MESC

OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

INTERNATIONAL WROUGHT COPPER COUNCIL

Joint Meeting 2024

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Office of Manufacturing & Energy Supply Chains
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IWCC Legal Disclaimer:

The purpose of this presentation is to guide programs benefiting the copper industry and to provide attendees with information to make independent business decisions.

BIL and IRA catalyzed almost $500B in US energy investments

$90B

in **BIL & IRA funds** directed to the Department of Energy in 2022

100%

of BIL and IRA clean energy **funding programs activated**

50-yr

US **unemployment low**

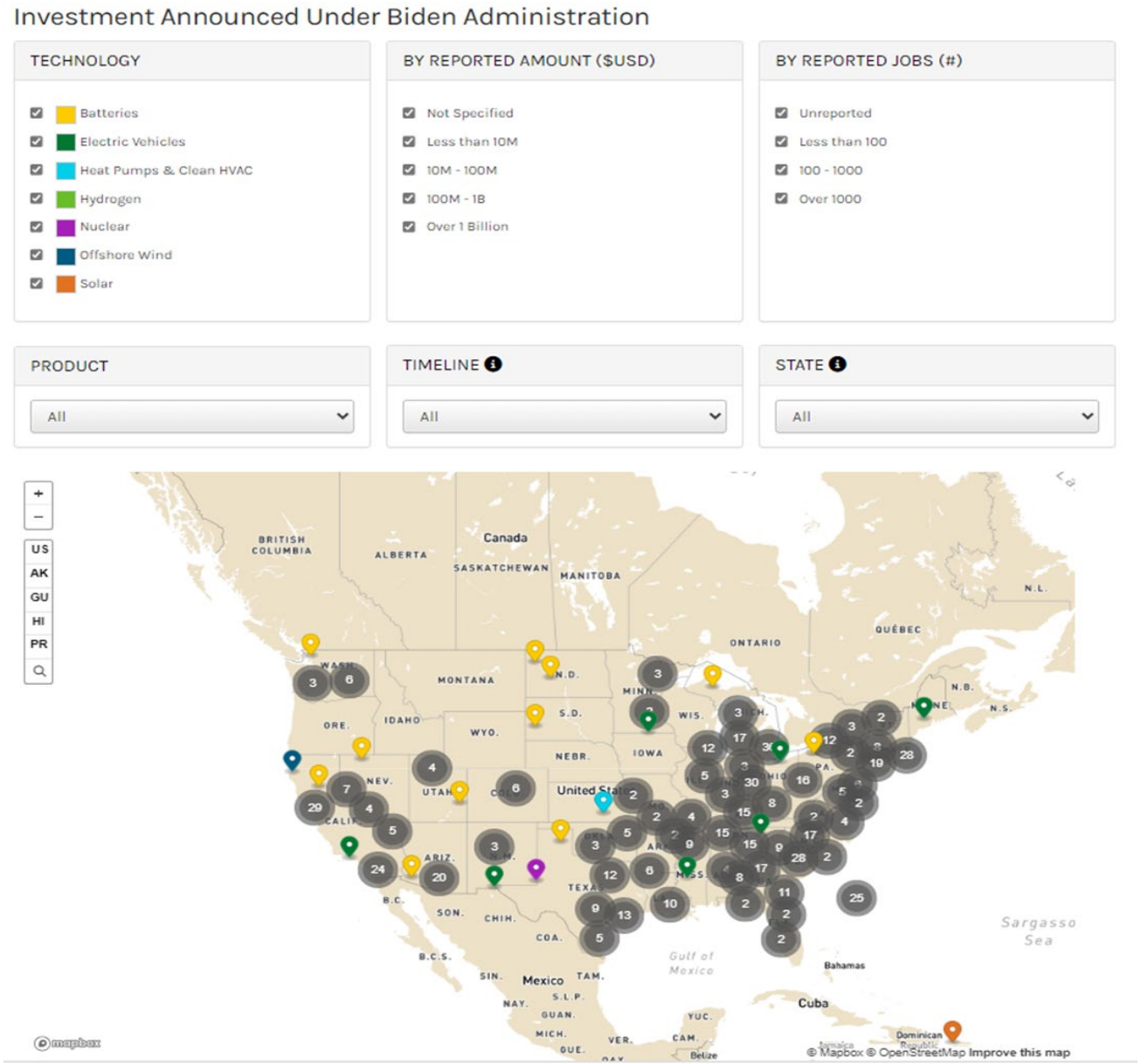
$400B

in **private US infrastructure investment in clean energy** over the past two years

Manufacturing is accelerating across clean energy technologies

US Manufacturing Investment Announcements

- **$120B+** Batteries
- **$35B+** EVs & EV Chargers
- **$16B+** Solar
- **$3.5B** Offshore Wind
- **$2B** Electrolyzers & Fuel Cells

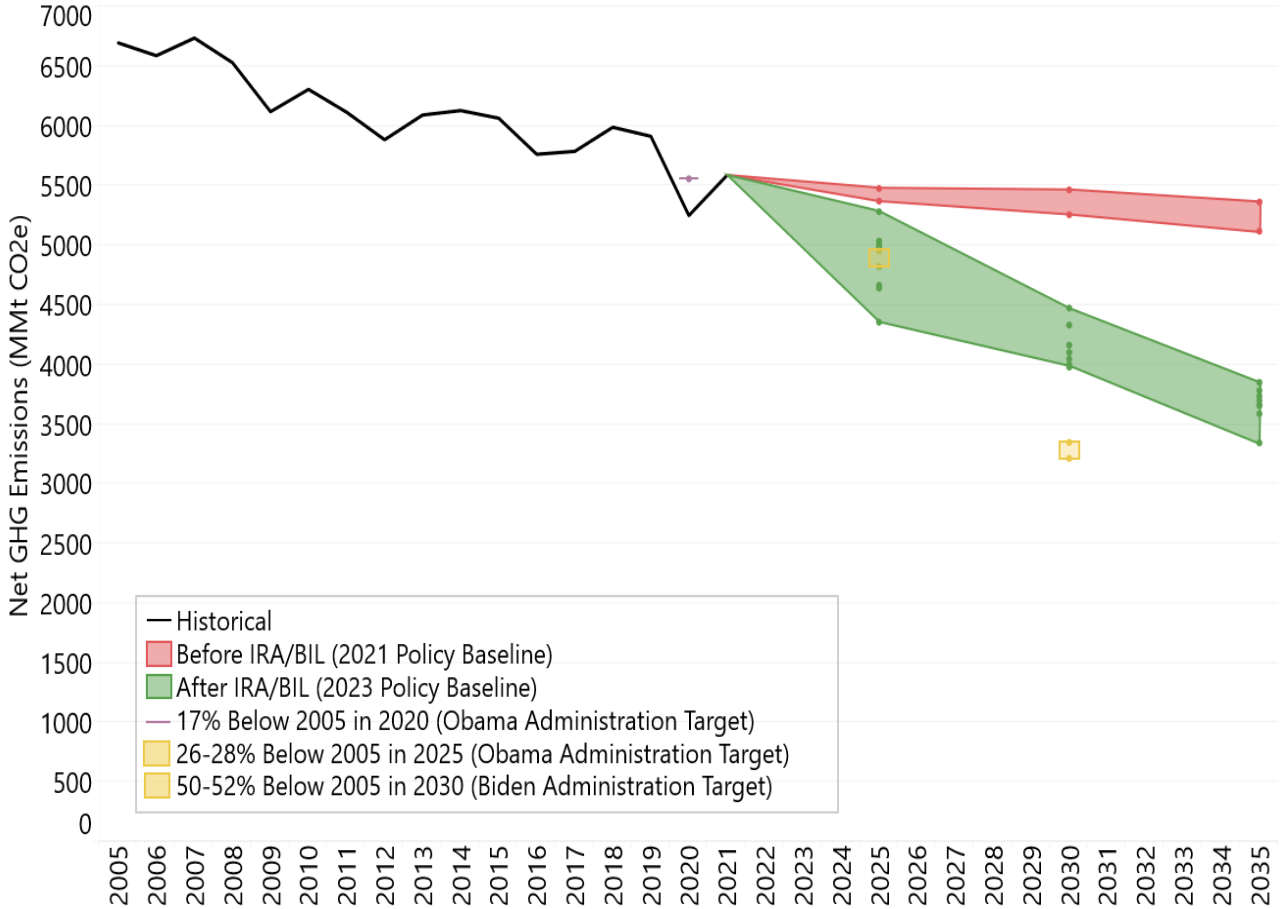


We're back on track!

IRA and BIL enabled U.S. net GHG emissions reductions of **33-41% below 2005 levels in 2030**

— ***nearly doubling***
projected carbon reductions
(*compared to the pre-IRA/BIL 2021 trajectory*)

United States Emissions Projection to 2035



Source: UNCC, Voluntary Supplement to the U.S. Fifth Biennial Report 2023

Critical minerals are the oil & gas of our energy future

Priorities: 2023 DOE Critical Minerals Assessment

- The 2023 DOE Critical Materials Assessment focuses on the **importance and criticality of materials to energy and decarbonization** technologies, with an **emphasis on future criticality** under **changing global market conditions**.

- Unique aspects:
  - Performed from a **global** perspective
  - Focused on the importance of materials to **clean energy technologies**, rather than to the economy in general
  - **Forward looking** to 2035, based on clean energy deployment scenarios and evaluating varying material intensities resulting from innovation and market trends

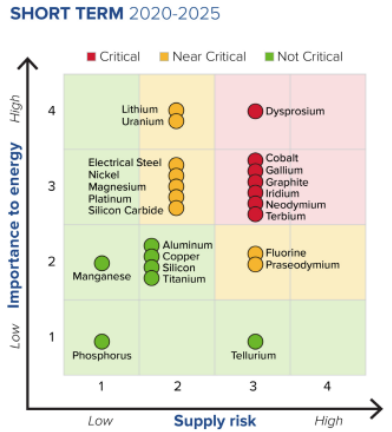


Figure 5.1. Short-term (2020–2025) criticality matrix.

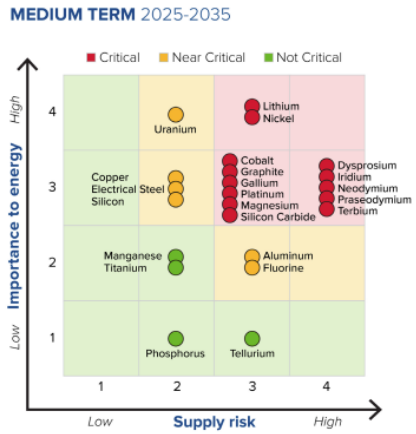


Figure 5.2. Medium-term (2025–2035) criticality matrix.

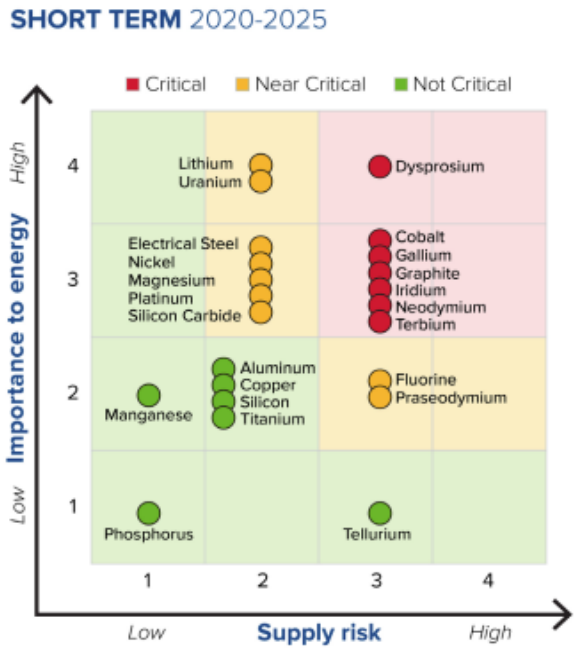
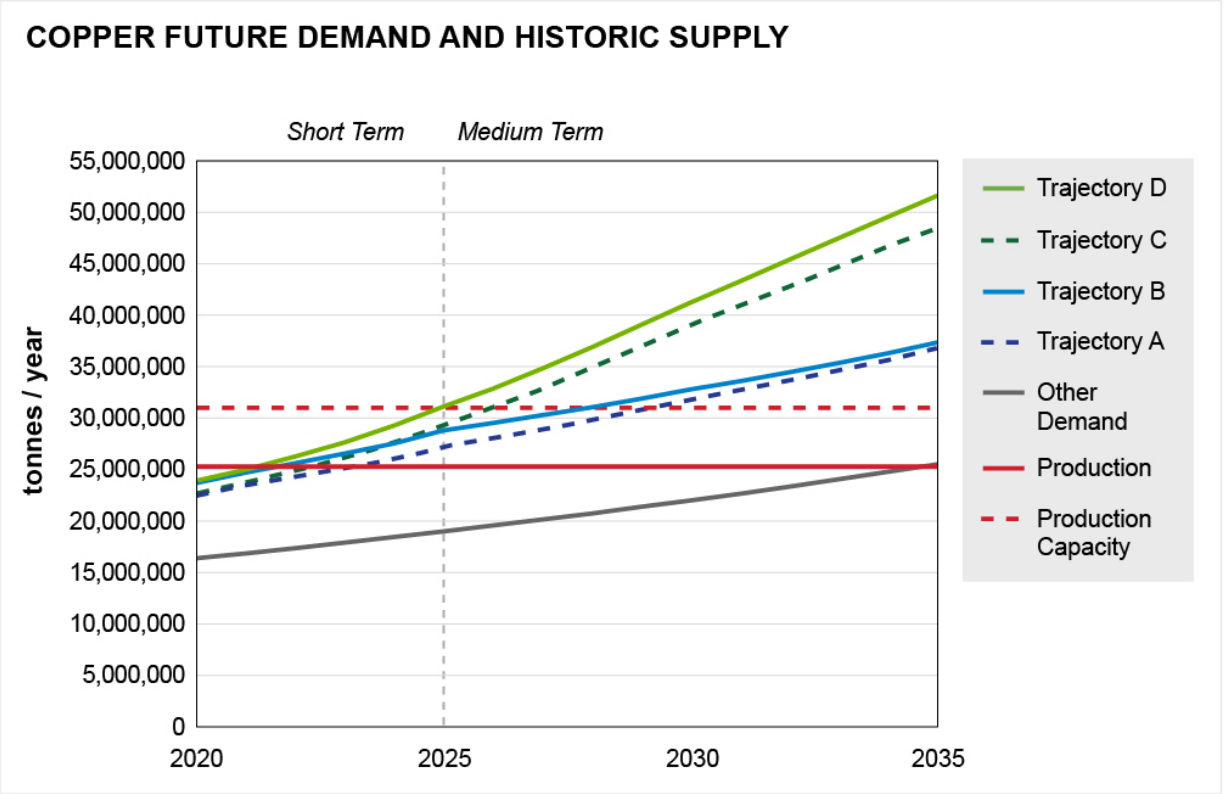


Figure 5.1. Short-term (2020–2025) criticality matrix.

Copper demand will continue to increase from 2020 to 2035

- **Copper demand increasingly exceeds global supply under all scenarios**
  - ***Trajectory A:*** business-as-usual; low material intensity
  - ***Trajectory B:*** business-as-usual; high material intensity
  - ***Trajectory C:*** high technology deployment; low material intensity
  - ***Trajectory D:*** high technology deployment; high material intensity
- **Copper's recycling capability will be increasingly valuable**



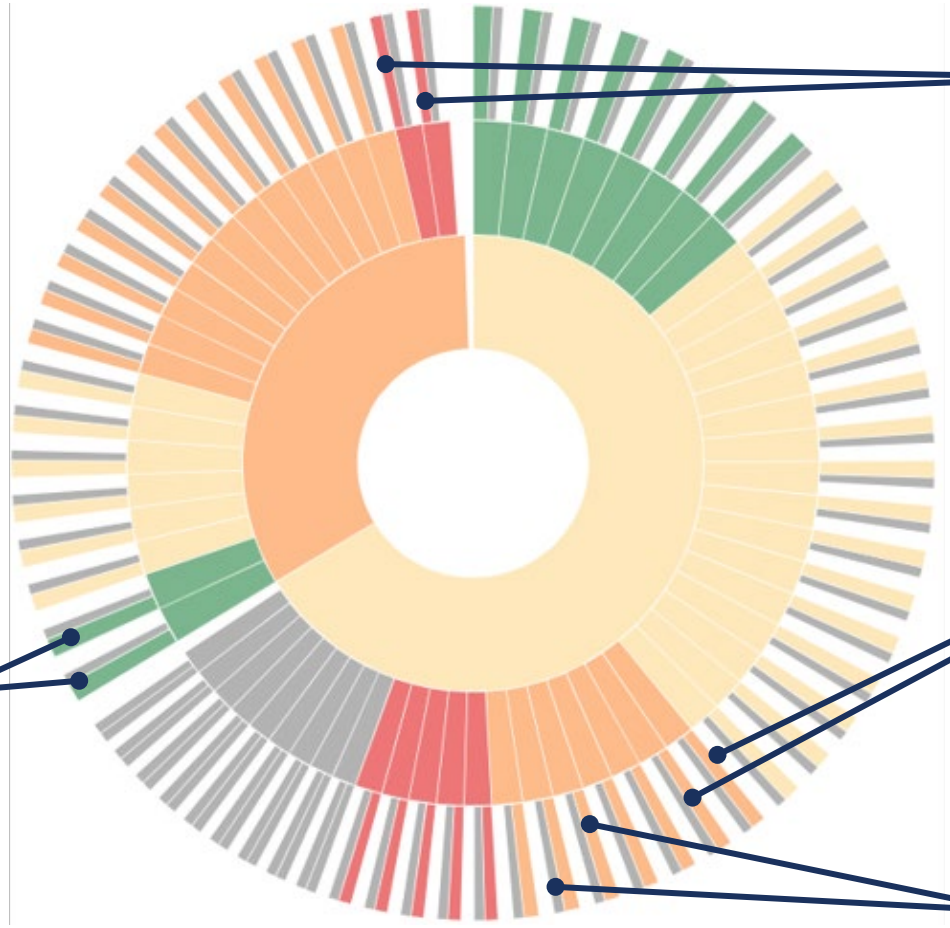
Source: U.S. Department of Energy, Critical Materials Assessment 2023

Supply Chain Readiness Level (SCRL) framework: analyzing supply chain vulnerabilities

Sample Technology

Low — **Readiness Assessment** — High

Analysis In Progress



Rare-earth elements with limited sources controlled by FEOC

No domestic manufacturing

The U.S. has abundant supplies of relevant raw materials

Manufacturing needs exceed current capabilities at domestic facilities

Copper holds supply chain risk across energy products

Mineral	Technology	Readiness Score
Cobalt	Batteries	Orange - concerning
Copper	Transformers, Electrolyzers, Wind, Solar and Batteries	Orange – concerning Yellow – some vulnerability
Dysprosium	Wind	Orange – concerning
Fluorine, Fluorspar*	Batteries, PEM Electrolyzers, Solar	Red – high/extreme
Gallium	Solar	Orange – concerning
Graphite	Batteries	Orange – concerning
Iridium	PEM Electrolyzers	Red – high/extreme
Lithium	Batteries	Orange - concerning
Magnesium	Solar	Yellow – some vulnerability
Neodymium	Wind	Orange – concerning
Nickel	Batteries, Electrolyzers	Orange – concerning
Platinum	PEM Electrolyzers	Orange – concerning
Praseodymium	Wind	Orange – concerning
Silicon Carbide	Batteries, Solar, Transformers	Yellow – some vulnerability

*The 2023 Critical Minerals Assessment considers Fluorine high-risk in the mid-term. Fluorspar is the only Fluorine mineral mined on a large scale according to USGS.

Copper pops up across our SCRL assessments

Current DOE supply chain readiness assessment for copper across key technologies

Batteries	Electrolyzers	Solar	Transformers	Wind
NMC-Gr	Alkaline	c-Si PV	Large Power	Offshore
LFP-Gr	PEM	CdTe PV	Distribution	Onshore

MESC is all about de-risking energy supply chains

VISION

To **eliminate vulnerabilities in US Clean Energy supply chains**, while driving unparalleled social, economic, and environmental impact through our programs & awards

MESC'S CORE FUNCTIONS

Manufacturing Investing

Strengthening and securing the energy supply chains America needs for a secure, clean and equitable energy system

Workforce Investing

Supporting workforce skills development by directly funding cutting-edge energy manufacturing training programs

Manufacturing Analytics Backbone

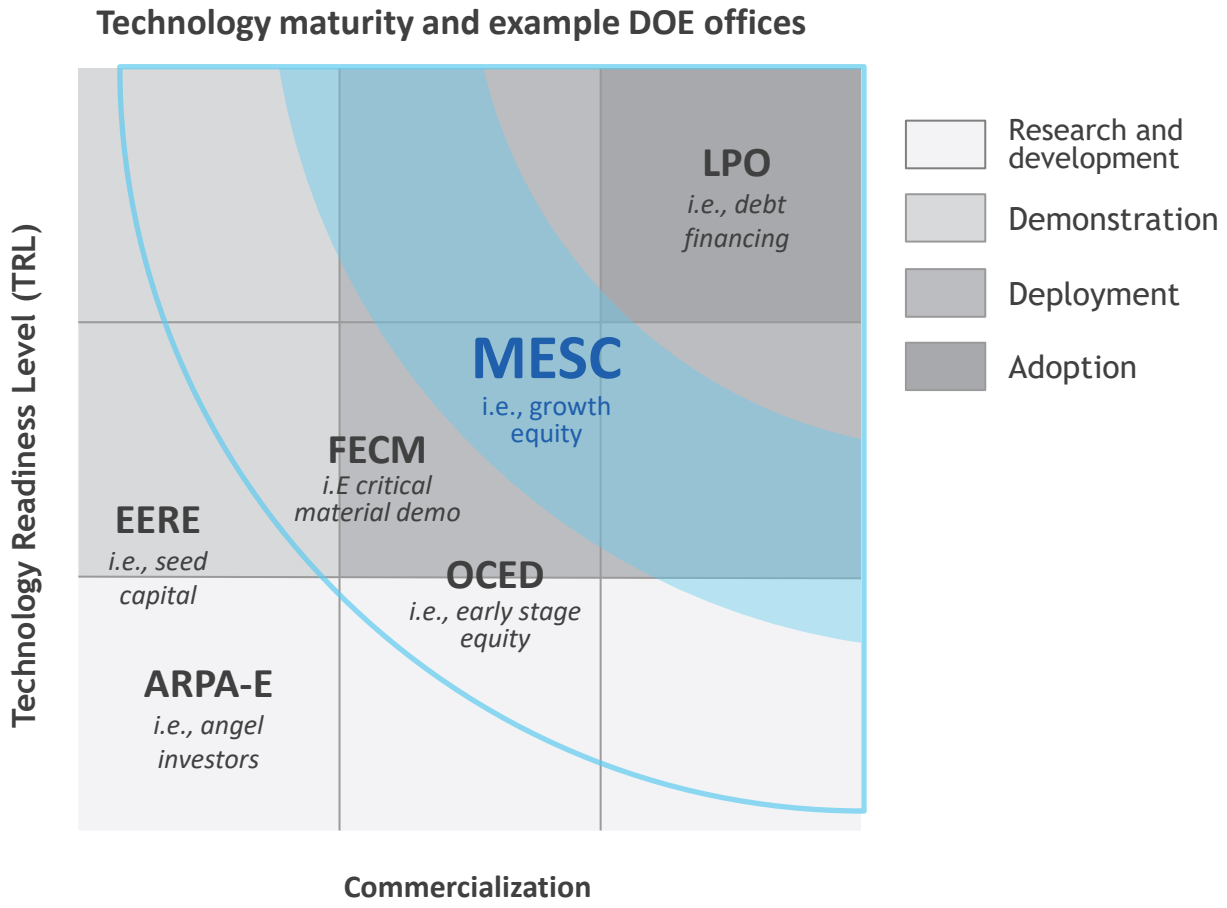
Robust modeling to guide and support DOE strategy and investments, private sector collaborative investments, and federal policy recommendations

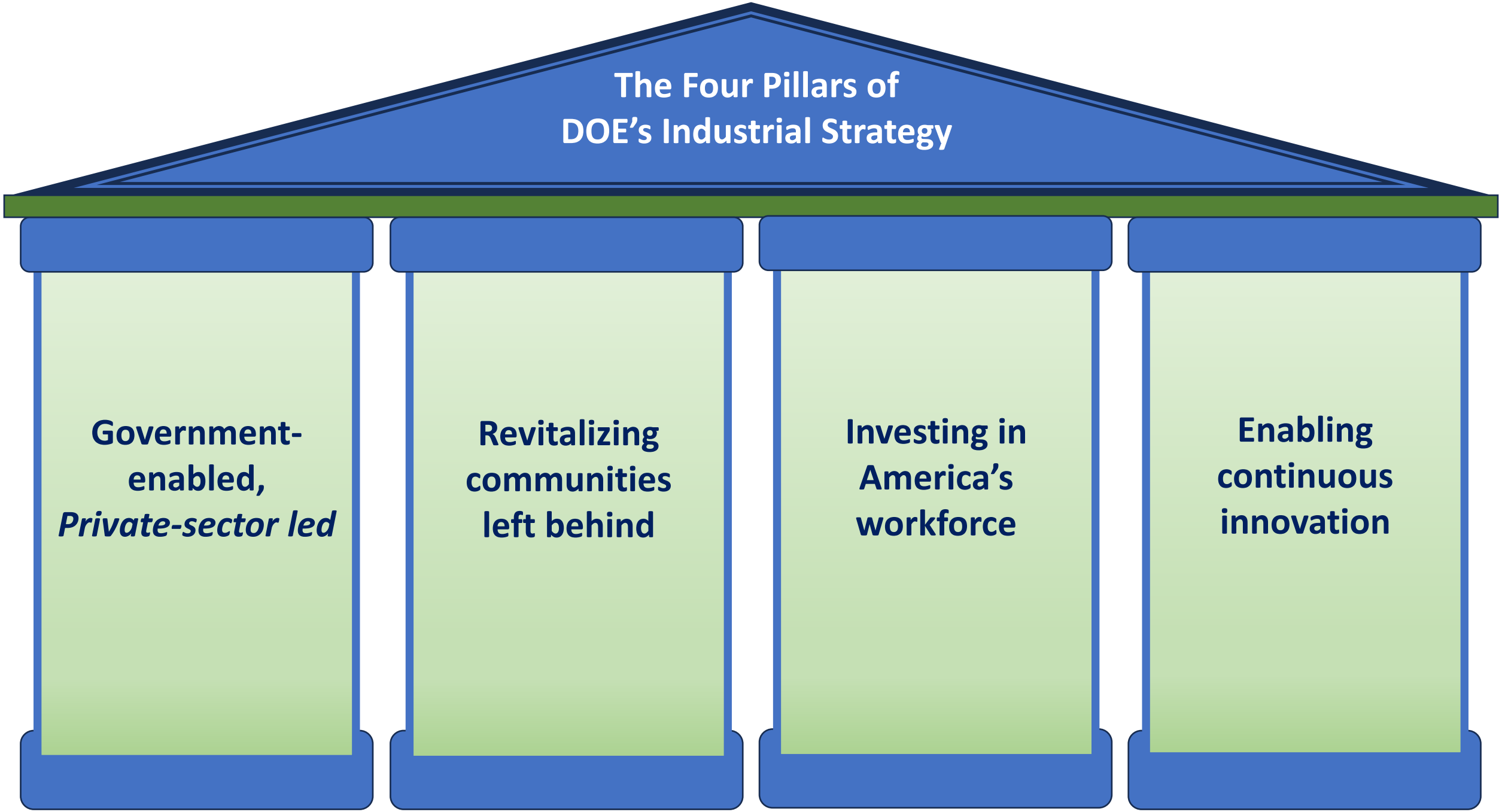
MESC operates in late-stage technology development, driving large-scale deployment of new technologies

The Office of Manufacturing and Energy Supply Chains is working alongside private capital to be a force multiplier to secure American supply chains domestically.

All DOE and MESC investments follow a data-driven approach, building on modeling, mapping, and analysis foundational from MESC experts.

MESC is supporting workforce through direct funding of cutting-edge energy manufacturing programs at universities, community colleges, and trade-schools to provide entry-level and mid-career support.




The Four Pillars of
DOE's Industrial Strategy
Government-enabled, *Private-sector led*
Revitalizing communities left behind
Investing in America's workforce
Enabling continuous innovation

MESC's impacts to-date

$3.9B+ private sector investment catalyzed

8830 construction and permanent jobs created

38% of investments in energy communities or J40 communities

1000+ students trained annually

1.3M+ EVs enabled annually

18.7M+ in benefits flowing to communities through Community Benefits Plans

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MESC Programs

Open for Applications	Under Review	Selected for Negotiation
Qualifying Advanced Energy Project Credit 48C Program Round 2 (Up to $6 billion)*	Advanced Manufacturing and Recycling Grants R2 ($425 million)*	Advanced Manufacturing and Recycling Grants R1 ($275 million)
Industrial Assessment Centers Implementation Grants ($400 million)	Consumer Electronics Battery Recycling, Reprocessing, and Battery Collection for Retailers ($15 million)	Consumer Electronics Battery Recycling, Reprocessing, and Battery Collection for States & Local Government ($7.2 million)
EV Conversion Playbook Deployment ($1.5 million)	Battery Material Processing and Battery Manufacturing Grants ($3.5 billion)	Defense Production Act – Heat Pumps Manufacturing R1 ($169 million)
Extended Product System Rebates ($10 million)	Defense Production Act – Heat Pumps Manufacturing R2 ($63 million)*	Industrial Assessment Centers Program – Expansion ($32 million)
** prior submission of a concept paper required for to submit a full application*	Domestic Manufacturing Conversion Grants Program ($2 billion)*	State Manufacturing Leadership Program ($22 million)
	IAC Technical Field Manager/Clearinghouse ($16 million)	
	IAC Clean Energy Manufacturing Workforce Training and Technical Assistance Awards ($24 million)	

Coming Soon!
State and local government funding to support small & medium advanced manufacturing and consumer battery recycling

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We want to hear from you!

Request for Information (RFI) Opportunities

Clean Energy Supply Chains Readiness and Analysis Methods

- This RFI is an opportunity for industry and other stakeholders to highlight specific supply chain gaps, vulnerabilities, and/or challenges impacting various components of clean energy technologies.
- MESC will create an investment opportunity heatmap across clean energy supply chains using these responses and Department of Energy's own analyses

Please submit replies through MESC's online portals or through email attachments to MESCanalysis@hq.doe.gov no later than 5:00 p.m. (ET) on June 10, 2024

Connect With MESC

energy.gov/mesc

MESC@hq.doe.gov

Office of Manufacturing and Energy Supply Chains, U.S. Department of Energy

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INVESTING IN AMERICA'S ENERGY FUTURE

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