Energy-Saving
HOMES, BUILDINGS, & MANUFACTURING

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Energy Efficiency Sector Overview

July 13, 2018

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Office of Energy Efficiency and Renewable Energy

Energy Efficiency Overview

Advanced Manufacturing Office

- Next generation processes / materials R&D
- Broadly applicable and for energy-intensive industries
- R&D Consortia
- Rare Earth Materials R&D – limit supply chain volatility
- Manufacturing technical assistance

Building Technologies Office

- Technology RD&D; 20 - 80% savings
- Homes & Building Systems RD&D; 50% savings
- Sensors/controls / grid integration RD&D
- Building decision-making tools
- Building codes technical assistance
- Appliance standards

Federal Energy Management Program

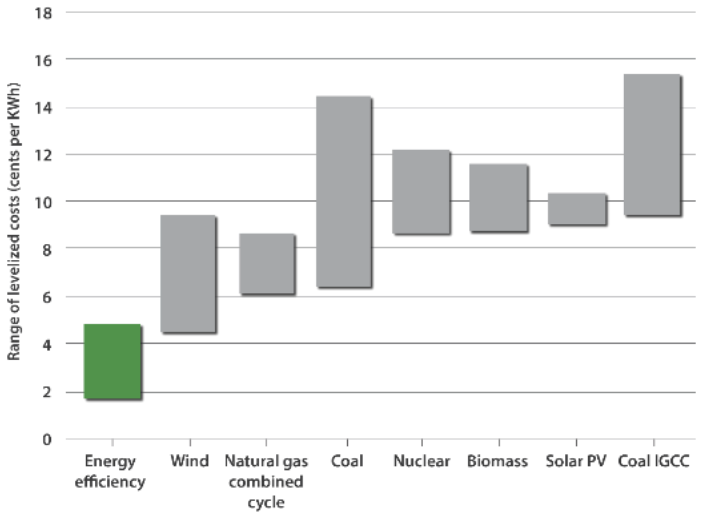
- Reduce energy costs for federal facilities and fleets
- Financing and technology technical assistance
- Skills training / tools
- Transfer of practices broadly

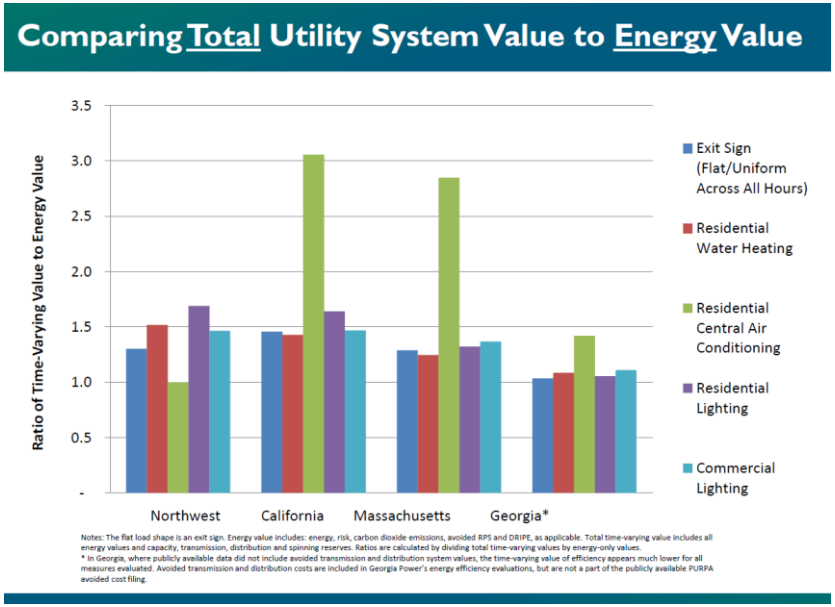
Weatherization & Intergovtal Programs

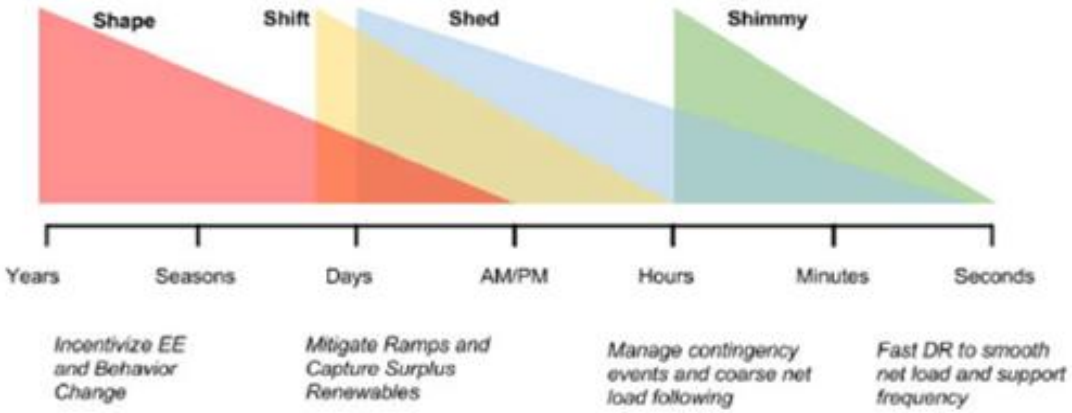
- Low income weatherization
- State Energy Program
- Best practice TA for state and local gov’ts

Office (Amounts in Thousands)	FY 2018 Enacted	FY 2019 Request	FY 2019 HEWD Mark	FY 2019 SEWD Mark
Energy Efficiency	$858,727	$142,000	$773,000	$873,000
Advanced Manufacturing Office	$305,000	$75,000	$260,000	$311,000
Federal Energy Management Program	$27,000	$10,000	$27,000	$31,000
Building Technologies Office	$220,727	$57,000	$180,000	$225,000
Weatherization and Intergovernmental Programs	$306,000	$0	$306,000	$306,000

Value of Energy Efficiency -- lower costs, improved affordability, reliability and resiliency







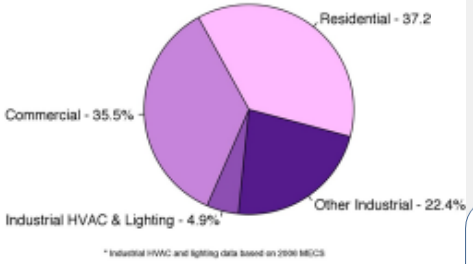
Buildings *are* *underutilized* as a flexible electric system resource

Residential and Commercial Buildings

U.S. Energy and Electricity

Energy Use

Electricity Use



* Industrial HVAC and lighting data based on 2006 MECS

SECTOR

113.6 million housing units

224 billion sq. ft.

21 quads

5.6 million commercial buildings

87 billion sq. ft.

18 quads

CONSTRUCTION TYPE

- New Construction
- Retrofit

Sample Envelope Types

- Masonry
- Wood frame
- Metal frame

- New Construction
- Retrofit

BUILDING USE

- Single-Family
- Multi-Family
- Manufactured Housing
- Food Service
- Retail
- Hospitality
- Office
- Education
- Healthcare
- Grocery
- Public

CLIMATE

- Marine
- Cold/Very Cold
- Hot Humid
- Hot Dry/ Mixed Dry
- Mixed Humid

OCCUPANCY

- Owner-Occupied
- Tenant-Occupied
  - Tenant Pays Energy Costs
  - Owner Pays Energy Costs

Sample Technology Areas (Gas and Electric)

Buildings Portfolio

- **Next Generation Energy Saving Technologies**
  - Enable development of cost-effective technologies capable of reducing a building's energy use per square foot
  - Improvements in lighting, HVAC (with improvement in working fluids), windows/envelope, water heating, and appliances.
  - Enable building to grid interactions / beyond batteries
- **Validation of High Performance Buildings**
  - Design and construction of new homes that consume 50% less energy per square foot for heating, cooling, and water heating relative to typical homes
  - Design and construction of new buildings that consume 50% less energy per square foot relative to the average commercial buildings.
- **Appliances & Equipment Standards and Building Energy Codes**
  - Meet statutory obligations
- **Building Energy Science STEM**

LED Performance

Electrochemical Water Heater

Manufactured Homes

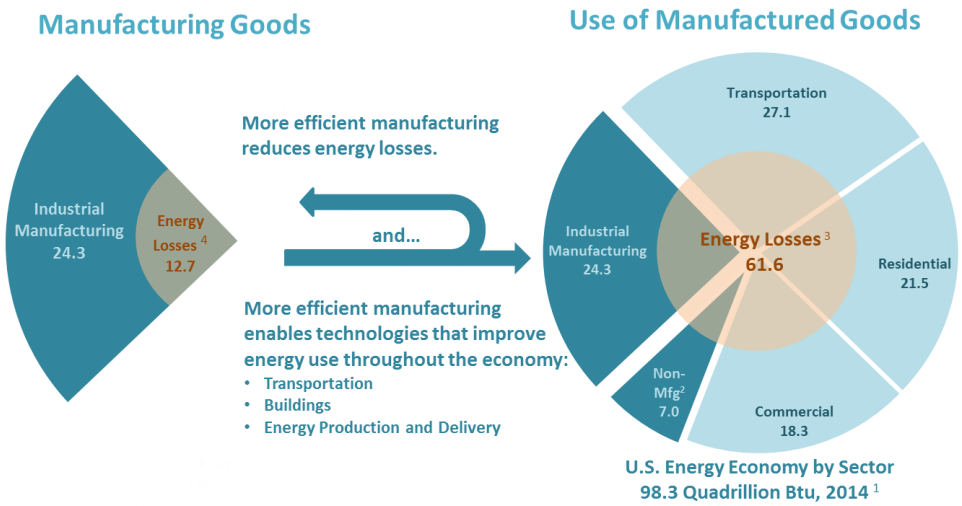
Open Source Controls

Advanced Manufacturing

Improve the energy productivity of U.S. industry, improve U.S. industrial competitiveness, and grow U.S. leadership in manufacturing

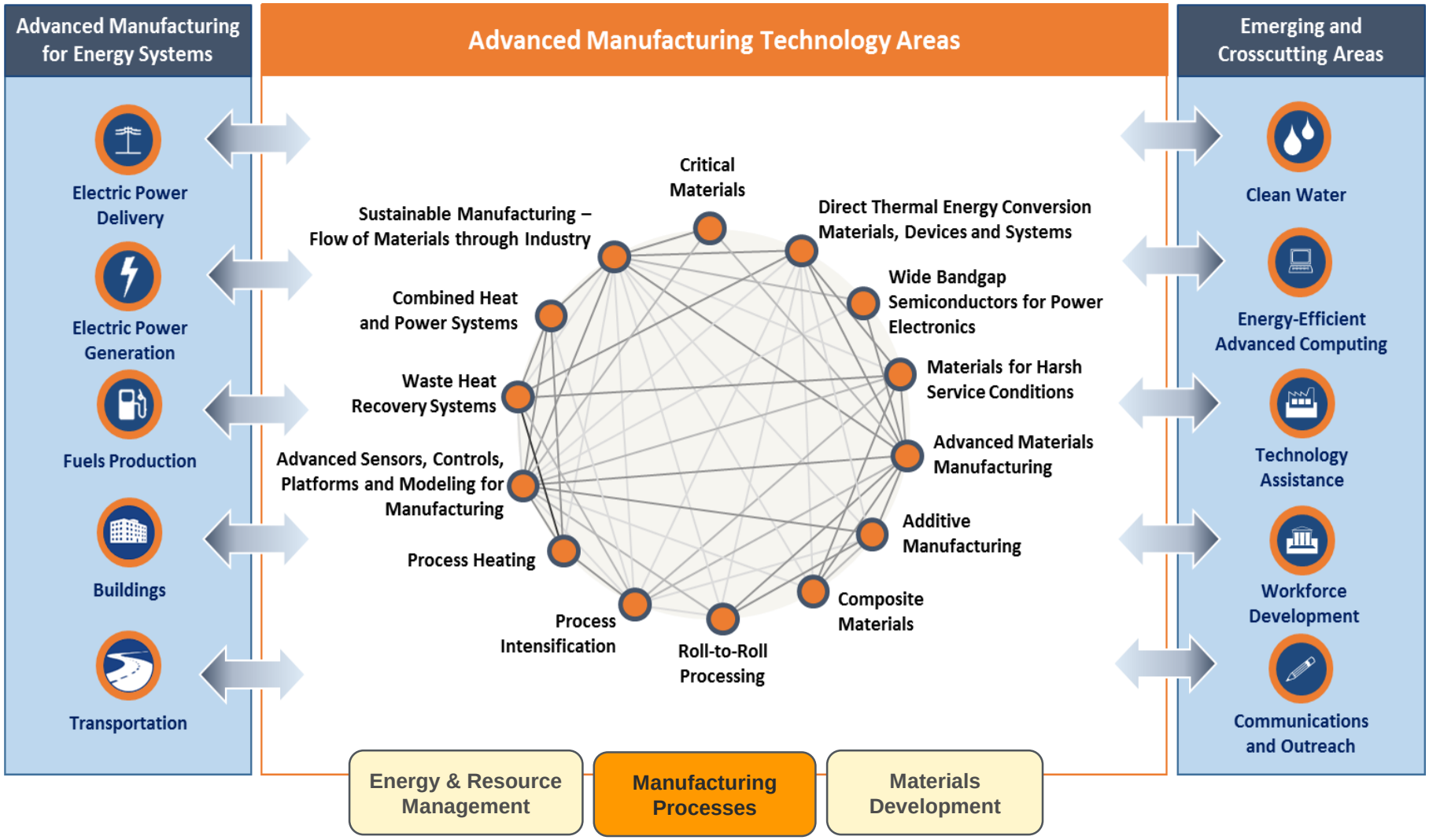
U.S. Manufacturing in 2014

- 12% of U.S. gross domestic product.
- Directly employed 12 million people and generated millions of jobs in other sectors.
- Sold products valued at $5.9 trillion.
- Represented 17% of the world's manufacturing output.
- Supplied 51% of total U.S. exports.
- Accounted for 25% of U.S. energy consumption at a cost of $130 billion.



1 Energy consumption by sector from EIA Monthly Energy Review, March 2015
2 Industrial non-manufacturing includes agriculture, mining, and construction
3 From LLNL Energy Flow Chart 2014 (Rejected Energy), adjusted for manufacturing losses
4 Manufacturing energy losses based on DOE AMO Sankey/Footprint Diagrams

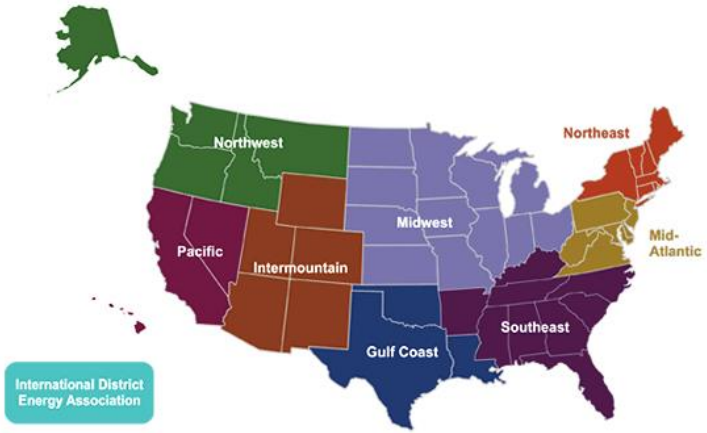
AMO R&D Topics



Industrial Technical Assistance

Efficient On-Site Energy

CHP Technical Assistance Partnerships

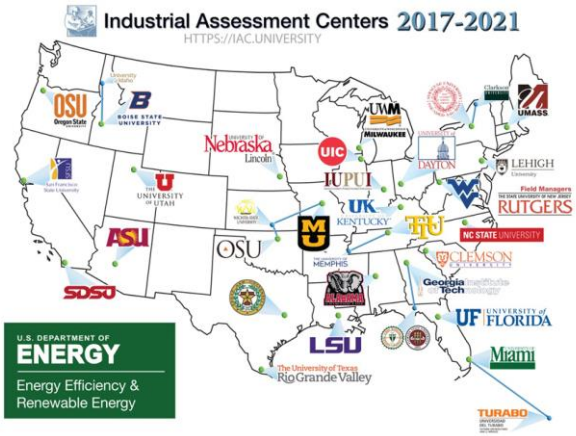


Better Plants
U.S. DEPARTMENT OF ENERGY

Simplot
Bringing Earth's Resources to Life
SAINT-GOBAIN
NISSAN
legrand®
ALCOA
3M

Better Buildings, Better Plants,
Industrial Strategic Energy Management

Schneider Electric
BRIGGS & STRATTON
Cummins
Johnson Controls



Student Training & Energy Assessments

University-based Industrial Assessment Centers

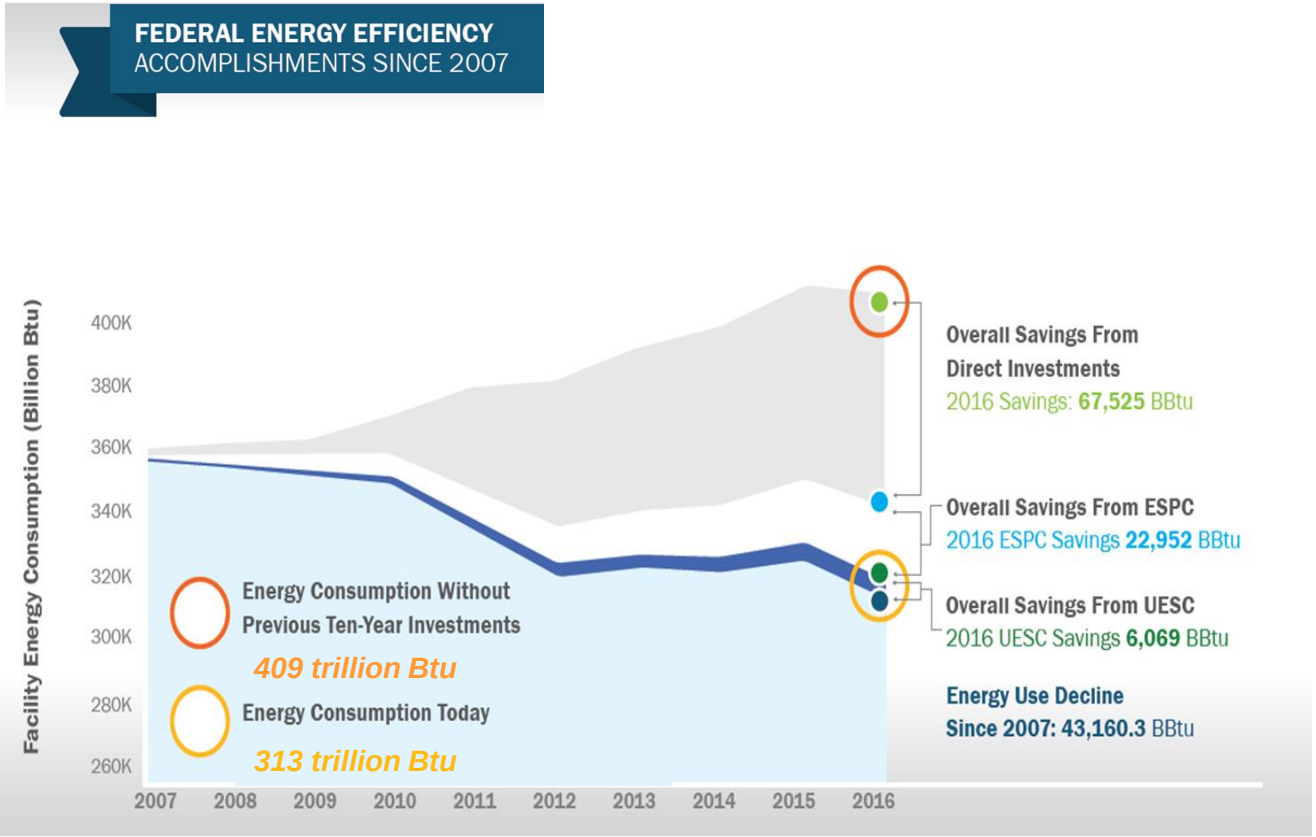
Federal Energy Management Program Office

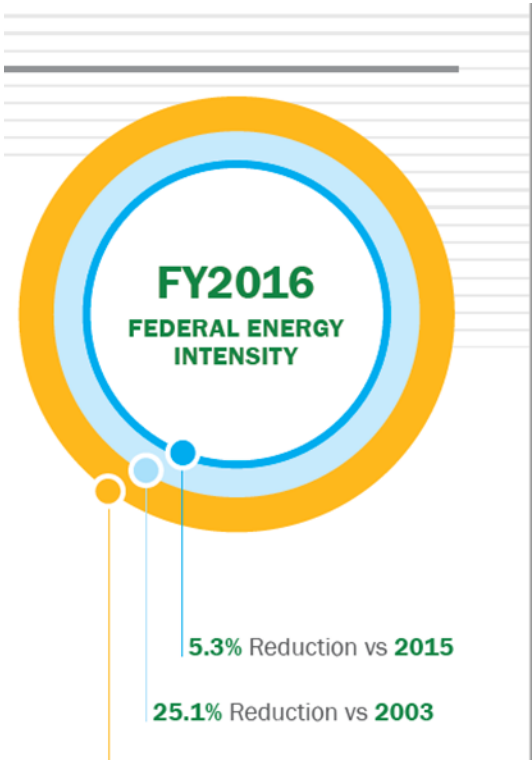
Enable Federal agencies to meet energy, water and other goals -- assist in improving federal facility resiliency / security aligned with Agency missions

Portfolio

1. **Assist Federal Agencies to Meet Goals**
   - Technical assistance
2. **Leverage Third-Party Performance-Based Contracts**
   - Improve access to private sector financing and agency know how in using them
3. **Catalyze Innovative/Leadership Projects at Federal Sites**
   - Improve federal know how by providing training and tools
   - Demonstrate best practice solutions with private sector (e.g. Better Buildings Data Center Challenge)
4. **Track Government-Wide Performance**
   - Support OMB/CEQ

Federal Energy Management Program





- Annual federal energy bill of ***$16.1 billion (FY16)***
- Between ***$9 billion*** and ***$15 billion*** of potential self-financing efficiency measures estimated to exist in Federal buildings.
- ***$165 billion of*** deferred maintenance and repairs required to bring government owned property, and equipment to an acceptable condition.