The project plans to invest US$1.9bn, to build 778MW of wind and solar to power a 250-MW electrolysis system, and plans to produce 50,000tpa of green hydrogen to produce 250,000tpa of green ammonia. It is expected to be put into commercial operation in 2029.[487]

China Energy Engineering International Group - Malaysia

In recent years, China and Malaysia have deepened their cooperation in the field of green hydrogen energy industry.

February 2024 saw Malaysia's Semarak Renewable Energy commission Power China to undertake the EPC on a US$400m 60MW green hydrogen facility powered by floating solar.[488]

March 2024 saw a consortium, formed by China Energy Engineering International Group and China Energy Engineering Jiangsu Electric Power Design Institute, sign a general contracting framework agreement for the Paka Green Hydrogen Integration Project in Paka, Terengganu with a Malaysian company, planning to design and build a 200MW green hydrogen plant and a supporting 30MW solar project.[489]

Envision Energy - Spain

September 2024 saw China's wind turbine giant Envision Energy sign an MoU with Spain's government, pledging to spend US$1bn on a vast green hydrogen technology complex in the European country. The factory is expected to produce 5GW of three different types of electrolyser per year, as well as ammonia production equipment.[490]

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[485] Renewables Now, China's Guofuhee, RCT plan 1-GW electrolyser factory in Germany, 12 October 2023
[486] Belt and Road Portal Yidaiyilu.com, Many African countries are exploring the development of hydrogen energy industry, 8 April 2024
[487] The Korea Economic Daily, CSCEC, SK Ecoplant in $1.9 bn Egypt renewable energy deal, 29 February 2024
[488] Hydrogen Insights, Malaysia's largest green hydrogen project to begin construction this year after closing $400m in finance, 23 February 2024
[489] Malaysia takes multiple measures to promote the development of hydrogen industry, 20 May 2024
[490] Recharge News, Chinese wind giant Envision pledges $1bn for Spanish green hydrogen complex, 10 September 2024

SECTION 10 CHINA'S OTHER CLEANTECH PROJECTS

Haier Group - South Africa & Egypt

July 2024 saw Chinese home appliance giant Haier Group announce it will fully acquire the South African water heater business of Sweden's Electrolux for ZAR2.5bn (US$137m).

May 2024 saw the Haier Group deepen its market presence in Africa with the opening of a US$160m factory in Egypt Ecological Park in May, with an annual output of more than 1.5 million products, including air conditioners, washing machines, televisions, refrigerators, and ice lockers.[491]

China Energy Engineering Construction – Biomass - Côte d'Ivoire

August 2024 saw CEEC commission the Biovea 46MW Biomass Power Plant, Côte d'Ivoire, which is West Africa's largest biomass power plant.[492]

Everbright Environment (Group) – W2E - Vietnam

April 2024 saw China's Everbright Environment (Group) Limited commission the US$75m Hue waste-to-energy (W2E) Project in Thua Thien Hue Province, Vietnam. It can process ~220,000 tons of domestic waste annually and generate 80GWh pa of green electricity.[493]

[491] Yicai, Haier Smart Home to Buy Electrolux's Water Heaters in South Africa for US$137M, 19 July 2024

[492] CEEC, Double Milestones of West Africa's Largest Biomass Power Plant Completed at One Day, 20 August 2024

[493] Everbright Environment (Group) Press release, Vietnamese Prime Minister Pham Minh Chinh attended the completion ceremony of Everbright Environment's Hue Waste-to-energy Project, 9 April 2024

SECTION 11 CHINA ODFI INTO AUSTRALIA

2023 was a multi-decade low for ODFI by Chinese entities into Australia. However, with a significant stabilisation of bilateral affairs under the new Australian Federal Government, 2024 has seen a material step up in Chinese corporate investments in greenfield renewable energy and BESS projects in Australia. Whilst this is a promising trend, it is still far below what other countries are enjoying, given a still opaque picture in terms of the policies and rules applying to new Chinese investment in Australia. A clarification of the rules is required, alongside other policy measures, to incentivise collaboration and co-investment that is in Australia's national interest, and seize the economic opportunities of Australia's pivot to zero-emissions trade and investment leader.

China's Leadership - Australian response

May 2024 saw Arcadium Lithium chairman Peter Coleman note the very constructive role of Chinese collaboration in Australia, stating that China was: "key to starting up a number of the miners that today are significant – both significant investors and significant employers in Western Australia. But I just can't see a future where you don't co-invest together."[494]

Under incentive programs such as the IRA, the US considers China, Russia, Iran and North Korea to be "foreign entities of concern" and has sought to ensure critical minerals that are "subject to the control" of those nations are not eligible for the subsidies offered.

Battery and car makers in the US can access tax breaks if they source a defined proportion of their battery components from Australia and Canada, but many Australian lithium projects would be ineligible under the current industry structure given the vast majority of Australian lithium currently is processed in China.

Final rules published by US officials in May 2024 [495] make clear that a company is disqualified if it is 25% owned by Chinese interests. The focus on Chinese ownership has raised doubts over whether two of Australia's biggest lithium mines will be deemed foreign entities of concern. Greenbushes is 26% owned by China Tianqi, 49%-owned by Albemarle US and 24%-owned by Australia's IGO. The Mt Marion lithium mine is 50% owned by China's Ganfeng, and 50% owned by ASX-listed Mineral Resources. [496]

Whilst the US Congress has in 2024 added Australia to the Defence Production Act as a domestic source, along with the UK and Canada, in practice this has not seen any material US strategic flow of new investments into Australian assets.[497]

But May 2024 also saw a range of Australian mining firms note that China's accelerated investment in new global supply and their use of their dominant global market power as the biggest buyer in the world has driven increased volatility and destructive commodity price outcomes, meaning there are growing calls for Australia to protect its national interests as a key commodity exporter.[498]

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[494] AFR, Lithium giant says China will remain pivotal to local mining projects, 22 May 2024
[495] https://www.govinfo.gov/content/pkg/FR-2024-05-06/pdf/2024-08913.pdf 6 May 2024
[496] AFR, Lithium miners plead 'foreign entity' case to US over China links, 20 May 2024
[497] AFR, Big China question hangs over Australia's critical minerals sector, 22 June 2024
[498] AFR, Big China question hangs over Australia's critical minerals sector, 22 June 2024

CEF advocates for Australia to introduce a strategic critical minerals reserve fund to provide floor and ceiling price guarantees to underwrite new investment, but also protect Australia's national interests.

In renewables, China's state-owned utility SPIC is the largest renewable energy gentailer in Australia post its 2016 A$2.5bn acquisition of Pacific Hydro (with wind and hydro assets across Australia, Chile and Brazil) from IFM Investors (and then beefed up with its $300m acquisition of Banco Santander's Australian Taralga Wind Farm).[499] This business was renamed to Pacific Blue.

June 2024 saw a state visit to Australia by Chinese Premier Li Qiang, who said that Australians should view China's development as an opportunity and not as a challenge or threat. Li said China's business interests fit in with the federal government's "Made in Australia" push and greater cooperation could strengthen and stabilise global supply chains in critical minerals and other sectors.[500]

The visit by Premier Li shows the improvement in the Australia-China relationship under the new Federal Government, after quite a lengthy cold spell. Australia has seen in the last two years the highest number of ministerial-level people-to-people meetings between Australia and China at any time in history.[501]

China is Australia's biggest trading partner, and it makes geographical and economic sense to find a strategic way to work with China while navigating the challenges and risks Chinese manufacturing expansion is posing for Australia.

[499] Reuters, China's State Power buys Australian wind farm for $227million: sources, 14 March 2016
[500] AFR, Australia won't bow to China on critical minerals, 18 June 2024
[501] CEF, Warmer Ties Could Cool the Planet: Potential for Australia-China Green Energy Collaboration, 21 June 2024

11.1 China's Australian Cleantech Investment

The opportunity for Australia to collaborate and partner with leading private Chinese corporations has never been more important or vital to Australia's future economic interests, given China's growing global technology and manufacturing leadership in almost all cleantech sectors, and the scope for Australia to help China decarbonise.

There is real potential for collaboration on energy infrastructure; value-added critical minerals and strategic metals refining onshore powered by renewable energy, so we export embodied decarbonisation e.g. green iron instead of iron ore, to our #1 trade partner; and on cleantech supply chain manufacturing, with appropriate foreign ownership limits, for example, requirements for majority Australian ownership to mitigate risks around control, influence and national security.

However, Chinese ODI into Australia is at a multi-decade low – Figure 11.1. Chinese investment in Australia's renewable energy sector has totalled A$6.7bn since 2006, representing 5% of China's total investment, with SPIC's acquisition of Pacific Hydro in 2015 representing half of this.

The extension of the critical minerals production tax credits to all investors in Australian value-adding in June 2024 is an important milestone conducive to investment and differentiates Australia's approach to collaborating with China from the increasing trade barriers to China being erected by the US.[502]

While there has been a significant improvement in bilateral relations between China and Australia since the new Albanese Federal Government was elected in 2022, the current foreign investment regulatory regime remains opaque and disincentivises Chinese investment.

CEF recommends further elucidation of the government's welcome for private Chinese investment into Australia, focussing on partnership with Australian firms where it involves leveraging China's technology, capital and automation expertise for value-adding.

CEF sees it as a strategic priority in the national interest that the rules of engagement with the Foreign Investment Review Board (FIRB) be clarified and communicated effectively, otherwise private Chinese capital will increasingly look elsewhere – a process which this report demonstrates is already well underway and accelerating.

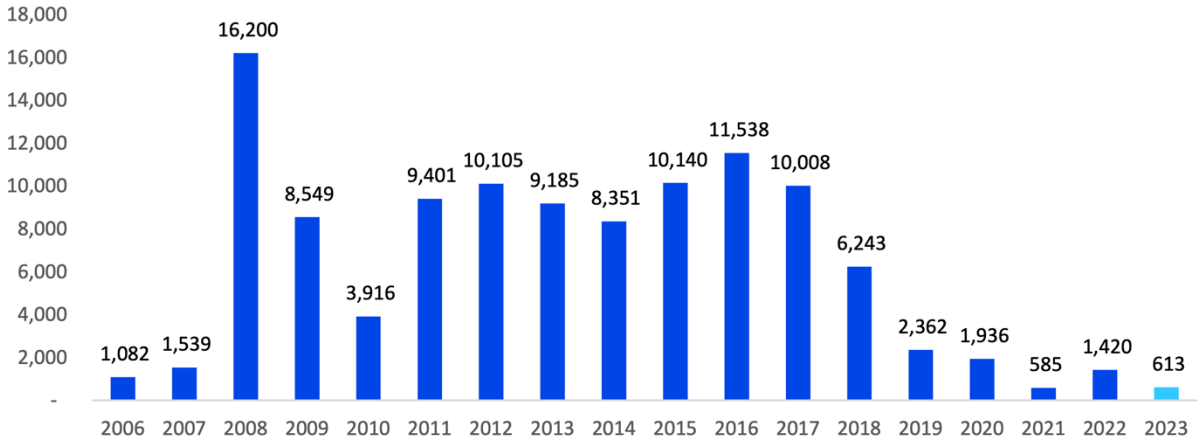
Welcoming, stable, predictable and transparent policy frameworks for foreign investment are critical for Chinese private investor confidence.

In CEF's view, these should be complemented by appropriately calibrated mechanisms to expand the diversity of global demand for Australia's key commodity exports, given China's already overwhelming market power in these sectors.

We outline below eight of the largest Chinese cleantech investors in Australia, along with a few smaller projects involving Australia-China collaboration and partnerships.

[502] AFR, Labor plans to open $13.7b critical minerals incentives to Chinese firms, 28 June 2024

Figure 11.1: Chinese ODI Into Australia by Value 2006-2023 (US$m)



Source: KPMG/University of Sydney [503]

Goldwind Australia

China's Goldwind Science & Technology (Goldwind) is the #1 wind turbine manufacturer globally, with annual revenues of Rmb26bn and total assets of Rmb142bn. Goldwind has China Three Gorges as its largest but non-controlling minority shareholder.

Established in 2009, Goldwind Australia is a leading renewable energy solutions provider, contributing 1,641MW of cumulative wind farm installs to-date. Goldwind delivers comprehensive renewable energy solutions to the Australian and New Zealand markets, including investment, planning, design, construction, operational and maintenance services.

Goldwind has built the 175MW White Rock Wind Farm and 20MW White Rock Solar Farm, and retains a 25% interest in the WRWF, partnering with Shanghai Stock Exchange listed China Energy Conservation and Environmental Protection Group (CECEP) at 75%.

December 2023 saw Goldwind announce it expects its 284MW Coppabella wind farm proposal in NSW to commence construction in 2024, having won a Long-Term Energy Service Agreement (LTESA) in the inaugural competitive tender process run by AEMO Services.[504] This development proposal was acquired from Epuron in 2018.[505]

August 2024 saw Goldwind and the privately owned Australian Omni Energy file their EIS for a 1.4GW wind farm and 200MW/400MWh BESS at the proposed Baldon Wind Farm, which would be built within NSW's South West Renewable Energy Zone (REZ). The proposal features Goldwind's first deployment in Australia of its new 8MW onshore wind turbine.[506]

[503] University of Sydney / KPMG, Demystifying Chinese Investment in Australia, April 2024
[504] Goldwind Press Release, Coppabella Wind Farm Project Successful in Inaugural AEMO Services Tender, 2 May 2023
[505] Goldwind, Coppabella wind farm, November 2023
[506] RenewEconomy, China's Goldwind files EIS for massive wind and battery project featuring biggest turbines to date, 12 August 2024

SPIC - Pacific Blue, Australia

Chinese owned Pacific Blue (formerly PacHydro) is Australia's only 100% renewable energy generator and retailer with 665MW of operating assets across wind, solar and hydro in Australia. Pacific Blue aims to double its clean energy portfolio to 2GW in the coming five years. Formed in 1992 as Pacific Hydro, the business was acquired by China's SPIC for A$3bn (including substantial hydro assets across Chile and Brazil). State Power Investment Corp. (SPIC) is one of the five major power generation groups in China and the largest solar power generation enterprise in the world.

Pacific Blue's most recent development is the Haughton Solar Farm, 60km south of Townsville in Queensland, being developed in stages with a total capacity of 500MW planned for completion by 2026.

September 2024 saw Pacific Blue's +A$100m 60MW/130MWh grid-scale BESS in Clements Gap, South Australia selected under the Federal Government's Capacity Investment Scheme (CIS) tender.[507] Construction began in June 2024. This BESS is adjacent to Pacific Blue's Clements Gap Wind Farm and is the first key milestone for Pacific Blue in realising its 2.5GW pipeline of capacity and energy storage solutions.[508]

China Construction Bank

In August 2024 CEF caught up with China Construction Bank (CCB), the third largest bank in the world (ranked by total assets). Renewable energy and green loans arranged and provided by CCB Australia in the past decade stand at a cumulative A$4bn, equating to ~25% of the total CCB corporate and institutional lending book. CCB has lent to the top 4 independent renewable energy generators in Australia, with loans to Goldwind (Cullen Range wind farm, 2013), SPIC (Pac Hydro acquisition finance, 2016), Macquarie Group (2018), AGL (syndicated corporate loan, 2019), Neoen (Western Downs solar, 2020 and a syndicated portfolio financing of A$1.1bn, 2023); Pacific Blue (portfolio financing, 2024).

Beijing Jingneng Energy International (BJEI)

2023 saw BJEI acquire a 26% stake in Moorabool Wind Farm and Moorabool South Wind Farm for A$197m, adding to their 25% stake acquired in 2022 for A$188m.

December 2023 saw China state-owned energy company Beijing Jingneng Energy International (BJEI) purchase from Lightsource bp five Australian solar projects totalling 1.04GW, for an equity value of A$813m. The five projects include the Wellington, West Wyalong, Woolooga and Wellington North projects which are already in operation, and the Wunghnu solar project due to be operational in the second half of 2024.

BJEI Australia chairman Warwick Smith, a former federal Liberal minister, said the purchase took the company's Australia portfolio to more than 2GW. BJEI Australia assets also include the 165.5MW Gullen Range wind farm in NSW (using Goldwind turbines) and the neighbouring 10MW Gullen solar farm, plus the 110MW Biala Wind Farm in NSW commissioned in 2020. [509]

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[507] Renew Economy, Six new big battery projects emerge as winners of first capacity tender, 3 September 2024
[508] Pacific Blue, Media release: Pacific Blue announces significant investment in South Australia's renewable energy future, 12 June 2024
[509] RenewEconomy, Lightsource bp sells **5** Australian solar farms to Chinese buyer, 15 Dec 2023

April 2024 saw ASX-listed TPC Consolidated Ltd sell energy retailer CovaU acquired by BJEI for ~A$100m. BJEI suggested this is a first step in building a renewable energy business in Australia.[510]

BJEI Australia also owns the 280MW Wollar Solar Farm near Mudgee, NSW, with construction due for completion at the end of 2024.[511]

China Light & Power Group (CLP) - EnergyAustralia

CLP HK owns EnergyAustralia, the third largest gentailer in Australia. EnergyAustralia is targeting up to 3GW in renewables and over A$5bn of storage and renewables initiatives long-time with projects in the development pipeline like the proposed Hallett BESS, Mt Piper BESS and Lake Lyell Pumped Hydro project.

July 2024 saw EnergyAustralia seek an equity buyer for a 50% stake in its 'shovel-ready' 350MW, 4-hour BESS proposal in the Latrobe Valley, which targets FID by the end of CY2024.[512] September 2024 saw this project underwritten by the Federal Government's CIS.

September 2024 saw EnergyAustralia's 50MW/200MWh BESS proposal at the Hallett methane gas fired power station 200km north of Adelaide, South Australia also underwritten by the Federal Government's CIS.[513]

Power China

Power China owns 9GW of solar projects across 30 countries, and 5GW of wind projects globally, from Ethiopia, Pakistan to Argentina. Power China has built over two thirds of China's hydro electricity fleet over the last 60 years, representing over 200GW of new capacity, as well as 90% of China's PHS capacity, totalling over 60GW.[514]

Power China owns 80% of the US$215m 148MW Australia Cattle Hill Wind farm in Tasmania, acquired in 2018 from Goldwind, who retains a 20% stake.

Shenhua Clean Energy Holdings (in JV with Hydro Tasmania)

Woolnorth Renewables is a JV between Hydro Tasmania (25%) and Shenhua Clean Energy Holdings ((75%), formed in 2012). We own and operate three wind farms in Tasmania. The largest is the 168MW Musselroe Wind Farm, located in the Dorset municipality. Woolnorth Renewables is the largest wind farm operator in Tasmania with over 300MW of capacity and generates 10% of Tasmania's electricity.

February 2023 saw Woolnorth Renewables propose the 400MW Mt Fyans Wind Farm for Western Victoria, 5km north of Mortlake.[515]

January 2024 saw Woolnorth Renewables propose the 40MW/80MWh Derby BESS in Tasmania, with construction due to commence in late 2024 for an end of 2025 commissioning.[516]

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[510] RenewEconomy, State-owned Chinese company buys Australian energy retailer to boost local renewable plans, 2 April 2024
[511] Wollar Solar Farm
[512] AFR, ICA Partners shops stake in EnergyAustralia's Wooreen battery project, 16 July 2024
[513] The Australian, EnergyAustralia a winner under Labor's renewables guarantee, 3 September 2024
[514] Power China, Power Assets
[515] Woolnorth Renewables, Mt Fyans Wind Farm
[516] Woolnorth Renewables, Derby BESS

August 2024 saw Woolnorth lodge plans to repower the 140MW Woolnorth wind farm to double its capacity.[517]

China Energy Engineering Construction – Australia - BESS

May 2024 saw China Energy Engineering Construction commence the EPC of the Templers 138MW/330MWh BESS near Adelaide, South Australia.[518] CEEC is working with ZEN Energy on this and a number of other solar and BESS proposals. [519]

Valent Energy – Gaw Capital / BW ESS - BESS

Valent Energy has a portfolio of 4 BESS developments across Australia of 1.6GWh worth A$2bn, including the Mornington Peninsula 240MW/480MWh BESS under construction and due for completion in 2025. Valent Energy is owned by Gaw Capital Partners (an HK private equity firm, AuM US$40bn) and BW ESS (part of the BW Group).[520]

Canadian Solar e-Storage / FRV Australia – BESS

August 2024 saw China's Canadian Solar's subsidy e-STORAGE awarded the EPC contract for 100MW / 200MWh BESS by Fotowatio Renewable Ventures (FRV) Australia for its Terang energy storage project in Victoria, Australia.[521]

Shanghai Electric Group / APA Group – Solar & BESS

Shanghai Electric Group Co., Ltd. is one of the largest diversified equipment manufacturing groups in China. It has the strength of supplying whole sets of equipment, EPC projects and comprehensive service for modern equipment. Since the 1990s, its revenue has always ranked it No.1 in the China equipment manufacturing industry.

September 2024 saw the final solar panels installed at APA Group's 45MW Port Hedland Solar PV generation facility and 35MW/ 36.7MWh BESS, to supply renewable energy for BHP in the Pilbara region of Western Australia.[522]

Trinasolar – Australia - BESS

Trinasolar has three BESS in development across Australia, one in Victoria, one in Western Australia and the third the 270MW/540MWh Augusta BESS in Port Paterson, South Australia.

May 2024 saw community engagement for Trinasolar's proposal to develop, construct and operate its 500MW/1,000MWh Kiewa Valley BESS project in the Kiewa Valley Victoria.[523]

September 2024 saw Trinasolar submit plans for a BESS of up to 660MW/2,640MWh in Kemerton, Western Australia.[524]

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[517] RenewEconomy, One of Australia's oldest wind farms could nearly double capacity by "repowering" with bigger turbines, 12 August 2024
[518] CEEC, CEEC Breaks Ground on EPC Project of Energy Storage in Australia, 30 May 2024
[519] RenewEconomy, Zen Energy breaks ground on its first big battery project, 28 May 2024
[520] Valent Energy, Enabling the Energy Transition Today
[521] Canadian Solar press release, Canadian Solar's E-Storage To Power 200 Mwh Energy Storage Project In Southeastern Australia, 7 August 2024
[522] APA Group, Port Hedland solar and battery project, September 2024
[523] The BorderMail, Community invited to discuss 500-MW North East battery project, 23 May 2024
[524] RenewEconomy, China solar giant Trina seeks approval for biggest battery project in Australia, 22 September 2024

APPENDIX A

Full table Direct Foreign Investment Cleantech Announcements from China since 2023 identified by CEF.

Technology	Company	Investment Partner	Location	Investment (US$m)	Date of news	Product	Expected start of production	Confimed /FID
Wind Farms	Power China	Huadong Power China	Egypt	709	Mar'2024	500MW wind farm	2024	Yes
Wind Farms	Power China	n.a.	Bangladesh	150	Jun'2024	65MW wind farm	2024	Yes
Wind Farms	Power China	Monsoon Wind Power	Laos	950	Nov'2023	to construct a 600MW wind farm	2025	Yes
Wind Farms	CEEC	ACWA Power	Uzbekistan	n.a.	Aug'2024	to construct a 1GW wind farm	2026	Yes
Wind Farms	CEEC	Power Beacon RE	Philippines	n.a.	Sept'2024	to construct a 400MW wind farm	2026	Yes
Wind Farms	China Southern Grid	ACWA Power	Uzbekistan	1,300	Jul'2024	Acquiring a 35% stake in 1GW wind	n.a.	Yes
Wind Farms	CK Infrastructure	Aviva Investors	UK	450	Aug'2024	175MW of onshore wind farms	2024	Yes
Wind Farms	Mingyang	COPEL	Brazil	n.a.	Aug'2024	240MW of onshore wind farms	n.a.	No
Wind Farms	Goldwind	n.a.	Georgia	n.a.	Aug'2024	206MW onshore wind farm	n.a.	No
Wind Farms	Goldwind	Red Sea Wind	Egypt	n.a.	Jun'2023	500MW onshore wind farm	n.a.	No
Wind Farms	Goldwind	Heongtong Group	South Korea	n.a.	Jun'2024	To supply 365MW of offshore turbir	n.a.	Yes
Wind Farm & BESS	Goldwind	Omni Energy	NSW, Australia	2,450	Aug'2024	1.4GW wind, 200MW-2hr BESS	2028	No
Wind Farm	Shenhua Clean Energy	Hydro Tasmania	Tasmania, Australia	n.a.	Feb'2023	400MW onshore wind farm	n.a.	No
Wind Manufacturing	Mingyang	Renexia	Italy	550	Aug'2024	Offshore wind turbines	n.a.	n.a.
Wind Manufacturing	Envision	RELC & Vision	Saudi Arabia	n.a.	Jul'2024	4GW pa of onshore wind turbines	n.a.	n.a.
Solar Farms	Power China	n.a.	Algeria	n.a.	Mar'2024	370MW of solar across 2 farms	2025	Yes
Solar Farms	Power China	n.a.	UAE	755	Mar'2024	1,500MW solar farm construction	2026	Yes
Solar Farms	Power China	Ayala Corp.	Philippines	n.a.	Jan'2024	584MW solar farm	2025	Yes
Solar Farms	Power China	n.a.	Argentina	n.a.	2024	315MW solar farm	2024	Yes
Solar Farms	Power China	n.a.	Tanzania	n.a.	Jul'2024	163MW solar farm + 22MW BESS	2025	No
Solar Farms	Power China	JA Solar	Atacama Desert, Chile	n.a.	Apr'2024	480MW solar farm	2024	Yes
Solar Farms	Power China	n.a.	Brazil	n.a.	Apr'2023	343MW solar farm	2025	Yes
Solar Farms	CEEC	ACWA & Aramco	Mecca, Saudi Arabia	n.a.	Feb'2024	2,600MW of solar farm	2024	Yes
Solar Farms	CEEC	ACWA & PIF	Taif, Saudi Arabia	972	Aug'2024	2,000MW solar farm construction	2026	Yes
Solar Farms	CEEC	TotalEnergies	Basra, Iraq	n.a.	Aug'2024	1,000MW solar farm construction	2027	Yes
Solar Farms	CEEC	n.a.	Uzbekistan	n.a.	Jul'2024	1,000MW of solar across 2 farms	2024	Yes
Solar Farms	CEEC	n.a.	Puerto Peñasco, Mexico	n.a.	Jul'2024	220MW solar farm	2024	Yes
Solar Farms	CEEC	ACWA Power	Egypt	n.a.	Jun'2024	200MW solar farm	2025	Yes
Solar Farms	CEEC	n.a.	Philippines	n.a.	May'2024	160MW solar farm	2025	Yes
Solar Farms	SPIC	n.a.	Brazil	n.a.	Jun'2024	738MW solar across 2 farms	2024	Yes
Solar Farms	Dongfeng Electric	Masdar	Uzbekistan	n.a.	Mar'2024	511MW solar across 2 farms	2024	Yes
Solar Farms	China General Nuclear	n.a.	Laos	2,000	Aug'2024	2,000MW of solar across 3 farms	2026	Yes
Solar Farms	United Energy Group	Green Profit	Sofia, Bulgaria	333	Mar'2024	250MW solar farm	2026	Yes
Solar Farms	Jinko Solar	EDF & TAQA	Dhafrah UAE	n.a.	Aug'2024	1,500MW solar farm	2024	Yes
Solar Farms	China Power Eng.	Tianjin Electric	Kerouan, Tunisia	n.a.	May'2024	100MW solar farm	2025	Yes
Solar Farms	China Harbour	Botswana Electricity	Botswana	n.a.	Jul'2024	100MW solar farm	2025	No
Solar Farms	BJEI	n.a.	Australia	530	Dec'2023	Acquired 5 solar projects from bp	2024	Yes
Solar Manufacturing	Trinasolar	PLN & Sinar Mas	Indonesia	100	Oct'2023	1GW modules pa	2024	Yes
Solar Manufacturing	Trinasolar	n.a.	Texas, US	200	Nov'2023	5GW modules pa	2024	Yes
Solar Manufacturing	JA Solar	n.a.	Arizona, US	60	2024	2GW modules pa	2024	Yes
Solar Manufacturing	Jinko Solar	n.a.	Florida, US	150	2024	2GW modules pa	2024	Yes
Solar Manufacturing	Jinko Solar	RELC & Vision	Saudi Arabia	985	Jul'2024	10GW cell / 10GW modules pa	n.a.	n.a.
Solar Manufacturing	TCL Zhonghuan	RELC & Vision	Saudi Arabia	2,100	Jul'2024	20GW solar wafers pa	n.a.	n.a.
Solar Manufacturing	Flat Glass Group	n.a.	Jawa Tengah, Indonesia	290	Nov'2023	1Mtpa of flat glass for solar module	2025	Yes
Solar Manufacturing	LONGi	Invenergy, US	Ohio, US	600	Sept'2024	5GW modules pa	2024	Yes
Solar Manufacturing	LONGi	n.a.	Serendah, Malaysia	n.a.	Oct'2023	9GW modules pa	2024	Yes
Solar Manufacturing	Tongwei	n.a.	Alabama, US	n.a.	2023	5GW modules pa	2023	Yes
Solar Manufacturing	Risen Energy	n.a.	Malaysia	n.a.	May'2024	4GW cell / 4GW modules pa	2024	Yes
Hydro	Power China	n.a.	Uganda	n.a.	Jun'2024	Hydro-electricity - 600MW	2024	Yes
Hydro	Power China	n.a.	Tanzania	n.a.	Feb'2024	Hydro-electricity - 2,115MW	2024	Yes
Hydro	Power China	n.a.	Indonesia	n.a.	Aug'2024	Hydro-electricity - 510MW	2024	Yes
Hydro	CEEC	China Energy	Pakistan	2,000	Aug'2024	Hydro-electricity - 884MW	2025	Yes
Hydro	China Harbour	China Energy	Bagmati, Nepal	n.a.	Aug'2024	Hydro-electricity - 78MW	2026	Yes
Grid Transmission	China State Grid	n.a.	Philippines	925	May'2023	184km subsea cable	2023	Yes
Grid Transmission	China State Grid	n.a.	Brazil	3,300	Apr'2024	2*1,500km grid transmission lines	n.a.	Yes
Grid Transmission	Southern Power Grid	Chilean partners	Chile	n.a.	Apr'2024	1,342km grid transmission line	n.a.	No

Technology	Company	Investment Partner	Location	Investment (US$m)	Date of news	Product	Expected start of production	Confimed /FID
Battery	CATL	n.a.	Debrecen, Hungary	8,100	Aug'2022	Battery Mfg, 100GWh	2025	Yes
Battery	CATL	n.a.	North Maluku, Indonesia	420	Dec'2023	Battery Mfg	2025	Yes
Battery	CATL	Ford	Michigan, US	n.a.	Nov'2023	Battery Mfg - technology licence	n.a.	Yes
Battery	CATL	Tesla	Nevada, US	n.a.	Mar'2024	Battery Mfg - technology licence	n.a.	No
Battery	CATL	GM / TDK	US	n.a.	Aug'2024	Battery Mfg - technology licence	n.a.	No
Battery	Gotion	PTT Group	Rayong, Thailand	n.a.	Dec'2023	Battery Mfg, 2GWh	2023	Yes
Battery	Gotion	n.a.	Michigan, US	2,360	Aug'2024	Battery Mfg	n.a.	No
Battery	Gotion	InoBat	Surany, Slovakia	1,000	Jun'2024	Battery Mfg, 20GWh	2027	Yes
Battery	Gotion	n.a.	Morocco	1,300	Jun'2024	Battery Mfg, 100GWh	n.a.	No
Battery	Gotion	Tata AutoComp	Pune, India	n.a.	Nov'2023	Battery Mfg for BESS, 6GWh	2023	Yes
Battery	EVE Energy	n.a.	Debrecen, Hungary	1,400	Nov'2023	Battery Mfg, 28GWh	2025	Yes
Battery	EVE Energy	Invest Kedah	Kedah, Malaysia	422	May'2024	Battery Mfg	2025	Yes
Battery	EVE Energy	n.a.	Coventry, UK	1,575	Mar'2024	Battery Mfg	n.a.	No
Battery	EVE Energy	Energy Absolute	Thailand	n.a.	Jul'2023	Battery Mfg, 6GWh	n.a.	No
Battery	EVE Energy	Cummins, Paccar	Mississippi, US	n.a.	Jul'2024	Battery Mfg for trucks, 21GWh	2026	Yes
Battery	Envision AESC	n.a.	Japan	350	May'2023	Battery Mfg	2024	Yes
Battery	Envision AESC	n.a.	Kentucky, US	1,450	Sep'2023	Battery Mfg, 30GWh	2024	Yes
Battery	Envision AESC	n.a.	Douai, France	1,450	Nov'2023	Battery Mfg, 9GWh	n.a.	Yes
Battery	Envision AESC	n.a.	Cáceres, Spain	1,100	Jul'2024	Battery Mfg	2026	No
Battery	SVOLT	n.a.	Finland	n.a.	Oct'2023	Battery Mfg, 100GWh	n.a.	No
Battery	Sunwoda	n.a.	Nyiregyhaza, Hungary	275	Jul'2023	Battery Mfg	2026	Yes
Battery	Sunwoda	n.a.	Bac Giang, Vietnam	275	Jul'2024	Battery Mfg	2026	Yes
Battery	CALB	n.a.	Sines Industrial, Portugal	2,200	Jan'2024	Battery Mfg, 15GWh	2026	No
Battery	Ganfeng Lithium	Yigit Aku	Turkey	500	Aug'2024	Battery Mfg, 5GWh assembly	2026	No
Battery	Farasis Energy	Togg	Gemlik, Turkey	n.a.	Apr'2023	Battery Mfg, 5GWh assembly	2023	Yes
Battery	Junda Shares	n.a.	Oman	280	Jul'2024	Battery Mfg, 5GWh	n.a.	No
Battery Materials	Shanghai Shanshan	n.a.	Finland	1,350	Oct'2023	Graphite anodes, 100,000tpa	n.a.	No
Battery Materials	Shanghai Putailai	n.a.	Sundsvall, Sweden	1,500	May'2023	Graphite anodes, 100,000tpa	n.a.	No
Battery Materials	Shinzoom	n.a.	Morocco	460	May'2024	Anodes	n.a.	No
Battery Materials	Huayou Cobalt	n.a.	Acs, Hungary	1,550	Jul'2024	Cathodes, 100,000tpa	2026	Yes
Battery Materials	BYD	n.a.	Chile	290	Aug'2024	Cathodes, 50,000tpa	n.a.	No
Battery Materials	Gotion	Anugrah Neo Mat.	Sulawesi, Indonesia	n.a.	Sep'2023	HPAL, 120,000tpa	n.a.	No
Battery Materials	BTR New Material	Tsingshan	Sulawesi, Indonesia	478	Apr'2023	Anodes, 80,000tpa	2026	Yes
Battery Materials	BTR New Material	n.a.	Morocco	350	Mar'2024	Cathodes, 50,000tpa	n.a.	Yes
Battery Materials	BTR New Material	n.a.	Morocco	366	Aug'2024	Anodes, 60,000tpa	n.a.	Yes
Battery Materials	CATL	YLB Mining	Bolivia	1,400	Jan'2024	Lithium hydroxide, 50,000tpa	n.a.	Yes
BESS	Trinasolar	Low Carbon	UK	n.a.	Feb'2024	BESS - 95MW/190MWh	2025	Yes
BESS	Trinasolar	n.a.	Kemerton, WA Australia	n.a.	Sept'2024	BESS - 660MW/2,640MWh	n.a.	No
BESS	Sungrow	Atlas Renewables	Chile	n.a.	Jun'2024	BESS - 200MW/880MWh	2025	Yes
BESS	Canadian Solar	Nova Scotia Power	Nova Scotia, Canada	n.a.	Jul'2024	BESS - 150MW/705MWh	2026	Yes
BESS	Envison	n.a.	UK	n.a.	Aug'2024	BESS - 300MW/624MWh	2026	Yes
BESS	CEEC	n.a.	Uzbekistan	n.a.	Apr'2024	BESS - 150MW/300MWh	2024	Yes
BESS	CEEC	Ministry of Investment	Uzbekistan	n.a.	Jan'2024	BESS - 1,800MWh	n.a.	No
BESS	Harbin Electric	Progresiva, Turkey	Turkey	n.a.	Feb'2024	BESS - 250MW/1,000MWh	n.a.	Yes
BESS	Shanghai Electric	Generali, Italy	UK	n.a.	Jan'2024	BESS - 100MW/100MWh	2024	Yes
BESS	BYD	Grenergy	Chile	n.a.	Sept'2024	BESS - 3000MWh	2025	Yes
BESS	Sungrow	'enso Power/Luminous	UK	n.a.	Sept'2024	BESS - 350MW/1,750MWh	n.a.	No
BESS	Sungrow	Spearmint Energy	Texas, US	n.a.	Aug'2024	BESS - 1,000MWh	2026	No
BESS	Sungrow	Algihaz	Saudi Arabia	n.a.	Jul'2024	BESS - 7,800MWh	2025	No
BESS	Hauawei Digital	n.a.	Saudi Arabia	n.a.	Sept'2024	solar 400MW & BESS - 1,000MWh	2024	Yes
NEV	BYD	Rever Auto	Thailand	486	Jul'2024	NEV Mfg - 150,000 units pa	2024	Yes
NEV	BYD	UzAuto	Uzbekistan	n.a.	Jun'2024	NEV Mfg - 50,000 units pa	2024	Yes
NEV	BYD	n.a.	Szeged, Hungary	n.a.	Feb'2024	NEV Mfg - 200,000 units pa	n.a.	Yes
NEV	BYD	n.a.	Camaçari, Brazil	1,000	Mar'2024	NEV Mfg - 150,000 units pa	2025	Yes
NEV	BYD	n.a.	Bahia, Brazil	633	Nov'2023	NEV Mfg - e-buses and trucks	2025	Yes
NEV	BYD	n.a.	Indonesia	1,300	Jun'2024	NEV Mfg - 150,000 units pa	2026	Yes
NEV	BYD	n.a.	Turkey	1,000	Jul'2024	NEV Mfg - 150,000 units pa	n.a.	No
NEV	BYD	n.a.	Mexico	n.a.	Aug'2024	NEV Mfg - 150,000 units pa	n.a.	No
NEV	Chery	Ebro-EV Motors	Spain	444	Apr'2024	NEV Mfg - 50,000 units pa	2024	Yes
NEV	Chery	n.a.	Thailand	n.a.	Apr'2024	NEV Mfg - 50,000 units pa	2025	No
NEV	Changan Auto	n.a.	Thailand	250	Nov'2023	NEV Mfg - 100,000 units pa	2025	No
NEV	Geely	Aston Martin	UK	307	May'2023	Doubled equity stake to 17%	n.a.	Yes
NEV	Geely's Volvo	n.a.	Kosíce, Slovakia	1,332	Jul'2022	NEV Mfg - 250,000 units pa	2026	No
NEV	Geely's Volvo	n.a.	Monterrey, Mexico	700	Aug'2024	Heavy duty truck manufacturing	2026	Yes
NEV	Human Horizons	Ministry of Investment	Saudi Arabia	5,600	Jun'2023	NEV Mfg - MoU	n.a.	No

Total Indentified 2023/24	67,111	US$bn
Total estimated 2023/24	109,227	US$bn