

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

## Advanced Materials and Manufacturing Technologies Vision and Strategy for America's Energy Transition

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#### **The World is Changing**











#### **And America is Taking Action**

Ambitious goals, investments in innovation, and bills and legislations

C ENERGY



\$50B to revitalize semiconductor research, development, and manufacturing

100% carbon pollution-free electricity by 2035; and netzero emissions economy by 2050.

America's Strategy to

Energy Transition

Executive Order 14017: "America's Supply

Secure the Supply Chain for a Robust Clean



\$50B to revitalize semiconductor research, development, and manufacturing

#### **The Right Time for AMMTO**

#### **Technology Innovation**



#### **Inspire People**



Transform Materials and Manufacturing



#### Vision

A globally competitive U.S. manufacturing sector that accelerates the adoption of innovative materials and manufacturing technologies in support of a clean, decarbonized economy.

#### Mission

We inspire people and drive innovation to transform materials and manufacturing for America's energy future.

#### **AMMTO's Contribution to America's Leadership in Advanced Manufacturing**

- 1. Why is it important?
- 2. Who created it?
- 3. How and when was it created?
- **4. How** did AMMTO contribute?

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NATIONAL STRATEGY FOR Advanced Manufacturing
A Report by the SUBCOMMITTEE ON ADVANCED MANUFACTURING COMMITTEE ON TECHNOLOGY
of the NATIONAL SCIENCE AND TECHNOLOGY COUNCIL
October 2022

# National Strategy for Advanced Manufacturing



Subcommittee on Advanced Manufacturing Committee on Technology National Science and Technology Council

#### Manufacturing Employment and Trade Balance

While manufacturing employment is rising, trade deficit for advanced technology products is increasing





# Strengthening American Manufacturing and Competitiveness

A CONTRACTOR OF CONTRACTOR OF

- Grow the Economy
- Create High-Quality Jobs
- Enhance Environmental Sustainability
- Address Climate Change
- Strengthen Supply Chains
- Ensure National Security
- Improve Healthcare



#### National Science and Technology Council (NSTC)

**Cabinet-level Council** through which the executive branch coordinates science and technology policy across the Federal R&D enterprise.

<u>Chair</u>: POTUS

<u>Members</u>: VPOTUS, OSTP Director, Cabinet Secretaries, and Agency Heads with significant science and technology responsibilities, and other White House officials.

Work organized under five primary committees

COMMITTEE ON TECHNOLOGY (CoT)								
Social and Behavioral Sciences Team (SC)	SAM: Advanced Manufacturing (SC)*	MGI: Material Genome Initiative (SC)						
Lab to Market (SC)	NITRD: Network and Information Technology R&D (SC)*	NSET: Nanoscale Science Engineering & Technology (SC)*						

#### NATIONAL SCIENCE AND TECHNOLOGY COUNCIL (NSTC)

COMMITTEE ON ENVIRONMENT, NATURAL RESOURCES, AND SUSTAINABILITY (CENRS)									
AQRS: Air Quality Research (SC)	SWORM: Space Weather Observation, Research, and Mitigation (SC)	SOST: Ocean Science & Technology (SC)*							
CSMSC: Critical & Strategic Mineral Supply Chains (SC)	Water-Energy-Food (TF)	SWAQ: Water Availability & Quality (SC)							
IARPC: Interagency Arctic Research Policy Committee (IWG)*	SES: Ecological Systems(SC)	T&R: Toxics & Risk (SC)							
SDR: Disaster Reduction (SC)	SGCR: Global Change Research (SC)*	USGEO: U.S. Group on Earth Observations (SC)							
MMCWG: Methane Monitoring and Characterization Working Group (WG)	MMCWG: Methane Monitoring and Jaracterization Working Group (WG)								
COMMITTEE	ON HOMELAND & NATIONAL SECU	RITY (CHNS)							
BDRD: Biological Defense Research & Development (SC)	Astronomical Assets and Data (IWG)	SCORE: Subcommittee on Special Cyber Operations Research and Engineering (SC)							
CDRD: Chemical Defense Research and Development (SC)	NDRD: Nuclear Defense Research & Development (SC)	DAMIEN: Detecting & Mitigating the Impact of Earth-Bound Near Earth Objects (IWG)							
D-IED: Domestic Improvised Explosive Devices (SC)	National Security Laboratory Research, Development, Test and Evaluation Facilities and Infrastructure (SC)	AUS: Autonomous Unmanned Systems (SC)							
SOS-CBRNE Standards (SC) CISR: Critical Infrastructure Security and Resilience (SC)									
	COMMITTEE ON SCIENCE (CoS)								
IWGN: Neuroscience (IWG)*	COMMITTEE ON SCIENCE (CoS) PSSC: Physical Science (SC)	LSSC: Life Science (SC)*							
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#### **Strategy Developed with Stakeholder Input**

Request for Information (RFI), Office of Science and Technology Policy Extensive input from the public, including from AIChE, ASME, ITIF, NAE, NDIA, SME, and many others 14 roundtables across the nation with industry (large and small across many sectors), academia, state and regional organizations and professional societies

Input received from nearly 1000 individuals and organizations

#### **Strategic Plan Structure**

#### Vision:

**United States leadership in Advanced Manufacturing -** grow the economy, create jobs, enhance environmental sustainability, address climate change, strengthen supply chains, ensure national security, and improve healthcare.

#### National Goals:

- Develop and implement <u>advanced manufacturing</u> <u>technologies</u> – 5 Objectives with 18 priorities
- Grow the advanced manufacturing <u>workforce</u> 3 Objectives with 8 priorities
- Build resilience into manufacturing <u>supply chains</u> and ecosystems – 3 Objectives with 11 priorities





#### **Next Steps**



Released the National Strategy on National Manufacturing Day – October 2022

Socialize the Goals/Objectives/Priorities with Government, Industry, and Academia

Develop an internal interagency implementation plan to achieve the goals of the National Strategy

Track the progress towards achieving the national goals, maximize coordination, and minimize duplication of effort



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#### AMMTO/IEDO's Contribution to Shaping NSAM

Goals	Objectives	D O C	D O D	D O E	D O L	D O T	E D	E P A	H H S	N A S	N S F	U S D
Advanced Manufacturing Technologies	Enable Clean and Sustainable Manufacturing to Support Decarbonization	•	•	•		•		•	•	A	•	•
	Accelerate Manufacturing for Microelectronics and Semiconductors	•	•	•							•	
	Implement Advanced Manufacturing in Support of the Bioeconomy	•	•						•	•	•	•
	Develop Innovative Materials and Processing Technologies	•	•	•		•		•	•	•	•	•
	Lead the Future of Smart Manufacturing	•	•	•						•	•	•
Advanced Manufacturing Workforce	Expand and Diversify the Advanced Manufacturing Talent Pool	•	•	•	•		•		•	•	•	•
	Develop, Scale, and Promote Advanced Manufacturing Education and Training	•	•	•	•	•	•		•	•	•	•
	Strengthen the Connections Between Employers and Educational Organizations	•	•		•	•	•		•		•	•
Manufacturing Supply Chains and Ecosystems	Enhance Supply Chain Interconnections	•	•	•					•	•	•	•
	Expand Efforts to Reduce Manufacturing Supply Chain Vulnerabilities	•	•	•		•		•	•	•	•	•
	Strengthen and Revitalize Advanced Manufacturing Ecosystems	•	•	•		•	•		•	•	•	•

# Enable Clean and Sustainable Manufacturing to Support Decarbonization



- Decarbonization of Manufacturing Processes
- Clean Energy Manufacturing Technologies
- Sustainable Manufacturing and Recycling



#### Develop Innovative Materials and Processing Technologies

- High-Performance Materials Design and Processing
- Additive Manufacturing
- Critical Materials
- In-Space Manufacturing





Credit: America Makes

#### Lead the Future of Smart Manufacturing



- Digital Manufacturing
- Artificial Intelligence in Manufacturing
- Human-Centered Technology Adoption
- Cybersecurity in Manufacturing



In **Progress**. I will add 4-5 slides over the weekend to cover:

- (1) AMMTO's Identity and Innovation Ecosystem
- (2) AMMTO's Goals and Operational Strategy
- (3) Invite and encourage people to <u>think with us</u> about the future of energy and manufacturing:
  - Here is what we did (MT FOA, NNS FOA, IACMI, Wind FOA)
  - > As we proceed, we need YOUR input in defining new areas





# Thank you





## **Backup Slides**



#### **Origin:** Congressional mandate for SAM in 2012 bipartisan COMPETES Act

**Functions:** Interagency planning, coordination, and information sharing on advanced manufacturing federal policy and programs. Assigned principal responsibility for development and execution of **National Strategic Plan for Advanced Manufacturing** 

**Priorities:** 

- Review and <u>Coordinate</u> Federal Government's Advanced Manufacturing R&D
- Update and Publish Strategic Plan

**Co-chairs:** Ezinne Uzo-Okoro (EOP/OSTP), Mike Molnar (DOC/NIST), Rob Gold/Tracy Frost (DoD/OSD),

**Membership:** DOC, DoD, DOE, DOL, DOS, DOT, ED, EOP, EPA, HHS, NASA, NSF, SBA, USDA

#### **Key Objectives**

- Advanced Mfg. Technologies & Program Coordination
- Education & Workforce Development
- Mfg. Ecosystem & Supply Chain

#### **Modern American Industrial Strategy**



- Areas where relying on private industry, on its own, will not mobilize the investment necessary to achieve our core economic and national security interests.
- Investments help accelerate and shape breakneck innovation, and they encourage private investment and market competition
- Infrastructure literally lays the groundwork for private investment
- Public investments in research and innovation power the private engine of the American economy.
- Transition to a zero-carbon economy may be the greatest economic transformation since the Industrial Revolution.
- 1) Deploying New Tools and Fresh Approaches, 2) National Commitment to Building Fairly at Scale and Speed, 3) Closer Cooperation with Allies and Partners

#### **Advanced Manufacturing Creates**





#### Why a National Strategic Plan for Advanced Manufacturing?



To address global competition, the Biden-Harris Administration has taken steps to:

- Revitalize the manufacturing sector,
- Increase the resilience of U.S. supply chains and national security,
- Invest in R&D, and
- $\circ~$  Train Americans for jobs of the future.



#### **Relevance to DOE/AMMTO**

# 1. DOE/AMMTO members actively contributed to the <u>development</u> and <u>implementation</u> of the SP

Goal 1: Diana Bauer (<u>Co-chair</u>), Blake Marshall, Jeremy Mehta, Alaa Elwany
Goal 2: Steve Shooter, Anne Hampson, Nebiat Solomon, Pete Langlois
Goal 3: Diana Bauer, Blake Marshall, Kelly Visconti, Zack Valdez

### Goal 1: Develop and Implement Advanced Manufacturing Technologies

#### Goal 1: Develop and Implement Advanced Manufacturing Technologies

- 1) Enable clean and sustainable manufacturing to support decarbonization
- 2) Accelerate manufacturing innovation for microelectronics and semiconductors
- 3) Implement advanced manufacturing in support of the bioeconomy
- 4) Develop innovative materials and processing technologies
- 5) Lead the future of smart manufacturing







#### Goal 2: Grow the Advanced Manufacturing Workforce

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#### **Goal 2: Grow the Advanced Manufacturing Workforce**





- 1) Expand and diversify the advanced manufacturing talent pool
- 2) Develop, scale, and promote advanced manufacturing education and training
- Strengthen connections between employers and educational organizations

#### Goal 3: Build Resilience into Manufacturing Supply Chain and Ecosystems

#### Goal 3: Build Resilience into Manufacturing Supply Chains and Ecosystems



- 1) Enhance supply chain interconnections
- 2) Expand efforts to reduce supply chain vulnerabilities
- 3) Strengthen and revitalize advanced manufacturing ecosystems

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