The Impact of the Inflation Reduction Act on Clean Energy Supply Chains

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REPORT OBJECTIVES

EXPLAIN CLEAN ENERGY SUPPLY CHAINS

INTERPRET HOW THE IRA HAS IMPACTED AND WILL IMPACT THESE SUPPLY CHAINS

SHARE POLICY RECOMMENDATIONS

AGENDA

01
Stake of the Government

Ensuring Successful Implementation of the IRA

02
Clean Technologies

Solar, Wind, EVs + Batteries

03
Impacts

Impact of the IRA thus far

04
Recommendations

Recommended Steps for Implementation

01

Stake of the U.S. Government

Objectives of the IRA

- Boost Domestic and International Clean Energy Production
- Financially Supporting Direct Government Action for the Clean Energy Transition
- Support Clean Technology Manufacturing, Deployment, and Adoption through Tax Credits
- Strengthen the U.S. Geostrategic Position in the Energy Sector
- Delivering Environmental and Social Justice

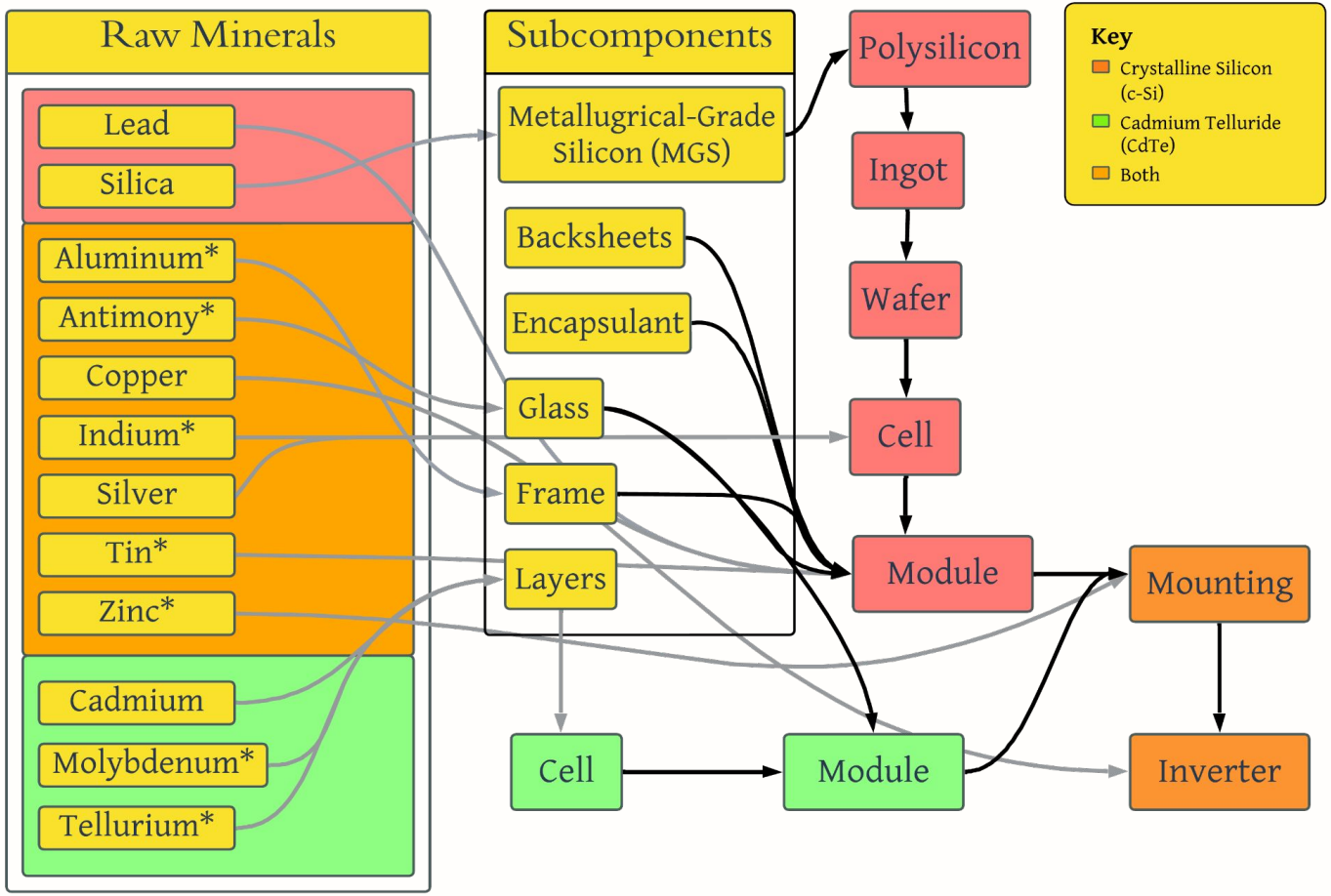
“This investment in environmental justice is real. It also provides tax credits that will create thousands of good-paying jobs — manufacturing jobs on clean energy construction projects, solar projects, wind projects, clean hydrogen projects, carbon capture projects, and more — by giving tax credits for those who build these projects here in America. ”

— President Joseph R. Biden Jr.
July 28, 2022

02

Visualizing Clean Tech Supply Chains

Abbr. Supply Chain of c-Si and CdTe Solar PVs



Solar Insights:

Global

- c-Si: >95%, CdTe: <5%

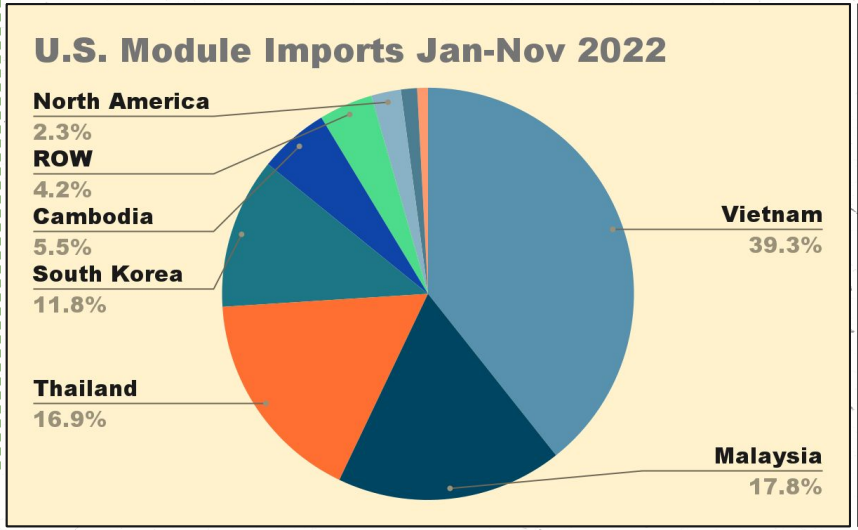
Domestic

- c-Si: 84%
- CdTe: 16%

U.S. lacks “subcomponent” manufacturing capacity

PVs will put strain on resources: Including Copper, Silver, Silica/Silicon, and Tellurium

Solar Supply Chain Network



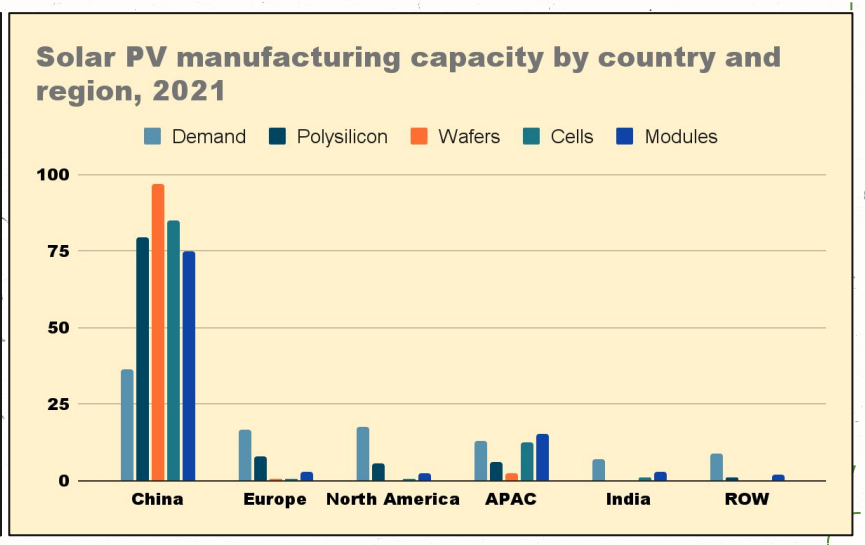
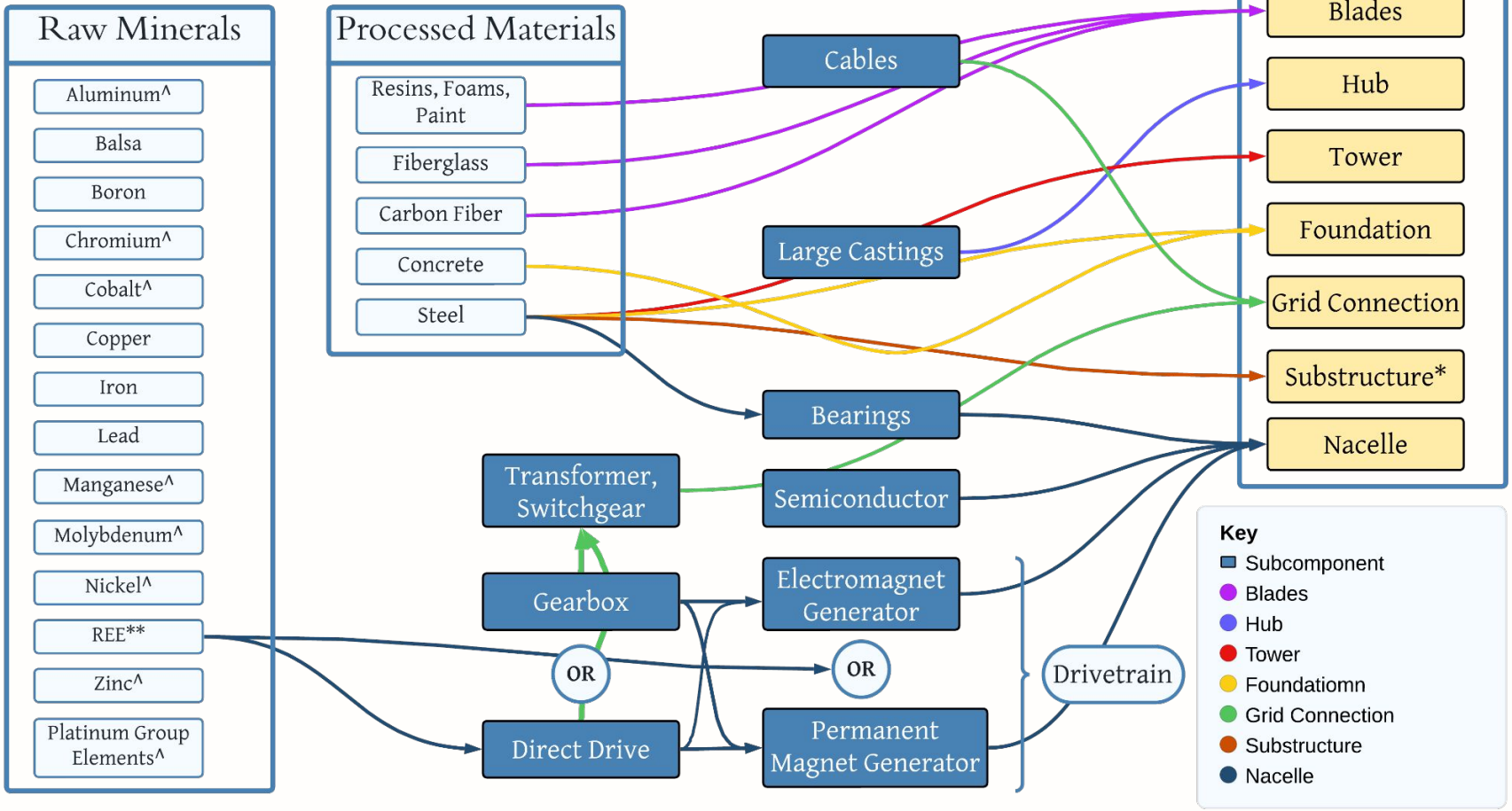


Image Credit: DOE and IEA

- U.S. produces 14% of Deployed Modules and 0% of ingot, wafer, and cells
- U.S. is home to First Solar, the largest CdTe PV producer, but is bottlenecked by Tellurium rarity
- China Produces 80% of all components in the Solar Supply Chain

Abbr. Supply Chain of Wind Turbines



Wind Supply Chain Network

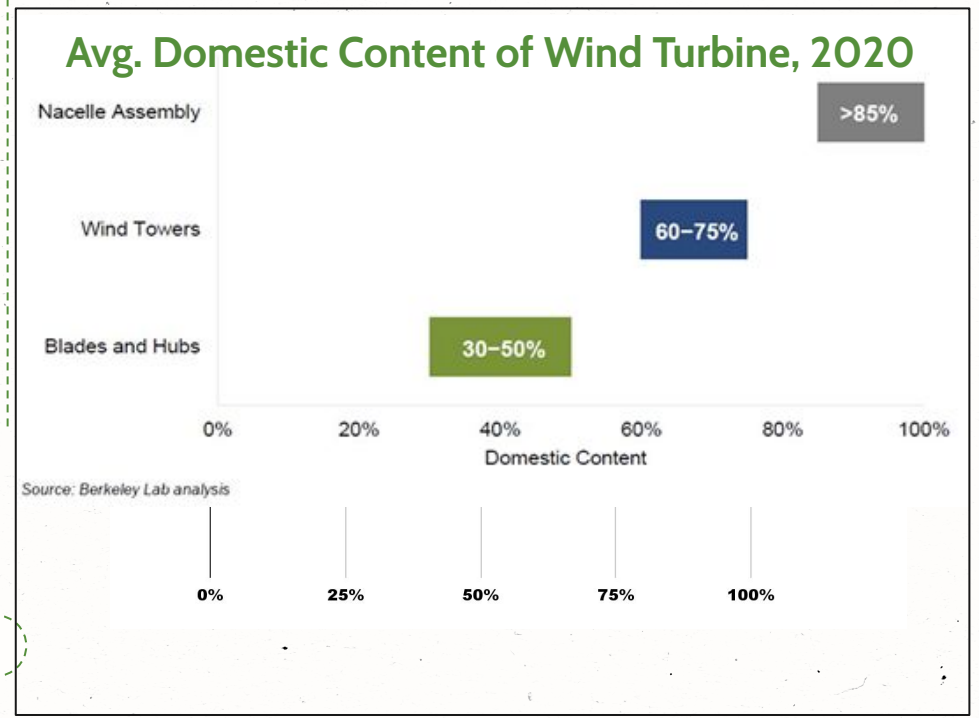
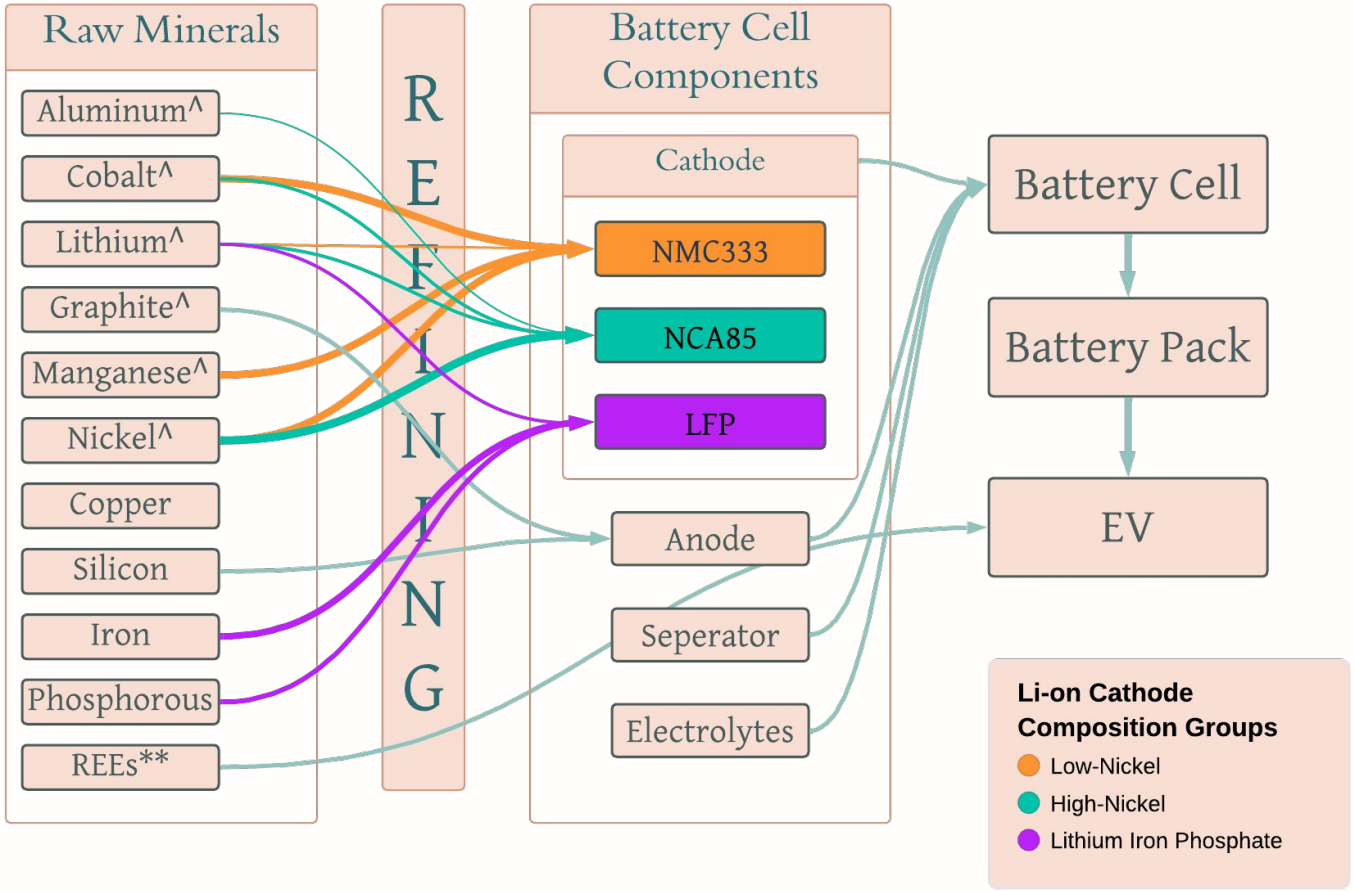


Image Credit: DOE

Wind Insights

- Most diversified supply chain discussed, though China in pole position
- Only U.S., China, India, Spain, and Germany can domestically produce all onshore wind turbine components
- GWEC predicts U.S. will maintain current (8-12%) global market share
- High REE and Hi-Tech reqs needed for offshore wind
- First Jones Act Compliant WTIV to go online in 2023

Abbr. Supply Chain of EV Lithium-ion Batteries



EV Insights

- Lithium-ion (Li-ion) Batteries most common form of short term energy storage
- Sodium ion battery & different cathode compositions could create less mineral-intensive, efficient alternative to Li-ion

EV Battery Supply Chain Network

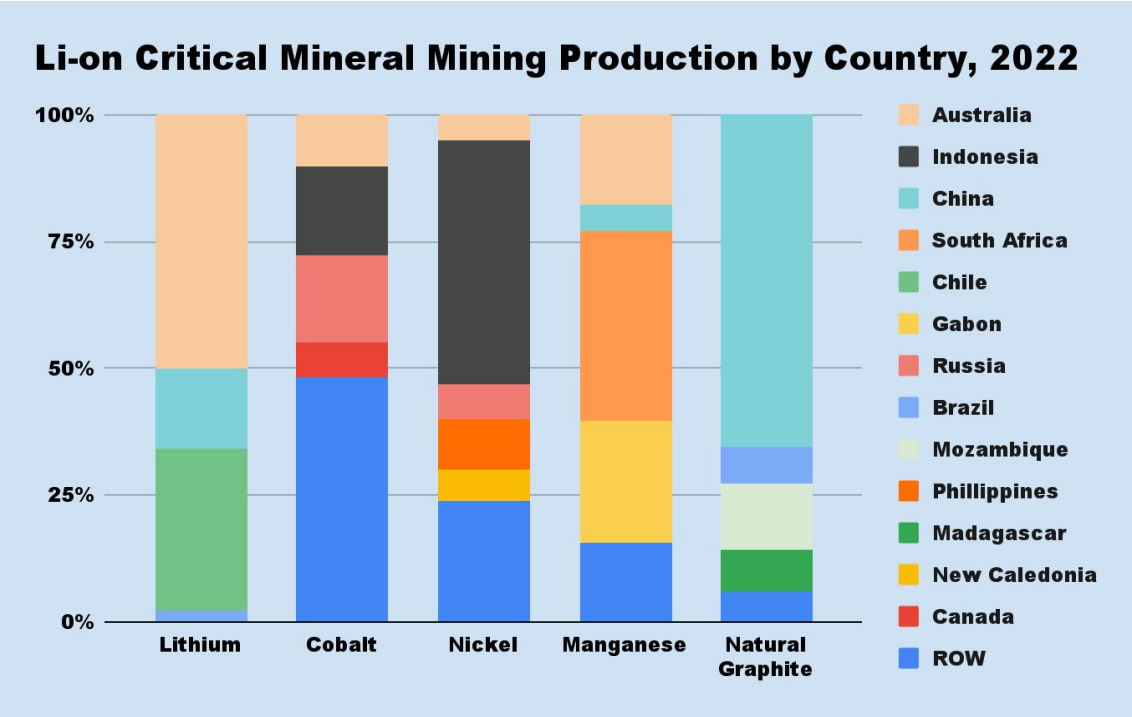


Image Credit: IEA

EV Insights

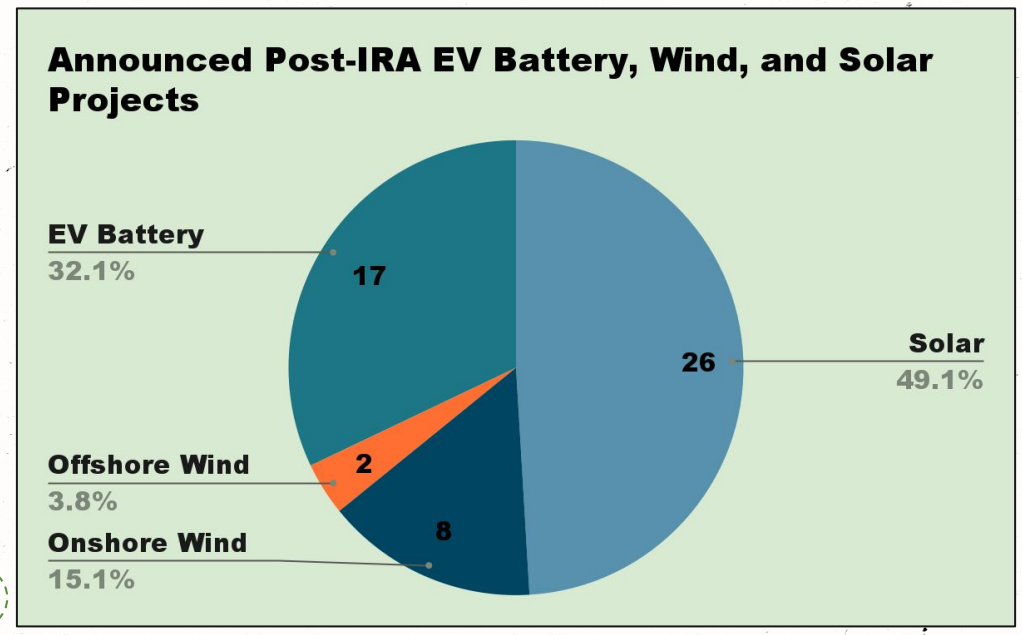
- Supply Chain relies on 2-3 countries for critical minerals.
- China acts as the global critical mineral "refinery"
- U.S. imports a significant % of Li-on batteries, 67% of imports are from China

Post-IRA Developments in Supply Chains

➔ Nearly every industry, market intelligence, and academic report acknowledges IRA impact on clean technology sector

01	IRA Policies Benefiting Solar Energy	• Clean Energy PTC/ITC • Advanced Manufacturing PTC/ITC • Low-income PTC/ITC • Homeowner Installation ITC
02	IRA Policies Benefiting Wind Energy	• Clean Energy PTC/ITC • Advanced Manufacturing PTC/ITC • Low-income PTC/ITC • Government Loans + Grants
03	IRA Policies Benefiting Li-on Batteries	• Clean Energy PTC/ITC • Advanced Manufacturing PTC/ITC • Consumer EV Tax Credits • Government Loans + Grants

Post-IRA Cleantech Supply Chains Roundup



IRA-Climate Investment Boom, Lingering issues persist

- **Wind:** IRA supports nascent Offshore Wind sector
- **Solar:** UFLPA & AD/CVD
- **EV:** North American Buildout
- **General:** Parts or all of the IRA remain under existential threat due to partisan politics, chilling investment in cleantech supply chains
- **General:** Treasury & Commerce Guidance can drastically affect all supply chains

03

Impacts

International Responses

EU

- Formation of EU-U.S. IRA Task Force
- EU Green Industrial Plan

Japan

- U.S. - Japan Agreement on Strengthening Critical Minerals Supply Chains

China

- Generally little direct reaction to the IRA
- Private sector has responded to IRA incentives through investments, including U.S., Mexico, and Canada

Future Impacts on Supply Chains

- Boost in Domestic Investment
- The IRA as a Provocateur of Global Clean Technology Industrial Policy
- De-risking and Decoupling

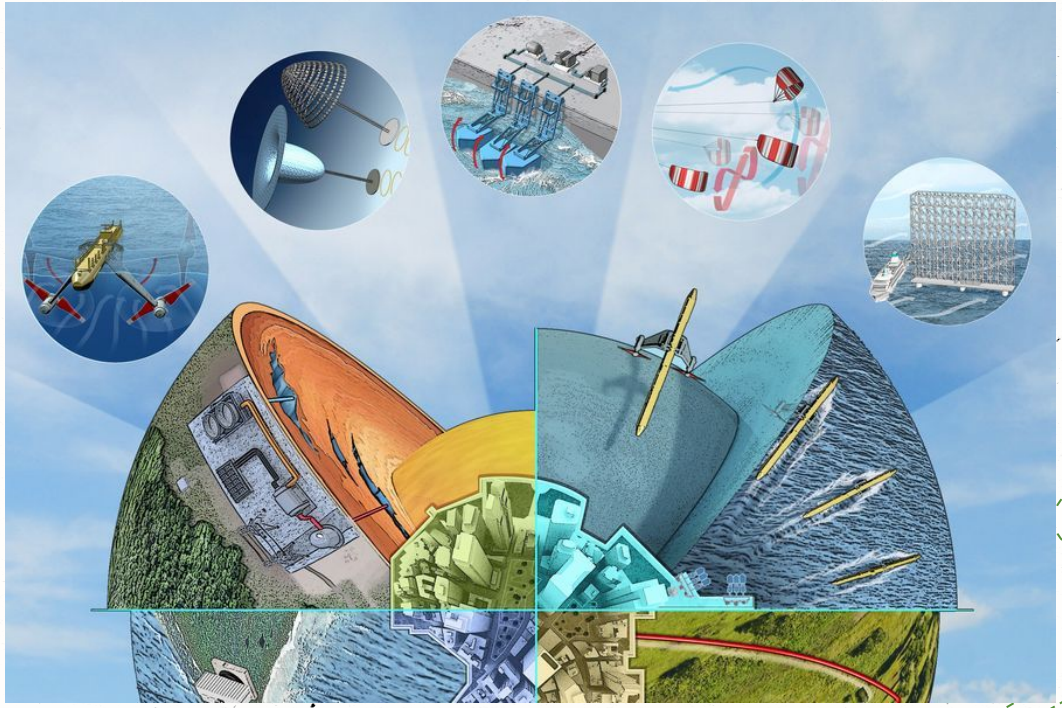


Image Credit: The Wall Street Journal

Determinants of Efficacy

- Continued breakthroughs in green energy technology
- More Developed Green Energy Workforce
- Investment in the Electric Grid
- Continued political support for the IRA
- Continued efforts to work with international actors to improve relations in regard to the IRA

04

Recommendations

1. Mineral Security Partnership Expansion

The MSP can be a critical tool for U.S. international economic policy

- Development of a “Battery Passport” to facilitate the trade of ethically-sourced battery components among member states;
- Establishment of Strategic Critical Mineral Stockpiles among member states;
- Creation of a public diplomacy campaign to communicate the accomplishments and the potential of the MSP, and promote understanding and discourse around critical minerals;
- Promoting further Research and Development Initiatives between MSP member states.

1a. Establishing a Joint Critical Minerals List for MSP Members

➔ Joint Critical Minerals List supports a Joint MSP Strategy and Joint Critical Minerals Strategy

Heuristic 1	Heuristic 2	Heuristic 3	Heuristic 4
Are there viable alternatives to the mineral that can replace it in most applications?	What is the role of the mineral in the bloc's energy, economic, and national security needs?	What is the average net-import reliance of the mineral for all MSP members?	Are there specific minerals in the clean energy supply chain particularly vulnerable to shocks?

1b. Battery Standards

- Development of a “Battery Passport” to Facilitate Trade of Ethically-Sourced Battery Components Among Member States

- Battery Passport would establish a digital twin of the physical battery that tracks data pertaining to:
  - carbon footprint;
  - labor standards;
  - origin of raw materials and countries involved in processing

- As a Passport Program grows, it would leverage standards and norms set by the MSP to secure the future of green energy supply chains and bolster it’s growth.

1c. MSP Public Diplomacy Campaign

Development of a public diplomacy campaign to communicate the accomplishments of the MSP, and promote discourse around critical minerals:

- Interface with the public through expanding MSP online presence
- Interface with media to bring critical mineral issues to the forefront of the public consciousness
- The MSP should establish a permanently-staffed secretariat to manage internal and external affairs

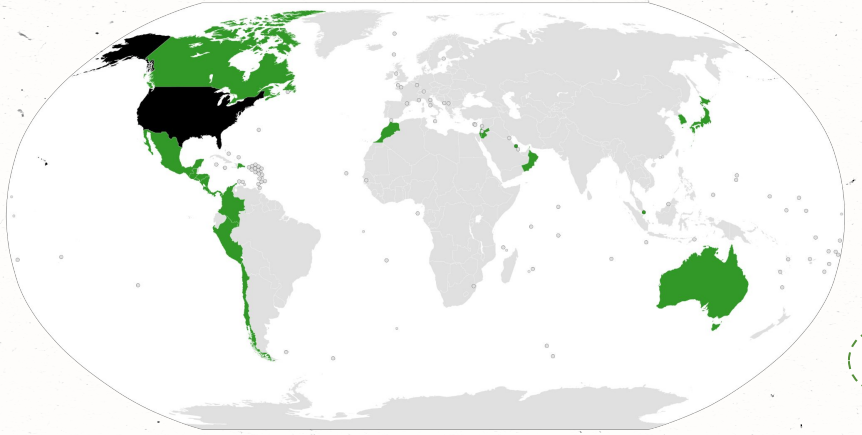
2. Mobilizing Private Sector Investment for Critical Mineral Sourcing and Processing

- Formation of country-specific diplomatic and expert task forces composed of seasoned U.S. negotiators with the goal of supporting private firms and entrepreneurs in reaching deals with emerging economies vital to the future of clean energy supply chains;

- Using Private Public Partnerships (PPPs) to mobilize the private sector in projects deemed to be in the U.S. national and international interest.

2a. Free Trade and New Agreements

- Encourage the signing of Free Trade Agreements—including bilateral critical mineral agreements—with international partners
- Emphasis on public-private cooperation
- Indonesia as a potential source of refined nickel



Countries with Free Trade Agreements with the United States

2b. Bilateral/Plurilateral Negotiation Teams

Team Composition = US government agency (DoE, DoS, DoD, USTR, DFC etc.) + X amount of Foreign government agencies

Teams Can:

- Negotiate with resource and refining-rich states to reach an investment framework
  - E.g. Make it easier to do business for MSP/U.S. companies
- Share research with those states or invested companies
- Provide climate-adjacent development assistance

Teams Hope to:

- Foster public, private, and PPP investment and operation in resource/refining-rich states to diversify MSP/U.S. Supply Chains
- Ensure investment/operation has high ESG standards

3. Reaffirming U.S. Leadership: Training Staff and Building Public-Private Partnerships

Foreign Service Institute Module on Critical Minerals.

- No course is currently offered by the FSI

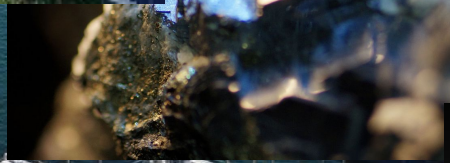
Fostering Investment through commercial diplomacy

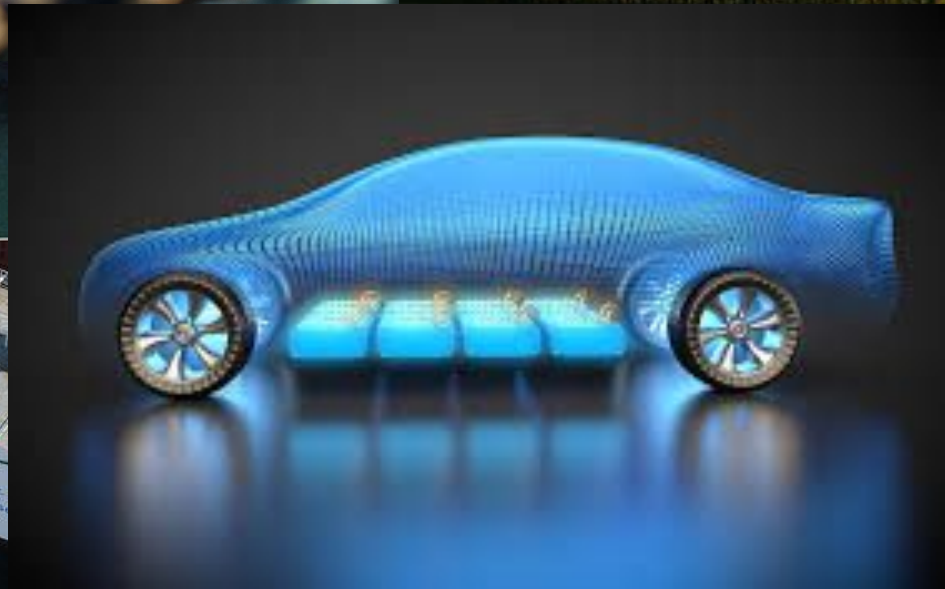
- Hosting business Fora
- Sending international delegations represented by U.S. agencies and private firms
- Supporting private firms interested in investing abroad in sectors vital to U.S. national interest

List of Policy Recommendations

- **Expansion of the Mineral Security Partnership (MSP)**
  - Development of a "Battery Passport" to facilitate the trade of ethically-sourced battery components among member states;
  - Establishment of a Strategic Critical Mineral Stockpile among member states;
  - Creation of a public diplomacy campaign to communicate the accomplishments and the potential of the MSP, and promote understanding and discourse around critical minerals;
  - Promoting further Research and Development Initiatives between MSP member states.
- **Reaffirming U.S. Leadership in the Clean Energy Space**
  - Education of Foreign Service Economic Officers stationed at U.S. Embassies and Consulates through an Foreign Service Institute Module on critical minerals
  - Fostering Investment through Business Fora and commercial diplomacy.
- **Mobilizing Private Sector Investment for Critical Mineral Sourcing and Processing**
  - Formation of country-specific diplomatic and expert task forces composed of seasoned U.S. negotiators with the goal of supporting private firms and entrepreneurs in reaching deals with emerging economies vital to the future of clean energy supply chains;
  - Encouraging the signing of Free Trade Agreements—including bilateral critical mineral agreements—with international partners;
  - Using Private Public Partnerships (PPPs) to mobilize the private sector in projects deemed to be in the U.S. national and international interest.

Questions





References

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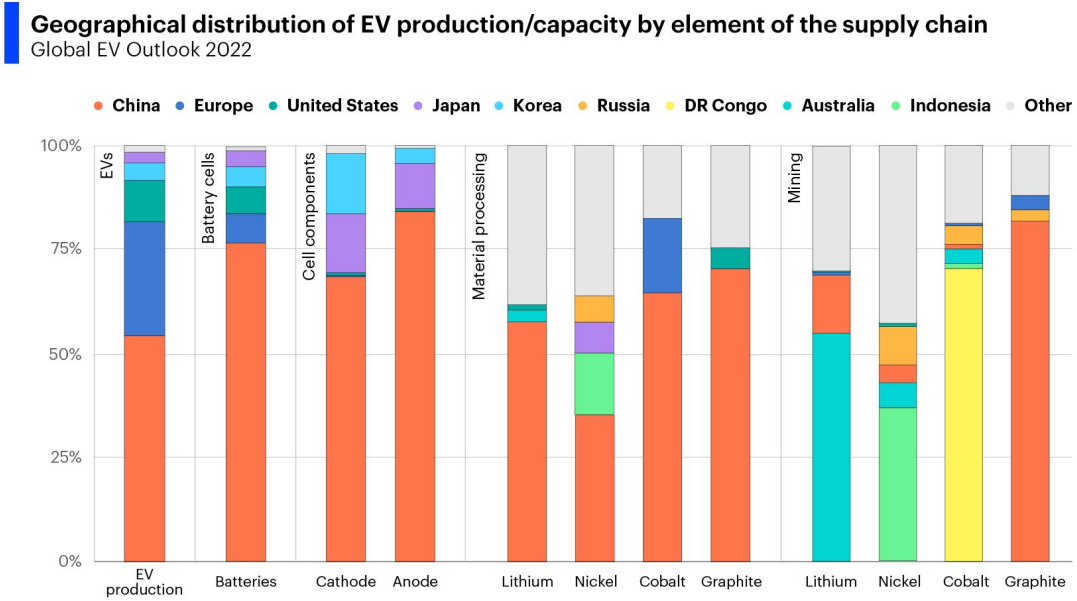
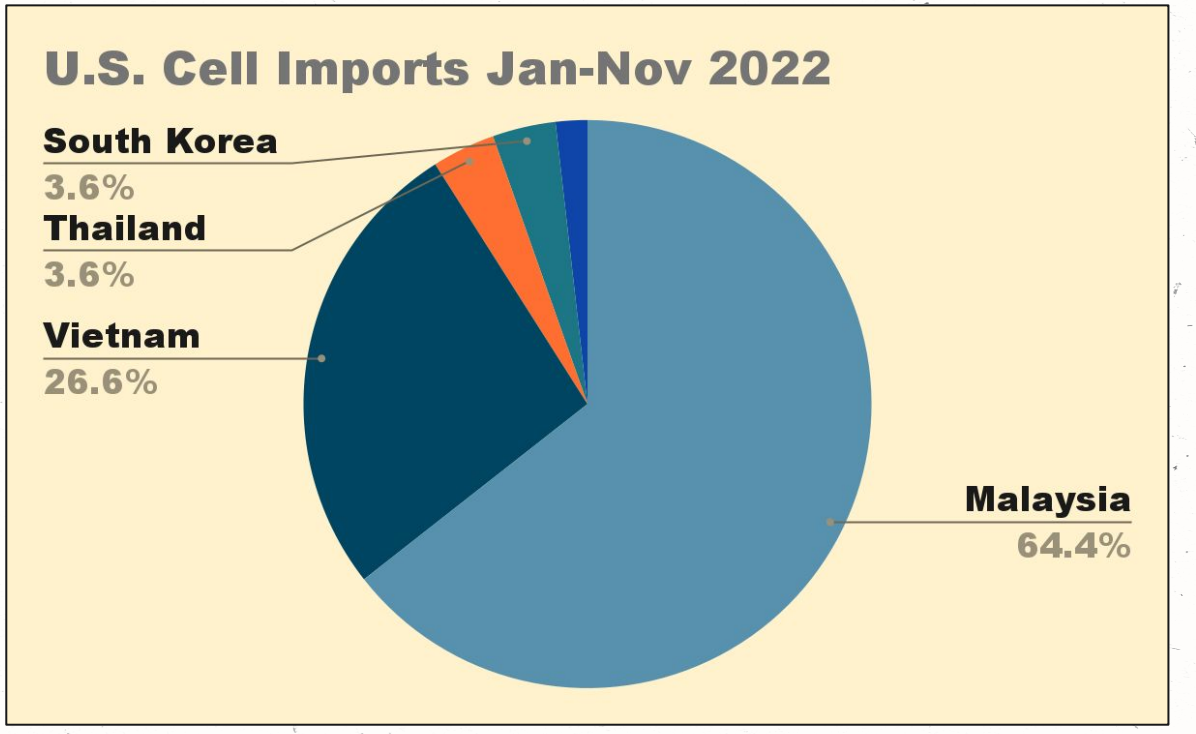
Energy.gov. “Quarterly Solar Industry Update.” Accessed May 2, 2023. https://www.energy.gov/eere/solar/quarterly-solar-industry-update.

Woodward, Aylin, and Kevin Hand. “The Next Bets for Renewable Energy.” *Wall Street Journal*, March 9, 2022, sec. Life. https://www.wsj.com/articles/the-next-bets-for-renewable-energy-11646848262.

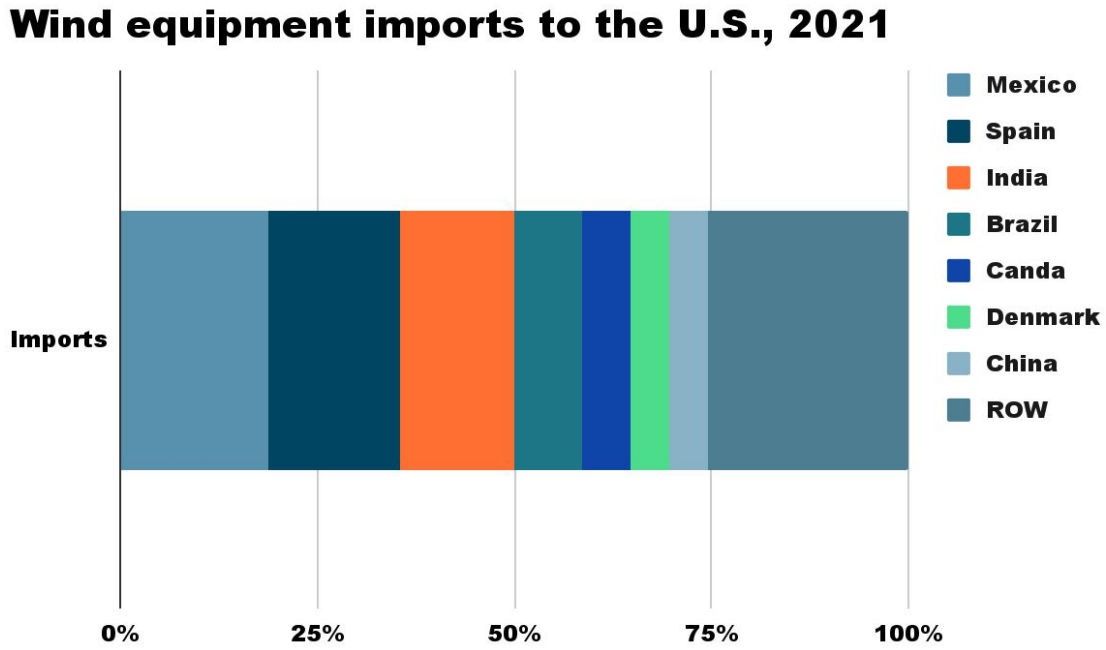
Appendix


Geographical distribution of EV production/capacity by element of the supply chain
Global EV Outlook 2022
China
Europe
United States
Japan
Korea
Russia
DR Congo
Australia
Indonesia
Other
100%
75%
50%
25%
0%
EVs
Battery cells
Cell components
Material processing
Mining
EV production
Batteries
Cathode
Anode
Lithium
Nickel
Cobalt
Graphite
Lithium
Nickel
Cobalt
Graphite

Appendix


U.S. Cell Imports Jan-Nov 2022
South Korea
3.6%
Thailand
3.6%
Vietnam
26.6%
Malaysia
64.4%

Appendix


Wind equipment imports to the U.S., 2021
Imports
0%
25%
50%
75%
100%
Mexico
Spain
India
Brazil
Canda
Denmark
China
ROW