



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

Advanced Manufacturing at the U.S. Department of Energy

AMO Peer Review 2018

July 17th, 2018

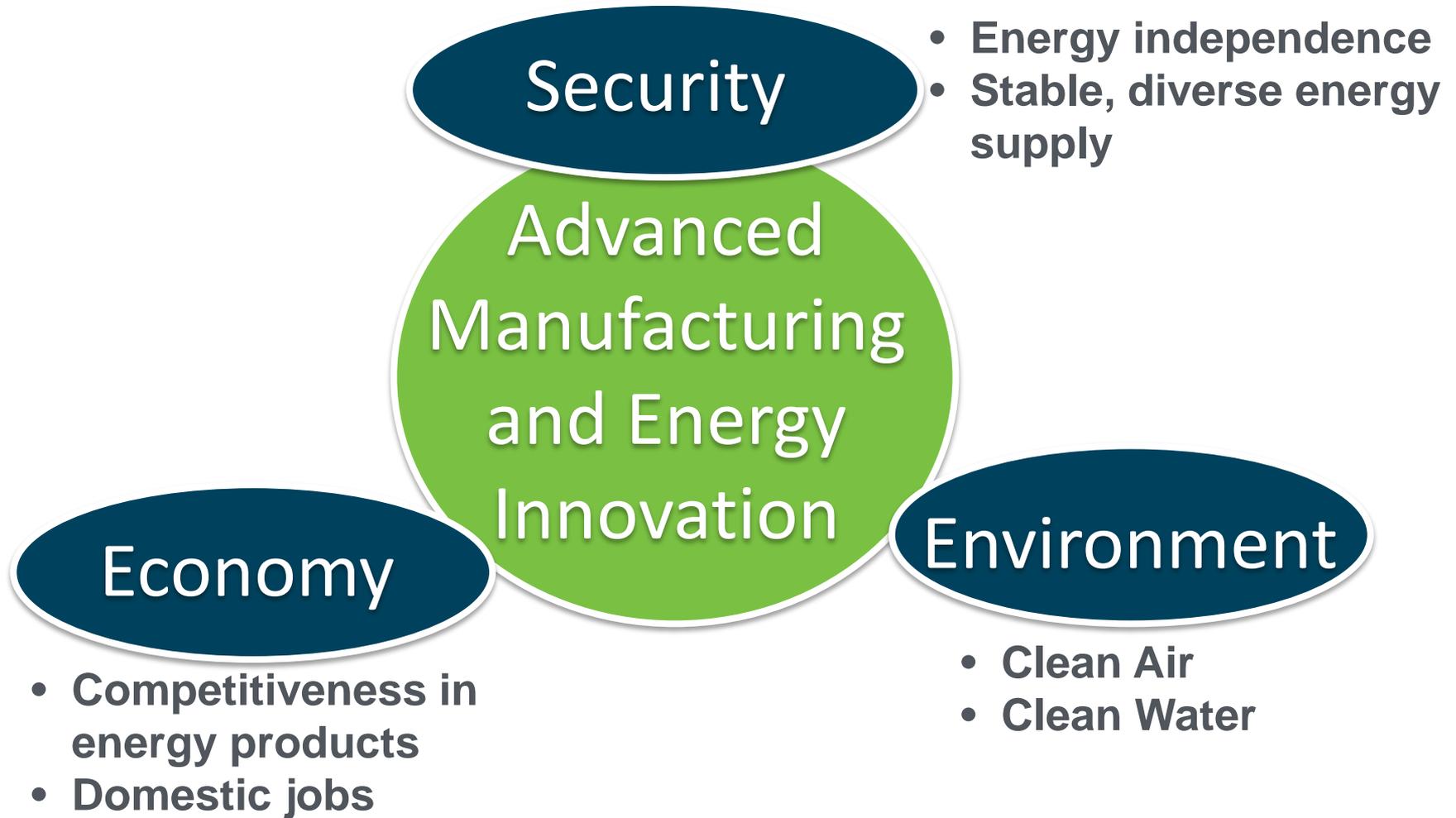
Rob Ivester

Director

Advanced Manufacturing Office

www.manufacturing.energy.gov

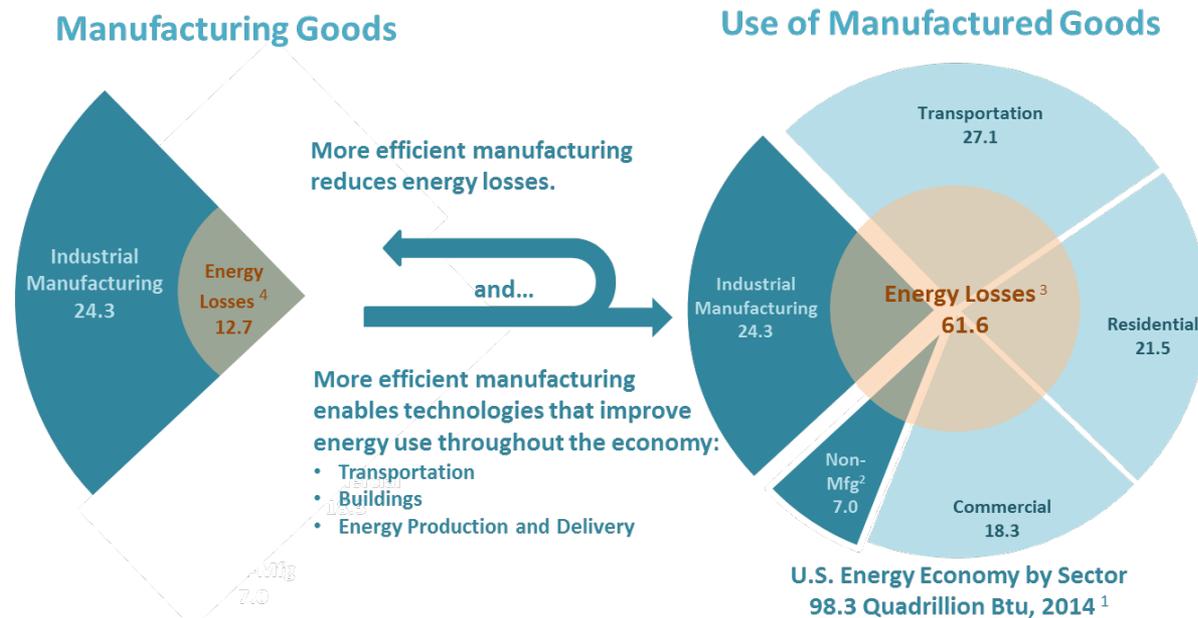
Impact of Energy and Manufacturing Innovation



Big Economic & Energy Footprint

Manufacturing:

- **Contributes ~ \$2 trillion to US GDP**
- **Accounts directly for ~12.5 million jobs**
- **Represents ~25% of nation's energy consumption**
- **Two-thirds of manufacturing sectors are energy intensive**

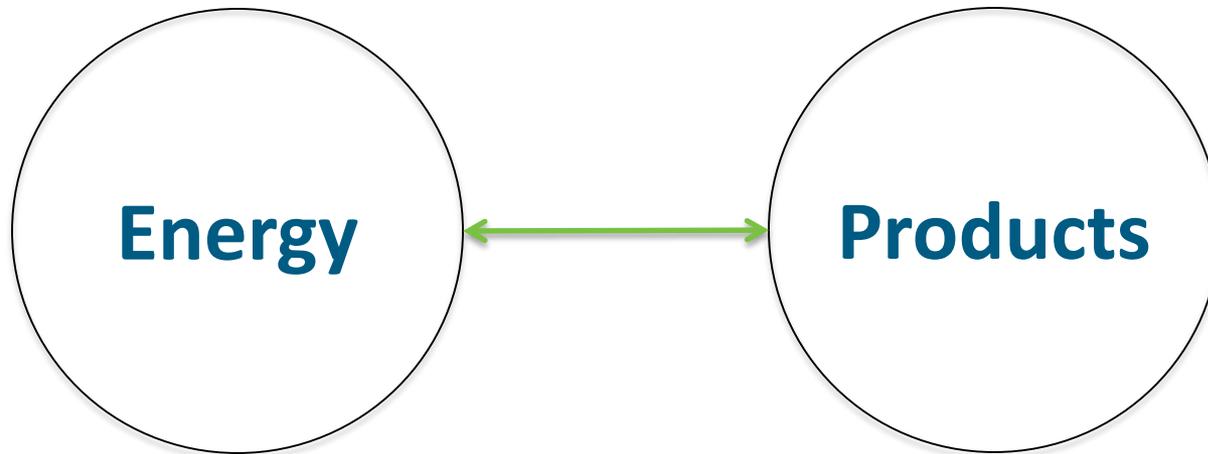


AMO Draft Multi-Year Program Plan available at
https://www.energy.gov/sites/prod/files/2017/01/f34/Draft%20Advanced%20Manufacturing%20Office%20MYPP_1.pdf

Technology Innovation through Applied Research and Development in Advanced Manufacturing and Energy is a Foundation for Economic Growth and Jobs in the US

Energy-Manufacturing Nexus

We need products to **make**, **move**, and **use** energy.



We need energy to **make**, **move**, and **use** products.

AMO Vision and Mission

AMO Vision and Mission

Vision: U.S. global leadership in sustainable and efficient manufacturing for a growing and competitive economy.

Mission: Catalyze research, development and adoption of energy-related advanced manufacturing technologies and practices to drive U.S. economic competitiveness and energy productivity.

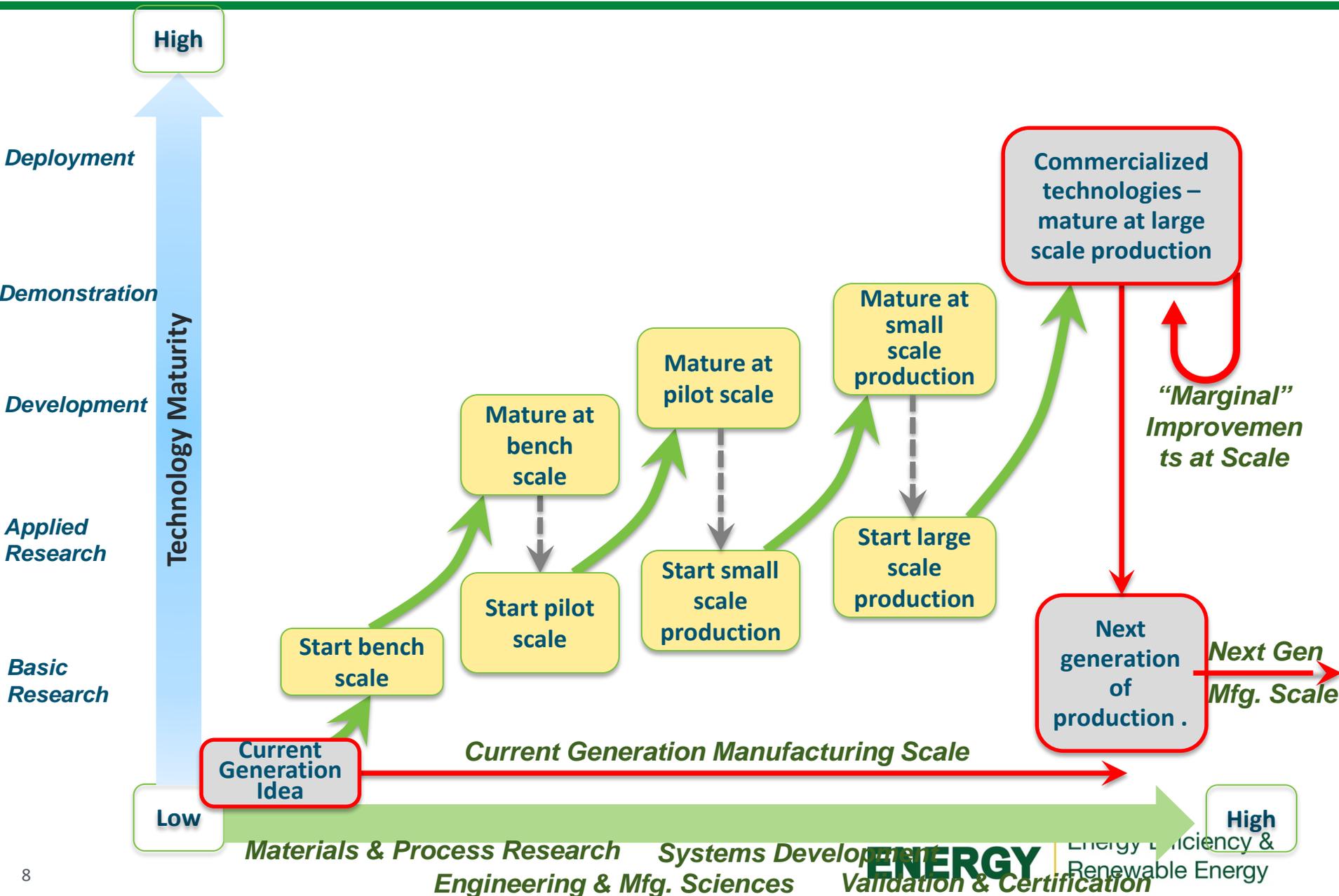
Alignment with Administration Priorities

- ✓ **Competitively selected**
- ✓ **Early-stage applied R&D projects**
- ✓ **Works with universities, laboratories, companies**
- ✓ **Merit-based & peer-reviewed**
- ✓ **Support energy productivity across the entire U.S. manufacturing sector.**

Balancing Priorities

Presidential Request (\$82M)	Appropriated (\$305M)
Focus on early stage research in materials and processes	
\$47M for R&D projects sub-program	\$85M for R&D projects sub-program
Lab-Embedded Entrepreneurship Programs (\$7.5M)	No Direction
High-Performance Computing for Manufacturing (\$6M)	No Direction
\$27.5M for R&D consortia sub-program	\$153M for R&D consortia sub-program
No funding for NNMI, but support for between four and six R&D consortia (\$16.5M)	Five CEMI Institutes, including the launch of a new Institute (\$70M)
No funding for Critical Materials and Desalination Hubs	Funding for Critical Materials (\$25M) and Desalination (\$20M) Hubs
Manufacturing Demonstration Facility and CFTF (\$11M)	Manufacturing Demonstration Facility and CFTF (\$20M)
\$13.5M for technical partnerships with no funding for IACs or CHP TAPs	\$30M for Technical assistance with funding for IACs and CHP TAPs

Technology vs Manufacturing Readiness Levels



Cerium Aluminum Alloys

Cerium:

- Many REE mines produce large amounts of Ce and La – which are the least expensive REEs. For Mt. Pass – **Ce and La represents 80% of the REO, but >25% of the value.**
- Price spike created significant demand destruction for Ce
- The transportation sector uses ~8M tons of Aluminum/year.
- Used ORNL's SNS to perform real-time evaluation of alloy prototype

Partners: Eck Industries, ORNL, LLNL, Ames, INL



3d Printed Sand
Molds



Cast Al-Ce Engine
Head Before
Machining

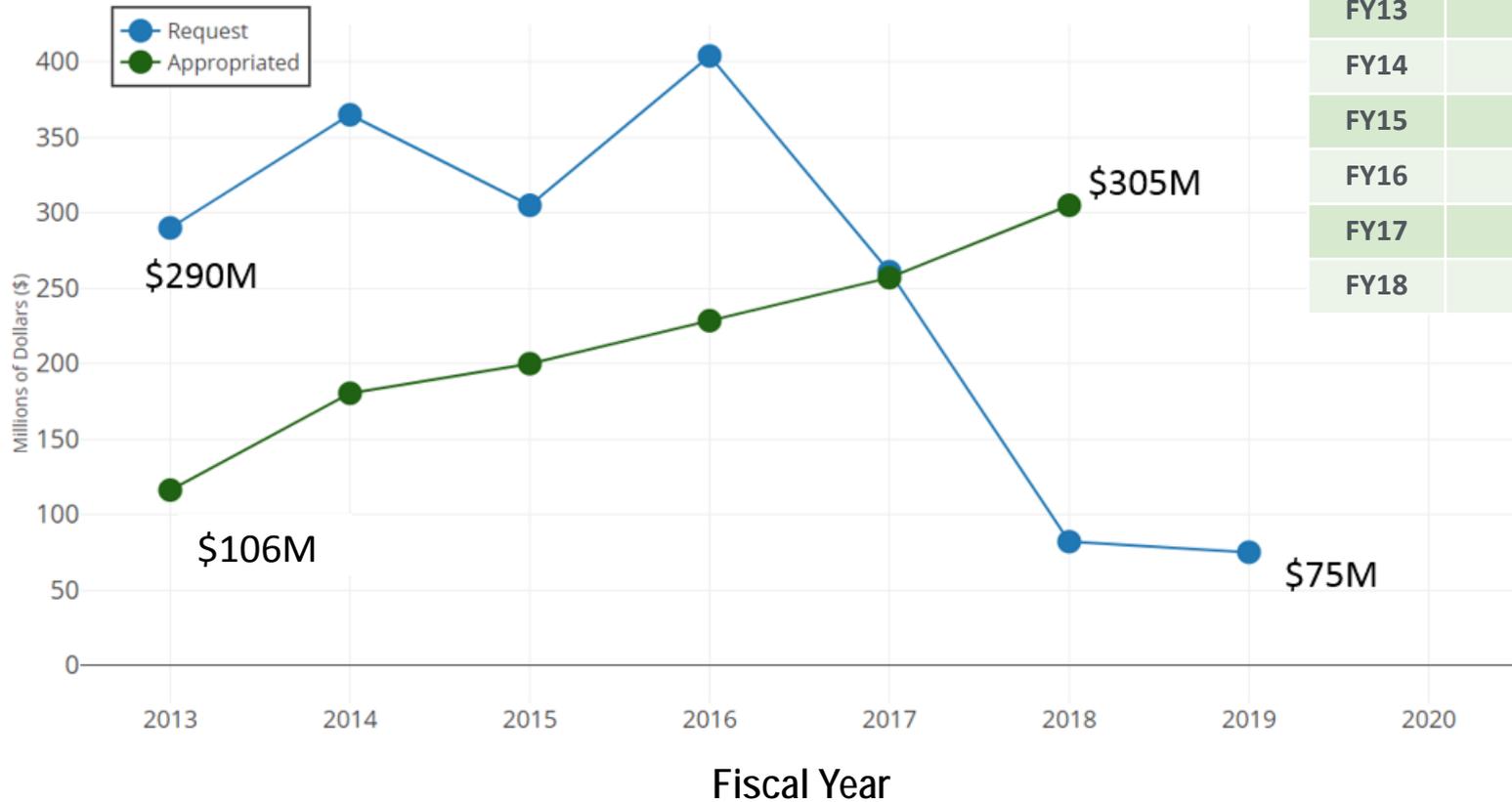


Final Al-Ce engine
head after
machining

Ce-Al alloy developed by CMI has as good (or better) properties as traditional Al alloys...without heat treatment. Saving >50% of the energy required for Al manufacturing.

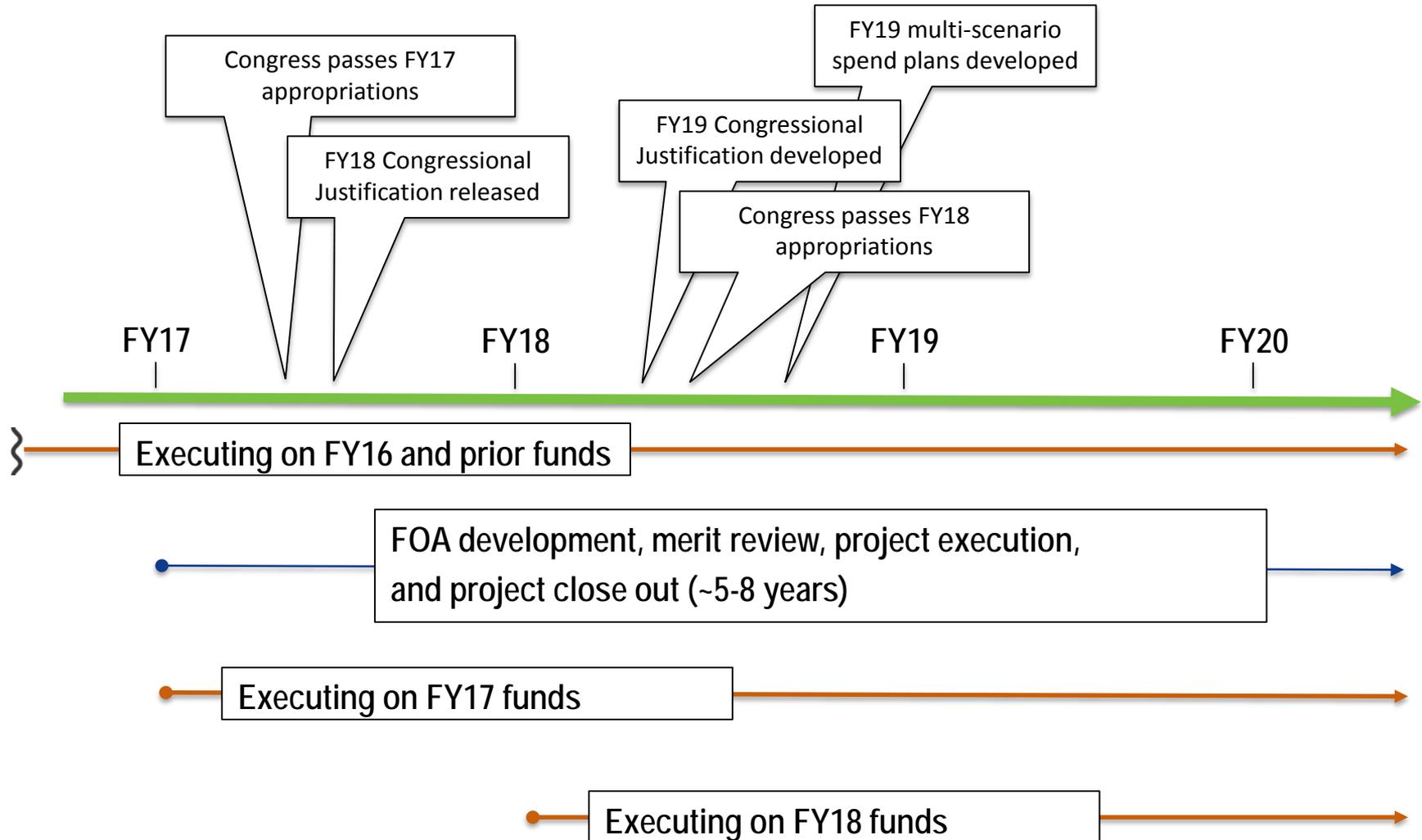
Continuing bipartisan support

AMO budget has steadily grown



Year	FTE Count
FY13	33
FY14	32
FY15	31
FY16	36
FY17	34
FY18	33

Funding is a multi-year process...



...with multiple constraints

Congressional Direction:

- Majority of funding is set aside for specific activities per Congress.
- FY19 Senate report language sets aside \$20M for a battery-focused MDF.
- FY18 final appropriations designated \$10M for district heating.

Department-level Discretion

- DOE can pursue top-level priorities within guidance given by Congress.
- Critical Materials Hub/Early Manufacturing USA Institutes
- Various cross-cut activities

Office-level Discretion

- Can orient funding to align with gaps in MYPP priorities based on remaining, non-directed funding.
- Next-Generation Electric Motors
- FY18 Lab Call

2017 Annual Peer Review

What we heard:

- More transparency around decision-making
 - How does AMO emphasize the 14 different technology areas?
- Clarify how Multi-Year Program Plan (MYPP) fits into both short and long-term decision making
- Better explain the early-stage R&D aspect of projects
- Help reviewers understand linkage projects, mission, and overall strategy
- Do a better job of aggregating and tracking the progress of investments across the portfolio