

Overview

The AMO portfolio spans a broad spectrum of 14 interconnected advanced manufacturing technology areas that have the potential to significantly improve manufacturing energy efficiency and minimize the life-cycle energy of manufactured products. AMO's Multi-Year Program Plan (MYPP) lays out the technology-specific performance, economic and energy metrics for each technology area. AMO assesses the impacts of their investments from three perspectives: retrospective (tracking past investments in technologies that are now commercialized), introspective analysis (assessing and validating current investments), and prospective analysis (strategic analysis and projections to inform future investments).

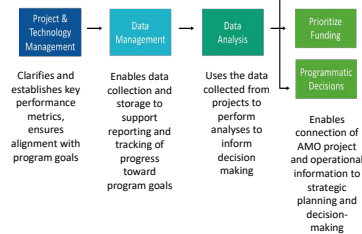
The AMO Introspective Performance Assessment Methodology with Verification and Validation of R&D Projects (IPA/V&V) effort is focused on strengthening AMO's introspective analysis through implementation of a transparent, consistent and standardized office-wide IPA/V&V methodology. The project will support AMO technology managers in assessing impacts of funded projects and addresses 2018 Peer Review Panel recommendations to expand the use of techno-economic assessment and identify and disseminate best practices across AMO.



Objectives

Develop and codify a methodology, process and procedures (MP&P) to provide AMO a consistent, transparent and defensible accounting of anticipated benefits of currently funded technologies and supporting R&D projects.

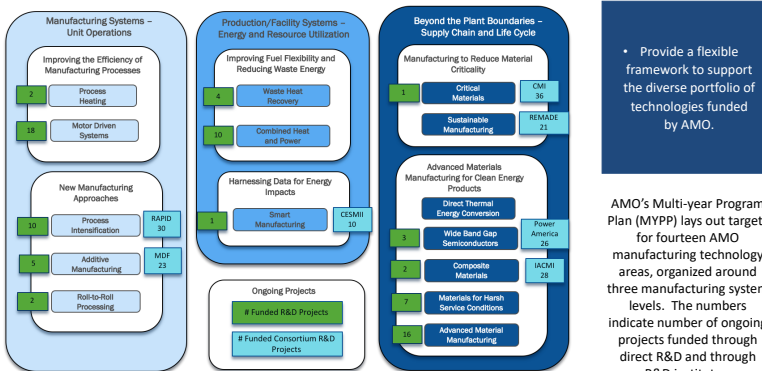
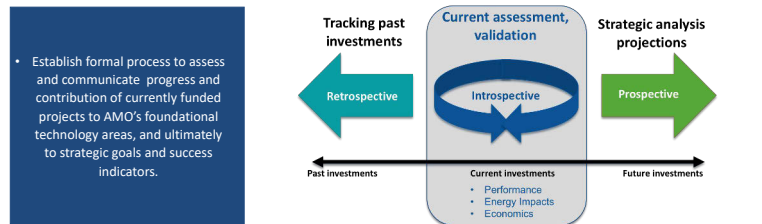
MP&P will encompass:



Tasks and Timeline

Task Name	2018	2019	2020	2021	2022	2023
AMO Verification/Validation Introspective Analysis Plan						
* Task 1: Finalize IPA/V&V workplan, scope, budget, timeline, roles, milestones and deliverables for validation/verification effort.						
* Task 2: Assess IPA/V&V Options for AMO						
* Task 3: Review MYPP Technology-Specific Targets: Assess Current AMO Project Metrics and Alignment with MYPP Goals						
* Task 4: Establish MP&P to facilitate Two-Tier Assessment of AMO R&D Projects and Introspective Program Analysis						
* Task 5: Conduct AMO IPA/V&V using MP&P						
* Task 6: Develop Staged AMO IPA/V&V Implementation and Dissemination Plan						

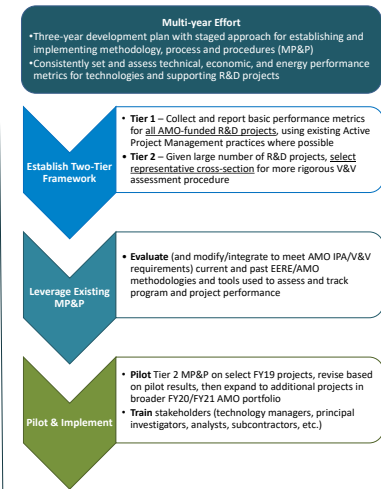
Vision and Context



Provide a flexible framework to support the diverse portfolio of technologies funded by AMO.

AMO's Multi-year Program Plan (MYPP) lays out targets for fourteen AMO manufacturing technology areas, organized around three manufacturing system levels. The numbers indicate number of ongoing projects funded through direct R&D and through R&D investments.

Approach



Existing Tools and Models

**Cross-Cutting Energy Assessment Tools/Models**

- Life Cycle GHG, Technology and Energy through the Use Phase (LIGHTEnUP) Tool (LBNL)
- Material Flows Through Industry (MFI) – Supply Chain Focus (NREL)

**Technology-Targeted Energy Assessment Tools/Models**

- Carbon Fiber Reinforced Plastic (CFRP) Energy Estimator Tool (ORNL)
- Additive Manufacturing Energy Impacts Assessment Tool (ORNL)

**Technology Cost Assessment Tools/Models**

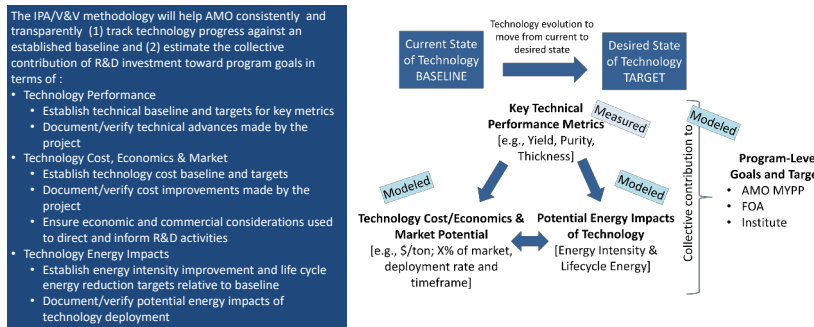
- Wind turbine blade manufacturing cost model (NREL/ORNL)
- Auto components (e.g., floor pan, door inner, hood inner) cost model (ORNL)
- WBG for motor drives manufacturing cost model (NREL)

**Outside-AMO Tools/Models**

**Additional data needs for projecting longer term impacts of R&D projects:**

- Market Potential (e.g., fraction of market impacted)
- Technology Maturation
- Technology Adoption Rate and Timing

Goals and Data Needs



Metrics

Verify and report progress in terms of:

**Cost**

- Develop techno-economic analyses to help understand economic implications of specific advanced manufacturing technologies and applications relative to the current state of the art

**AMO Energy Success Indicators**

**Energy Intensity**

- Validate advanced materials, processes, and technologies that reduce manufacturing energy intensity by 20% by 2023 compared to the 2015 average technology.

**Lifecycle Energy**

- Advance materials and manufacturing technologies with the potential to reduce life cycle energy by 50% by 2023 compared to the 2015 state-of-the-art.

General Concept for Data Collection

Project/Technology Information/Overview				
Project/Technology Title	Description	Focus Area	Partners	
Application(s)/End User(s)	TRL/NMRL	Barriers	Market Potential	
Project/Technology Metrics			MYPP Link	
Project/Technology	Baseline State of Technology (SOT), Date	Interim Target, Date	Final Target, Date	Commercial Potential
<b>Design/Model Assumptions and Technical Performance</b>				
Technology/Process				
Scale				
Key Technical Metric 1				X
Key Technical Metric: etc.				X
<b>Economic</b>				
Cost Metric Calculation	Model/Tool/Key Assumptions Documentation/Link			
Capital Cost				
Operating Cost				
Unit Cost (e.g. \$/kg)				X
<b>Energy</b>				
Energy Metric Calculations	Model/Tool/Key Assumptions Documentation/Link (E and LC Energy)			
Energy Intensity (e.g. J/kg)				X
Lifecycle Energy Impact				X

Proposed Tier 2 Pilot Focus

**Goal:** include multiple technology areas and project types (i.e., direct R&D and institute-funded) to ensure flexibility of methodology, process, and procedures (MP&P)

Select ongoing funded projects from:

- Institute for Advanced Composites Manufacturing Innovation (IACMI)
- Rapid Advancement in Process
- Intensification (RAPID) Institute
- Process Intensification R&D projects

New projects in process of scoping and defining in:

- Clean Energy Smart Manufacturing Innovation Institute (CESMII)
- Cybersecurity Institute for Energy Efficient Manufacturing