



**CLIMATE ENERGY FINANCE**

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**WA Renewables and  
Critical Minerals  
Superpower Summit**

**Smart Energy Council**

**26 June 2023**

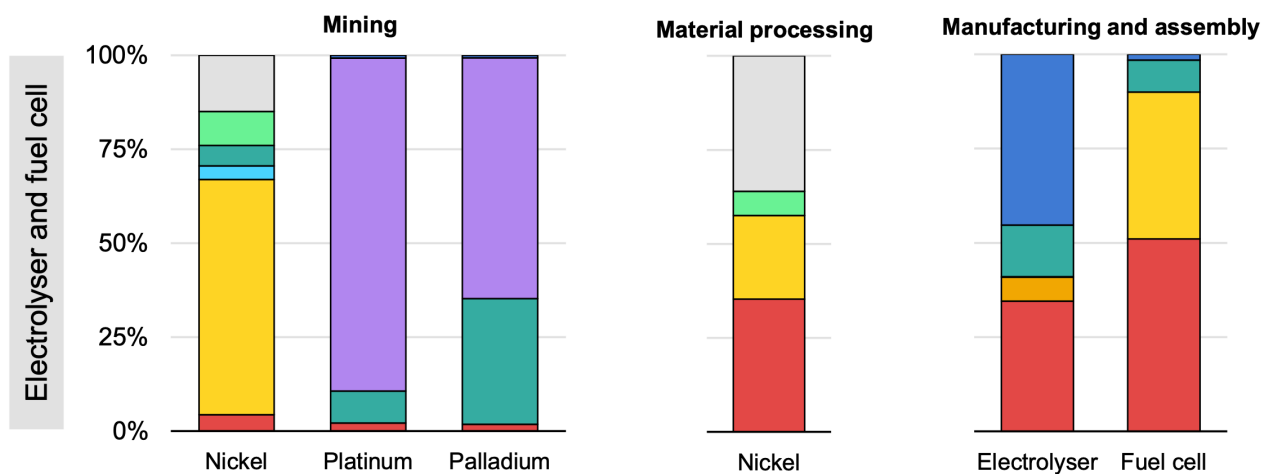
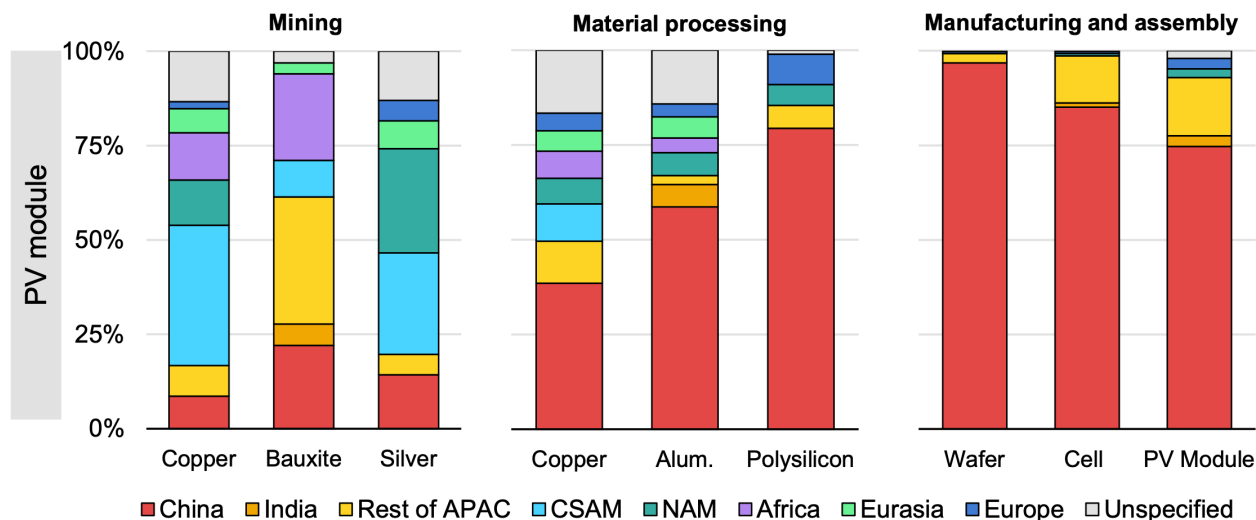
# Western Australia as a Renewables and Critical Minerals Superpower

1. Energy Transition: China leads the world; and this is a global technology and investment race
2. The US IRA and EU NZIA (Net Zero Industry Act), India's solar PLI, Japan's GX Roadmap, Canada critical minerals strategy & South Korea re batteries
3. The Australia-US Compact: Climate change, critical minerals and clean energy is the third pillar of the Australia-US alliance; Australia's Critical Minerals Strategy
4. WA Renewables Plan: SWIS Demand Assessment

Financial markets are all about the rate of change

# 1. China Leads the World on Mineral Processing

Supply chain security, cheap RE and resource ownership means Australia should be leveraging our new competitive advantages to lead the global energy transition



# 1. China Leads the World in Renewable Energy

China installed 87GW of Renewable Energy in 5MCY2023, and is on track to deliver their 1,200GW by 2030 RE target 5 years early

## New Electricity Capacity Installed in China in Jan-May 2023

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

Source: NBS, CEF Estimates

# 1. China Leads the World in Renewable Energy

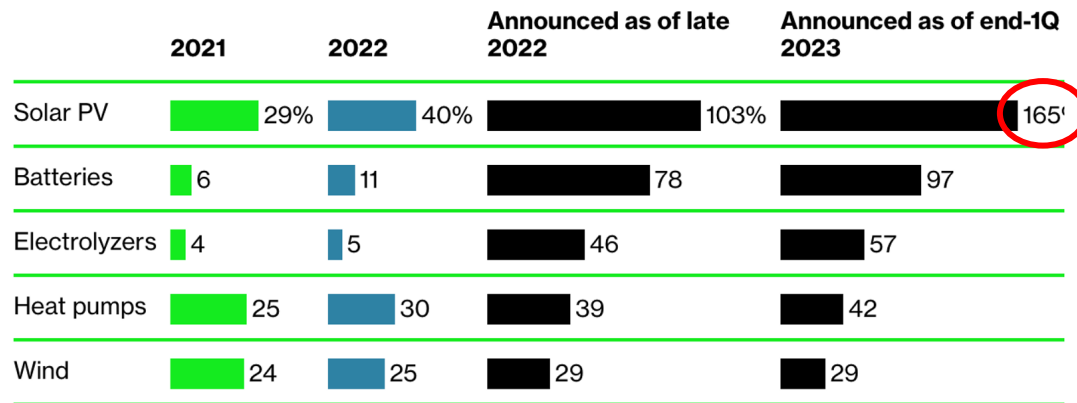
China EV share in May 2023 was 33.6% of total passenger sales. And 689,000 units in the month, +62% yoy.

<b>China Automobile Sales</b>	<b>May-23</b>	<b>YoY</b>	<b>Market Share</b>	<b>YTD 2023</b>	<b>YoY</b>	<b>Market Share</b>
<b>Domestic</b>						
Passenger Vehicles	2,051,000	26%		9,001,000	11%	
NEVs	689,000	62%	33.6%	2,810,000	47%	31.2%
<i>of which BEV</i>	496,000	52%	24.2%	2,019,000	35%	22.4%
<i>of which PHEV</i>	194,000	94%	9.5%	790,000	91%	8.8%
<b>Export</b>						
Passenger Vehicles	325,000	66%		1,467,000	97%	
<i>of which EV</i>	106,000	153%	32.6%	441,000	162%	30.1%
<i>Source: China Association of Automobile Manufacturers, Climate Energy Finance calculations</i>						

# 1. China Leads the World in Renewable Energy

## Solar manufacturing scaling up at unbelievable speed

Installed and announced manufacturing capacity, relative to 2030 levels needed in IEA net zero scenario



Think of ~1,000GW pa of solar installs globally by 2030

The IEA APS assumes 290GW pa 2022-2030 (~400GW by 2030);

NZE scenario assumes 462GW pa 2022-2030 (~600GW by 2030)



## Massive PV Manufacturing Complex In China

### JinkoSolar Plans RMB 56Bn Vertically Integrated Solar PV Production Compound In Shanxi

25 May 25 2023 Taiyang News

- JinkoSolar has entered an investment framework agreement for a large scale manufacturing complex in Shanxi
- It will host monocrystalline silicon pull rod, silicon wafer, high efficiency solar cells and modules with 56 GW annual capacity each
- Phase I and II with 14 GW capacity for each of the products are planned to enter commercial operations in Q1 and Q2 of 2024

Source: Bloomberg, Multiplying Solar and Battery Factories Put Net Zero in Closer Reach, 25 May 2023

[https://www.bloomberg.com/news/articles/2023-05-25/boom-in-solar-panel-ev-battery-factories-brings-net-zero-closer?utm\\_source=website&utm\\_medium=share&utm\\_campaign=twitter&leadSource=verify%20wall](https://www.bloomberg.com/news/articles/2023-05-25/boom-in-solar-panel-ev-battery-factories-brings-net-zero-closer?utm_source=website&utm_medium=share&utm_campaign=twitter&leadSource=verify%20wall)

China's Taiyangnews, 25 May 2023, <https://taiyangnews.info/business/massive-pv-manufacturing-complex-in-china/>

## 2. US Inflation Reduction Act 2022

~US\$800bn funding => a resurgence in US manufacturing post the IRA

**Figure: US Private Construction by Manufacturers**

### Korean companies to invest \$8 billion in U.S. battery factories

Korea JoongAng Daily

April 25, 2023

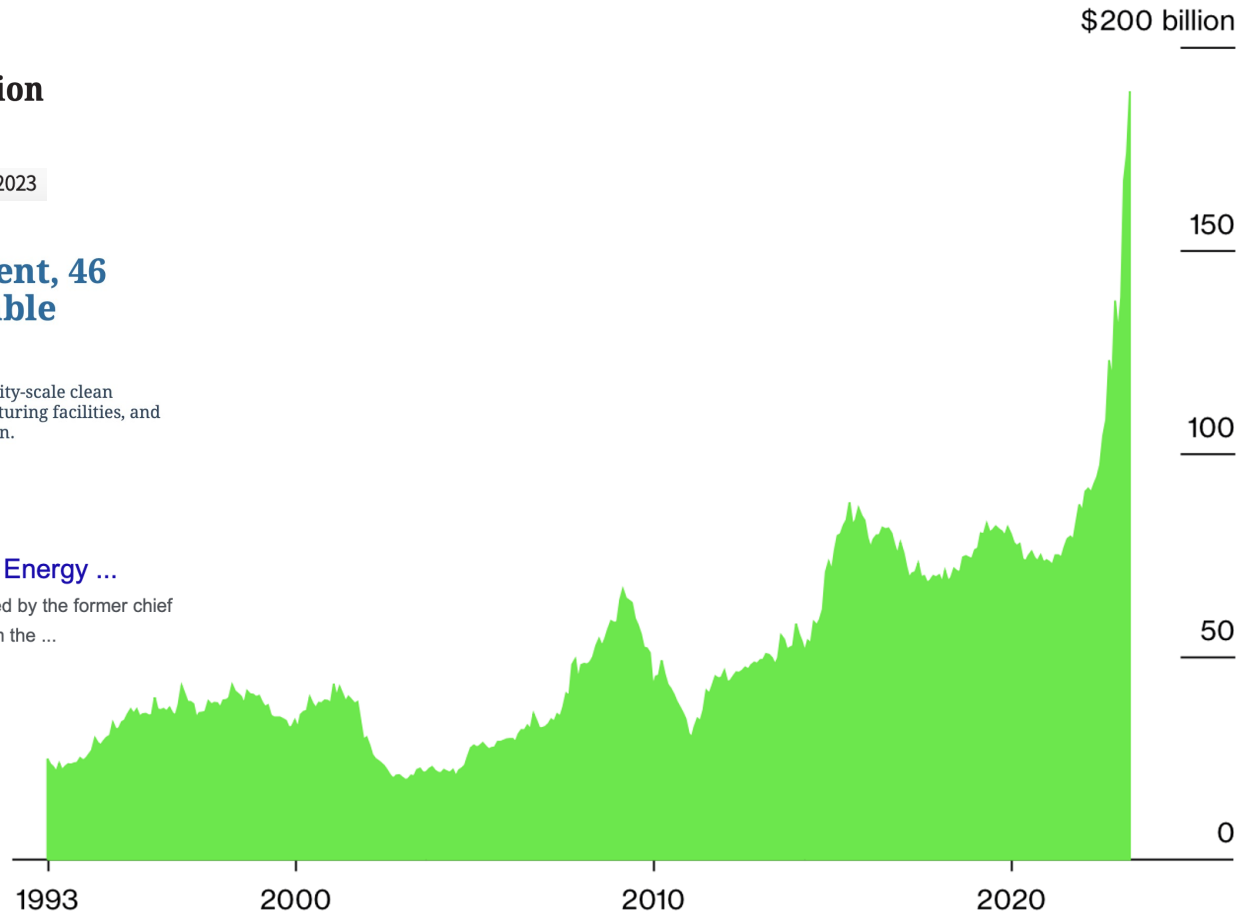
### Since IRA, \$150 billion investment, 46 factories, 18,000 jobs in renewable energy

Since passage of the Inflation Reduction Act of 2022 in August, utility-scale clean power sector announced \$150 billion in funding, 46 new manufacturing facilities, and nearly 20,000 new jobs, said the American Clean Power Association.

APRIL 17, 2023 RYAN KENNEDY

### Nevada battery recycler wins \$2bn loan from Energy ...

10 Feb 2023 — Redwood Materials, a recycling venture founded by the former chief technology officer at Tesla Inc., secured the conditional loan from the ...



Source: US Census Bureau, [Bloomberg](#)



## 2. EU Net Zero Industry Act 2023



Press release | 16 March 2023 | Brussels

### Net-Zero Industry Act: Making the EU the home of clean technologies manufacturing and green jobs

The aim that the EU's overall domestic share of strategic net-zero technologies manufacturing capacity is >40% of EU deployment needs by 2030.

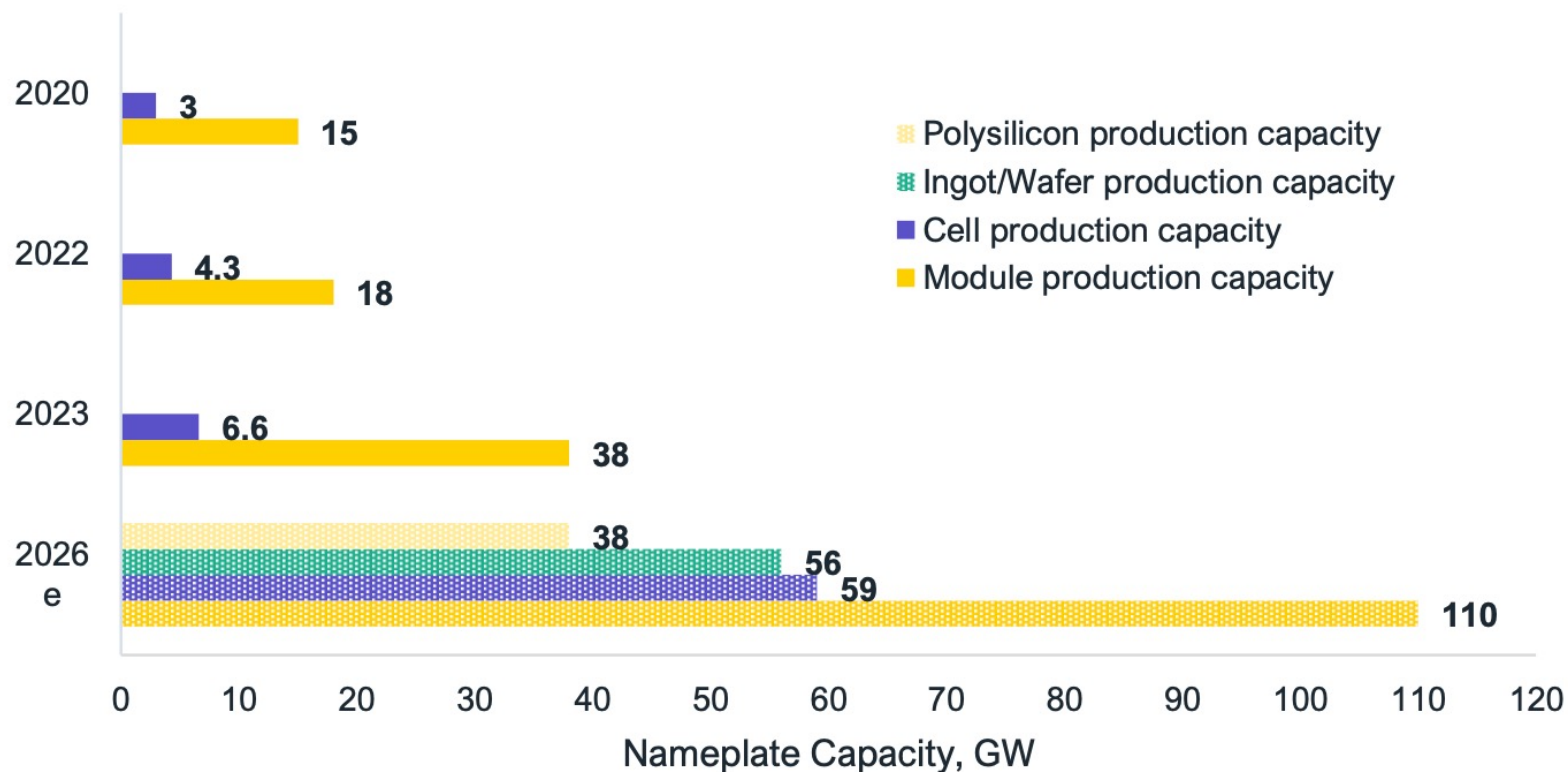
Today, the Commission proposed the [Net-Zero Industry Act](#) to scale up manufacturing of clean technologies in the EU and make sure the Union is well-equipped for the clean-energy transition. This initiative was announced by President **von der Leyen** as a part of the [Green Deal Industrial Plan](#).

The Act will strengthen the resilience and competitiveness of net-zero technologies manufacturing in the EU, and make our energy system more secure and sustainable. It will create better conditions to set up net-zero projects in Europe and attract investments, with the aim that the Union's overall strategic net-zero technologies manufacturing capacity approaches or reaches at least 40% of the Union's deployment needs by 2030. This will accelerate the progress towards the EU's 2030 climate and energy targets and the transition to climate neutrality, while boosting the competitiveness of EU industry, creating quality jobs, and supporting the EU's efforts to become energy independent.



## 2. India's Solar Manufacturing PLI

MNRE secretary Indu Shekhar Chaturvedi said 21 Sept'2022 that the Solar PLI would add 74 GW of solar module manufacturing capacity, an investment of Rs 94,000 crore.



Source: PV Magazine's Uma Gupta 22 November 2022

<https://www.pv-magazine.com/2022/11/22/india-launches-second-phase-of-incentive-scheme-for-solar-manufacturing/>

JMK Research / IEEFA India, India's Photovoltaic Manufacturing Capacity Set to Surge, April 2023

## 2. Japan's GX Roadmap

Japan's Cabinet approves policy roadmap including plans for national ETS

METI's "Green Transformation" (GX) ten-year roadmap with ¥20 trillion in government support includes a 46% reduction in carbon emissions by 2030, a national ETS phased in from 2026, and "zero-emission thermal power" to decarbonise electricity by 2035.



On 10 February 2023, Japan's Cabinet approved the [Basic Plan](#) for the "GX: Green Transformation Policy", designed to help Japan reach its climate targets. Earlier in 2022, the Ministry of Environment, Trade, and Industry (METI) released the draft Basic Plan for public consultation, before compiling the final version towards the end of the year. The proposal comes at a time when Japan is facing an energy crisis, with energy in short supply and sharp increases in prices. To address these energy security challenges, Japan aims to continue moving towards "growth-oriented" carbon pricing.

The newly approved Basic Plan is a ten-year roadmap of Japan's decarbonization strategy. It outlines several carbon pricing instruments that will work in tandem to help Japan reach its NDC targets of a 46% reduction in greenhouse gases by 2030 and climate neutrality by 2050. These include the Green Transformation (GX) League (a voluntary baseline-and-credit system), a more traditional emissions trading system (ETS) later down the line, and a carbon levy.

Source: International Carbon Action Partnership 22 Feb 2023

<https://icapcarbonaction.com/en/news/japan-s-cabinet-approves-policy-roadmap-including-plans-national-ets> & J-REI 28 Feb 2023

<https://www.renewable-ei.org/en/activities/reports/20230228.php>

# 2. Canada

## The Canadian Critical Minerals Strategy

**FROM EXPLORATION TO RECYCLING:**  
Powering the Green and Digital Economy for Canada and the World



**The Canadian Government has announced a sizeable C\$3.8bn in funding to back the country's new critical minerals strategy in a bid to make Canada a global leader in producing electric vehicle (EV) batteries.**

**Critical Minerals are the Building Blocks for the Green and Digital Economy**



### A Strong Foundation

Since 2015, the federal government has taken action to build Canada's clean economy and create good middle class jobs. This includes:

- ✓ Putting in place a federal carbon pricing system, which puts money back in the pockets of Canadians and gives businesses the flexibility to decide how best to reduce their emissions;
- ✓ \$15 billion for the Canada Growth Fund to incentivize private sector investment into projects and companies that will grow Canada's clean economy at speed and scale;
- ✓ \$8 billion for the Net Zero Accelerator to make large-scale investments in clean technologies;
- ✓ \$4.2 billion for the Low Carbon Economy Fund to support the installation of emission-reducing technologies for provinces and territories, businesses, Indigenous communities, and other organizations;
- ✓ \$3.8 billion for Canada's Critical Minerals Strategy, which will help make Canada a global supplier of choice for the critical minerals that are the bedrock of clean and digital technologies;
- ✓ \$3.9 billion to make zero-emission vehicles more affordable for Canadians and Canadian businesses, and to build new charging stations across Canada;
- ✓ \$1.5 billion for the Clean Fuels Fund to encourage investment in the production of clean fuels, including clean hydrogen and biofuels;
- ✓ \$4.7 billion for the National Trade Corridors Fund for investments in our ports, roads, railways, and airports;
- ✓ \$33.5 billion for the Investing in Canada Infrastructure Program to support new investments in public transit; green infrastructure; community, culture and recreation infrastructure; and rural and northern communities;
- ✓ \$35 billion for the Canada Infrastructure Bank to attract private capital to major infrastructure projects and help build more infrastructure across the country; and,
- ✓ \$2.6 billion for the new Canada Innovation Corporation, which will support Canadian businesses in investing in research and development.

Source: Canadian Government Dec 2022,

<https://www.canada.ca/en/campaign/critical-minerals-in-canada/canadian-critical-minerals-strategy.html>

## 2. Korea's Refocus on the US IRA

### Battery Makers Plow \$31 Billion Into Remaking Korean Steel Hub

*The city of Pohang built up a world class steel industry over decades. Now it's turning to EV batteries.*



The sun sets over the Posco steel mill in Pohang, South Korea, on July 17, 2018. The city is increasingly seen as the country's new capital for the electric vehicle battery industry.

A South Korean city home to one of the world's biggest steelmakers is betting its manufacturing expertise, billions of dollars in investments and government incentives can help it dominate a 21st century industry: electric vehicle batteries.

Companies in the south-eastern hub of Pohang — famous for **Posco Holdings Inc.** steel mills and one of the country's elite universities — are aggressively building out EV battery campuses as automakers hurry to find reliable suppliers outside China. Three South Korean giants in the global battery market — LG Energy Solution Ltd., Samsung SDI Co. and SK On Co. — have promised 40 trillion won (\$31 billion) in domestic investments with their local suppliers.

President Yoon Suk Yeol said 'the government and companies including Samsung Electronics Co. will pour US\$422bn into areas such as chips and EV in the nation's most aggressive effort yet to win a heated global race for tech supremacy'

Source: Bloomberg's Heejin Kim 16 March 2023  
<https://www.bloomberg.com/news/articles/2023-03-15/battery-makers-plow-31-billion-into-remaking-korean-steel-hub>

# 3. Australia-US Compact

Climate change, critical minerals and clean energy is third pillar of the Australia-US alliance



THE WHITE HOUSE

MAY 20, 2023

## Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact



BRIEFING ROOM

STATEMENTS AND RELEASES

Australia and the United States commit to enhance bilateral cooperation under a Climate, Critical Minerals and Clean Energy Transformation Compact (the Compact), establishing climate and clean energy as a central pillar of the Australia-United States Alliance. Australia and the United States recognise the importance of addressing the climate crisis as a critical component of the bilateral relationship. The Compact is a framework which is designed to advance ambitious climate and clean energy action this decade, at home and abroad. The framework intends to coordinate policies and investments to support the expansion and diversification of responsible clean energy and critical minerals supply chains, accelerate the development of markets for established and emerging technologies, meet the growing energy and adaptation needs of the Indo-Pacific, and enhance the region's role as a driver of resilient and sustainable global prosperity.

The US will back Oz for COP31 in partnership with our Pacific neighbours.

Supply chains: Oz treated as a US domestic source; but unlikely direct US subsidies to Oz projects;

The Quad investor network, EFA-US EXIM collaboration



# 3. Australia's Critical Minerals Strategy



## Create diverse, resilient and sustainable supply chains through strong and secure international partnerships

We will supply processed critical minerals to diversify global markets and support Australia's access to priority technologies. This includes working with international partners to build secure, resilient and sustainable supply chains that reduce market concentration. We will enhance our high environmental, social, and governance (ESG) credentials and our status as a trusted and reliable trading partner.

## Build sovereign capability in critical minerals processing

We will move up the critical minerals value chain and increase Australia's footprint in downstream processing. We will make high-value products that build new industries and strengthen our domestic resilience to supply chain shocks.

## Use our critical minerals to help become a renewable energy superpower

We will unlock our vast potential as a major supplier of the critical minerals needed to decarbonise the global economy. Australia's critical minerals sector will help the world decarbonise, including enabling Australia to reach our own legislated targets of 43 per cent below 2005 levels by 2030 and net zero by 2050.

## Extract more value onshore from our resources – creating jobs and economic opportunity, including for regional and First Nations communities

This could add \$134bn to Oz GDP and create 262,600 new jobs by 2040 => "Proportionate" response:

- \$500m funding for NAIF (**new**)
- \$225m to Geoscience Australia
- \$100m critical minerals development program.
- \$2bn EFA critical minerals facility
- NRF: \$3bn Low emissions tech
- NRF: \$1bn Resources value-add
- \$50m Australian Critical Minerals R&D Hub
- \$57m Critical Minerals International Partnerships
- Powering the Regions Fund: \$1.9bn
- \$3.1bn Australian Apprentices Incentive System
- \$500m Jobs & Skills Councils
- \$105m New Energy Apprenticeships

Another critical minerals review 2026

# 3. Australia's Critical Minerals Strategy

South Korea-Australia Integrated Mining-Batteries-EV Cooperation



CLIMATE ENERGY FINANCE

*Due for release 29 June 2023*

## DRAFT - A VALUE-ADDED CRITICAL MINERALS BILATERAL AGREEMENT FOR AUSTRALIA AND SOUTH KOREA

Australia's imperative to create a mutually-beneficial bilateral agreement with South Korea, leveraging the US Inflation Reduction Act to complement Korea's battery industry and value-add onshore.

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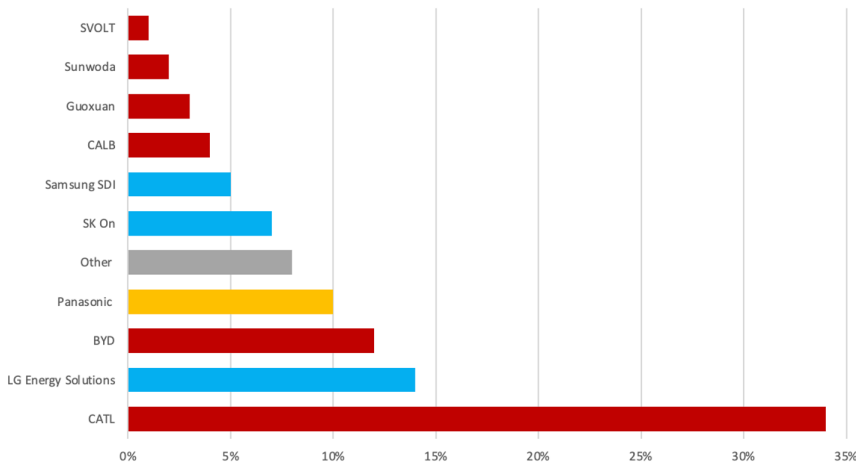
**Matt Pollard, Global EV Supply Chain Analyst, CEF**  
**Tim Buckley, Director, CEF**  
**Dr Annemarie Jonson, Director Communications**



# 3. Australia's Critical Minerals Strategy

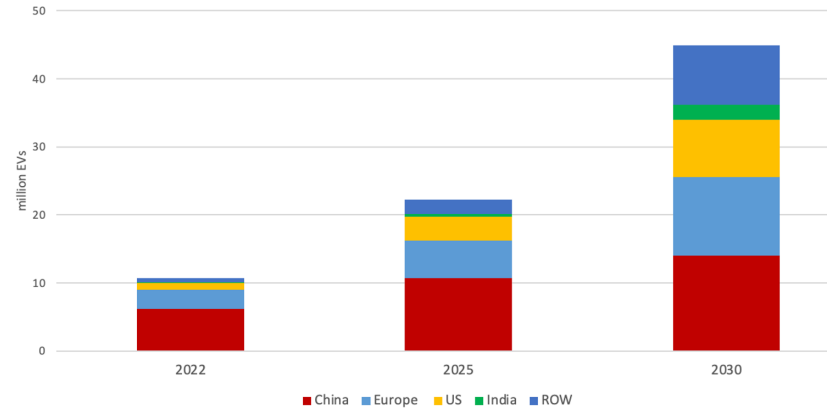
## South Korea-Australia Integrated Mining-Batteries-EV Cooperation

**Figure: Global EV Battery Manufacturer Market Share 2022:**



Source: SNE Research, CleanTechnica

**Figure: Global EV Sales 2022 with 2025 and 2030 Forecast**

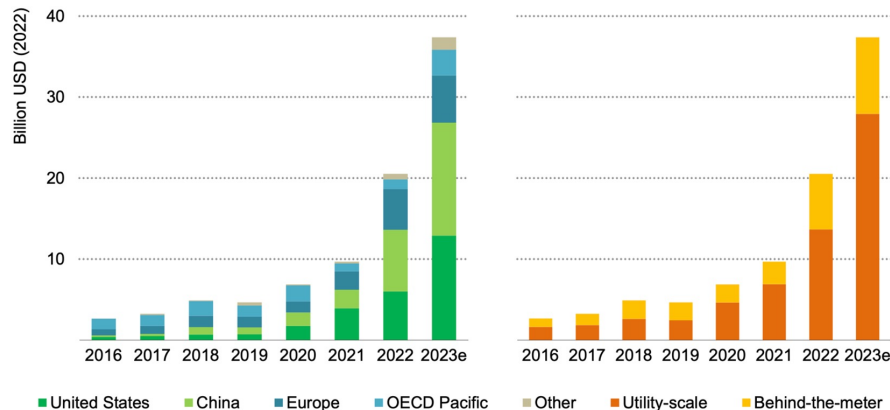


Source: IEA Global EV Outlook 2023, CEF Calculations

Note: Forecasts under Announced Pledges Scenario

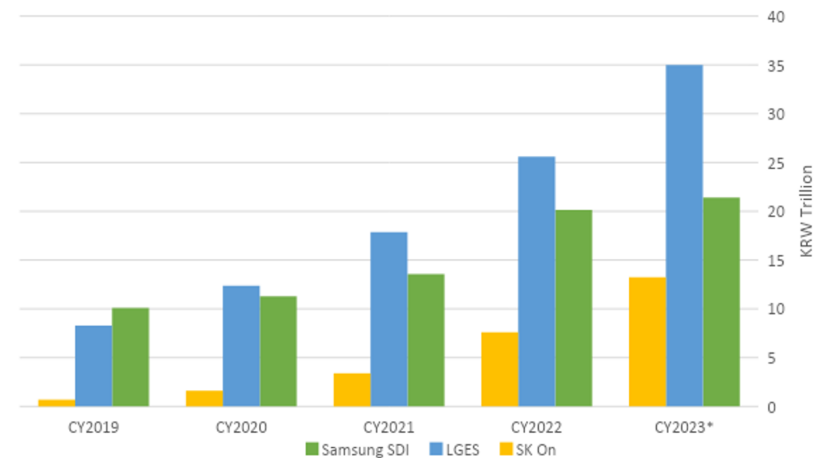
**Figure 6.1: Global Investment in Battery Storage is Set for Rapid Growth in 2023**

Battery storage investment by geography (left) and segment (right), 2016-2023e



Source: IEA calculations based on Clean Horizon (2023), BNEF (2023) China Energy Storage Alliance (2023)

**Figure: Revenue Growth of SK Firms Battery Divisions 2019-2023**



Source: Company Accounts, CEF Calculations

Note: CY2023 data annualised from 1QCY2023 Earnings

# 4. WA Renewable Energy Plan

SWIS Demand Assessment: 50GW of RE + Storage needed for WA by 2042

Figure 3: New capacity type

