

U.S. DEPARTMENT OF  
**ENERGY**

Office of  
**ENERGY EFFICIENCY &  
RENEWABLE ENERGY**

**ADVANCED MATERIALS &  
MANUFACTURING  
TECHNOLOGIES OFFICE**



# Advanced Materials and Manufacturing Technologies Office

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Director, AMMTO

**2024 U.S. DRIVE & 21st Century Truck All  
Technical Team Meeting**  
October 21, 2024



# Advanced Materials and Manufacturing Technologies Office

## Supporting Clean Energy Manufacturing



Batteries and long duration storage  
Wind turbines and wind blades  
Hydropower components  
Castings/forgings  
Industrial motors  
Hydrogen storage  
High efficiency conductors  
Power electronics  
Microelectronics

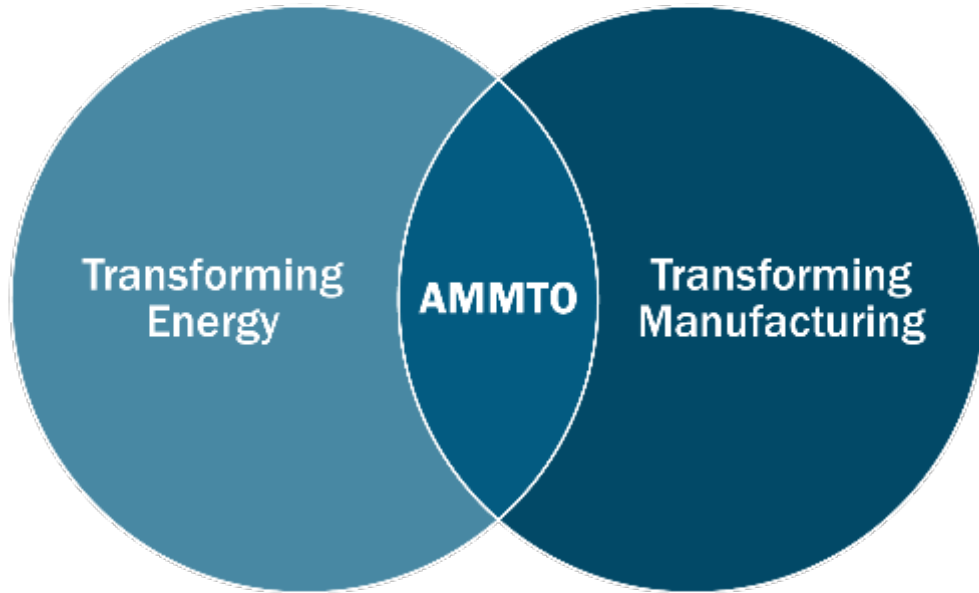
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## Manufacturing Technologies, Materials, Workforce

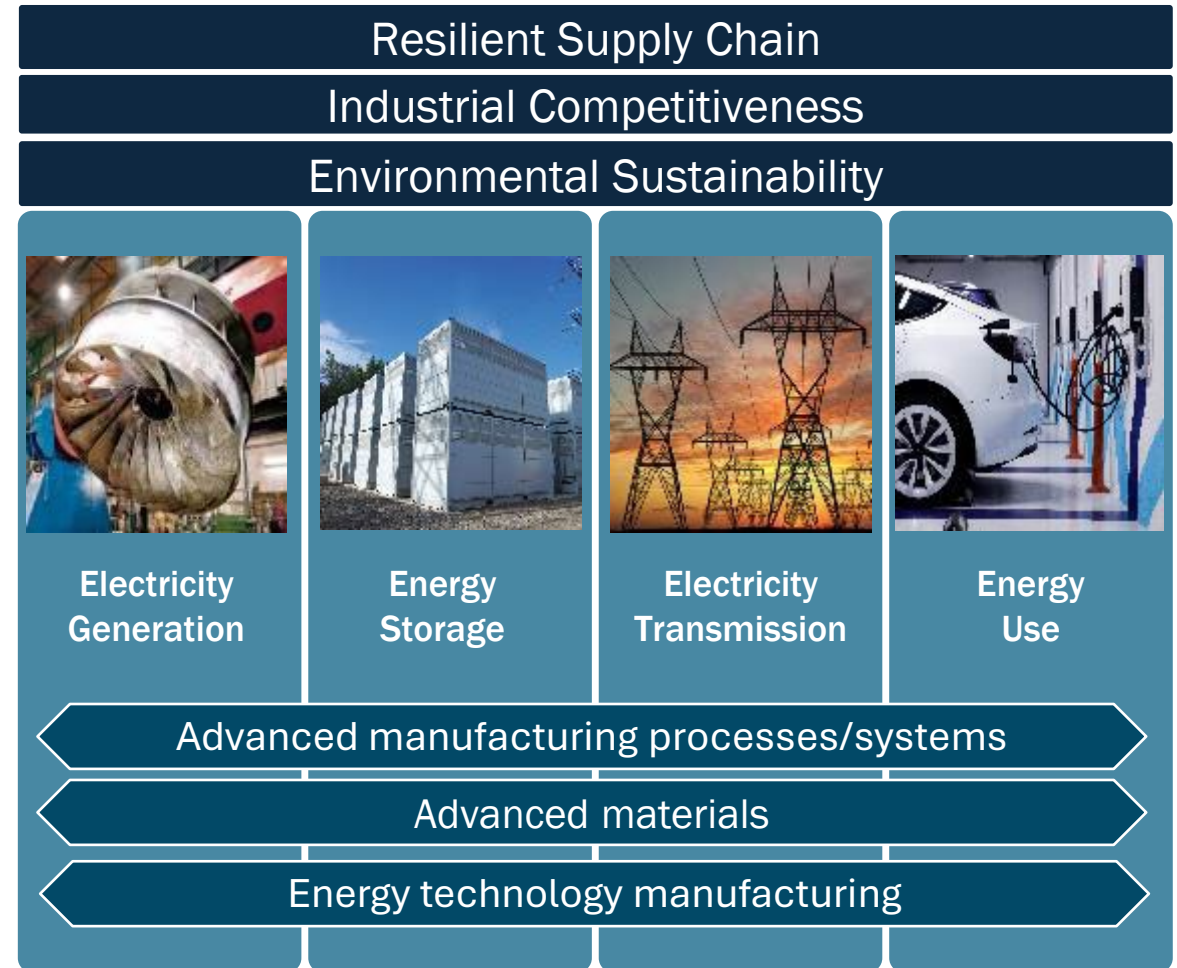
- Manufacturing Technologies: smart manufacturing, AI/ML, cybersecurity, high performance computing, roll-to-roll manufacturing, additive manufacturing, circularity
- Advanced Materials: advanced composites/metals/ceramics, critical materials, high conductivity metals, harsh service condition materials
- Workforce: training programs, curricula development, entrepreneurship

# Enabling Resilient, Innovative Domestic Manufacturing

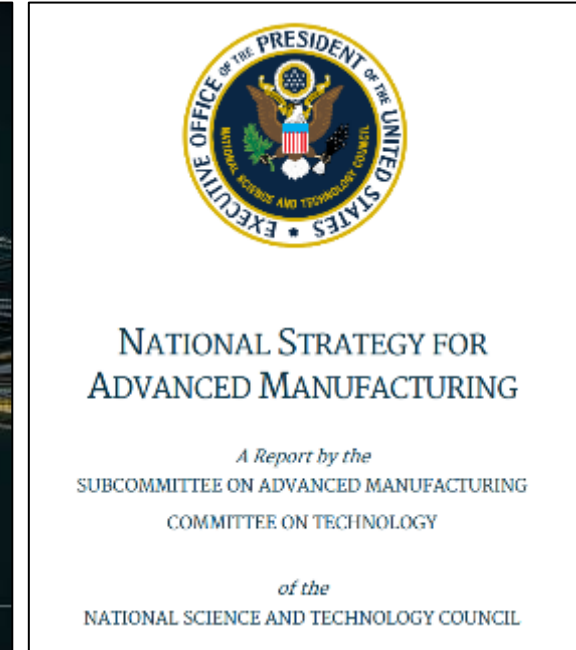
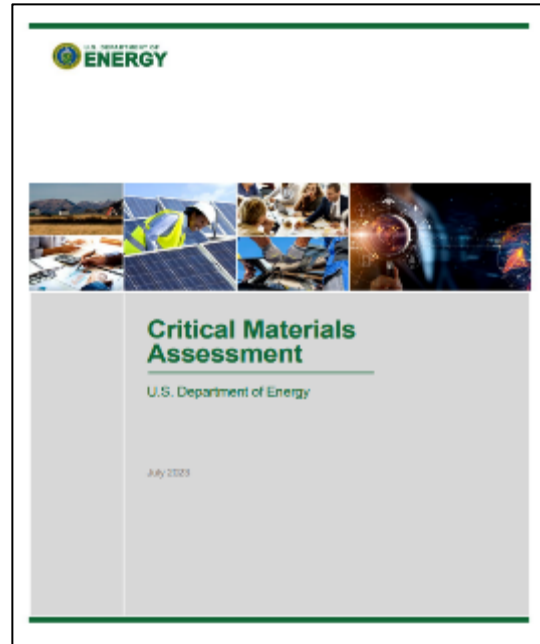
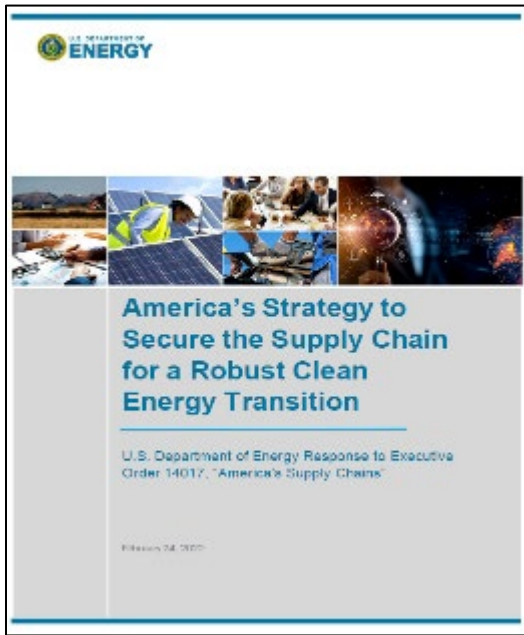
**Vision:** A globally competitive U.S. manufacturing sector that accelerates adoption of innovative materials and manufacturing technologies in support of the energy sector.



Innovations in cross-cutting materials and manufacturing technologies are needed for leapfrog advances in the US energy sector



# Manufacturing Technology Analysis and Strategy



- Analysis guided research to drive impact of manufacturing innovation for supply chain resiliency and industrial decarbonization goals.
- Technology roadmapping for key manufacturing and materials technologies.
- Strategy development for manufacturing innovation in multiple areas including critical materials, smart manufacturing, circular economy, power electronics, microelectronics, harsh environment materials.

# AMMTO's Innovation Ecosystems

## Energy Innovation Hubs

- Integrated, multidisciplinary research centers that combine basic and applied research with engineering to accelerate scientific discovery and address critical energy issues.

## Manufacturing USA Institutes

- Network of manufacturing innovation institutes created to secure U.S. global leadership in advanced manufacturing through large-scale public-private collaboration on technology, supply chain, and education and workforce development.

## Lab-led R&D Consortia

- Leverages unique facility capabilities and expertise in advanced manufacturing at national laboratories to work collaboratively on industrial-relevant, pre-competitive R&D.

## Lab-led R&D Manufacturing and Pilot-Scale Facilities

- Strategic investments in physical assets at labs to advance clean energy manufacturing.

## Lab-led Infrastructure for Manufacturing Industry

- Provides access and connectivity to lab programs, codes, facilities and experts in areas of entrepreneurial incubation and high-performance computing.





# Critical Materials: Major R&D and Demonstration Investments

## Critical Materials Accelerator FOA (link)

- Focused on RD&D to foster lab/industry partnerships to prototype/pilot technologies and processes proven at the bench scale to accelerate adoption of innovative solutions to address critical material high impact areas

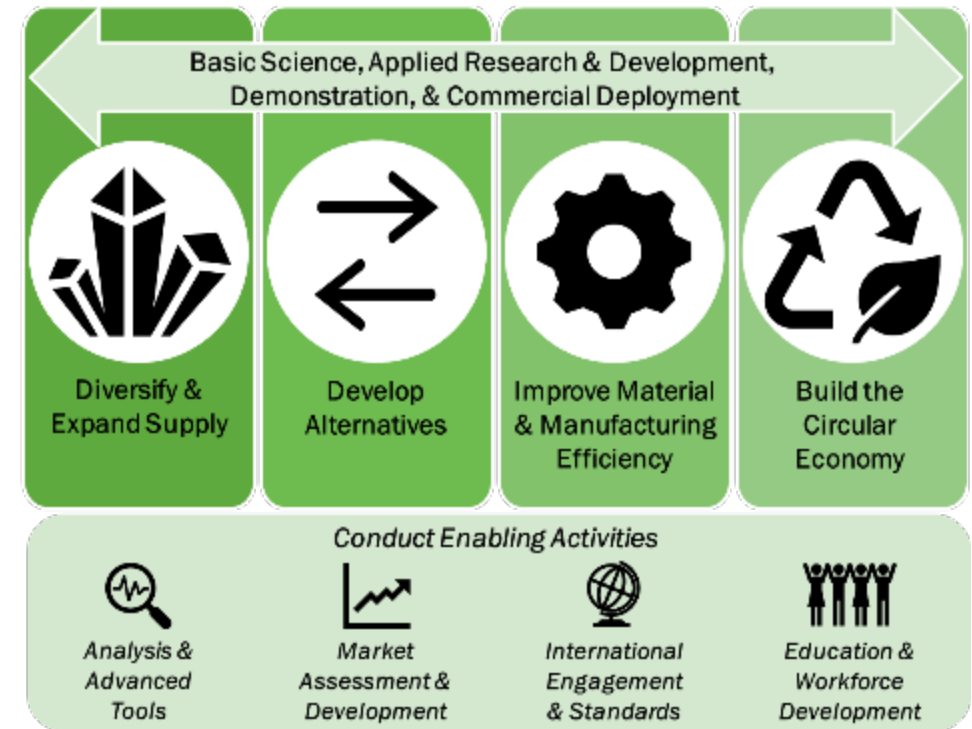
## Critical Materials Innovation Hub (link)



- Focused on R&D to support advancing cost-effective extraction, separation, processing, metallization, substitution, and recycling of critical materials, to support domestic supply chains for high-value add technologies that rely on these materials (e.g., permanent magnets, energy storage, electronics).



## DOE CMM Strategy:

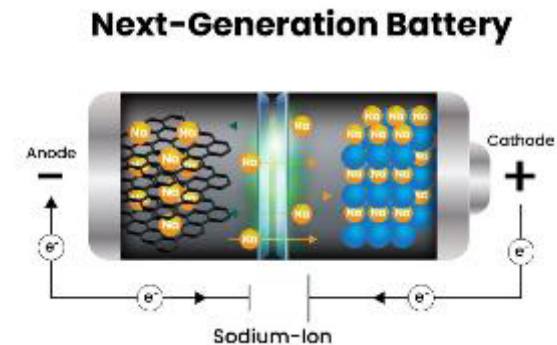


<https://www.energy.gov/critical-minerals-materials>

# Critical Materials: Other Related Investments

## Transformative Battery Manufacturing FOA ([link](#))

- Focused R&D to address processing gaps between bench-scale manufacturing and industrial-scale manufacturing of next-generation batteries with a focus on flow batteries, Na-ion batteries and battery manufacturing equipment.



## Circularity-Focused Prizes

### 1) Electronics Scrap Recycling Advancement (E-SCRAP) Prize ([link](#))

- Focused on building partnerships across the recycling value chain to optimize/integrate critical material separation/recovery technologies, and develop/demonstrate innovations along the e-scrap value chain.



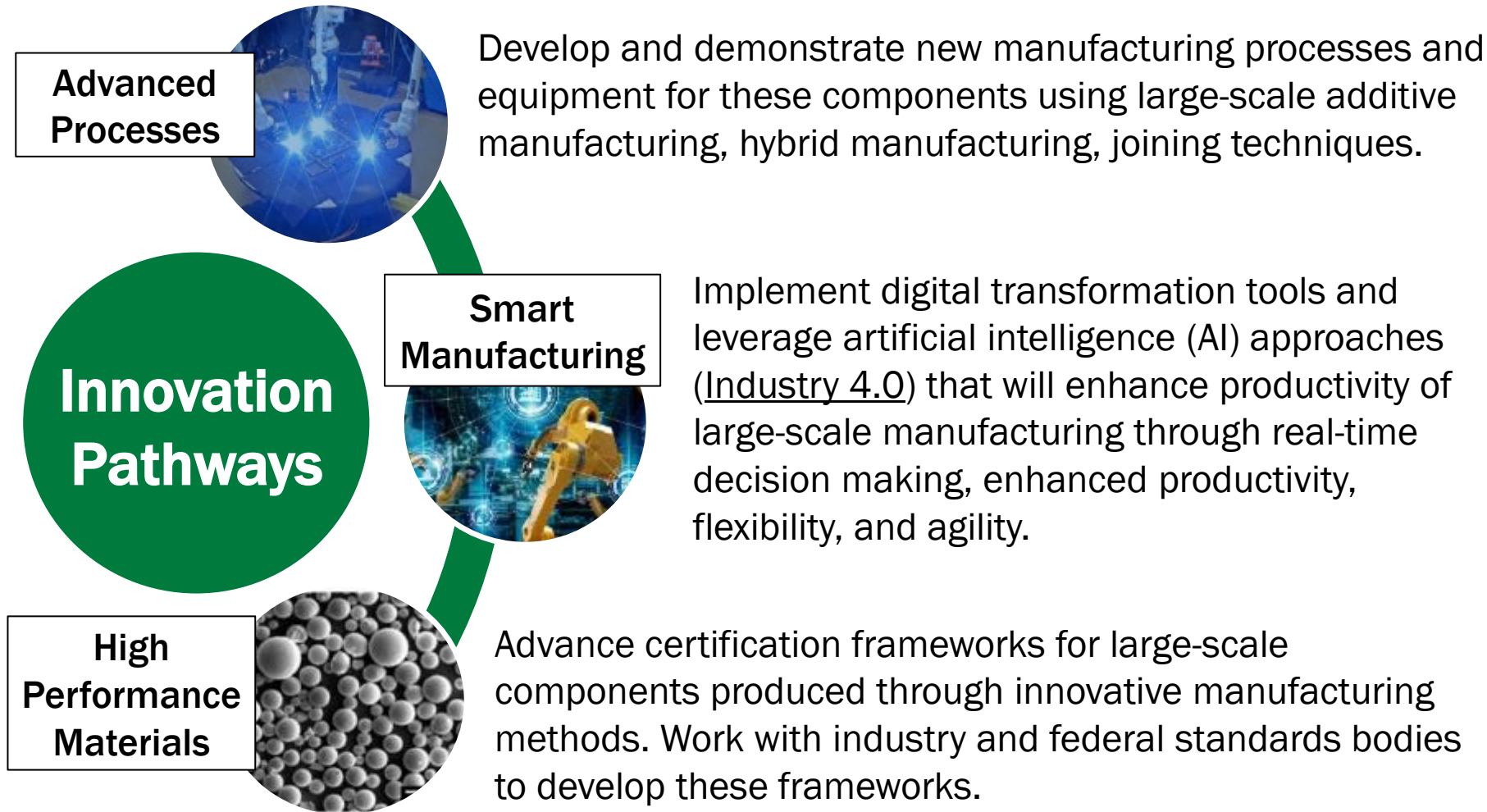
### 2) Re-X Before Recycling Prize ([link](#))

- Focused on stimulating innovation in circular economy approaches that unlock new or expanded supply chains that can reintegrate end-of-use products into the economy via re-use, repair, refurbishment, remanufacturing, and/or repurposing (“Re-X”).



# Smart Manufacturing: innovation for manufacturing processes

**Goal:** Advance innovative manufacturing to support a resilient domestic supply chain for clean energy systems



**Conventional Foundry**



**Foundry of the Future**





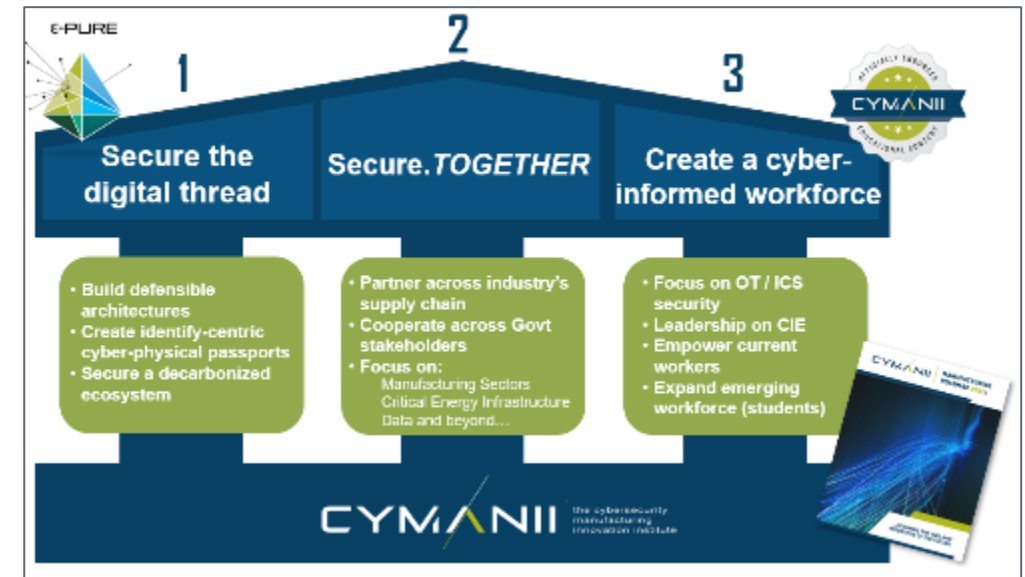
# Smart Manufacturing: Manufacturing USA Initiatives

## Clean Energy Smart Manufacturing Innovation Institute (CESMII) ([link](#))

- **Mission:** Accelerate the development, adoption, and deployment of advanced sensors, controls, platforms, models, and training to enable Smart Manufacturing to become the driving sustainable engine that delivers innovations for clean energy manufacturing and productivity.

## Cybersecurity Manufacturing Innovation Institute (CyManII) ([link](#))

- **Mission:** Secure U.S. manufacturers as they digitize by fortifying their physical systems with embedded cybersecurity and energy efficient solutions.



# Smart Manufacturing: Additional Major Investments

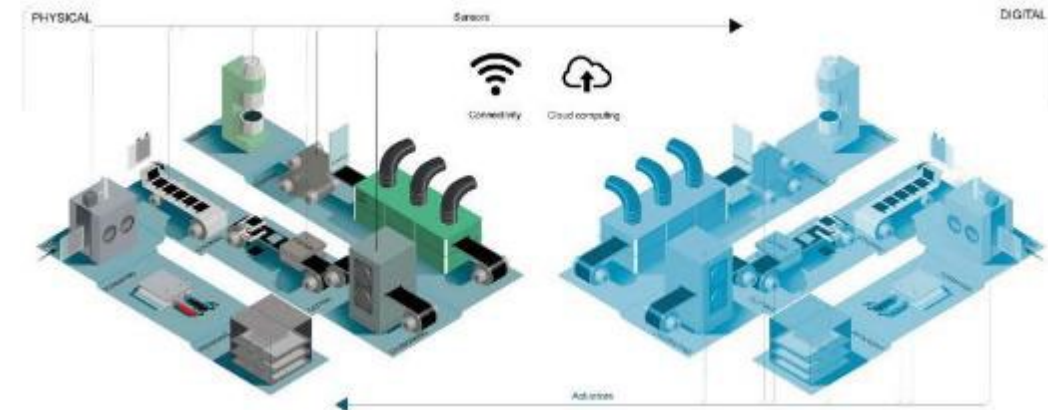
## Manufacturing Demonstration Facility ([link](#))

- Mission: Develop and aid the adoption of additive manufacturing (AM) and composite technologies to improve the energy and material efficiency, productivity, and competitiveness of American manufacturers.



## Application-Oriented RD&D ([link 1](#), [link 2](#))

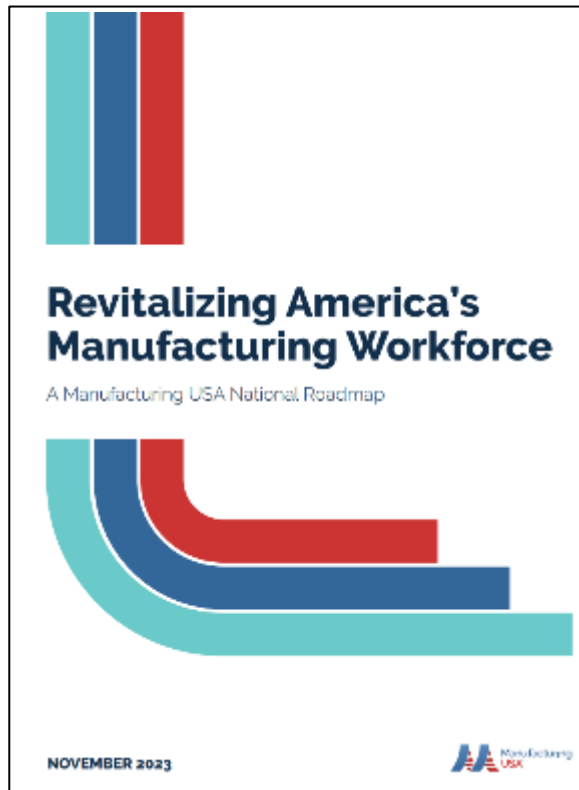
- **Goal:** Advance smart manufacturing technologies to enable resilient, leading-edge manufacturing for the energy sector (e.g., electric vehicles, wind blades, batteries, solar, etc.) by leveraging artificial intelligence methods that couple manufacturing data with product quality.



# Education and Workforce Strategy

**Vision:** A robust, diverse, and thriving workforce has the skills required to transform and accelerate the development and adoption of innovative materials and manufacturing technologies and drive a globally competitive, clean energy economy.

## Consortia strategy:



### Priority 1: Equip an advanced manufacturing workforce with evolving skills

The advanced manufacturing workforce of today and tomorrow requires the necessary skills to develop, deploy, and operate innovative technology. Growing and continually updating skillsets to meet industry needs requires technical learning content, curricula, and training opportunities. As technology continues to advance, initiatives must be in place to equip the workforce with the skills they need to acquire and succeed in high-quality jobs and advance the sector.



### Priority 2: Broaden access to advanced manufacturing career pathways

Removing barriers to education and career pathways for groups that have historically been left out of advanced manufacturing careers (e.g., disadvantaged communities, women, underrepresented minorities, individuals with disabilities) not only broadens the manufacturing talent pool but also promotes more inclusive workplaces, which help improve worker retention and increase career progression opportunities.



### Priority 3: Spark interest in advanced manufacturing careers to secure a steady workforce talent pool

Improved perceptions and greater awareness of roles in the advanced manufacturing industry will help exponentially grow the size the industry' talent pool.



# Education and Workforce: Select Initiatives

## Smart Manufacturing Training ([link](#))

- **Goal:** develop competency-based learning program to train smart manufacturing workforce and deliver to 1000+ companies and educational institutions across the country
- **Accomplishments:** launched modules on smart manufacturing fundamentals, data management, technologies, cybersecurity, and implementation



## Cybersecurity Mobile Training ([link](#))

- **Goal:** develop mobile training program to deliver hands-on cybersecurity manufacturing training directly to businesses at their location
- **Accomplishments:** launched training vehicle and trained more than 15,000 workers on cybersecurity fundamentals and best practices



# Look forward to building on past successes

## Continuing our shared purpose:

- Advancing clean energy goals through innovations in materials and manufacturing technologies
- Bolstering and demonstrating the strength and value of American innovation in manufacturing through R&D

## Consider a role in government and join us as a clean energy champion!

- Federal roles
- Federal fellowships (ORISE, AAAS)

<https://www.energy.gov/eere/ammtto>



**Careers and Fellowships**  
Advanced Materials & Manufacturing Technologies Office

Advanced Materials & Manufacturing Technologies Office > Careers and Fellowships

### Fellowships at AMMTO

The U.S. Department of Energy (DOE) offers post-graduate fellowships under the Oak Ridge Institute for Science and Education<sup>®</sup> (ORISE) and American Association for the Advancement of Science<sup>®</sup> (AAAS) Fellowship programs.

### AMMTO Careers

Interested in helping DOE build America's clean energy future? The Office of Energy Efficiency & Renewable Energy (EERE) is hiring for the Advanced Materials and Manufacturing Technologies Office.

- Careers
- Fellowships
- Sign up for updates
- Funding Opportunities

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