MESC
OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

DOE Tribal Clean Energy Summit

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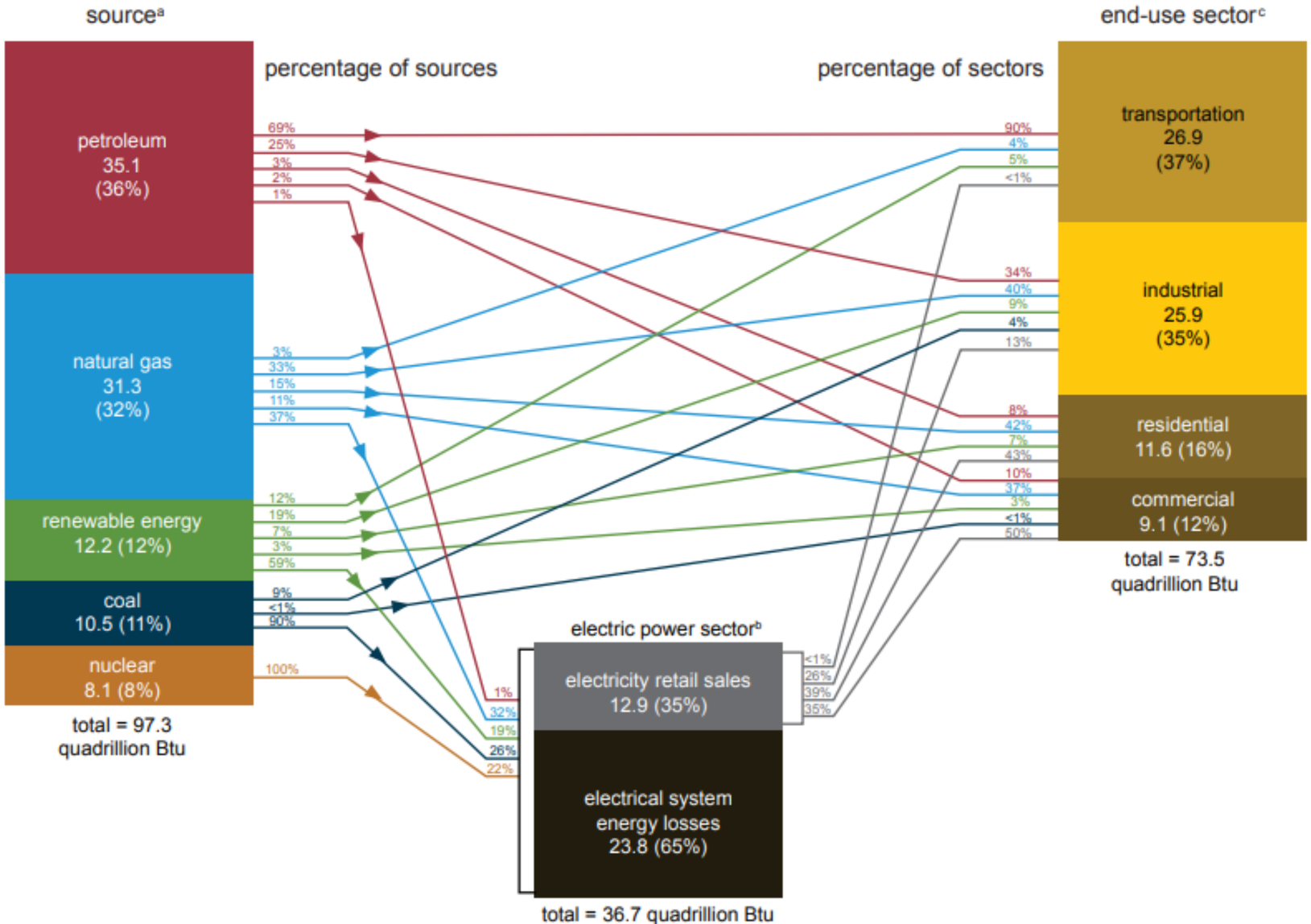
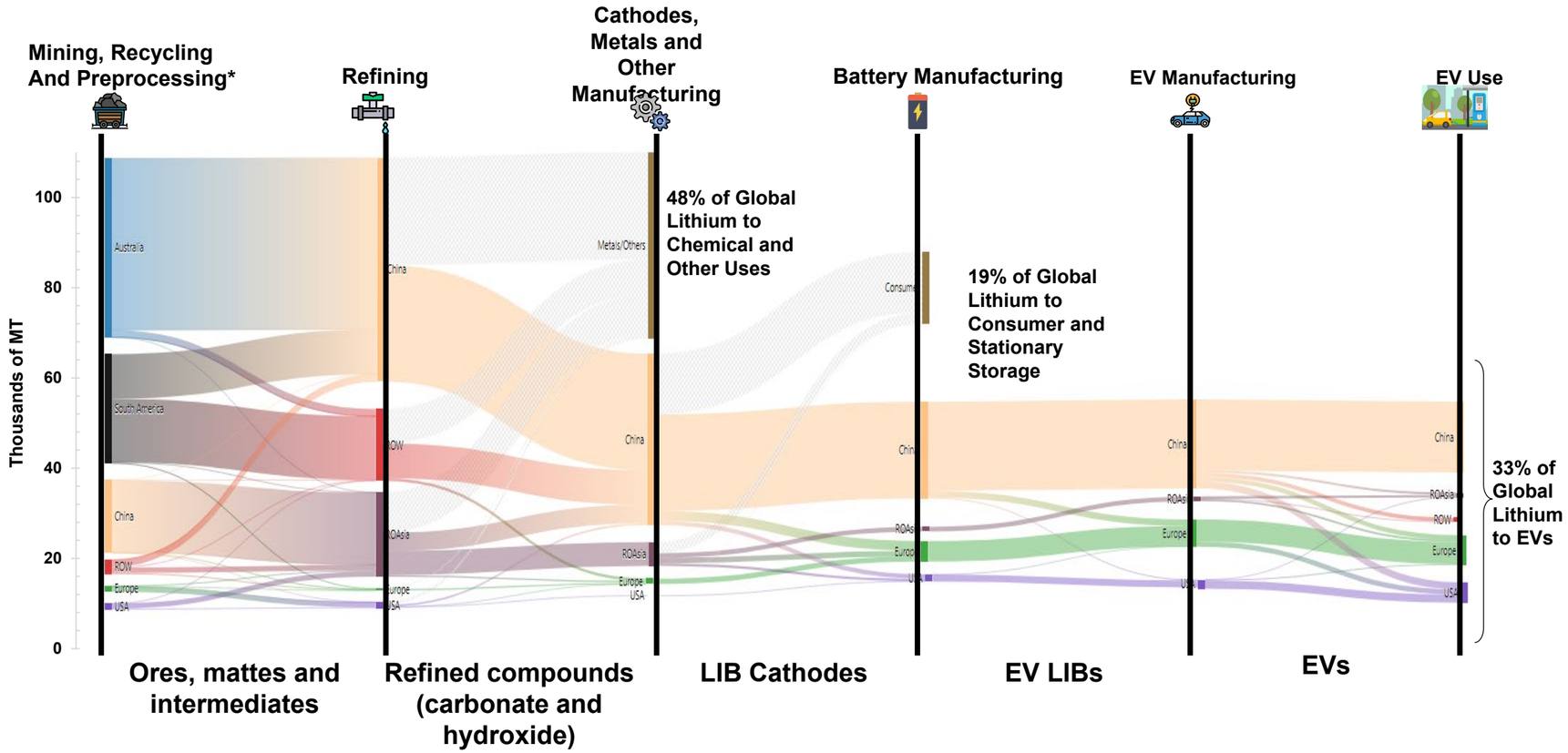
U.S. DEPARTMENT OF ENERGY

U.S. energy consumption by source and sector, 2021

quadrillion British thermal units (Btu)



2021 Global Supply Chain Flows



ROAsia – Rest of Asia
ROW – Rest of World

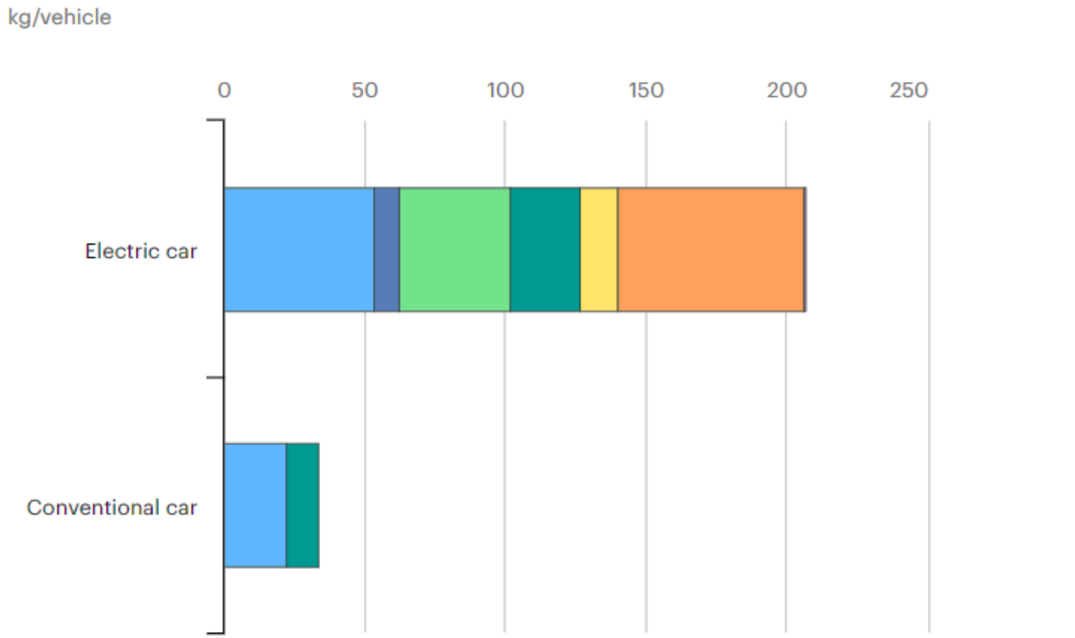
Non- LIB EV battery related flow

***Mining, Recycling and Preprocessing products:**

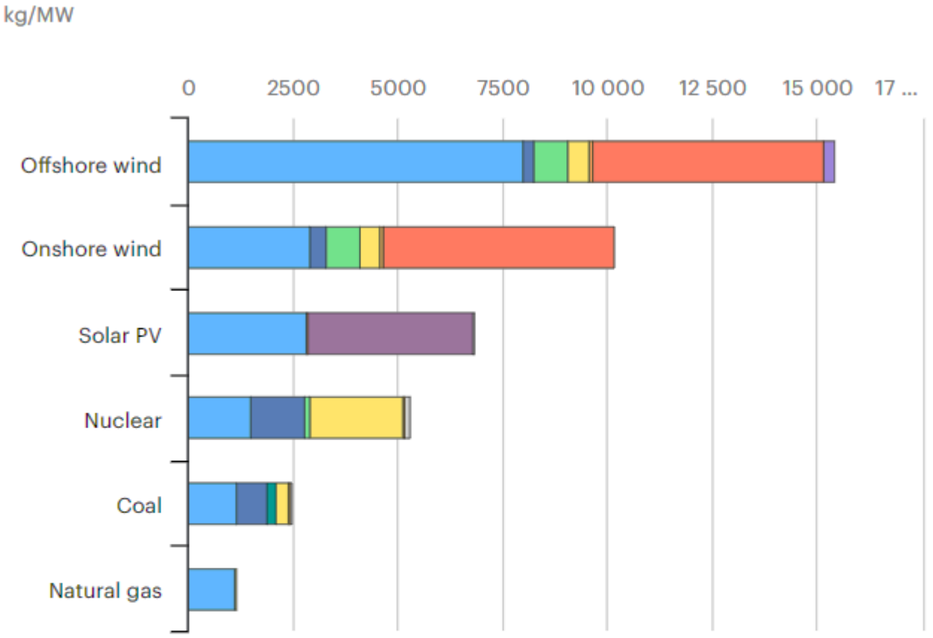
- Ores: naturally occurring solids containing cobalt
- Mattes and Intermediates: (30-100% Co)

Sources: NREL Analysis; USGS,"Mineral Commodity Summaries"; 2022, https://doi.org/10.3133/mcs2022; International Trade Centre, a joint agency of the World Trade Organization and the United Nations, https://www.intracen.org/ , "Global Cobalt Outlook 2020-2030" and Battery Material Manufacturing database, https://www.bnef.com

Critical Minerals for Electric Vehicles and Clean Energy Technologies

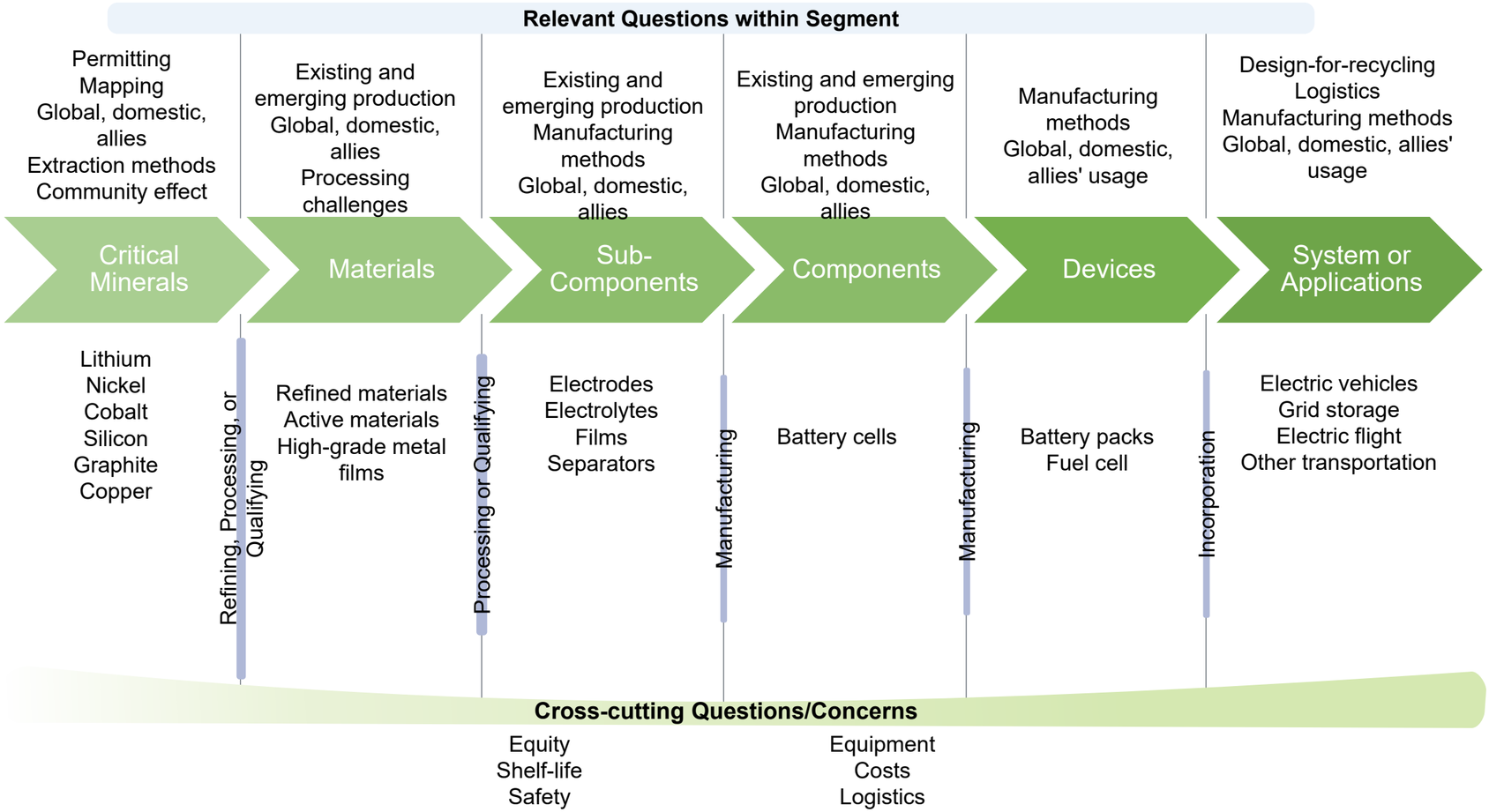


Copper Lithium Nickel Manganese Cobalt Graphite Zinc
Rare earths Others



Copper Nickel Manganese Cobalt Chromium Molybdenum Zinc
Rare earths Silicon Others

Mapping out the lithium-ion battery supply chain



Decarbonizing Is Part Of a Broader Approach

Meet Everyone's Needs

Reliable energy solutions for people and goods recognizing diverse needs of different communities and stakeholders

Affordable

Affordable (for consumers) and competitive for industry by supporting economy/jobs

Environmental Quality

High quality local air and water in addition to GHG emissions

Areas of Engagement

- **Strengthening and securing energy supply chains** to modernize the nation's energy infrastructure and support the clean energy transition
- **Recent Congressional action and the road ahead**: Bipartisan Infrastructure Law, CHIPs Act, and Inflation Reduction Act

U.S. DEPARTMENT OF ENERGY

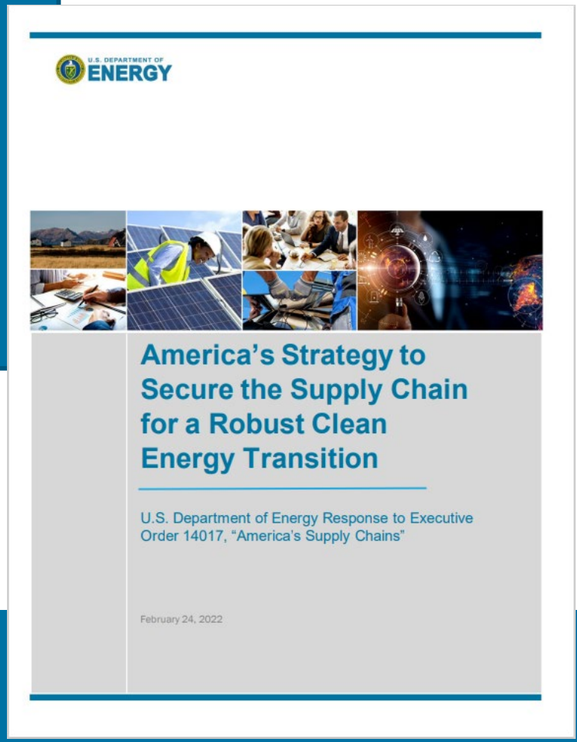
Strengthening and securing energy supply chains to modernize the nation's energy infrastructure and support the clean energy transition

Executive Order 14017: America's Supply Chains *(February 2021–2022)*

- DOE released 14 reports on the energy sector supply chains, including 13 issue-specific deep dive assessments and an overarching strategy report
- "America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition" is the first-ever comprehensive U.S. government strategy to secure our domestic energy supply chains and an Energy Industrial Base
- Lays out dozens of critical strategies and actions to build secure, resilient, and diverse domestic energy supply chains
- Part of a larger whole-of-government approach on supply chains

Deep-Dive Assessment Report Topics

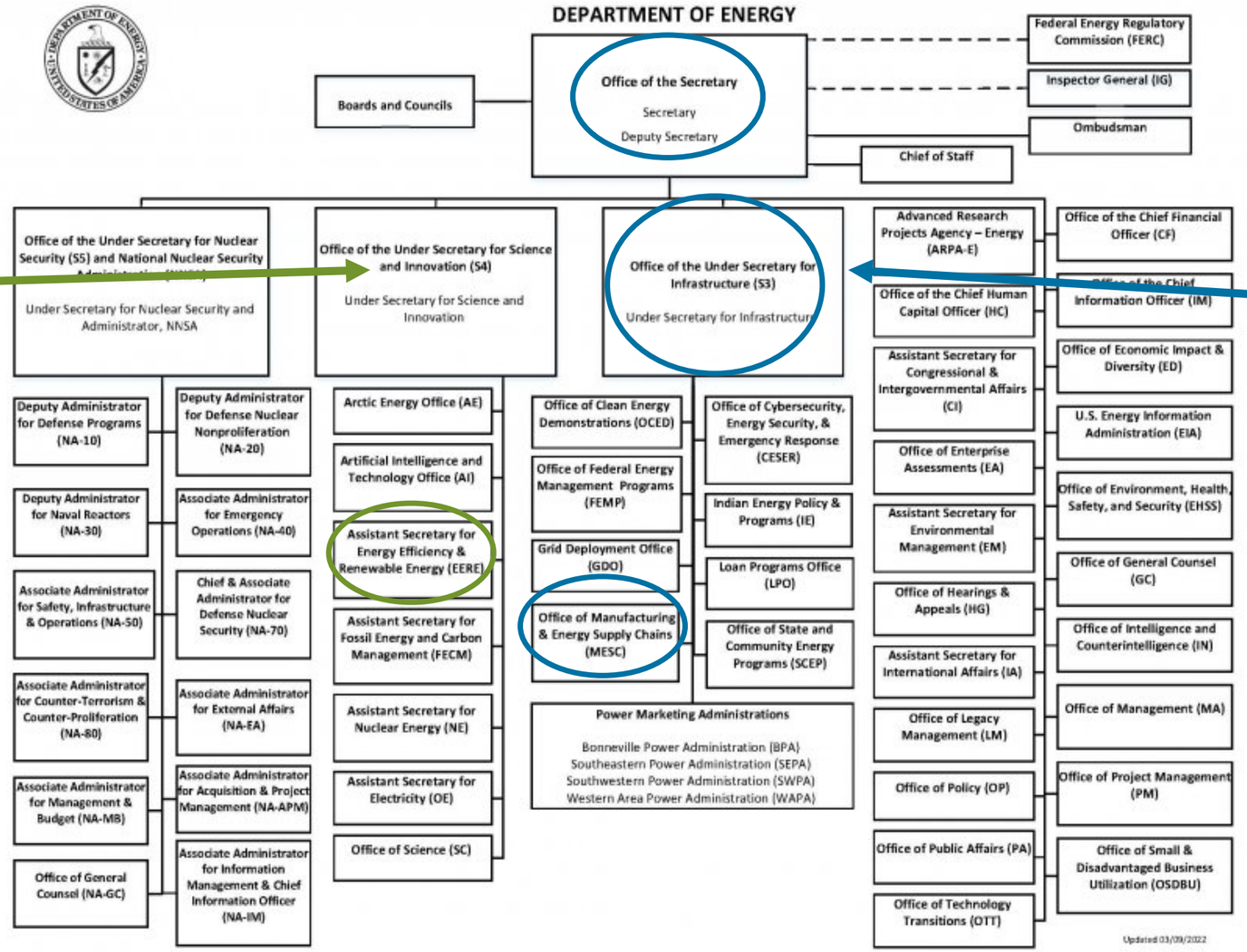
- Carbon capture materials
- Electric grid including transformers and high voltage direct current
- Energy storage
- Fuel cells and electrolyzers
- Hydropower including pumped storage hydropower
- Neodymium magnets
- Nuclear energy
- Platinum group metals and other catalyst
- Semiconductors
- Solar photovoltaics
- Wind
- Commercialization and competitiveness
- Cybersecurity and digital components



https://www.energy.gov/policy/securing-americas-clean-energy-supply-chain

DOE's Office of Manufacturing & Energy Supply Chains

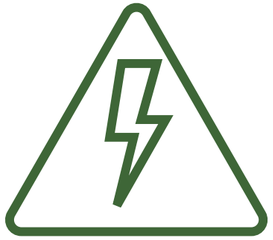
Research & Development



Demonstration & Deployment

DOE's Office of Manufacturing & Energy Supply Chains

Responsible for **strengthening and securing manufacturing and energy supply chains** needed to modernize the nation's energy infrastructure and support a clean and equitable energy transition.



Cultivate energy sector industrial base

Engage with ALL stakeholders

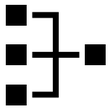
Develop clean domestic manufacturing

Create Jobs

Manufacturing & Energy Supply Chain BIL Funding

- **<u>Facility and Workforce Assistance</u>:** Address regional manufacturing and supply chain challenges and train the next generation of energy engineers
  - Industrial Assessment Centers, Expansion, and Implementation ($550M)
  - Manufacturer/Industrial/ Recycling Grants in Distressed Communities ($750M)
  - State Manufacturing Leadership ($50M BIL)

- **<u>Battery and Critical Materials</u>:** Support Scale-Up and Deployment of manufacturing infrastructure critical to the Nation's energy supply chain
  - Battery Manufacturing, Material Processing, and Recycling (>$6B)
  - Rare Earth Element Demo Facility ($140M)

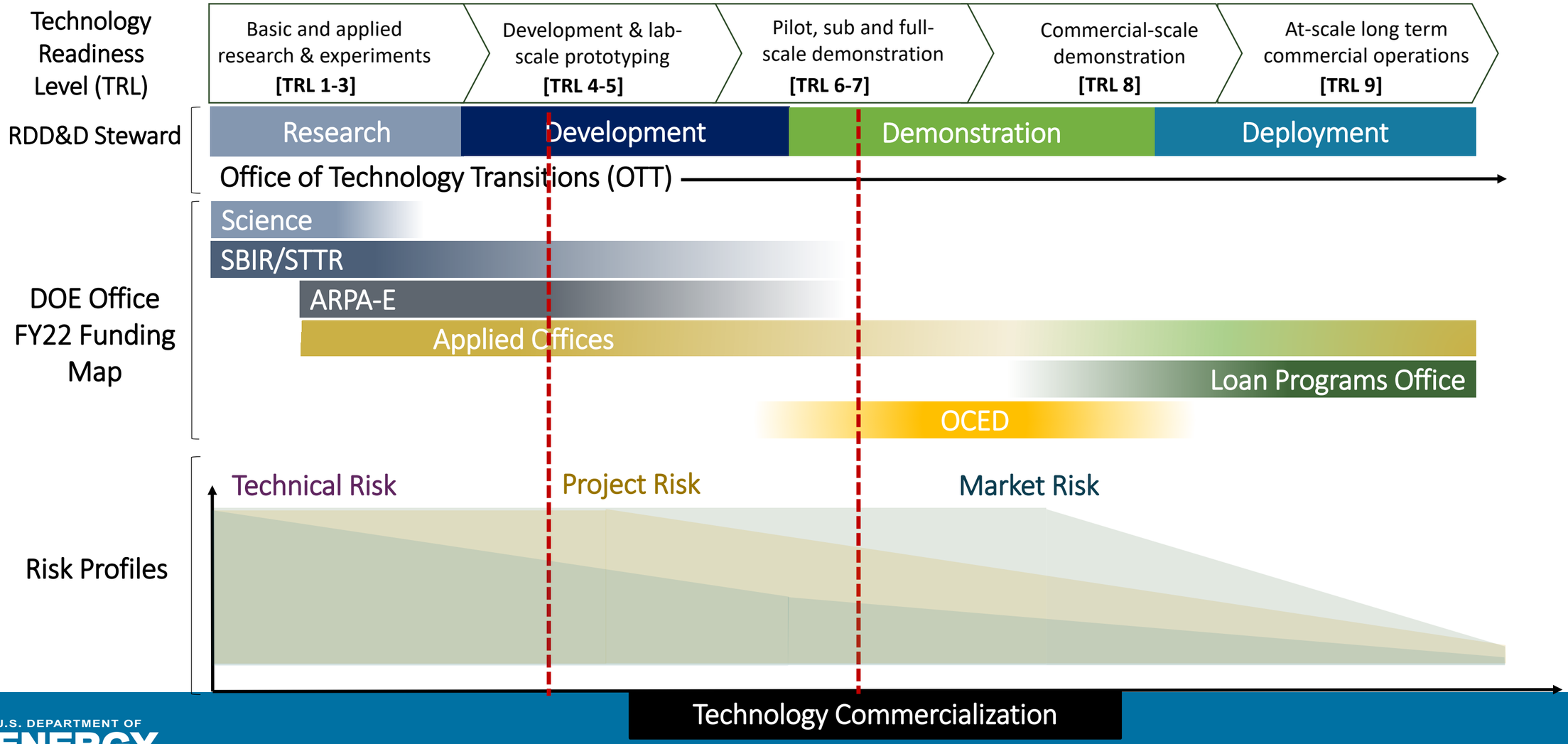


- **<u>Energy Sector Industrial Base</u>:** Assess and identify national and regional energy sector supply chain gaps and challenges, and strategies to address those issues
  - Transformer and EPS Rebates ($20M)

Critical Minerals Institute – DOE National Labs

Diversifying Supply	• Expanding sources, transformative processes, new uses for co-products
Developing Substitutes	• Synthesize materials that meet needs, use less
Driving Reuse and Recycling	• Available materials more efficiently, reducing waste in mfg. processes
Crosscutting Research	• Research tools to forecast future critical minerals

OCED Role Across Research, Development, Demonstration & Deployment (RDD&D) Continuum



IAC Expansion

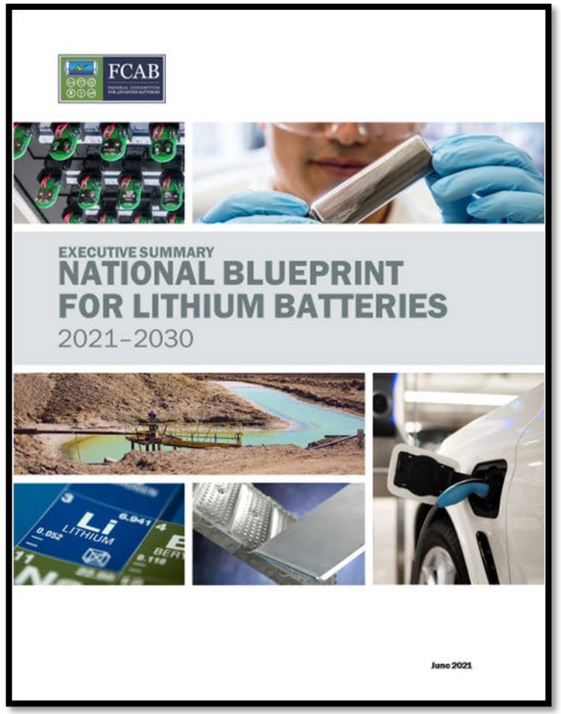
Community College, Trade School, Union Training Program		
Eligibility	Community Colleges accredited by USDE Regional Accrediting Organization Trade Schools accredited by Accrediting Commission of Career Schools and Colleges Union Training Programs (in development)	
Grants	Potential Award range: >$100K-annual (3-5 years)	
Roles	Provide training for entry-level clean energy workforce jobs Participate in IAC assessments with IHE IACs or independently Support outreach to SMMs, including development of and on-site distribution of training and education Host events bringing together stakeholders Host internship and apprenticeship programs Develop connections with industry for credentials and certification in clean energy pathways	
Potential Areas of Interest	- Advanced Manufacturing - Carbon Capture & Sequestration - Cybersecurity - Distributed Energy Technologies - Energy Efficiency - Energy Management - Engineering (electric engineering, energy engineering)	- HVAC & Refrigeration - Management (business development, finance, marketing, public affairs) - Renewable Energy (solar, wind installation) - Smart Manufacturing - Waste Management - Water / Wastewater Technologies

IAC Implementation Grants

IAC Implementation Grants	
Eligibility	Small and Medium-Sized Manufacturers
Total Funding	$400M over FY22-FY26
Prerequisite	IAC Assessment CHP TAP + IAC Assessment Assessment Deemed Equivalent
Individual Awards	≤ $300,000 each to implement recommendations made in assessments above 50% cost share
Prioritization	Energy savings + GHG emission reduction Financial need (must supplement, not supplant available State or private funds available)

National Blueprint for Lithium Batteries

By 2030, the United States and its partners will establish a secure battery materials and technology supply chain that supports long-term U.S. economic competitiveness and job creation, enables decarbonization goals, and meets national security requirements.



https://www.energy.gov/eere/vehicles/articles/national-blueprint-lithium-batteries

Minerals

Battery Materials

Cells/Packs

Recycling

Innovation

GOALS TO ACHIEVE OUR VISION

1 Secure access to raw and refined materials and discover alternates for critical minerals for commercial and defense applications

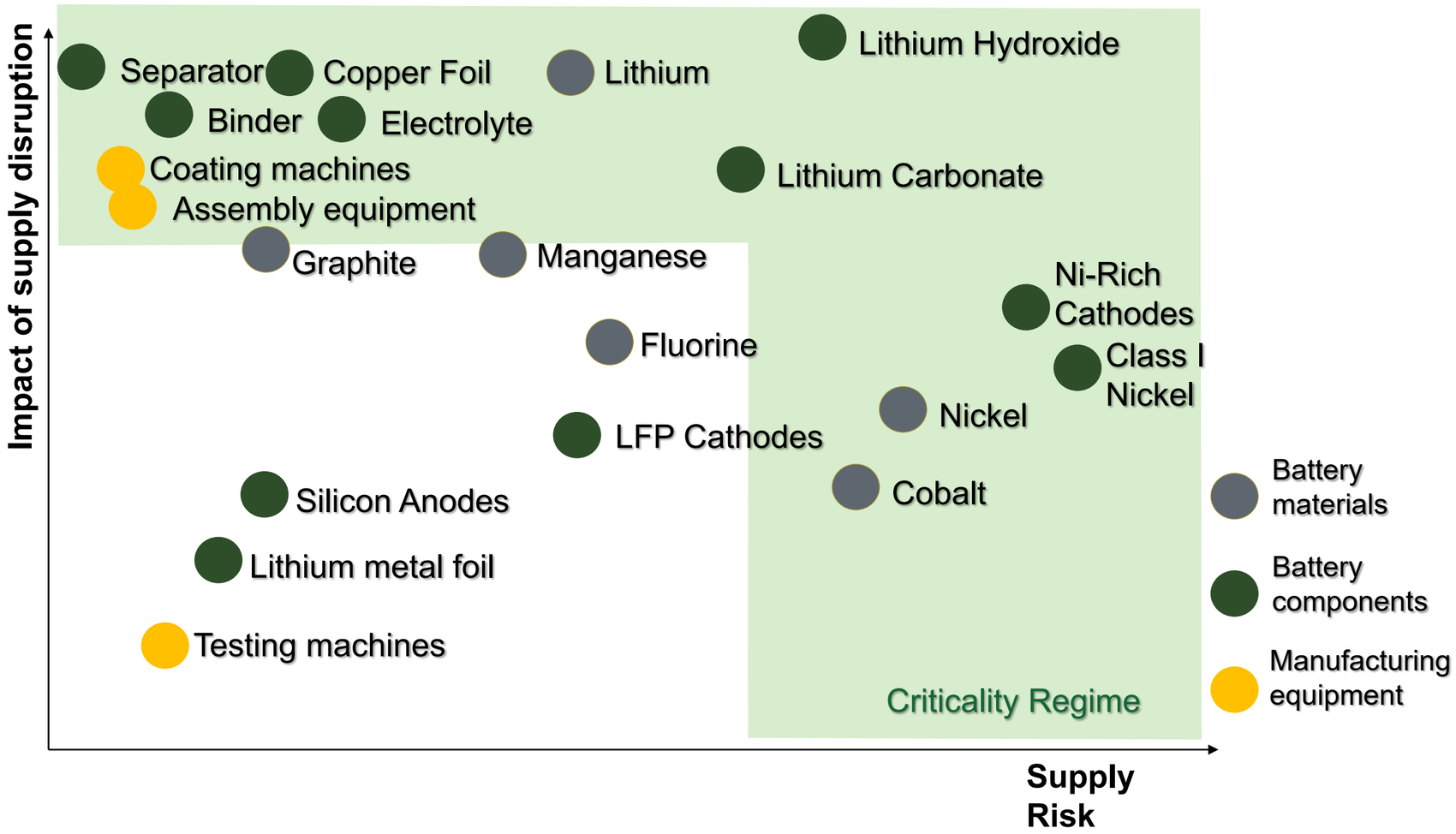
2 Support the growth of a U.S. materials processing base able to meet domestic battery manufacturing demand

3 Stimulate the U.S. electrode, cell, and pack manufacturing sector

4 Enable U.S. end of life reuse and critical materials recycling at scale and a full competitive value chain in the United States

5 Maintain and advance U.S. battery technology leadership by strongly supporting scientific R&D, STEM education, and workforce development

Identifying Battery Supply Chain Criticalities



Recent Congressional action and the road ahead: Bipartisan Infrastructure Law, CHIPs Act, and Inflation Reduction Act

MESC - Inflation Reduction Act (IRA)

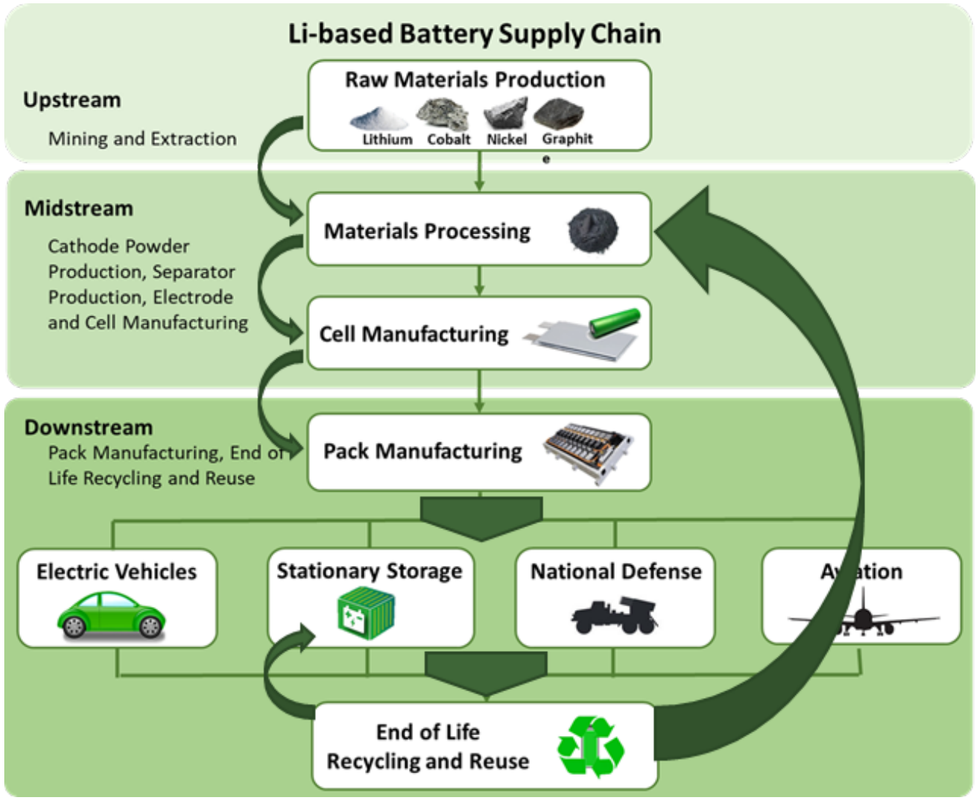
- **Programs**:
  - Invest in clean energy demonstration projects through **Industrial Facilities Deployment at $5.8B** in partnership with OCED (grants, rebates, loans, co-ops) at 50% cost share

- **Grants**:
  - **$2 billion in Domestic Manufacturing Conversion Grants** to support the transition of domestic manufacturing facilities to manufacture EVs, hybrids, and hydrogen fuel cell vehicles

- **Defense Production Act**:
  - **Heat Pumps initially at $250M** with ongoing potential for increased funding with other technologies (semiconductors, electrolyzers, solar, fuels cells, insulation)

- **Tax Credits**:
  - 45X – A new **Advanced Manufacturing production tax credit** is created for production of clean energy technology components that are produced in the U.S. or by a U.S. possession (solar, wind, battery, critical minerals).
  - 48C - The new and expanded **Advanced Energy Investment Tax Credit** credits up to 30 percent of the qualified investment in property used in a qualifying advanced energy project. **(capped at $10B)**

BIL + IRA: Battery Materials Processing and Battery Manufacturing



BIL	IRA	DPA
	✓	✓
✓		✓
✓	✓	
✓	✓	
	✓	
✓		

Summary

- **Strengthening and securing energy supply chains** to modernize the nation's energy infrastructure and support the clean energy transition
- **Recent Congressional action and the road ahead**: Bipartisan Infrastructure Law, CHIPs Act, and Inflation Reduction Act

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