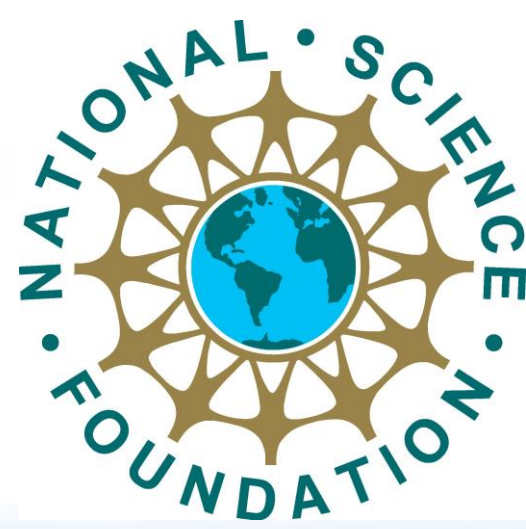




U.S. DEPARTMENT OF
ENERGY

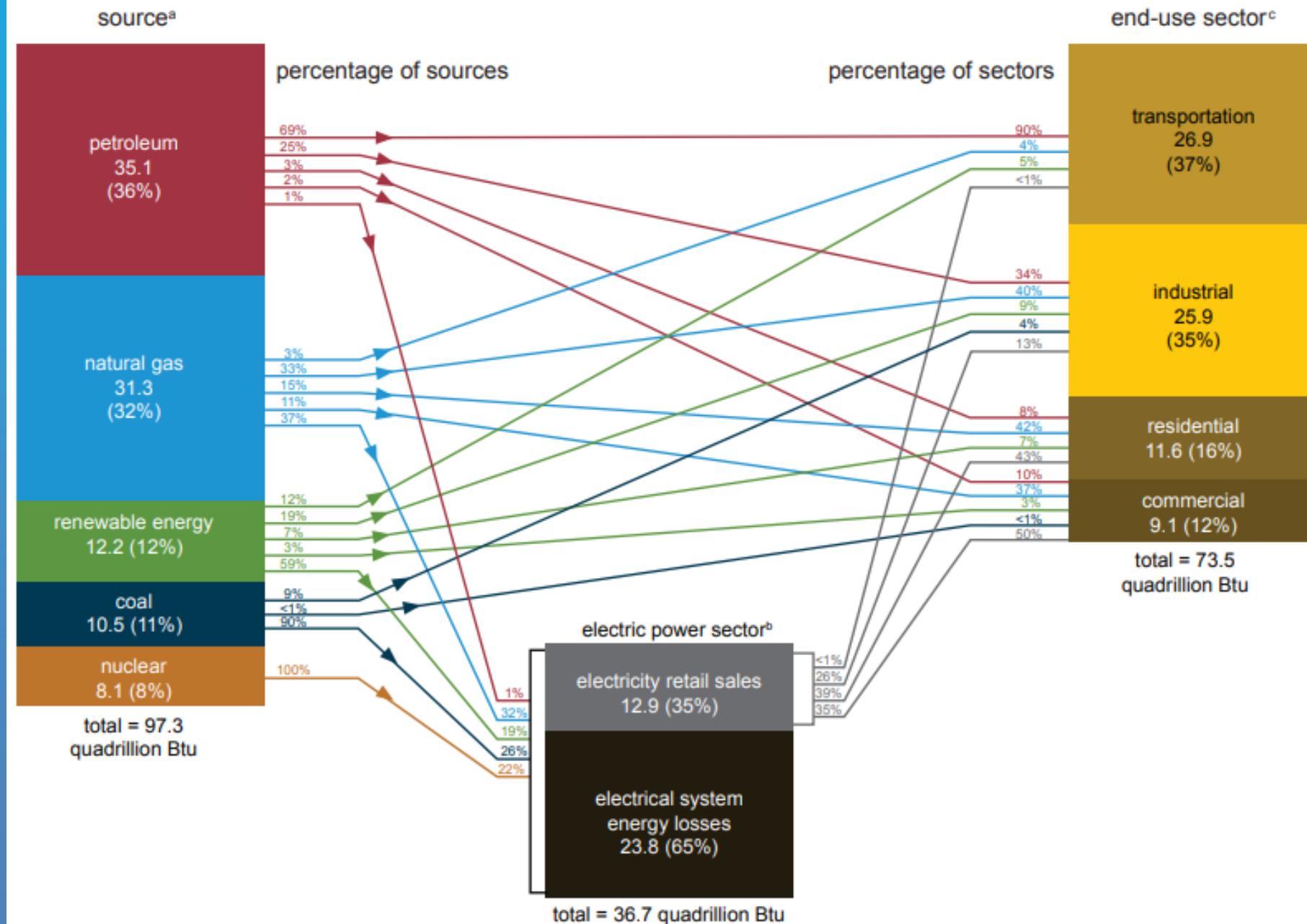


Deploying our way to a Clean Energy Future

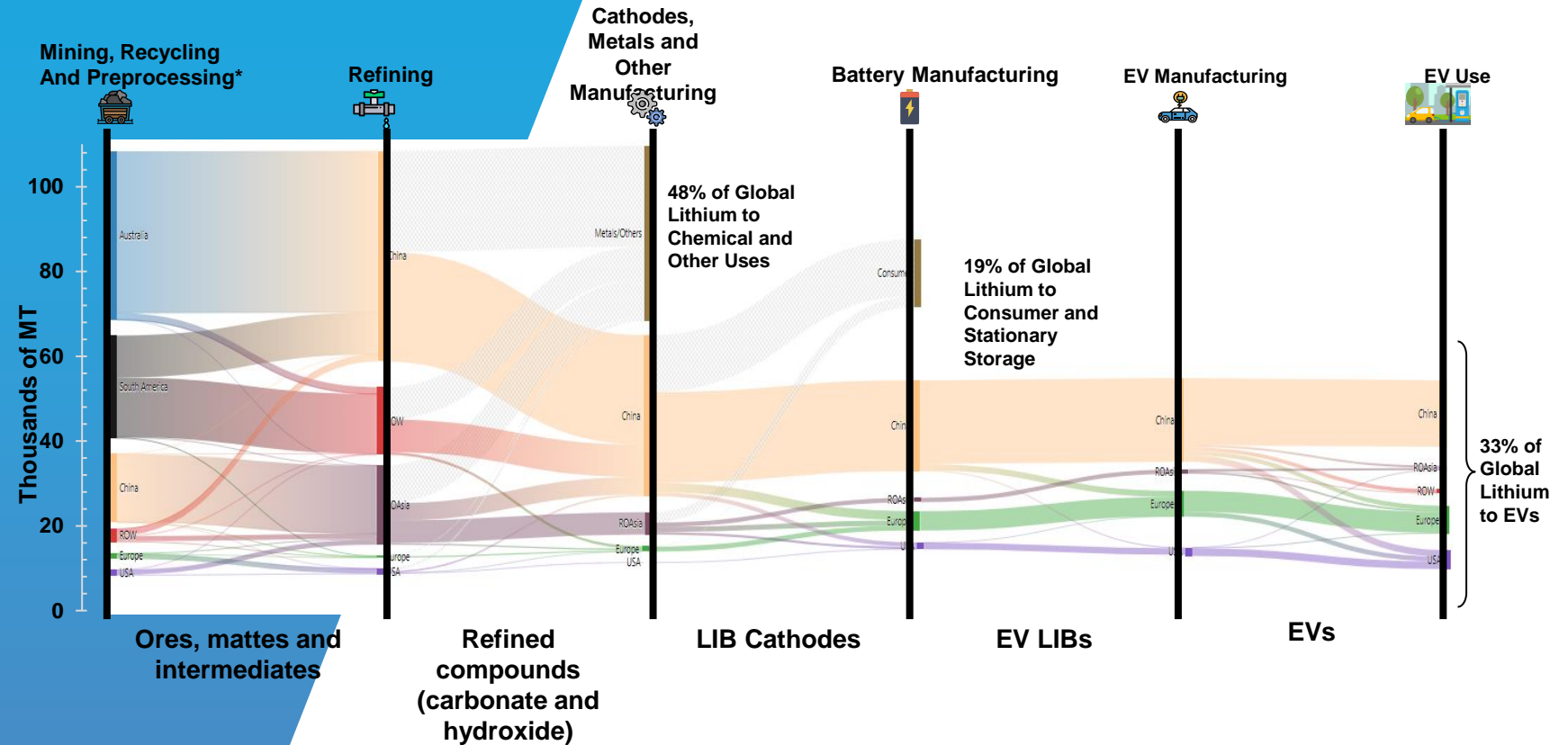


U.S. energy consumption by source and sector, 2021


quadrillion British thermal units (Btu)



2021 Global Supply Chain Flows



ROAsia – Rest of Asia
 ROW – Rest of World

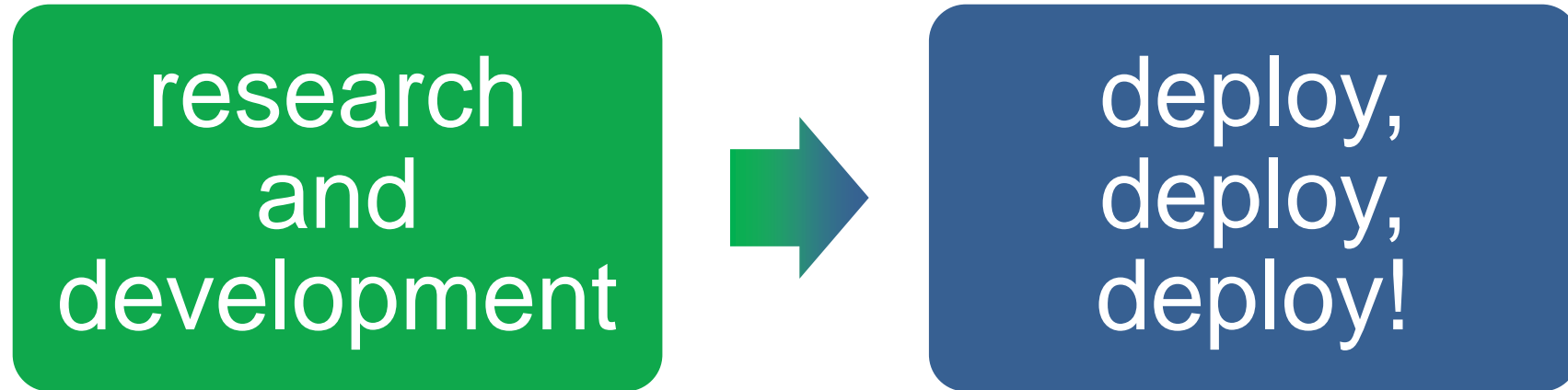
 Non- LIB EV battery related flow

***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>

Innovation and Infrastructure



**HIGH-PAYING, GOOD QUALITY JOBS THAT
DON'T REQUIRE COLLEGE DEGREES**

SAFER HOMES FOR KIDS + FAMILIES

LOWER MONTHLY ENERGY BILLS

**MAKING CLEAN ENERGY CONSUMER
CHOICES MORE ACCESSIBLE + AFFORDABLE**

**LESS RELIANCE ON FOREIGN MANUFACTURERS
+ A MORE RESILIENT SUPPLY CHAIN FOR CONSUMERS**

**SUPPORT FOR STATE, LOCAL, + TRIBAL
GOVERNMENTS TO MAKE COMMONSENSE,
LOCALIZED INVESTMENTS FOR THEIR COMMUNITIES**

Learn more at www.energy.gov/BIL

\$7.5 billion

Building a national EV charging network so every community can access zero- + low-carbon transportation options

\$3 billion

Supporting weatherization + energy efficient upgrades for American homes + businesses

\$2.8 billion

Bringing battery production home to America, creating more than 8,000 U.S. jobs

\$425 million

Helping states implement clean energy projects

\$250 million

Funding state loan programs for energy efficient upgrades in residential + commercial buildings

AND MUCH MUCH MORE...

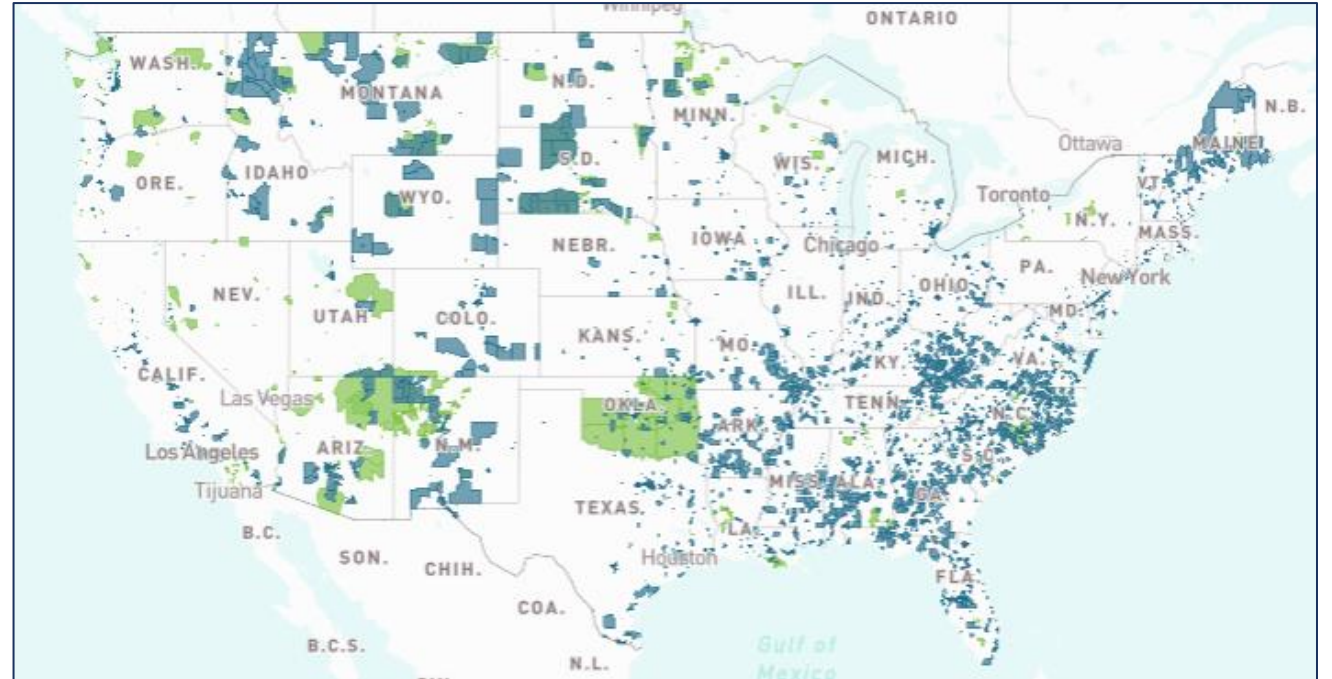
Goals for Funding Opportunities



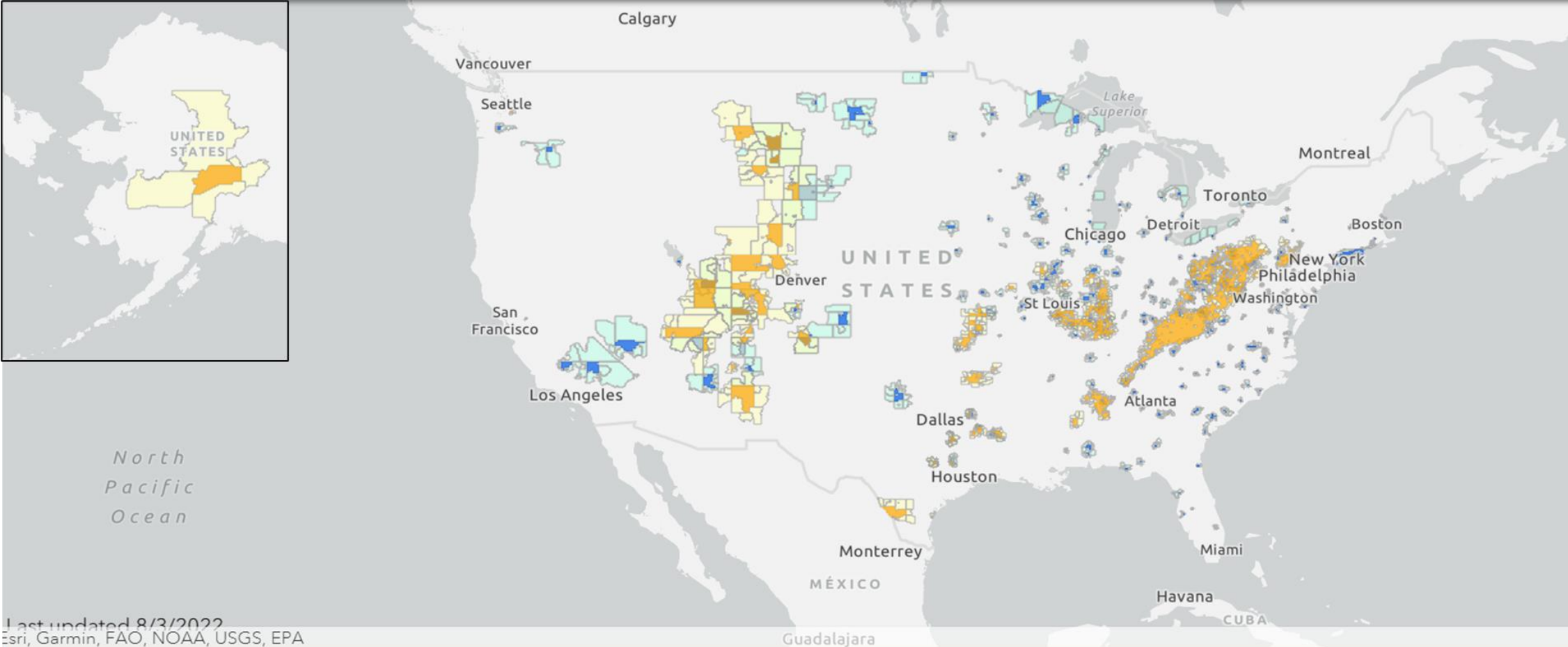
Justice40 Disadvantaged Communities

Where are the disadvantaged communities (DAC)?

- Community can be either:
 - people in geographic proximity or
 - people experiencing a common condition.
- Disadvantage was measured based on a score across 36 indicators.
- Census tracts with at least 30% low-income households and disadvantage scores higher than 80 percent of those in their state are DACs.



40209 Energy Communities



U.S. DEPARTMENT OF ENERGY | NATIONAL ENERGY TECHNOLOGY LABORATORY | CC BY 4.0

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[Live Map Link](#)



PROCUREMENT SENSITIVE – DOE INTERNAL DOCUMENT

Clean Energy Infrastructure Stakeholders



Communities



States and Tribes



Utilities



Industry



Manufacturers



Non-profits



Universities



K-12 Schools



Infrastructure Projects Create Jobs and Local Benefits



Lowering energy bills for households and businesses



Creating good jobs and boosting energy supply chains and domestic manufacturing



Advancing world-class, next generation clean energy technology demonstrations



Making the energy system more secure, reliable, and resilient

GROWING THE CLEAN ENERGY ECONOMY



Phase

Research & Development

Demonstration

Deployment

Diffusion

Occupations

Research

Design &
Engineering

Construction, Installation, Manufacturing,
Production, Repairs, Operations & Maintenance,

Sales & Service

Who is the Clean Energy Workforce?



Training

4-year or advanced degree, professional license

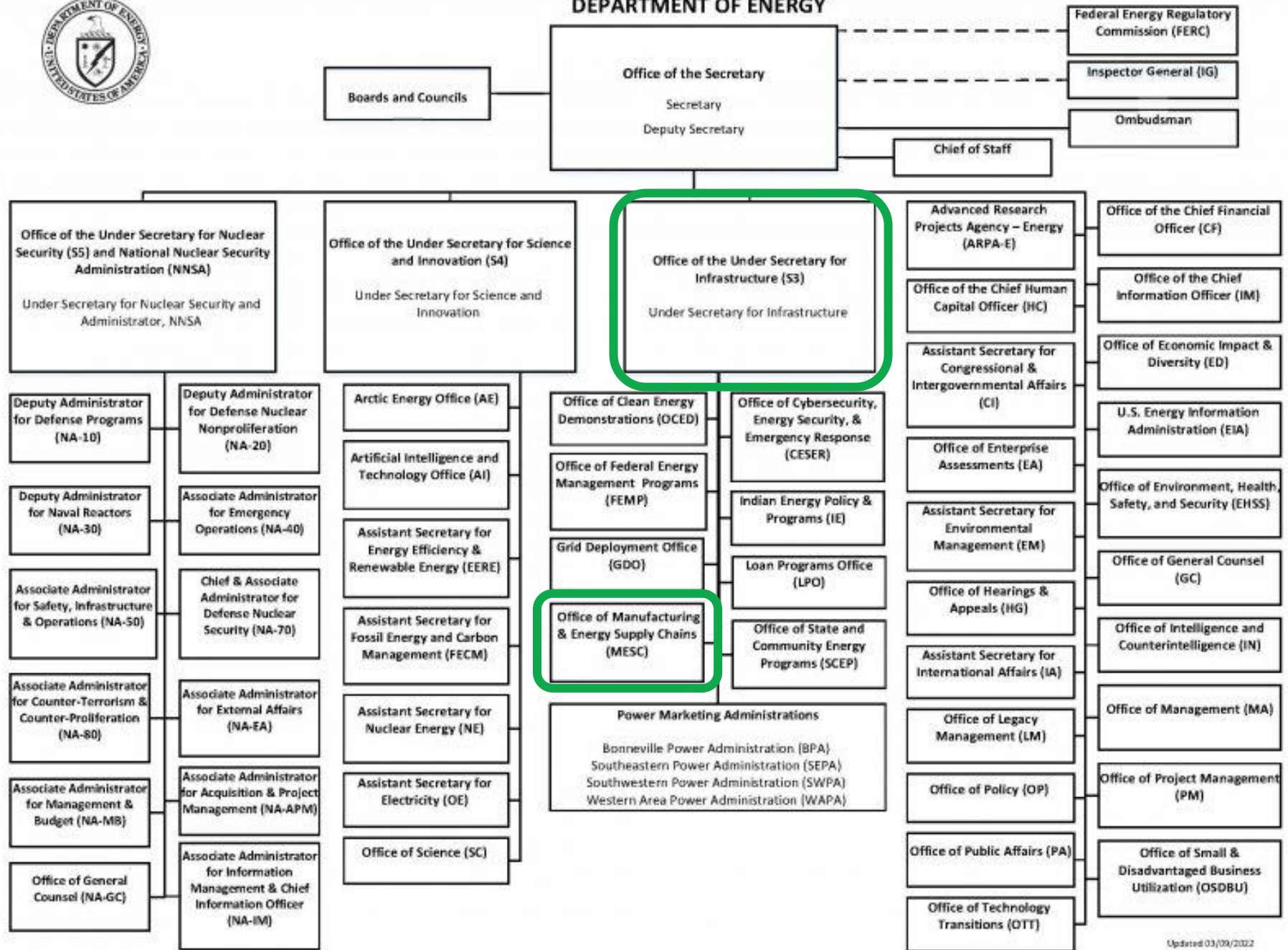
Technical degree, Apprenticeship, Certification



MESC
OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

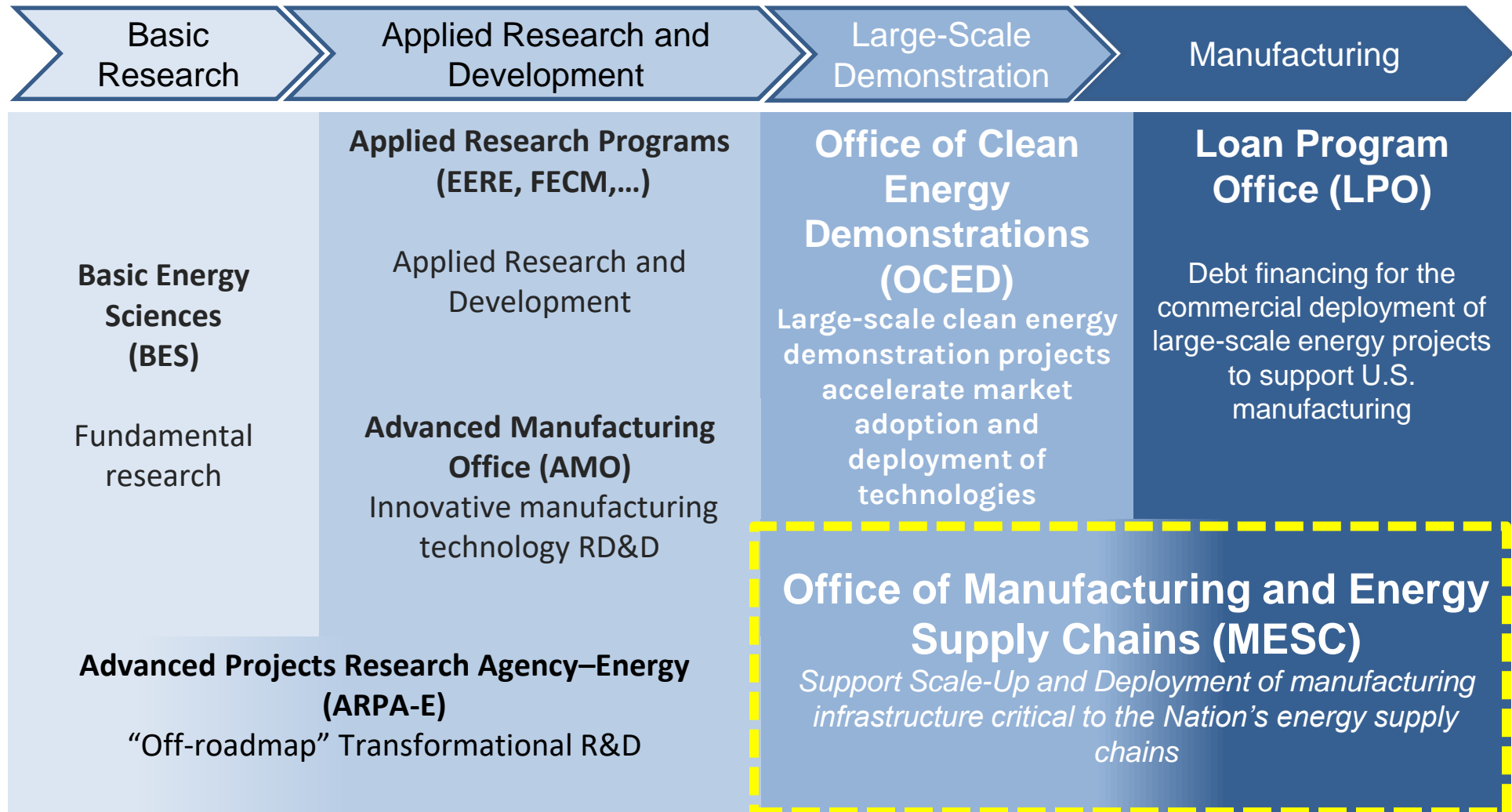


DEPARTMENT OF ENERGY



MESC's Place in the DOE Ecosystem

DOE Innovation, Demonstration, Manufacturing Landscape



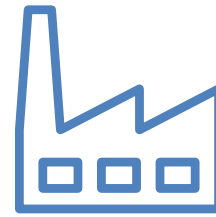
DOE's Office of Manufacturing & Energy Supply Chains



**Energy Sector
Industrial Base**



**Engage with
ALL stakeholders**



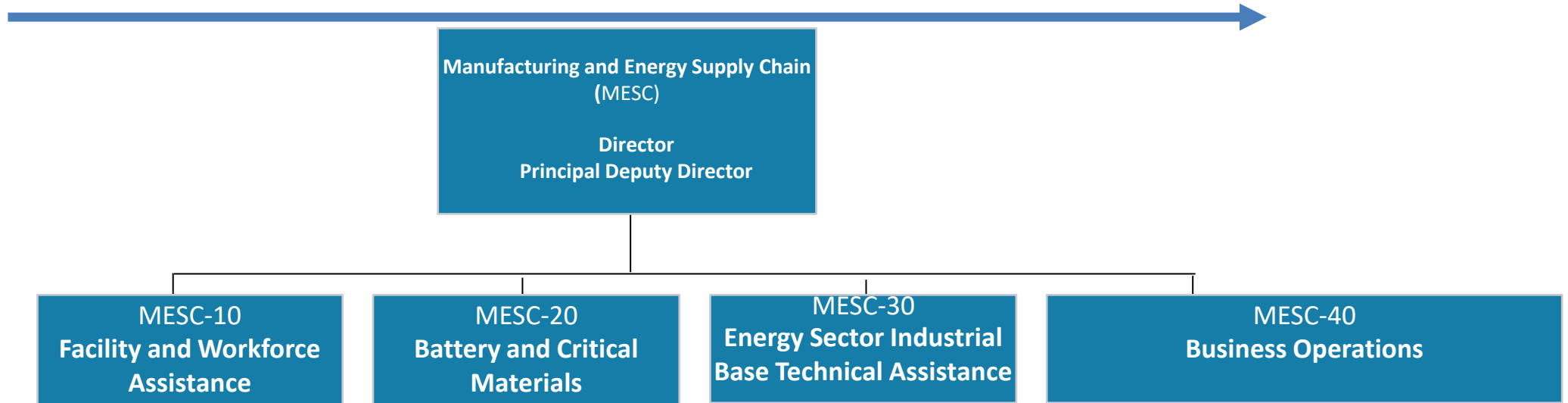
**Develop clean
domestic
manufacturing**



**Create
Jobs**

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.

Manufacturing and Energy Supply Chain



Cross-Office Functions:

- Strategy
 - Lead intra-DOE coordination
 - Set multi-year program plans with other offices
- Portfolio Management
 - Assess project/portfolio risk
 - Support portfolio decision-making
 - Project Selection and Execution
- Expert Team to support Strategy and Portfolio Management, Awards, Technology experts
 - Market / technoeconomic
 - Financial



MESC Distinctives

Mission: Strengthen and secure domestic clean energy and manufacturing supply chains

Objectives: Catalyze resilient and sustainable energy sector industrial base (ESIB)

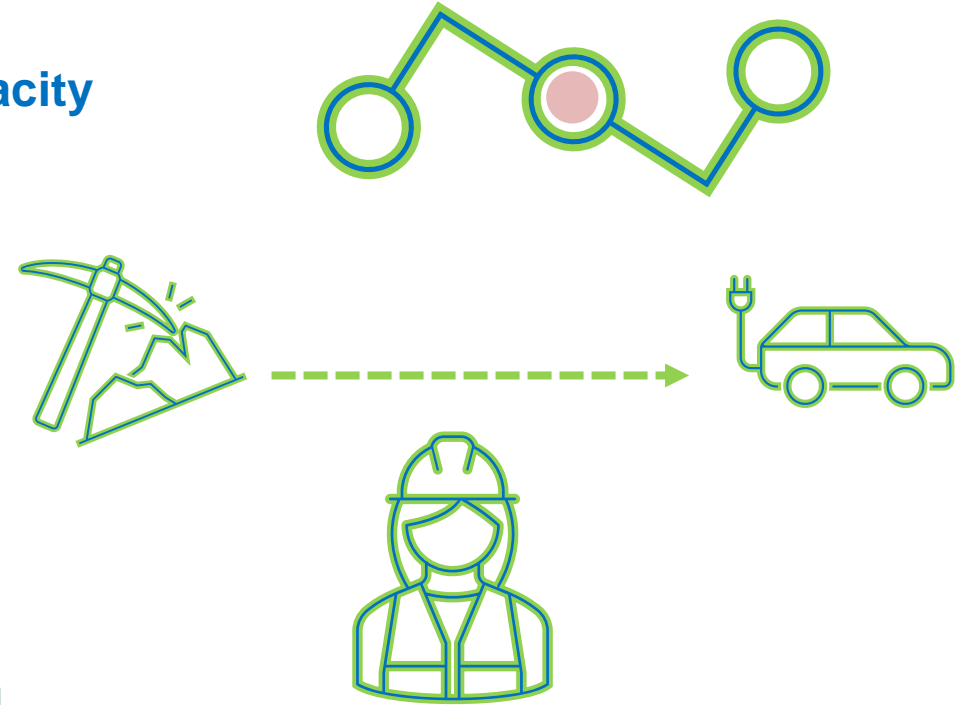
- **Scale-Up and Deployment of new manufacturing infrastructure** to fill critical ESIB gaps
- **Support Manufacturing Facility Upgrades** to achieve ESIB decarbonization Goals
- Bolster **small and medium manufacturing enterprises** and support **communities in energy transition**.
- Develop domestic manufacturing **clean energy workforce capabilities** and resources



MESC Distinctives

Mission: Strengthen and secure domestic clean energy and manufacturing supply chains

- (1) Install Critical Supply Chain Manufacturing Capacity
- (2) Reduce Industrial Base Carbon Emissions
- (3) Increase Clean Energy Jobs



~\$6B – battery supply chains

~\$6B – industrial decarbonization

~\$10B – ITC (48c)



Director: David Howell (acting)

Principal Deputy Director: David Howell

Chief of Staff: Zack Valdez

MESC-10

Facility and Workforce Assistance

Structure

Address regional manufacturing and supply chain challenges

- *Upgrade existing manufacturing facilities*
- *Emphasis on opportunities for small and medium enterprises and communities in energy transition.*
- *Train the next generation of energy engineers*

Funding

1. FY23 IACs
2. BIL 40523 IAC Expansions
3. BIL 40521 IAC Impl. grants
4. BIL 40209 Manufacturer/Industrial/ Recycling Grants in Distressed Community
5. BIL 40534 State Manufacturing Leadership
6. **IRA 50161 Advanced Industrial Facilities Deployment**

Stakeholders

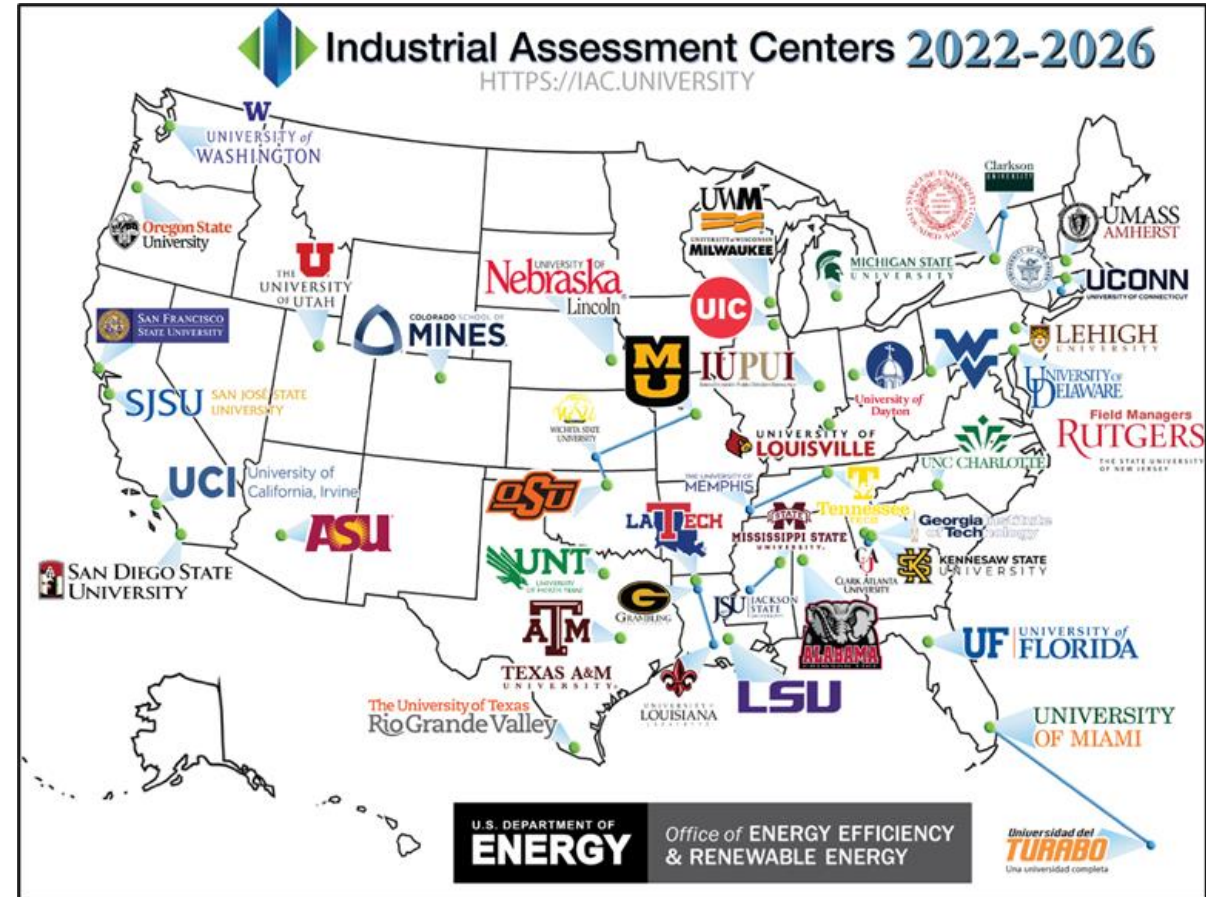
- *Broad Group of Industrial Enterprises*
 - *Regional Manufacturers*
 - *Small and Medium Manufacturing Enterprises*
- *Academia: Universities, Community Colleges, Technical Schools*
- *State/Local Governments*



Industrial Assessment Centers (IAC) Program

For more than four decades, the federal government has worked with four-year IHEs through the IAC Program to:

- Provide technical assistance to small- and medium-sized manufacturing firms in areas including energy efficiency, smart manufacturing, cybersecurity, and more
- Train the next generation of energy-savvy engineers



Director: David Howell (acting)

Principal Deputy Director: David Howell

Chief of Staff: Zack Valdez

MESC-20

Battery and Critical Materials

Structure

Scale-Up & Deployment of new manufacturing capacity

- *Critical minerals and materials, and key material components*
- *Establish critical critical materials recycling and re-use ecosystem*
- **CM Focus Areas**
 - *Battery materials*
 - *Rare Earths, PGMs, + Other Critical Materials*

Funding

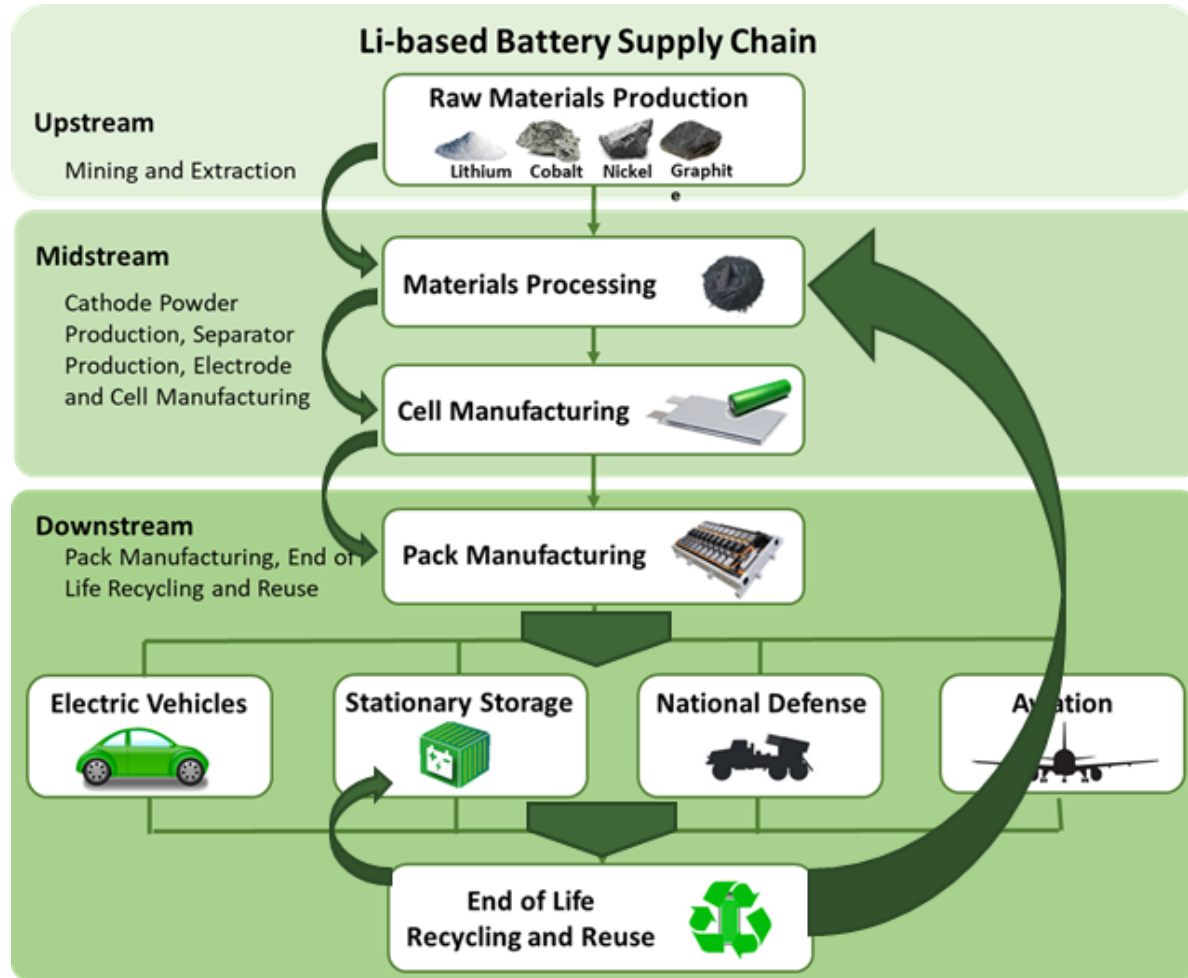
1. 40207 Battery Material Processing
2. 40207 Battery Manf.
3. 40207(f3) Battery Recycling: State/Local Programs
4. 40207(f4) Battery & Crit. Mineral Recycling: Retailer Collection
5. BIL 40205 Rare Earth Demo

Stakeholders

- *Upstream and Mid-Stream Mineral Processing, Refining, and Materials Production Enterprises*
- *Recycling Enterprises*
- *Upstream and Mid-Stream Innovation, Demonstration and Scale-Up Stakeholders*
- *Private Sector, Federal Agencies, International Partners, State/Local*



Background: Battery Supply Chain and BIL, IRA, DPA



BIL	IRA	DPA

BIL FOA 2678

Sec. 40207(b) Battery Material Processing Grants

- Total \$3 Billion Federal over 5 years
- 2022 FOA: \$1.5 Billion Federal (*matched by Applicant*)

Sec. 40207(c) Battery Manufacturing and Recycling Grants

- Total \$3 Billion Federal over 5 years
- 2022 FOA: \$1.6 Billion Federal (*matched by Applicant*)



Director: David Howell (acting)

Principal Deputy Director: David Howell

Chief of Staff: Zack Valdez

MESC-30

Energy Sector Industrial Base

Structure

Scale-Up & Deployment of new manufacturing capacity

- *Critical components, devices, systems*
- *Establish world-class Energy Sector Industrial Base mapping, modeling, and analysis tools.*
- **ESIB Focus Areas**
 - *Grid/HV/Storage*
 - *Solar/Wind*
 - *Fuel Cells/Electrolysis*
 - *Semiconductors*

Funding

1. FY23 Technical Assistance Modeling. Mapping, and Analysis
2. BIL 4055 Rebate Program
3. **IRA 50143 Manufacturing Conversion Grants (+OCED)**
4. **DPA (IRA).**
5. **48c + 45x Tax Credits**

Stakeholders

- *Mid-Stream and Down-Stream Components, Device, and Systems Manufacturing Enterprises*
- *Supply Chain Planning and Forecasting Stakeholders*
- *Private Sector, International Partners*

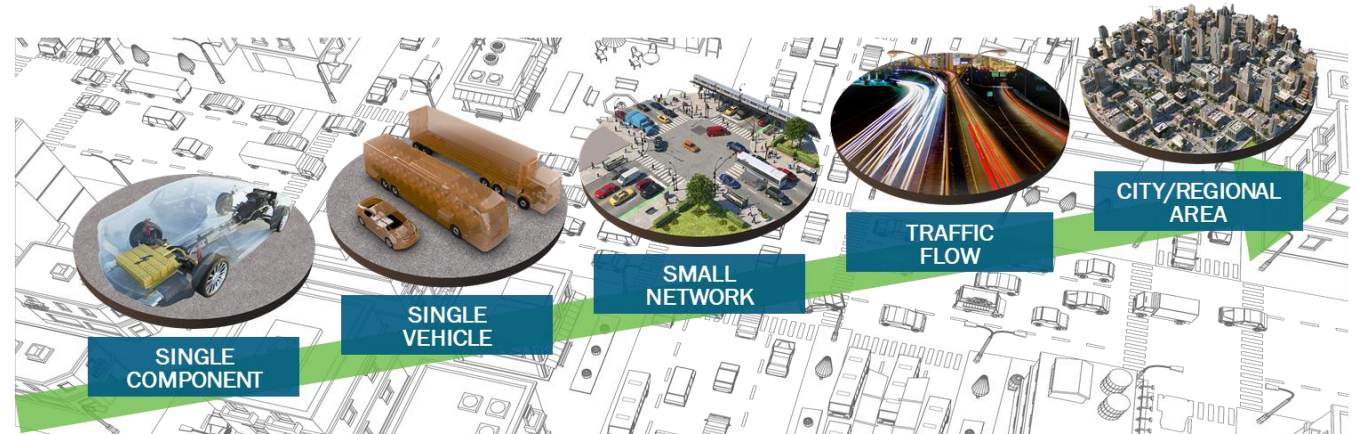


ESIB: Supply Chain Modeling and Analysis

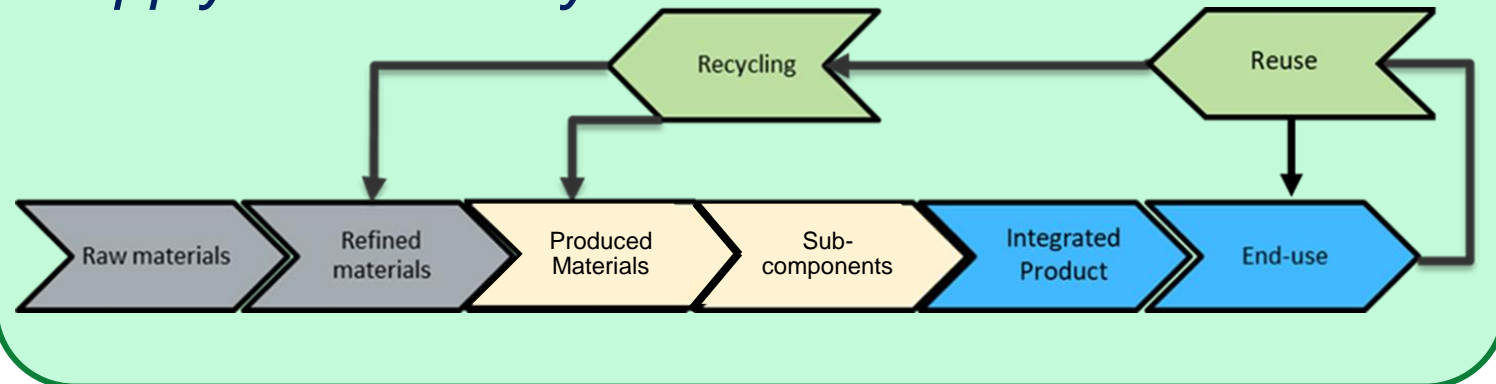
Provide a comprehensive and upgradeable framework for modeling and analysis

- Current modeling and analysis is disparate and focused on individual needs in programmatic areas
 - Typically sponsored by technology offices in individual areas
 - Often emphasizes R&D instead of manufacturing supply chain and strategic investments
- Key supporting work to set priorities and direction
 - Supporting models, data, and analysis for energy related minerals, materials, and components

Example Modeling Framework: SMART Mobility

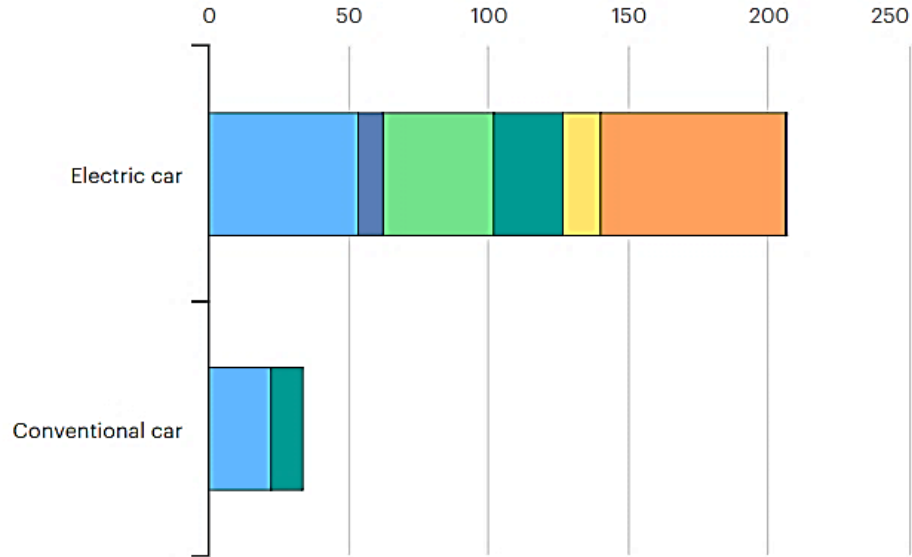


Supply Chain Analysis



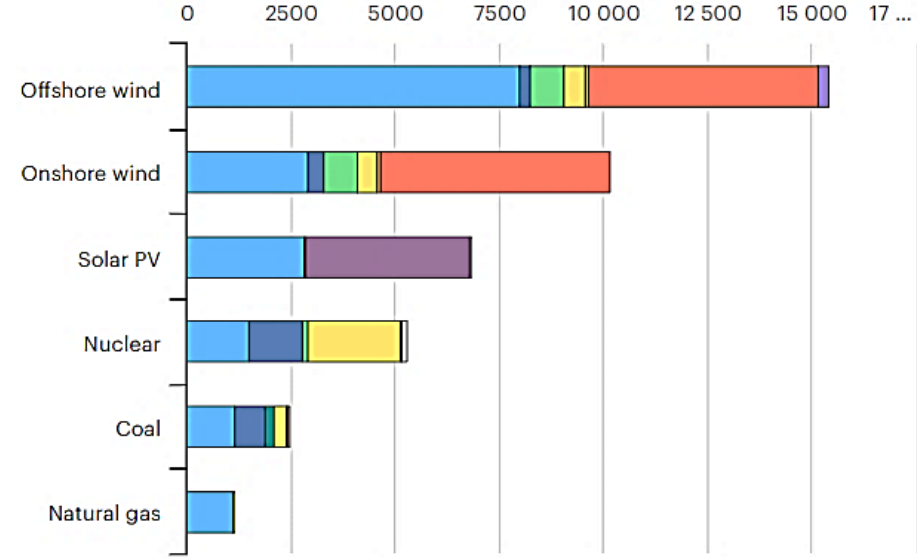
Critical Minerals for Electric Vehicles and Clean Energy Technologies

kg/vehicle



IEA. All Rights Reserved

kg/MW



IEA. All Rights Reserved

- Copper
- Lithium
- Nickel
- Manganese
- Cobalt
- Graphite
- Zinc
- Rare earths
- Others

- Copper
- Nickel
- Manganese
- Cobalt
- Chromium
- Molybdenum
- Zinc
- Rare earths
- Silicon
- Others



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

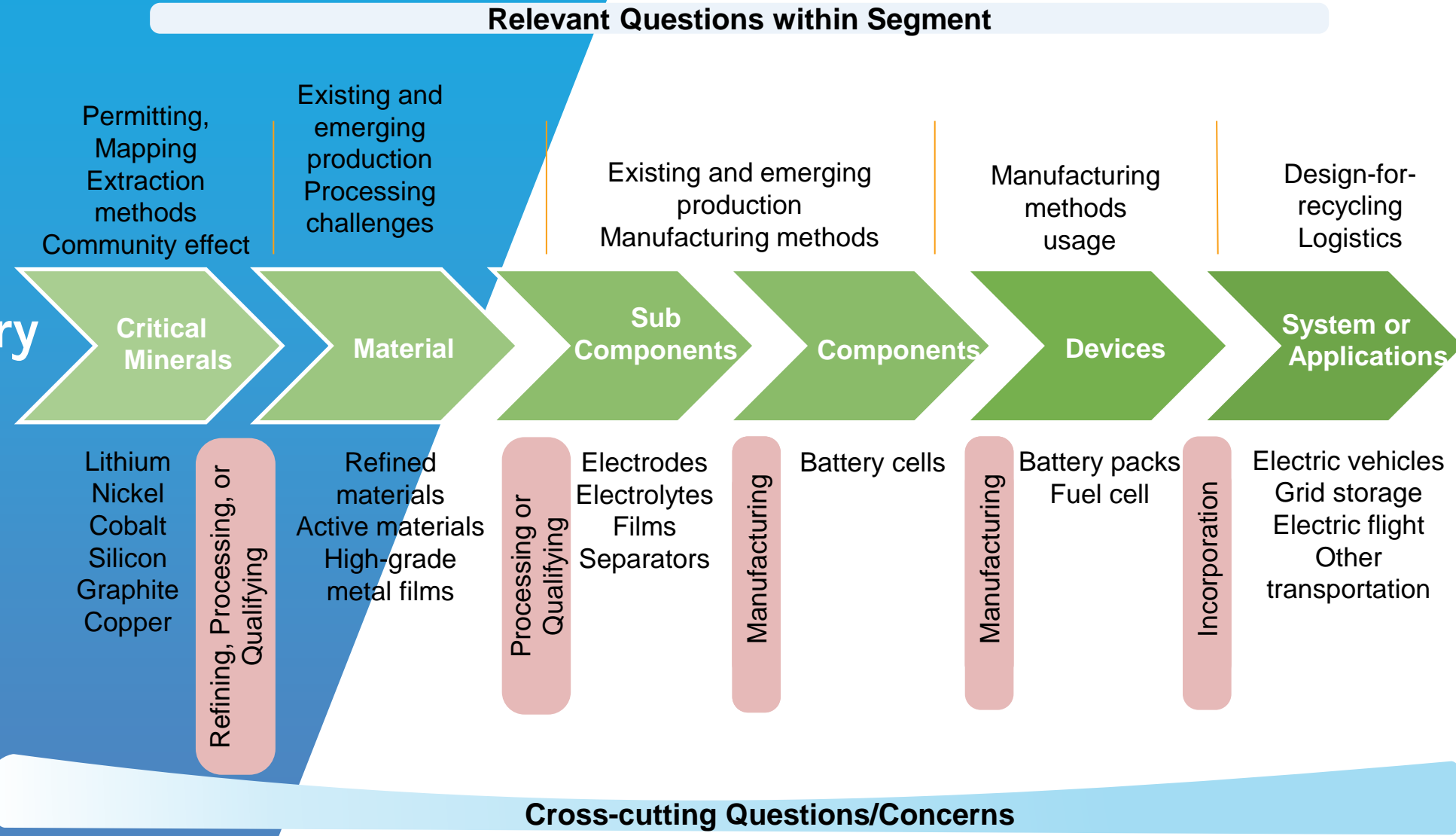
- Research tools to forecast future critical minerals



MESC

OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

Mapping the lithium-ion battery supply chain



Critical Minerals

Material

Sub Components

Components

Devices

System or Applications

Refining, Processing, or Qualifying

Processing or Qualifying

Manufacturing

Manufacturing

Incorporation

Lithium
Nickel
Cobalt
Silicon
Graphite
Copper

Refined materials
Active materials
High-grade metal films

Electrodes
Electrolytes
Films
Separators

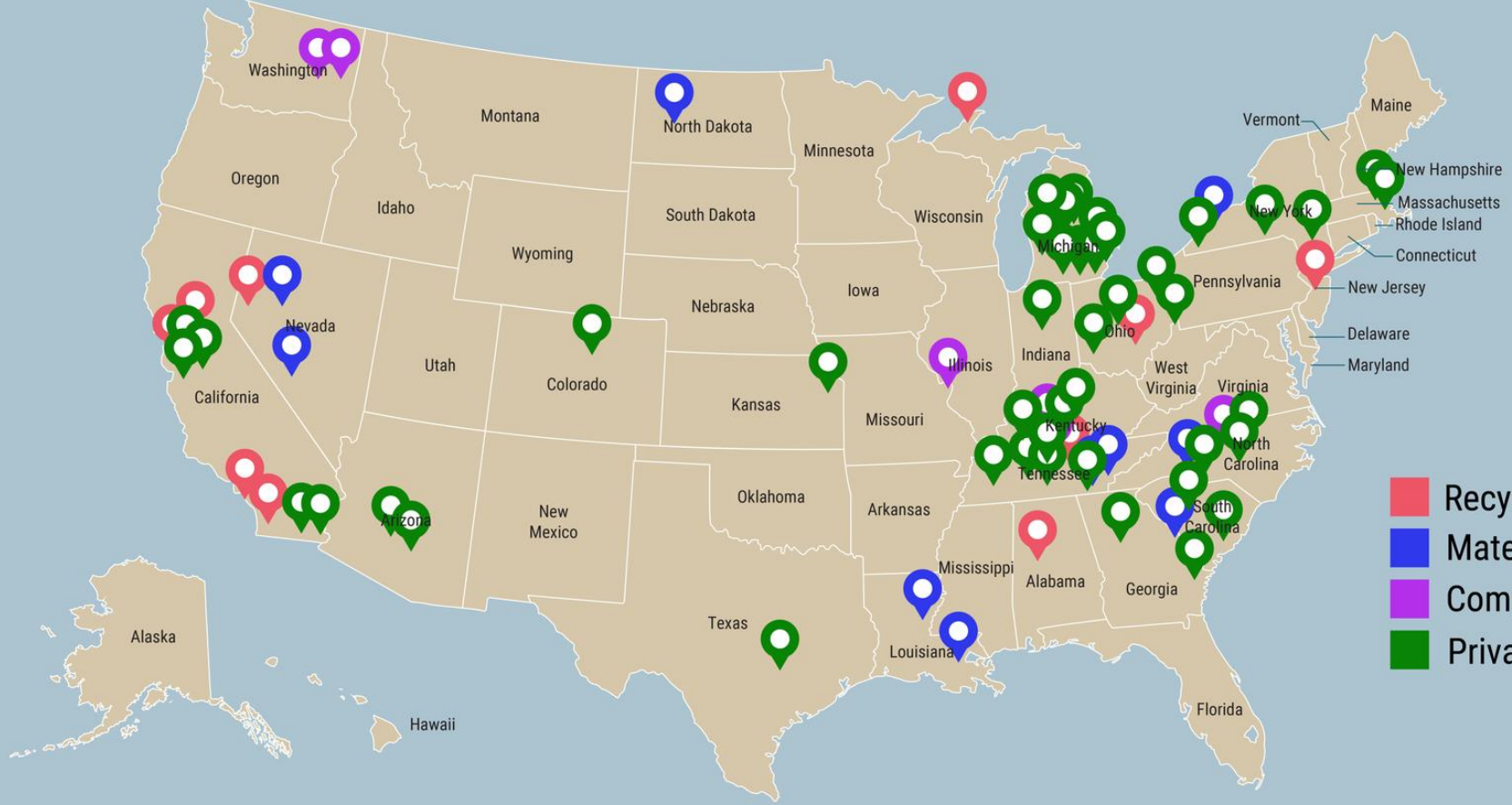
Battery cells

Battery packs
Fuel cell

Electric vehicles
Grid storage
Electric flight
Other transportation

American-Made Batteries

U.S. Battery Manufacturing Since President Biden Took Office



79 battery manufacturing facilities
(*7 announced but not pictured)

\$93 billion total investment... and counting

- Recycling & Upcycling
- Materials Separation & Processing
- Component Manufacturing
- Private Sector Investments



Zack.Valdez@hq.doe.gov