



Tim Buckley, Director
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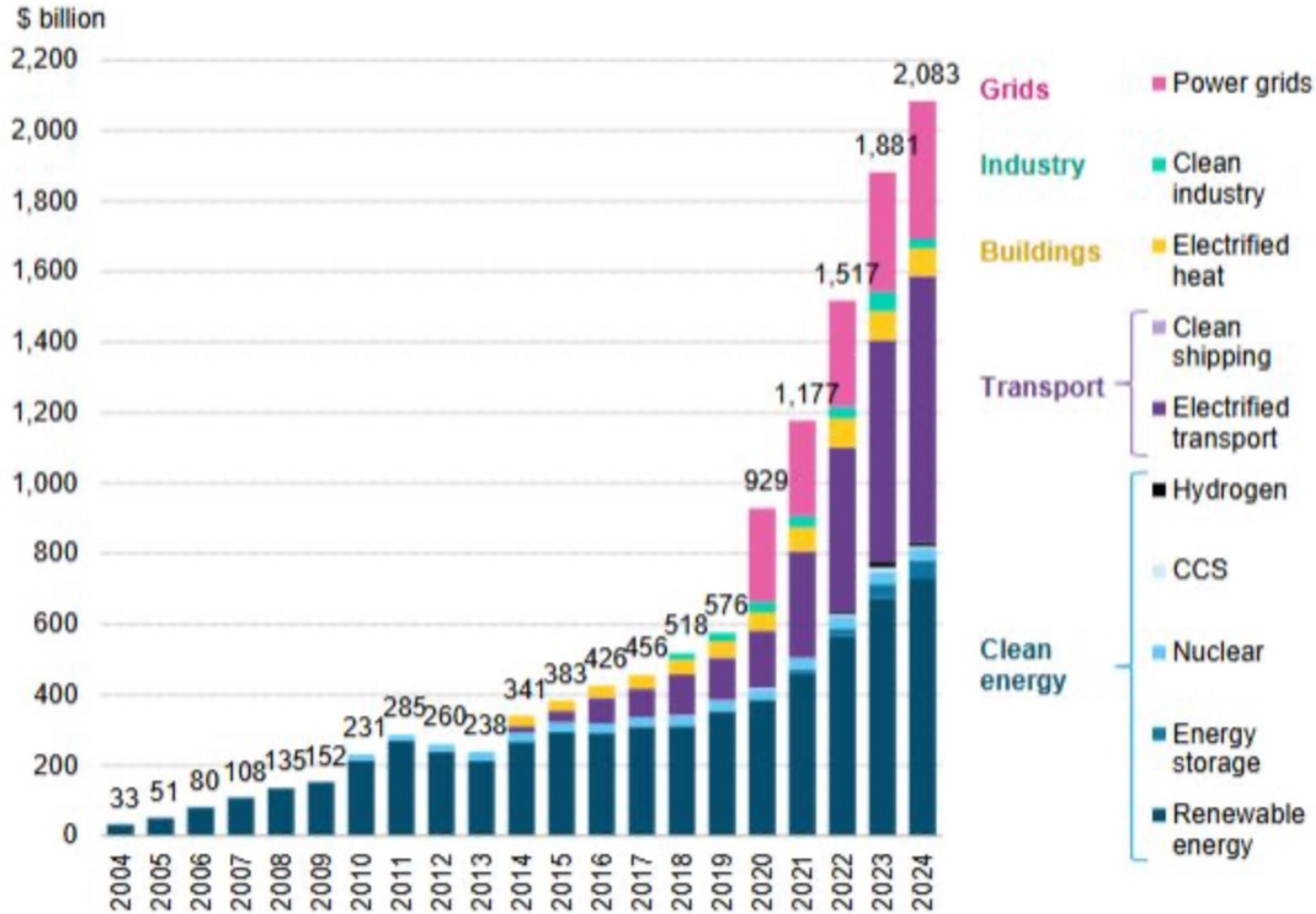
Engineers Australia

**Electricity Sector
Transition: Growing
Renewables and Industry**

3 April 2025

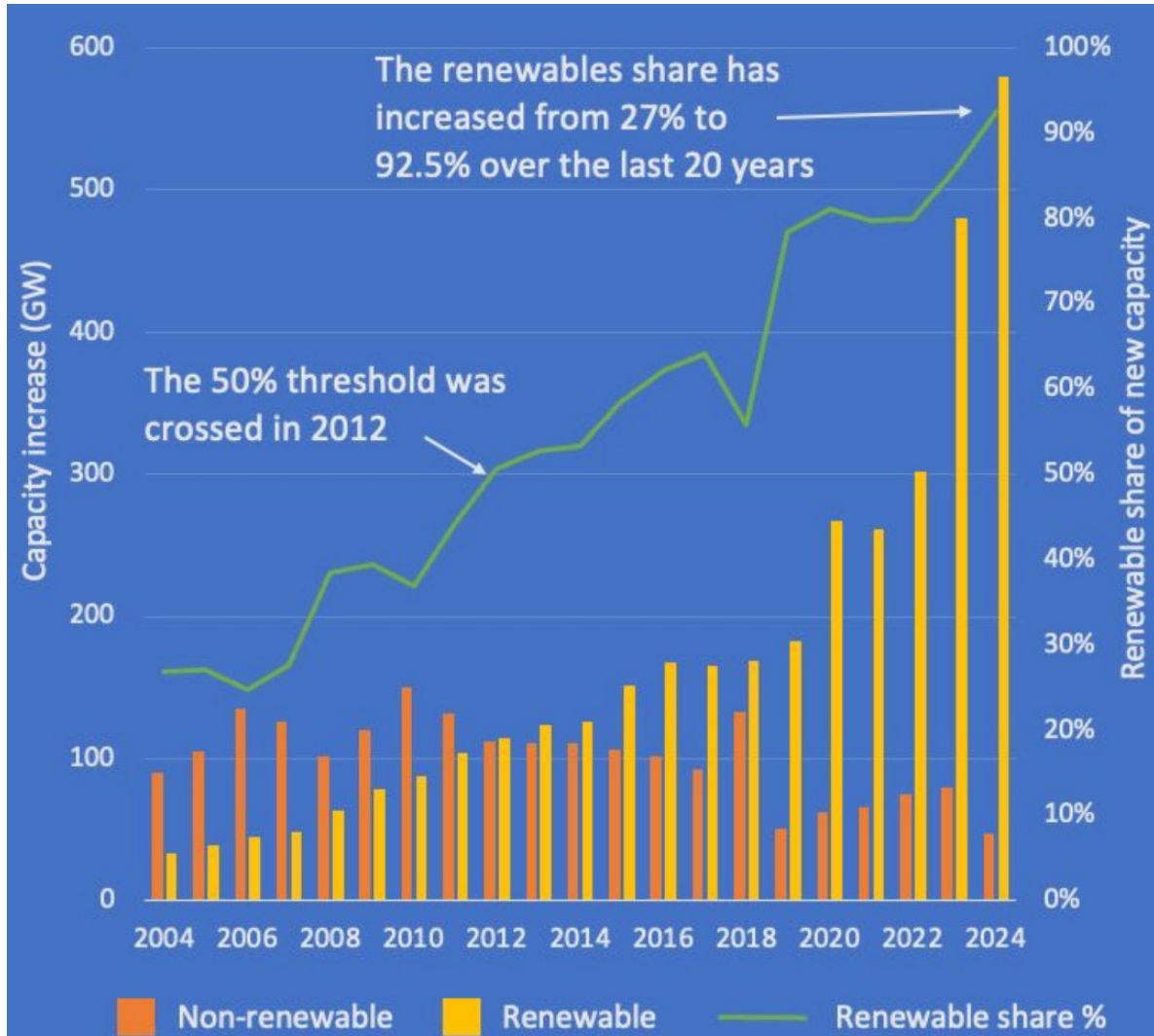
China's Cleantech Manufacturing Dominance

G The world invested US\$2.1 trillion in cleantech in 2024, +11% yoy



Renewables in Electricity

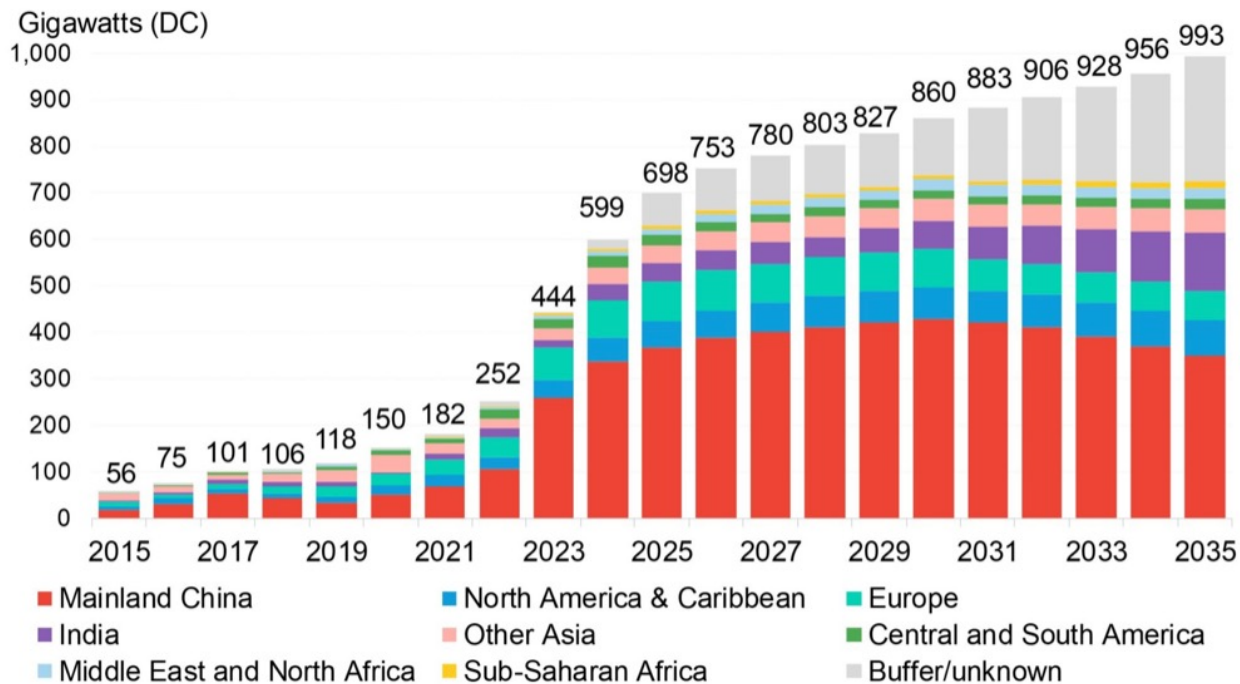
Renewables made up 92.5% of total global capacity added in 2024



Renewables in Electricity

Ongoing deflation & technology improvements in solar + BESS enables the solar boom to continue

PV installations, historical and forecast



Source: BloombergNEF. Note: Full data in BNEF's Capacity tool ([web](#) | [terminal](#)).

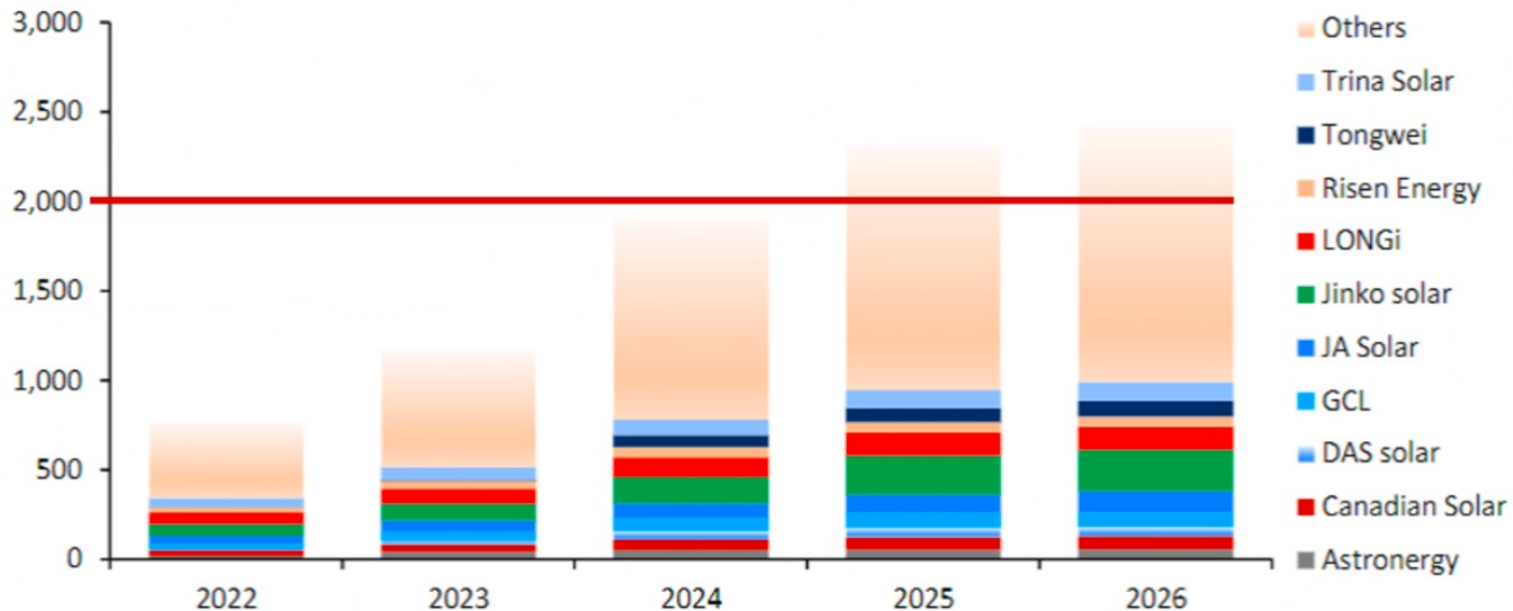
Source: BloombergNEF

Global Solar Module manufacturing capacity

Massive expansion of solar module manufacturing capacity – also outside China

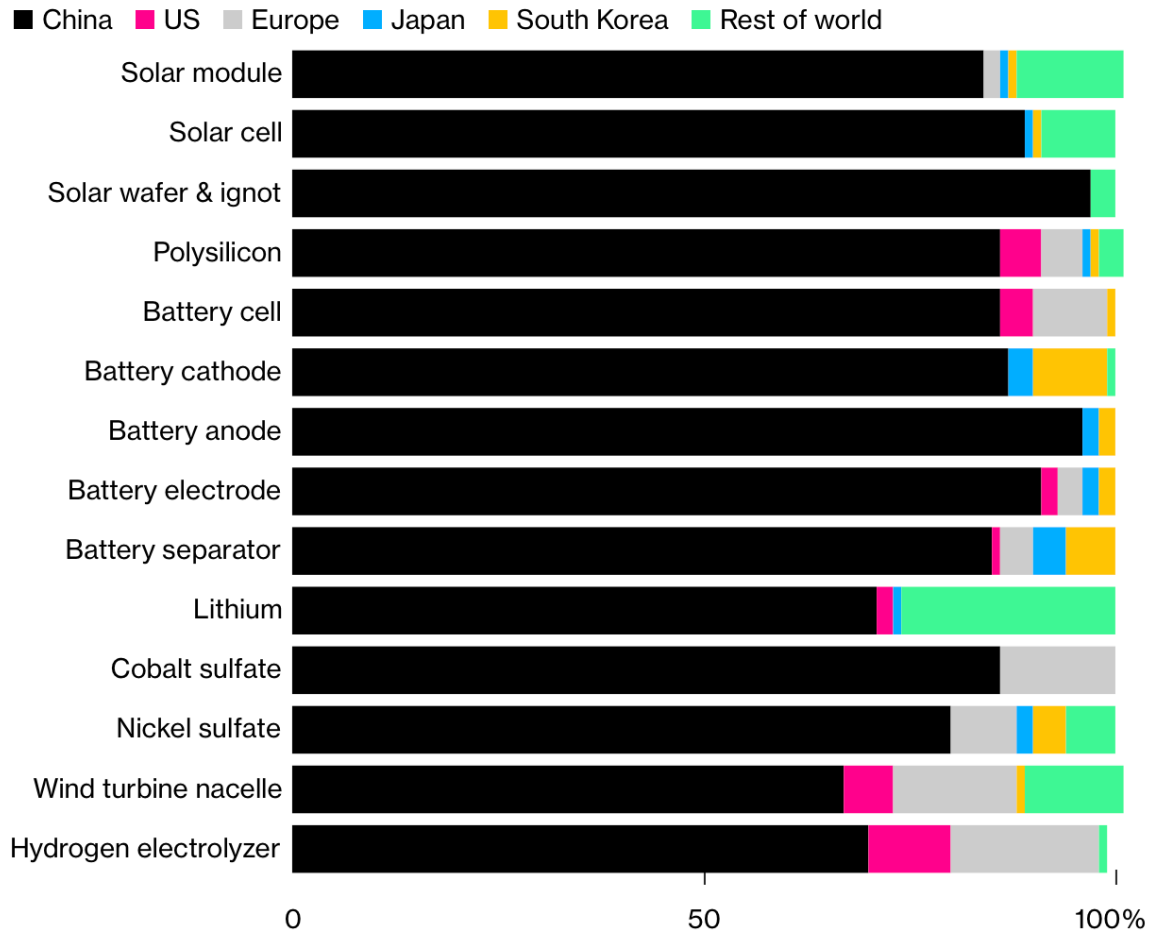
Global module manufacturing capacity, 2022-2026

Gigawatts direct current (GW_{DC})



China's Cleantech Manufacturing Dominance

China now dominates global cleantech manufacturing, RD&D, domestic installs, exports and OFDI



China is Moving in Decarbonisation, Rapidly

China leads the world in firmed renewable energy globally, by far, with a staggering 375GW of zero emissions capacity additions in CY2024.

New Capacity Installed in China in Jan-Dec 2024

		Jan-Dec 2024	Share of new adds (%)	Change (yoy %)	Dec-24	Share of new adds (%)
Thermal Power	GW	54.1	13%	4%	6.7	6%
Hydropower	GW	14.4	3%	3%	4.4	4%
Nuclear Power	GW	3.9	1%	7%	2.7	2%
Wind Power	GW	79.3	18%	18%	27.6	25%
Solar Power	GW	277.2	65%	45%	70.9	64%
Total capacity added	GW	429.0	100%	15%	112.3	100%
Renewable Energy adds	GW	370.9	86%	25%	102.9	92%
Zero Emissions Capacity Adds	GW	374.8	87%	25%	105.6	94%
Investment in Completed Power Grid Project	1 billion yuan	608.3		15%	79.3	

Source: NBS, CEF Estimates

China is Moving in Decarbonisation, Rapidly

China leads the world in firmed renewable energy globally, by far, adding another 50GW of renewables capacity in 2MCY2025 YTD.

New Capacity Installed in China in Jan-Feb 2025

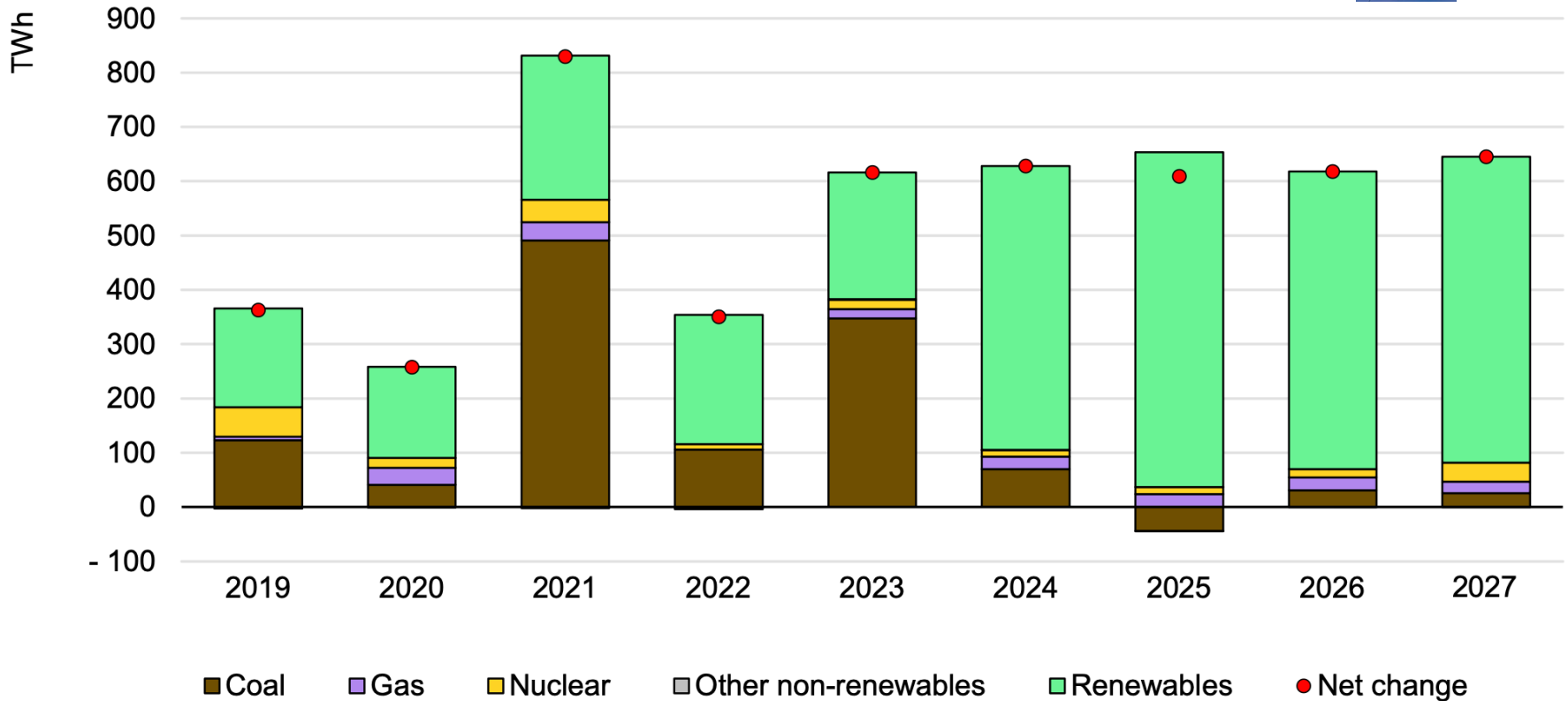
		Jan-Feb 25	% Share of total new adds	% yoy change	Jan-Feb 24	% Share of new adds
Th Office on the web Frame	GW	3.6	7%	-6%	3.9	7%
Hydropower	GW	1.3	2%	45%	0.9	2%
Nuclear Power	GW	-	0%	0%	-	0%
Wind Power	GW	9.1	17%	1%	9.0	17%
Solar Power	GW	39.6	74%	3%	38.4	74%
Total capacity added	GW	53.7	100%	3%	52.2	100%
Renewable Energy adds	GW	50.0	93%	4%	48.3	93%
Zero Emissions Capacity Adds	GW	50.0	93%	4%	48.3	93%
Total new spent on power grid investment	US\$bn	6.0		34%		

Source: National Energy Administration, Climate Energy Finance Calculations

China is Moving in Decarbonisation, Rapidly

The IEA models peak coal in China in 2024, and ~95% of electricity generation growing being zero emissions

Year-on-year change in electricity generation in China, 2019-2027

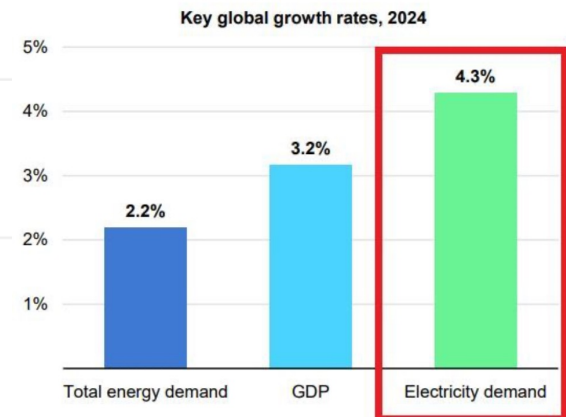
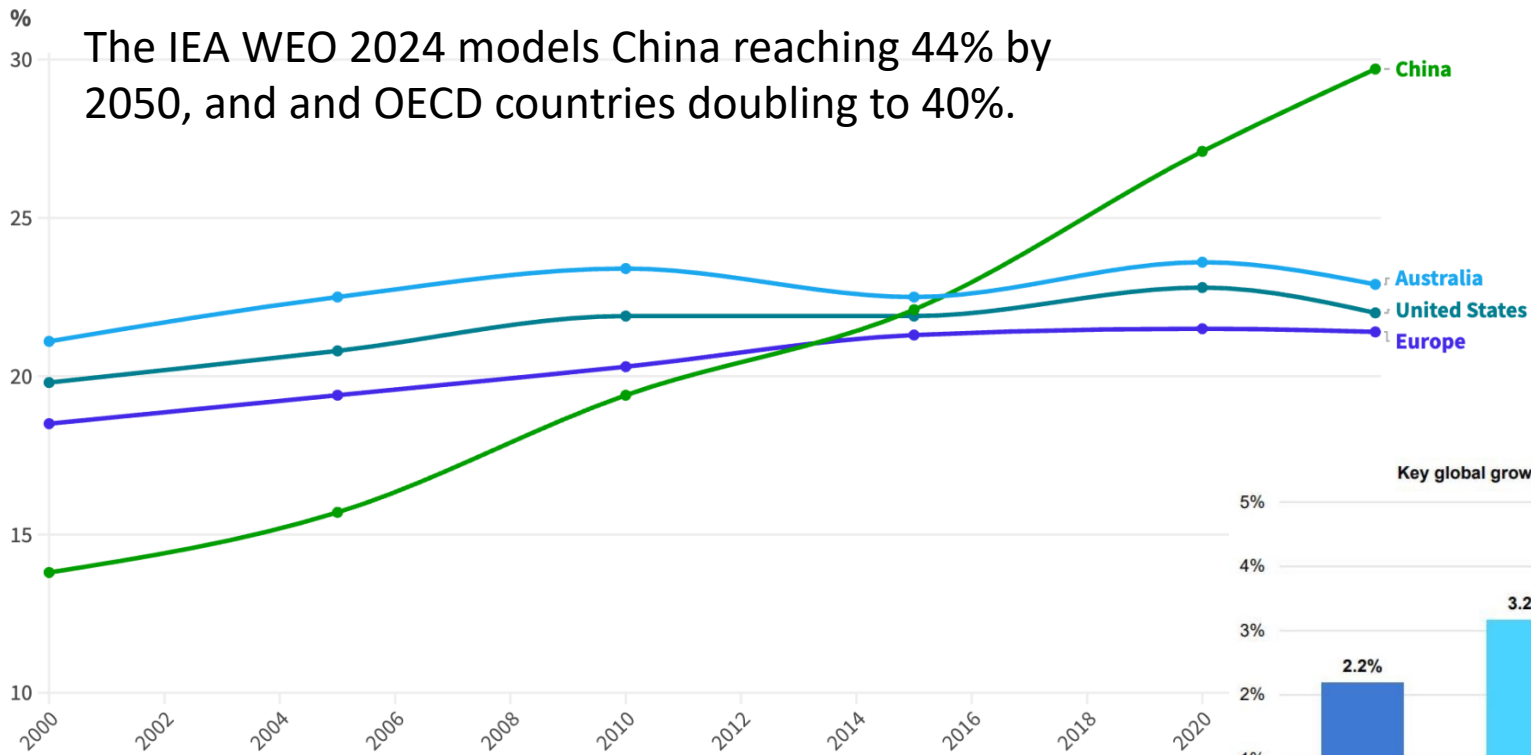


China's Electrification of Everything

China Leads the world on Progressive Electrification of Everything

Share of final energy from electricity

China has leapfrogged United States, Europe and Australia in electrification



Source: CEF calculations, [Enerdata](#)

China New Energy Vehicles

NEV momentum has accelerated to-date in 2025

Snapshot electric vehicle sales in Jan-Feb 2025 vs Jan-Feb 2024, Year to Date (YTD) %

- Global: 2.4 million, +30%
- China: 1.4 million, +35%
- EU & EFTA & UK: 0.5 million, +20%
- USA & Canada: 0.3 million, +20%
- Rest of World: 0.2 million, +35%

- BYD Global NEV sales in 3MCY2025 were 623,384 vehicles, +92.5% yoy (within this, EV were 250,279 vehicles, +56.2% yoy).
- Tesla's EU sales 45% yoy 2MCY2025 to 25,582 vehicles
- Tesla's China sales in 2MCY2025 were 60,480 -13.6% yoy

Source: RhoMotion, 12 March 2025

<https://rhomotion.com/news/global-ev-sales-up-50-in-february-2025/>

China's US\$141bn Cleantech ODFI since 2023

China's response to the growing US and EU anti-China trade barriers: US\$141bn of Outbound Foreign Direct Investment in Cleantech, Globally

China's great green march across the globe

The Middle Kingdom wants to control the global clean-tech sector. Can it save the planet, too?

BY TAN DAWN WEI, DAVID FOGARTY AND WAHYUDI SOERIAATMADJA | PUBLISHED: MAR 22, 2025

THE STRAITS TIMES

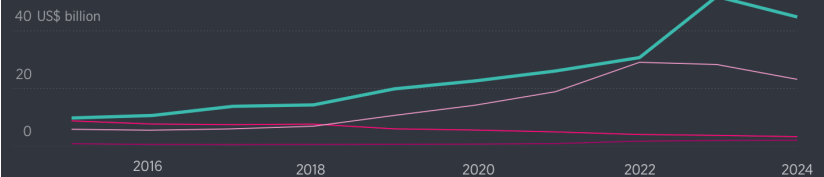
BEIJING/SINGAPORE/JAKARTA – On the outskirts of the Indonesian city of Semarang in Central Java, a new factory is cranking out solar cells and assembling solar panels with the help of robots, while autonomous carts whizz around ferrying parts and components.

The Trina Mas Agra Indonesia solar panel plant, operational since October 2024, is a US\$100 million joint venture between China's Trina Solar, Indonesian conglomerate Sinar Mas and Indonesian state utility PLN.

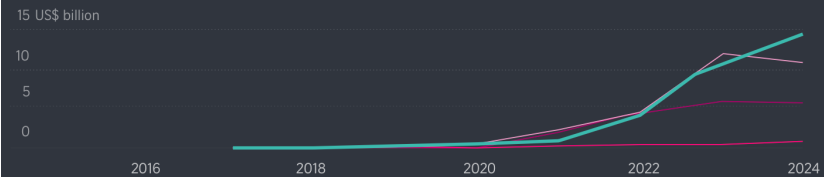
With an annual one gigawatt (GW) total panel capacity that is set to increase to 3GW, the plant is the first and largest integrated solar cell and solar panel manufacturer in Indonesia. It is helping to accelerate a much-needed energy transition in South-east Asia's largest economy, and could in future bring green electricity to Singapore.

The **Global South** has emerged as a major destination for Chinese clean-tech exports, vying with the **EU**, **US** and **UK**.

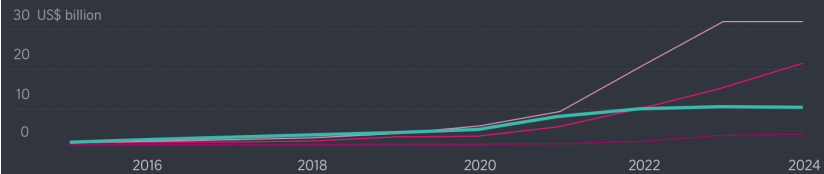
Solar



Electric vehicles



Batteries



Source: CEF Report: **China Outbound FDI, Oct'2024**

<https://climateenergyfinance.org/wp-content/uploads/2024/10/final--CEF-Report-China-Outbound-FDI-2-October-2024-2.pdf>

The Straits Times 22 March 2025: <https://www.straitstimes.com/multimedia/graphics/2025/03/china-great-green-march-globe/index.html?shell>

The World is Responding to China's Challenge

The European Commission announced another €100bn for clean industrial investments

Europe's clean industrial future

27 February 2025

Yesterday, one of the year's most awaited legislative pronouncements was unveiled, as European Commission President Ursula von der Leyen [presented the EU Clean Industrial Deal](#) — a roadmap to strengthen Europe's industrial competitiveness & accelerate decarbonisation.

Bringing together energy-intensive industries & clean-tech innovation, the **Clean Industrial Deal** sets the course for a climate-neutral and resilient European economy. Landing as a response to geopolitical tensions, economic slowdowns, and increasing global competition, the deal has been labelled a big win for clean-tech manufacturers and industrial decarbonisation aiming to ensure that Europe's industries remain at the forefront of the green transition. Key initiatives are:

- €100+ billion mobilised for clean industrial investments, including a new Industrial Decarbonisation Bank.
- Made in Europe” incentives to ensure EU procurement prioritises sustainable, locally produced clean tech.
- Support for energy-intensive sectors (steel, cement, chemicals) to cut emissions while maintaining competitiveness.
- An [Affordable Energy Action Plan](#) to lower energy bills for industries, businesses and households and speed up the roll-out of clean energy and accelerate electrification and interconnectivity, making the link between security of supply and competitiveness abundantly clear.
- Looser state aid rules to help industries transition to low-carbon production and green manufacturing.
- New Circular Economy & Raw Materials Plan in 2026 to reduce waste and secure key industrial materials.
- Skills & workforce development to create new green jobs in industrial regions.
- Carbon Border Tax (CBAM) adjustments to protect EU industries from carbon-intensive imports.

Australia is Responding to China's Challenge

Strategic public capital is a key facilitator, in the absence of a CO₂ price signal

FMIA, CIS, RTN, NRF, Future Fund, CEFC, ARENA, EFA, NAIF

Capacity Investment Scheme

The Capacity Investment Scheme (CIS) is an Australian Government revenue underwriting scheme to accelerate investment in:

- 23 GW of renewable capacity representing \$52 billion in investment
- 9 GW of clean dispatchable capacity representing \$15 billion in investment.

South Australia

Australian
Associated Press

20 Feb 2025

Troubled Whyalla steelworks gets \$2.4bn government bailout as hunt for new owner begins

“Crucial support:” Federal Labor launches \$2bn green aluminium production credit scheme

 RENEW ECONOMY **Andrew Brown** Jan 20, 2025

Rio Tinto says aluminium could run on renewables and batteries

FINANCIAL REVIEW Feb 6, 2025

\$19bn Rewiring the Nation Fund

The \$19 billion Rewiring the Nation (RTN) Fund is a significant expansion of CEFC investment capacity, with a particular focus on facilitating the timely delivery of grid and transmission projects, using CEFC capital to accelerate the benefits of grid transformation to consumers, including helping to lower consumer energy costs.

\$200 million investment in critical minerals to build Australia's future

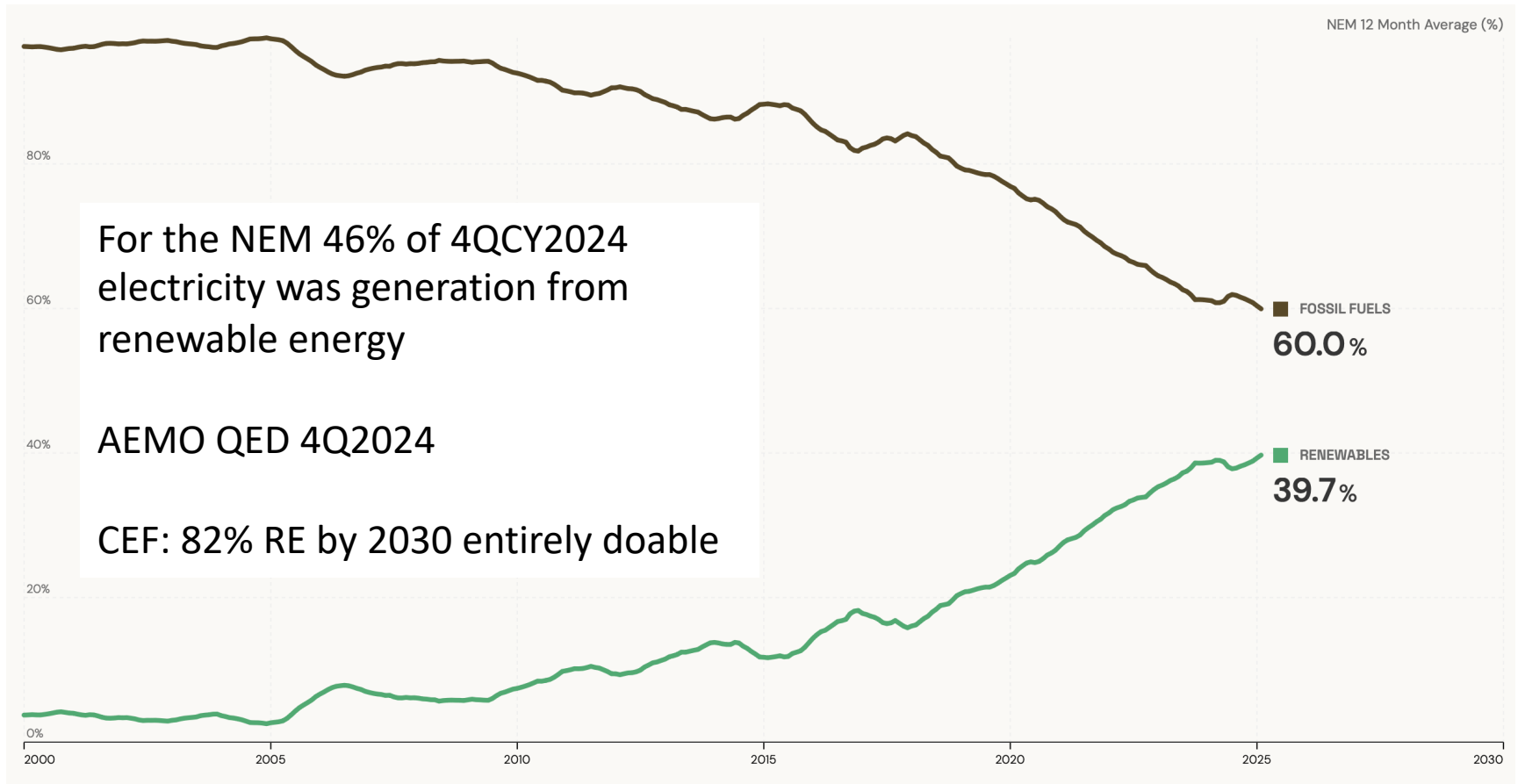
15 January 2025

The Hon Ed Husic MP
Minister for Industry and Science

The Albanese Government's National Reconstruction Fund Corporation (NRFC) will invest \$200 million in Arafura Rare Earths to help build Australia's Future.

Australia's Electricity System Decarbonisation

**Electrification & Decarbonisation – National Electricity Market
(NEM) CY2024 @ 39.3% renewables; 1QCY2025 @ 44.0%**

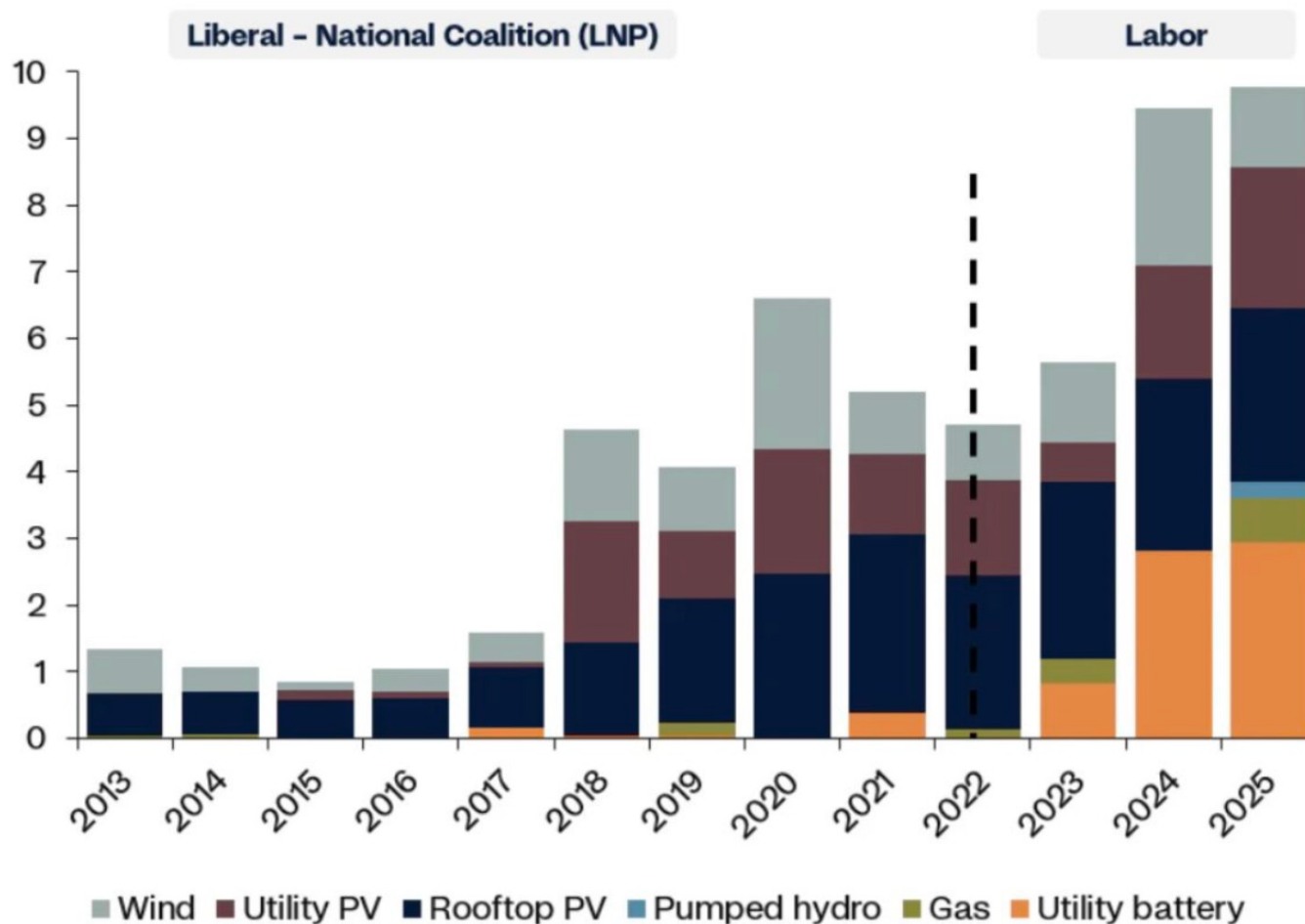


Source: Open Electricity, <https://openelectricity.org.au>

AEMO QED 4QCY2024 <https://aemo.com.au/energy-systems/major-publications/quarterly-energy-dynamics-qed>

Australia's Electricity System Decarbonisation

7GW pa of new generation capacity (including DER) is too little



**Excludes coal, biomass and diesel

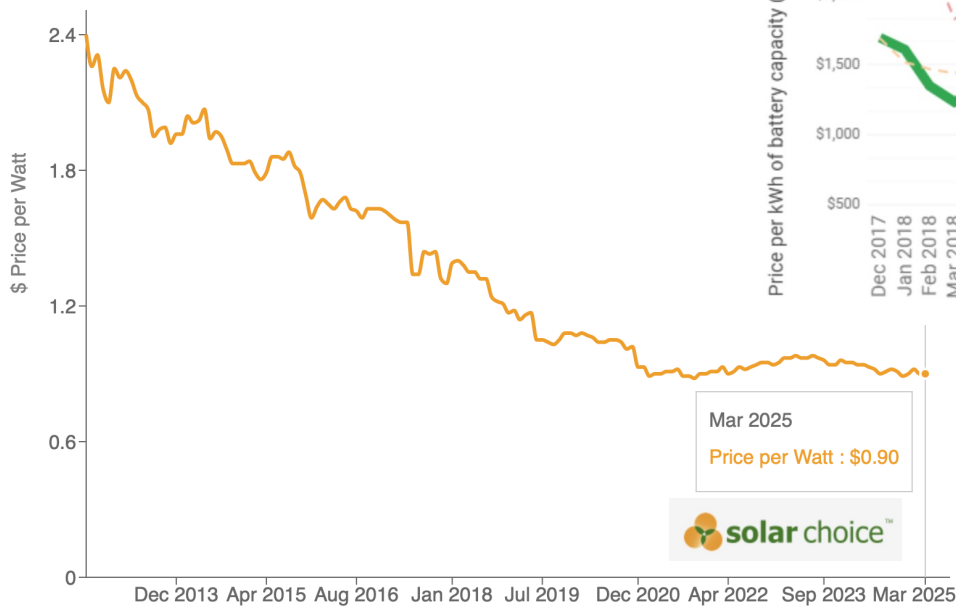
Source: Rystad Energy's Renewables & Power Solution, March 2025

A Rystad Energy graphic

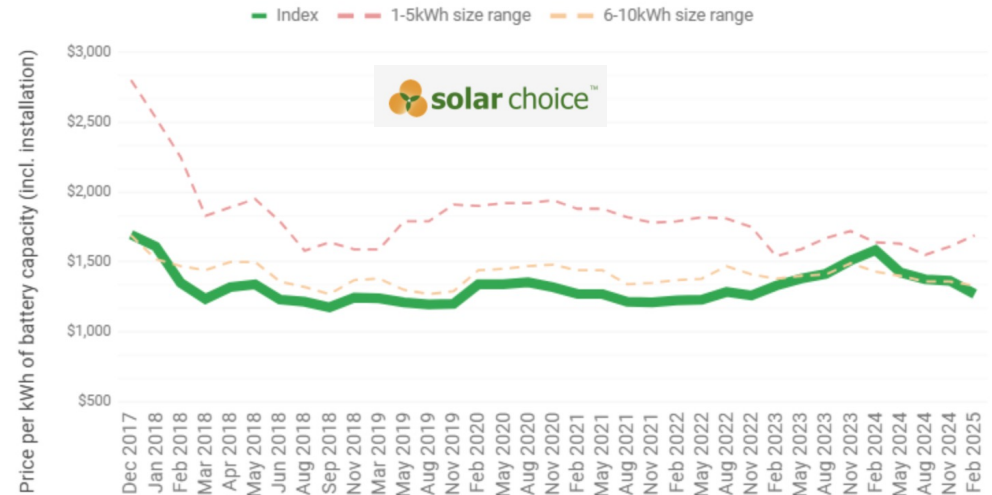
Australia's Electricity System Decarbonisation

Rooftop Solar, Behind the Meter Storage & V2G – Needs to be Accelerated

National Solar Choice Price Index



Solar Choice Battery Price Index



National	NSW	QLD	VIC	WA	SA	ACT	TAS
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Australia's Electricity System Decarbonisation

Massive deflation, manufacturing capacity expansion and technology development: Solar + BESS => Accelerated Energy System Disruption



CLIMATE ENERGY FINANCE

International Solar PV and BESS Manufacturing Trends

Solar PV's disruption is happening at a speed beyond imagination, turbocharged by BESS firming

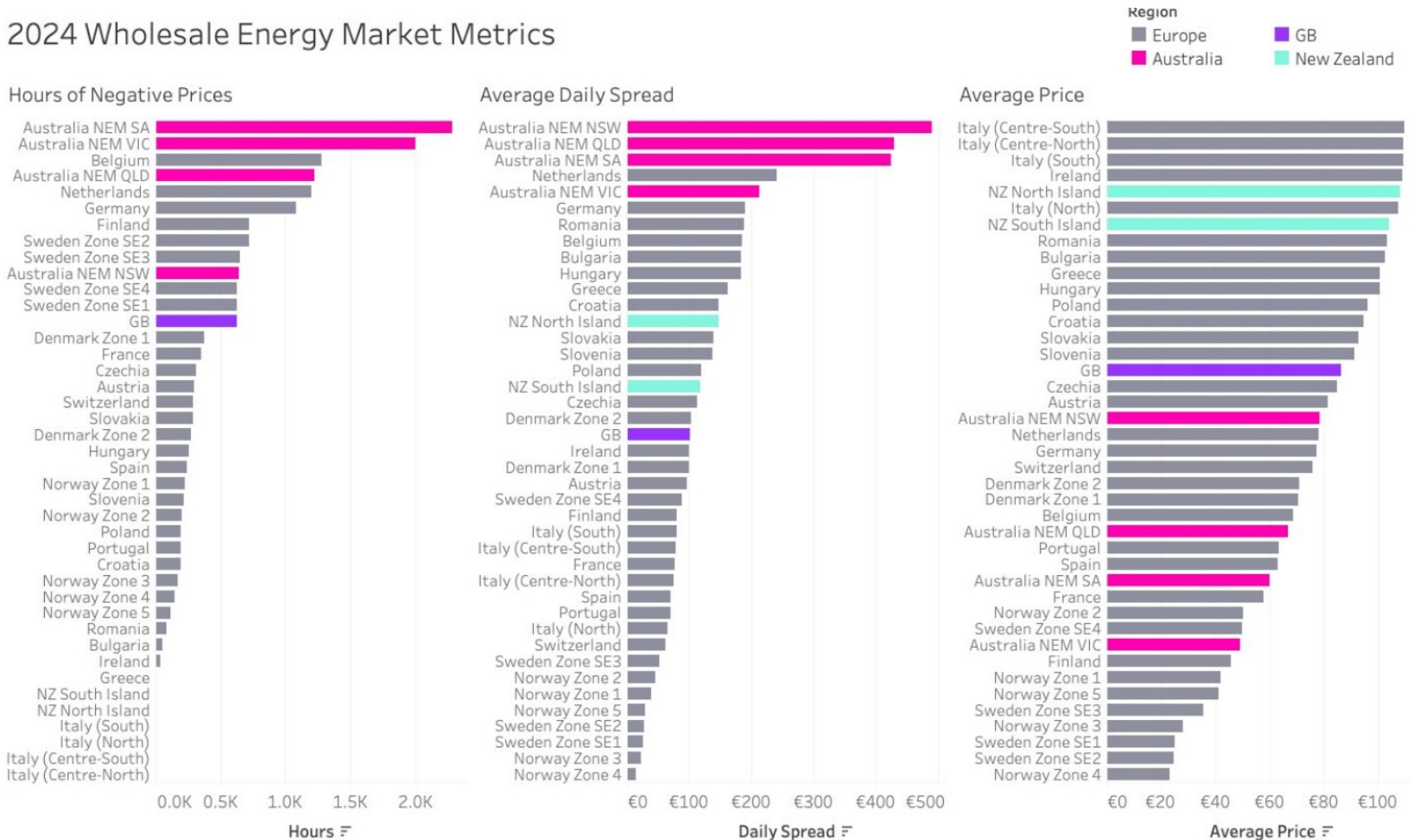


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Tim Buckley, Director, CEF (tim@climateenergyfinance.org)

Australia's Electricity System Decarbonisation

Negative electricity prices enable a lot more batteries, in turn enables a lot more VRE

2024 Wholesale Energy Market Metrics



GB and European data based on day-ahead hourly markets

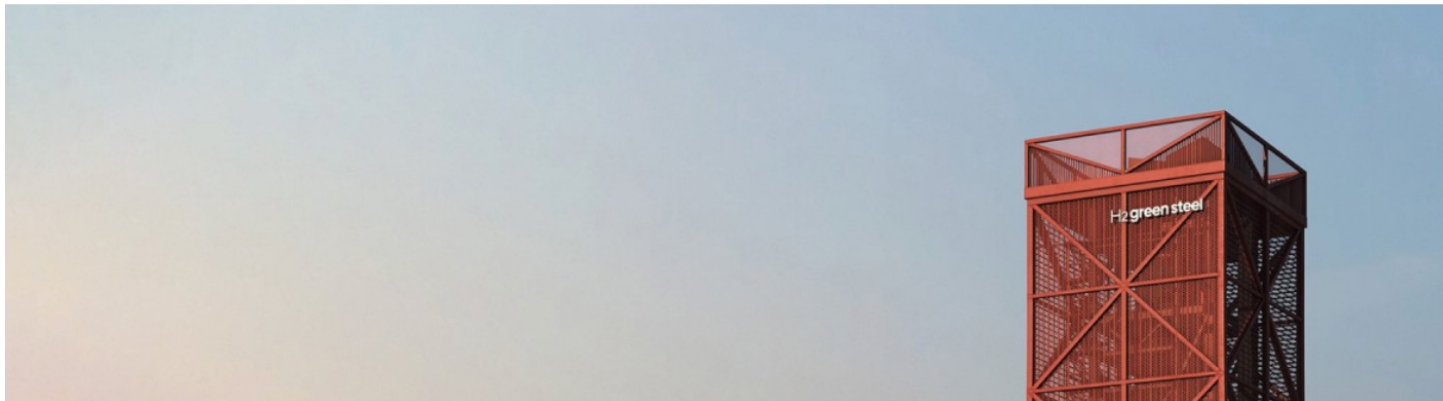


CLIMATE ENERGY FINANCE

Green Metal Statecraft: Forging Australia's Green Iron Industry

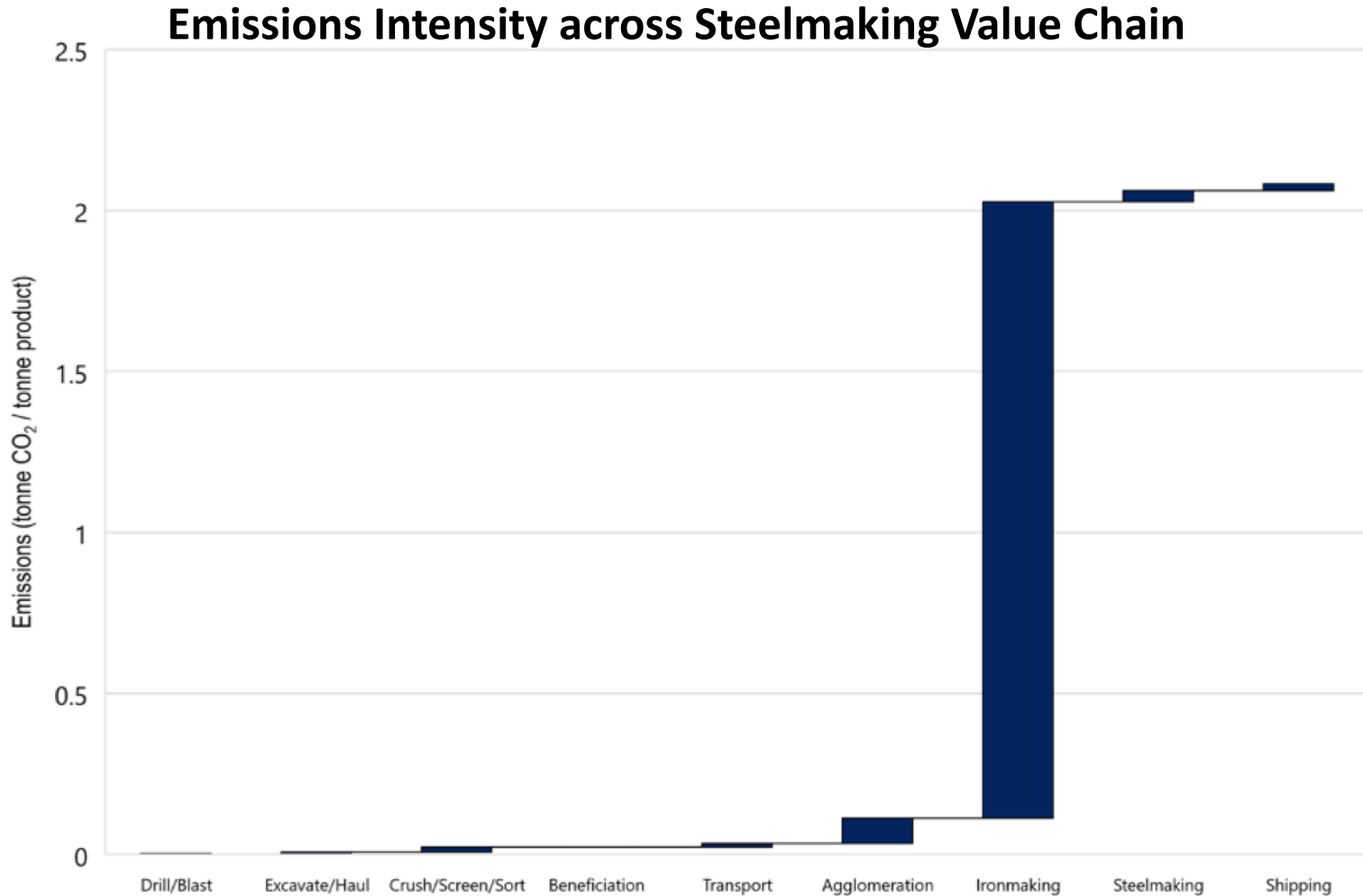
Matt Pollard, Net Zero Transformation Analyst, CEF

Tim Buckley, Director, CEF



https://climateenergyfinance.org/wp-content/uploads/2024/11/CEF_Green-Metal-Statecraft_FINAL.pdf

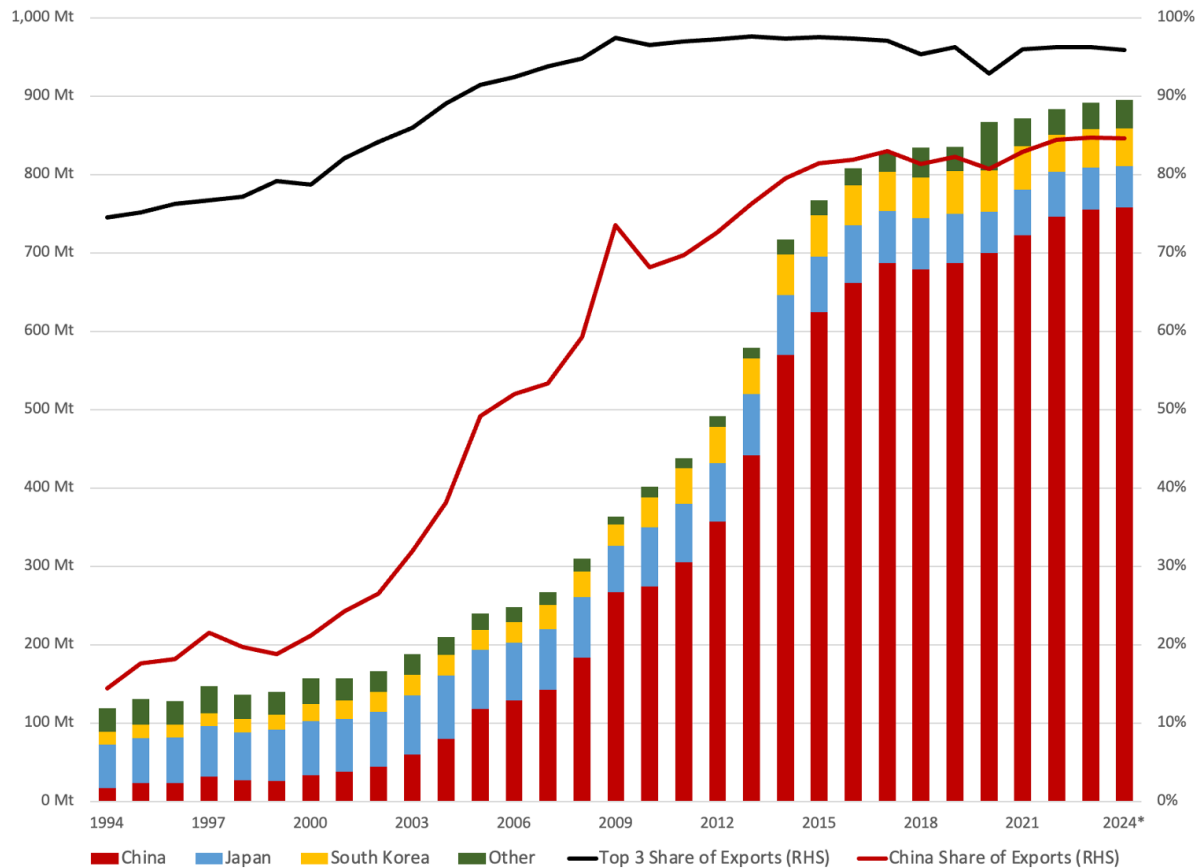
Australia – a massive economic threat, but also a massive strategic opportunity



Source: MRIWA, WA Green Steel Opportunity

Australia – a massive economic threat, but also a massive strategic opportunity

Australia's Iron Ore Export Markets



China accounted for 85% of Australia's A\$138bn pa of iron ore exports, having delivered +6% CAGR in volume over the last decade. This has been a key partnership of profound strategic value for Australia.

But Chinese steel production likely peaked in 2020 (China's steel output was -3% yoy in 2024), scrap use is rising, and China is diversifying into Simandou, Guinea (120Mtpa).

Australia's Green Iron Challenge

The case for a 'Clean Commodities Trading Company' to advance Australia's green superpower ambitions

A Clean Commodities Trading Company classification would deliver massive and connected economic, environmental, and strategic gains.



OLIVER YATES



ELIZABETH THURBON

DECEMBER 4, 2024

Share



The CCTC as a model for sophisticated green energy statecraft. (Bruce Aspley/Adobe)

Australia is uniquely positioned to become a green superpower. We believe a Clean Commodities Trading Company (CCTC) — potentially jointly owned with trading partners such as Japan and South Korea — could be the next key to unlocking our green industrial potential. Working alongside a smart Production Tax Credit (PTC) scheme, a CCTC would derisk global supply and demand for nascent green industrial products like metals, hydrogen and fuels.

Australia is introducing value-add Production Incentive Credits as part of its wider Future Made in Australia (FMIA) strategy.

CEF is also advocating for the development of an Asian CBAM, to leverage and extend the EU CBAM, and China's national ETS in electricity, hopefully soon to also cover steel.

Source: The Mandarin, Dec'2024

<https://www.themandarin.com.au/282814-clean-commodities-trading-company-australias-green-superpower-ambitions/>