



Scope of AMO Industrial Technical Assistance Support

BTO Visit
Oct 19, 2016



General Areas of Support

- Better Plants
- Industrial Assessment Centers
- Software Tools
- Strategic Analysis
- Technical Assistance / Technical Deployment
 - Diagnostic Equipment Loan Program
 - Energy Management Benchmarking Survey
 - Industrial Focus Groups
- Other

Better Plants

- History
 - Led DOE tools and resource development
 - Ran system-specific steering committees
 - Developed and delivered Plant-Wide assessment and ESA program
 - Co-developed the SEN Leader Program
- Program management
- Numerous TAMS
- Coordinate INPLTs
 - Subcontract experts
 - Loan equipment





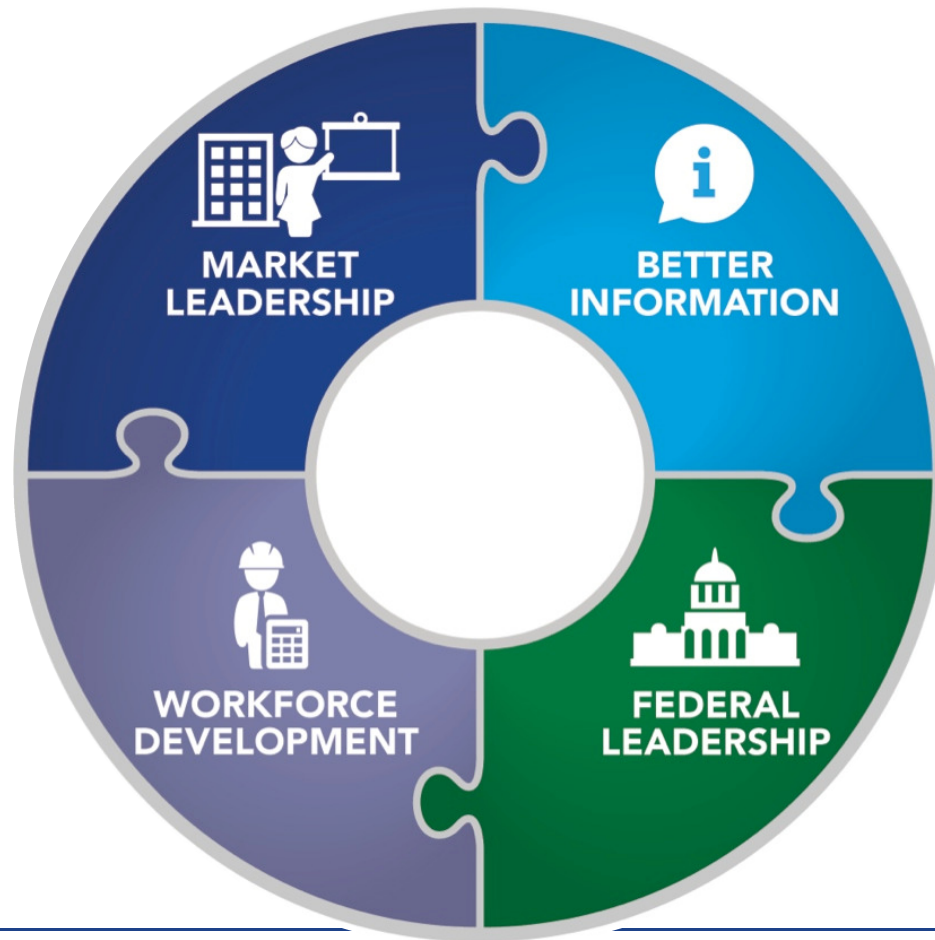
Developing Innovative, Replicable Solutions with Market Leaders

- Better Buildings Challenge
- Better Buildings Alliance
- Better Buildings, Better Plants
- Better Buildings Accelerators
- Better Buildings Residential
- Superior Energy Performance



Developing a Skilled Clean Energy Workforce

- Better Buildings Workforce Guidelines



Making Energy Efficiency Investment Easier

- Building Performance Database
- Building Energy Data Exchange Specification
- New Financing Solutions
- Building Energy Asset Scoring Tool
- Home Energy Score
- Appraisal Foundation Memorandum of Understanding



Leading by Example in the Federal Government

- New Executive Order
- President's Performance Contracting Challenge
- DOE Leadership

Office of Energy Efficiency and Renewable Energy (EERE)

Unified at EE Level: Strategy, Data, Program Numbers, Partner support
Solutions Center/Summit/Media Outreach

Maria, Danielle, Amy

Commercial (BTO)

Roland
Jason, Holly,
Andrew, Sultan and
Cindy

BB Challenge

BB Alliance

Accelerators:

- Energy Data
- Home Info
- Home Upgrade

Public Sector (WIP)

Anna
Sarah, Alice,
Crystal, Adam

BB Challenge

Accelerators:

- ESPC
- Outdoor Lighting

Industrial (AMO)

Mark, Jay
Eli, Bruce

BBBP
Challenge

Better Plants
Program

Accelerators:

- SEP
- CHP

Federal/DCs (FEMP)

Tim
Will

BB Challenge
(Data Centers)

Federal BB
Commitment

- Accelerator:
- Data Centers

Multifamily (HUD/BTO)

Kevin, Julia

BB
Challenge

Better Buildings Solution Center



- Nearly 200 solutions tested and proven by Partners – 100 added in 2016
- Find solutions by topic, building type, solution type, building size, sector, technology, location, and more.

energy.gov/bbsc

Better Buildings, Better Plants

- Better Plants Program is a key component of the President's **Better Buildings Initiative**, which seeks to improve the energy efficiency of commercial and **industrial** buildings
- Through Better Plants:
 - Set **long-term efficiency goals**
 - Receive **technical assistance, networking opportunities** and **national recognition**
- Manufacturers have two opportunities to engage in Better Plants:
 - Broader-based Program level
 - Higher-level Challenge level

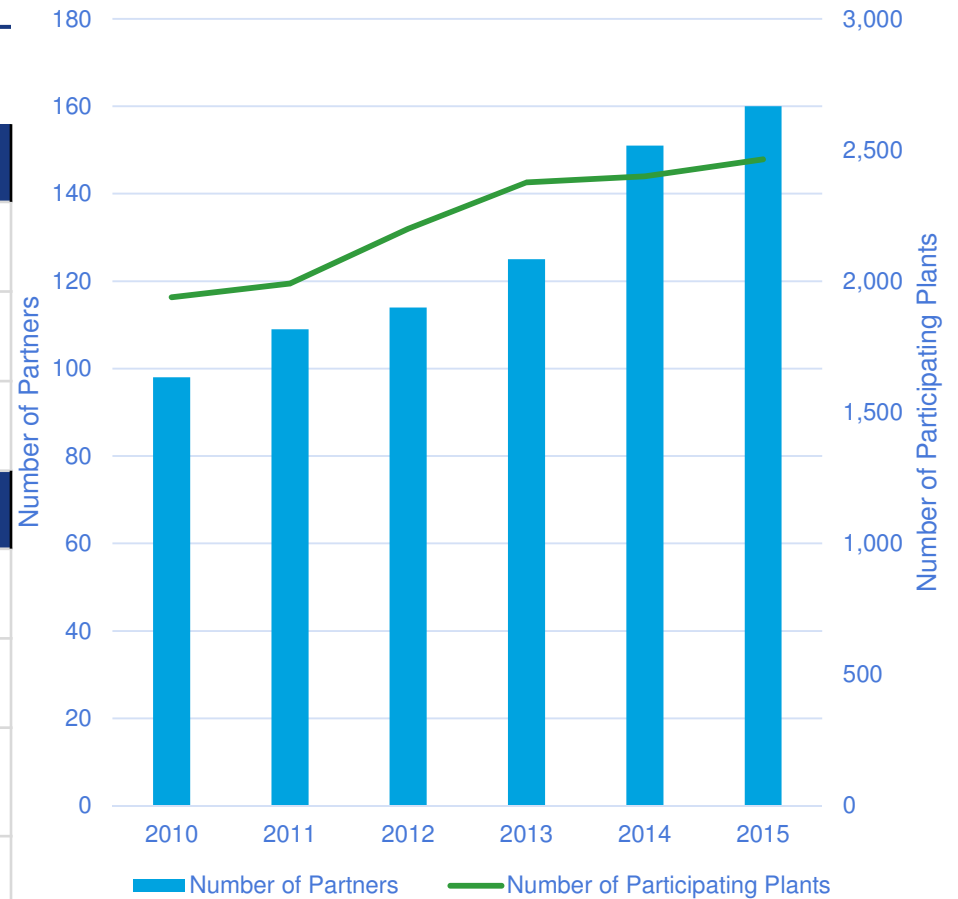


Better Plants Overview

Program Partners and Energy Footprint Continue to Grow

Better Plants Snapshot

Accomplishments	Total
Number of Partners to date (September, 2016)	181
Approximate Number of Plants	2,500
Percent of U.S. Manufacturing Energy Footprint	11.5%
Reported Savings	
Cumulative Energy Savings (TBtu)	600
Cumulative Cost Savings (Billions)	\$3.1
Cumulative Avoided CO ₂ Emissions (Million Metric Ton)	34.7
Average Annual Energy Intensity Improvement Rate	3.0%



Better Plants Challenge



TAM Support for Baseline/Data Analysis

- Help with energy baselines and data tracking/reporting
 - **Regression-Based Approach**
 - **Facility-Level Approach**
 - **Corporate-Level Approach**
- DOE's EnPI 4.0 tool includes GHG and cost savings calculations
- Free guidance document available



In-Plant Trainings

- Teach how to conduct assessments, use DOE tools, and implement projects
- Open to host plants, peer companies, suppliers
- ~60 INPLTs covering steam, compressed air, process heating, pumps, fans, and treasure hunts since 2011
- Identified > 3 TBtu and \$14 million in energy savings
- DOE is offering new INPLT focused on wastewater, strategic energy management and refrigeration systems

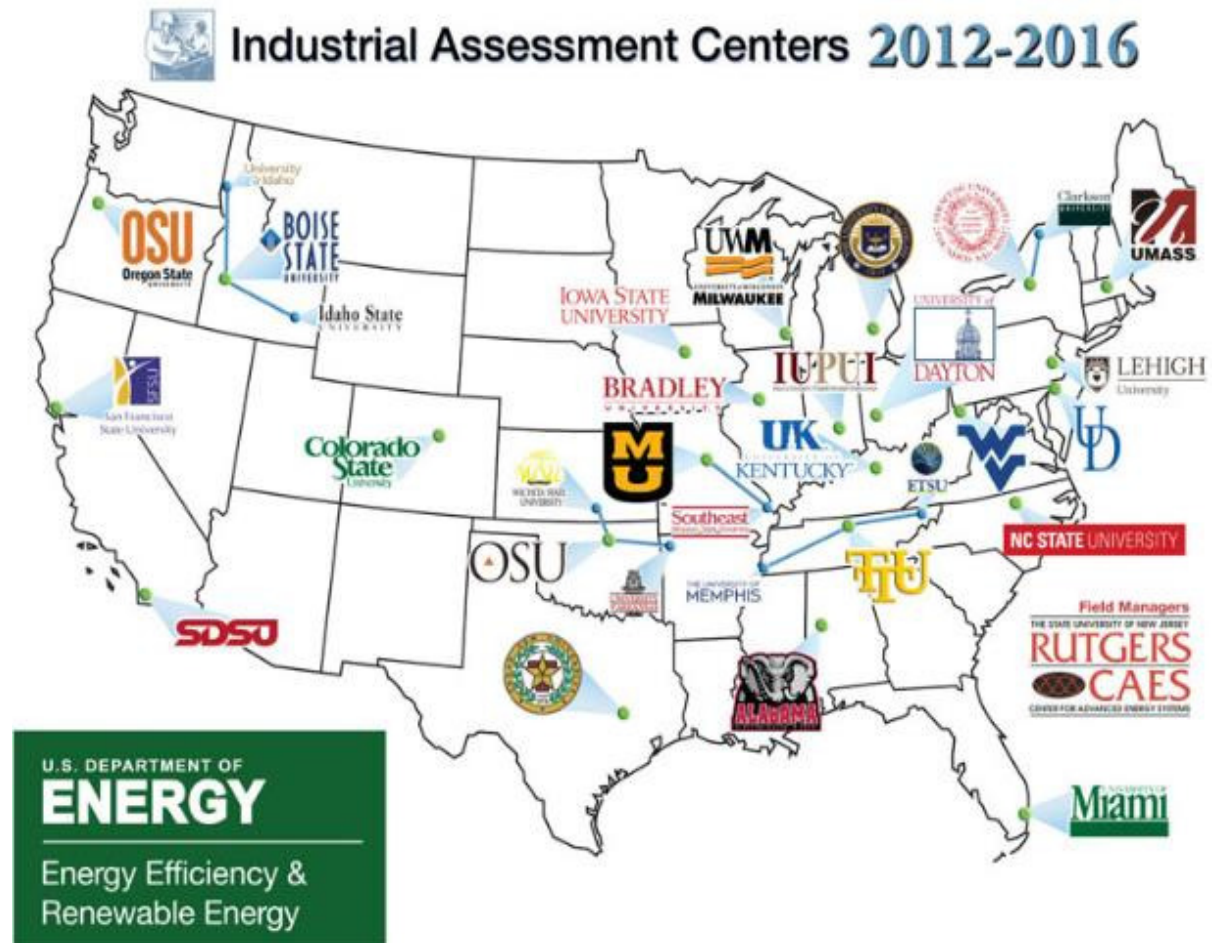


Process heating INPLT at an ArcelorMittal plant in Nov. 2013. Photo courtesy ArcelorMittal and ORNL.

<http://energy.gov/eere/amo/better-plants/>

Industrial Assessment Centers

- Maintain the IAC Student Registry
- Support Student activities for the IAC
 - Student Metrics
 - Webinars
 - Student Certificates
 - Internship Program
 - Social Media
 - Student/Alumni Awards



AMO Strategic Analysis

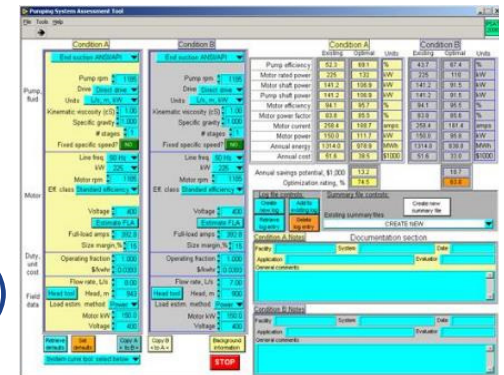
- Multi-lab collaboration through AMO
- Work with:
 - LBNL, NREL, and ANL
- Focus:
 - Identification, research, development, demonstration, and deployment of technologies
 - Energy-water-materials efficiency, reduce the carbon footprint, and enhance the competitiveness of U.S. industries
- Semi-related research activities in:
 - **Industrial process heating, waste heat assessment and analysis** (reduce, recover, and recycle), **smart manufacturing, industry water-energy** analysis, **industry waste management** and **electro-technologies**

AMO Tool Redevelopment

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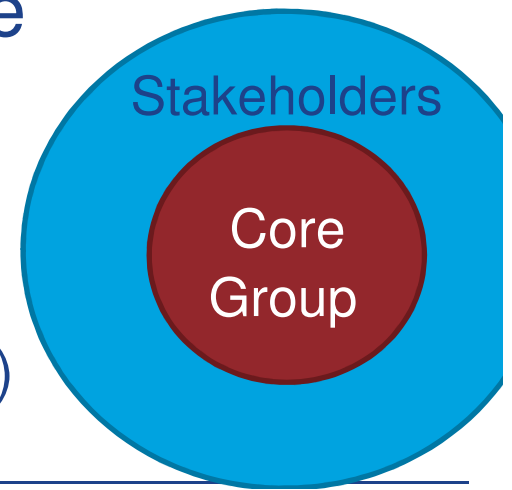
AMO Tool Revamp

- Recreating all of the DOE Core Tools
 - Pump System Assessment Tool (PSAT)
 - Fan System Assessment Tool (FSAT)
 - Compressed Air (AirMaster+)
 - Process Heating Modeler Tool (PHAST)
 - Steam System Modeler Tool (SSMT)
 - Several Non-core Tools: PEP, EnPI, eGuide, etc
- Drivers:
 - Several of the existing tools no longer work
 - DOE doesn't work source code for past tools
 - Upgrading capabilities
 - Open-Source of all code



Other Benefits

- Decouple engine from user interface
- Common software engine library
- Multiple interfaces
 - Web
 - Desktop (Windows, Mac, Linux)
 - Mobile
- Completely OpenSource – MIT Licence
- GitHub repository
- Community Engagement
 - Core development team
 - General Stakeholders (including Better Plants)



Tool Revamp Schedule

- Pumps (PSAT) - 10/31/2016
 - Process Heat (PHAST) - 5/31/2017
 - (Excel version in a few months)
 - Fans (FSAT) - 9/31/2017
 - Compressed Air (AirMaster+) - 5/31/2018
 - Steam (SSMT/SSAT) - 9/31/2018
 - LogTool - 9/31/2018
- Not included – Excel PEP tool - 7/15/2016

Future DOE Training Plans

- Awareness and User Training
 - Online modules
 - Length: Minutes to hours
- In-Plant Training
 - Ran through Better Plants Program
 - Classroom plus Hands-on
 - Length: 1-3 days
- Certified Practitioner
 - System-Specific, In-Depth Training
 - Classroom
 - Length: ~2.5 days



Diagnostic Equipment Loan Program

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Diagnostic Equipment Loan Program

- Goal: Provide diagnostic equipment to partners free of charge (think Autozone rental)
- Historically:
 - Currently loan equipment to Energy Experts for INPLTs
 - Inventory of equipment available
- Equipment used for:
 - INPLTs
 - Internal energy investigations
 - Implementation M&V
 - Test the equipment before buying
- Timeframe – 1 day up to 4 weeks
- Rolling application process – first come, first serve
- Generic Policy – “You break it, you buy it”



Instrument	Application
Anemometer	Measure air flow and help quantify leakage around seals (process heat, building envelope).
Combustion Analyzer	Quantify the amount of excess oxygen in boiler/combustion process exhaust.
Conductivity Meter	Quantify the amount of undissolved solids in boiler blowdown.
Current Transformer	Help quantify an actual change in the electrical consumption of a component or system.
Digital Manometer	When used with pitot tubes, digital manometers can help determine air flow rates in fan systems or ductwork.
Digital Multimeter	Measure voltage, current and resistance.
Digital Thermometer	When combined with a thermocouple this is useful for determining process temperatures.
HOBO Data Logger	When combined with the accessories below, the data logger is used to determine trends in non-steady state systems: current transformer - clamp-on; current transformer - split core; pressure transducer; temperature/RH sensor.
Infrared Camera	Useful for evaluating structures, door seals, insulation, oven hot spots, etc.
Infrared Thermometer	An infrared thermometer can be useful for non-contact temperature measurements for both manufacturing processes and building envelope applications.
Manometer–Hydronic	Used for measuring pressure drop across components in fluid systems.
Pitot Tube	Measure fluid flow velocity by using the difference between the total and static pressures.
Power Logger	Used for logging power in low voltage (<600 V) 1-Phase or 3-Phase electrical components such as pumps, fans, and compressors.
Pressure Transducer	Pressure transducers are most frequently used for compressed air and pumping systems.
Strobe Tachometer	A strobe tachometer is a non-contact method for determining the rotating speed of a shaft (motors, pumps, fans).
Thermocouple	Used to measure temperature for various applications.
Time-of-use Logger	Used for logging starts and stops of equipment with intermittent duty cycles such as sump pumps, vent fans, refrigeration units, etc.
TRMS Supermeter	Used for non-contact temperature measurement and voltage, current, resistance, inductance, capacitance, and frequency measurement.
Ultrasonic Flow Meter	Used to measure the flow rate in fluid systems without breaking the pressure boundary.
Ultrasonic Leak Detector	Used to identify leaks in compressed air or steam systems.

Diagnostic Equipment

HOBO U12 Data
Logger + 600 AMP Split
Core Current
Transformer

HOBO H22 Energy
Logger – Multi Channel
Multi Transducer Data
Logger

HOBO U12-014 Logger
– 0 to 1800 degree
thermocouple

Pelican 1510
Case

Kill-A-Watt
120VAC outlet
energy meter

Dickson
Pressure
Logger

Fluke 345 – Clamp
Meter (Power
Factor / Energy
Logging)

UE Ultrasonic
Leak Detector



Energy Management Benchmarking Survey

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Energy Management System Survey

- Purpose
 - Designed to help partners **evaluate and benchmark** the strengths and weaknesses of their energy management systems
 - Help energy managers “justify their existence”
- Outcomes
 - Results to be provided back in the form of a **summary report**
 - Summary report will provide **energy management system benchmarking information**
 - Recommend to complete survey **once a year**
- Sections
 - Company profile
 - Energy program
 - Energy procurement
 - Project funding
 - Energy team
 - Communication
 - Staff training
 - Achievement recognition
 - Energy assessment
 - Equipment management
 - Energy monitoring

Sample Survey Questions

#	Question	Answer			
Energy Program					
9.	Does your company have any ISO 50001 certified plants?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Do not know	
10.	Is your company considering obtaining ISO50001 certification for plants within the next 12 months?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Do not know	
11.	Other than ISO 50001, what other Energy Management Standards or Programs are your company implementing?	<input type="checkbox"/> DOE Superior Energy Performance	<input type="checkbox"/> Energy Star Guidelines for Energy Management	<input type="checkbox"/> None	
		<input type="checkbox"/> Other (please provide more information here)			
12.	Where does the Energy Management Program reside in your company?	<input type="checkbox"/> Energy procurement and utilization	<input type="checkbox"/> Sustainability	<input type="checkbox"/> Environmental health and safety	
		<input type="checkbox"/> Other (please provide more information here)			
13.	How long has the Energy Management System been in place?	<input type="checkbox"/> Less than 3 years	<input type="checkbox"/> Over 3 years	<input type="checkbox"/> None	
		<input type="checkbox"/> Other (please provide more information here)			

Energy Management Survey - Next Steps

- DOE & BP Partner Review
 - **High level comments** on the survey about how to **provide more value** to Better Plants Program and Partners
 - Get feedbacks on **survey format** and **questions**
 - Revise to fit **partners' preference** and include most **important questions**
- Administrative Requirement
 - Obtain **OMB approval** on data collection
 - Clear relevant **legal issues**
- Roll Out
 - Paper based or online survey services (e.g. survey monkey)

Industrial Focus Groups

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Better Plants Industrial Focus Groups

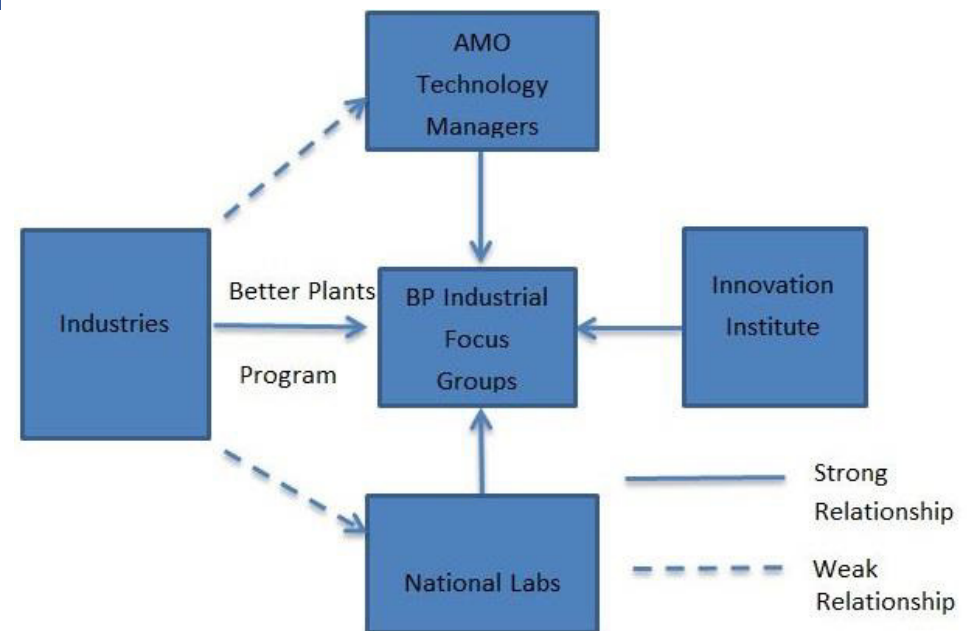
“Bring together Better Plants partners with similar processes to identify and overcome sector specific barriers to energy efficiency”

Goals

- Establish a network of partners for each sector
- Tailor DOE offerings to the needs of a specific industrial sector
- Connect the Industries to the various National Labs.

Differentiating from EnergyStar

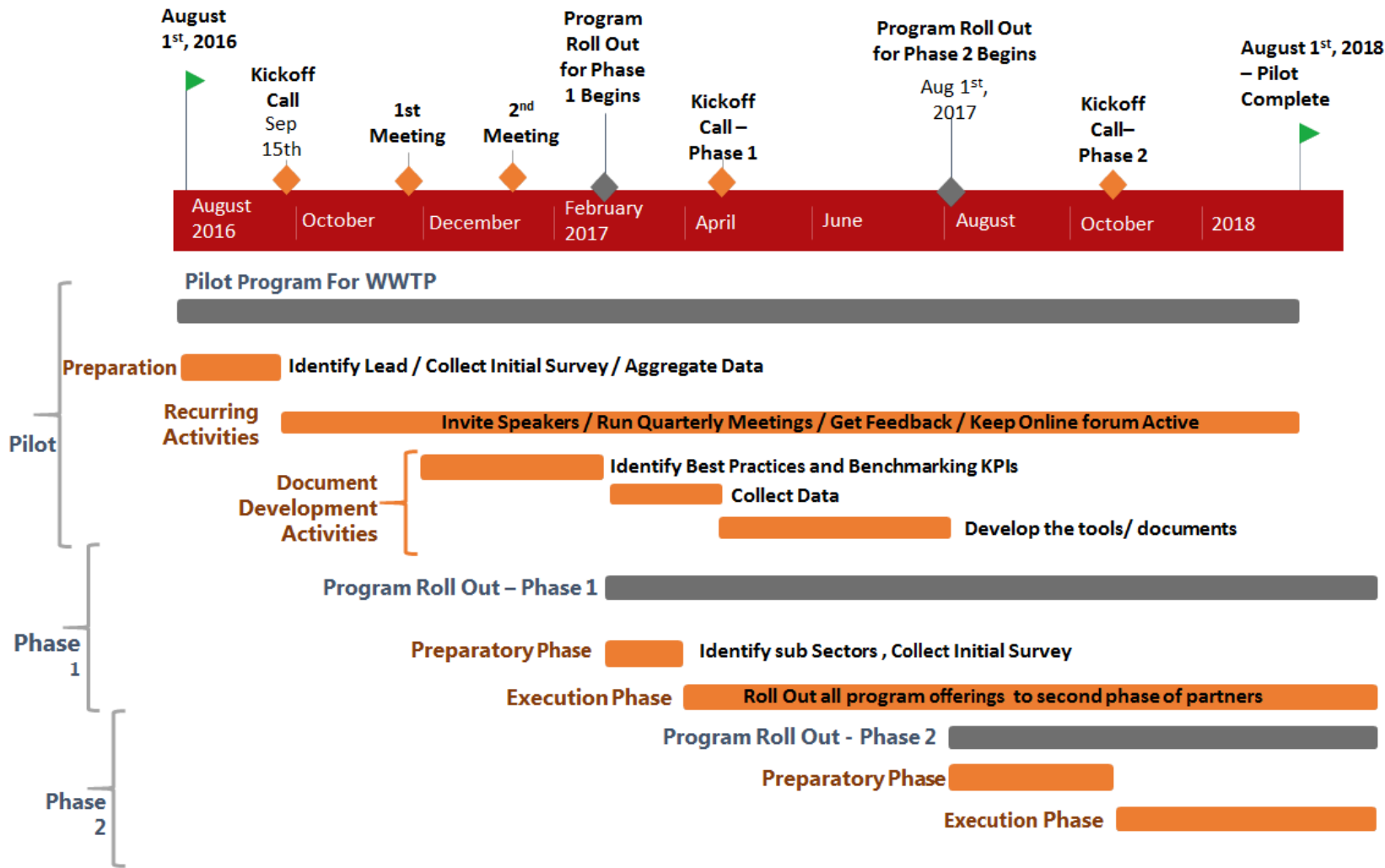
- Focus on technology deployment.
- Process level best practices and benchmarking
- Focus on unaddressed processes



Better Plants Industrial Focus Groups – Focus Areas / Outcomes

Focus Areas	Activities	Outcomes
1. Technology Transfer	<ul style="list-style-type: none"> • Technology Transfer Events • Technology Webinars • Workshops • AMO Document - Review 	<ul style="list-style-type: none"> • Technology Transfer - Summary. • List of identified R&D Topics
2. Best Practices	<ul style="list-style-type: none"> • Quarterly Calls • Online Activities 	<ul style="list-style-type: none"> • Best Practices Manual
3. Benchmarking	<ul style="list-style-type: none"> • Sector Specific Surveys • Quarterly Calls • Online Activities 	<ul style="list-style-type: none"> • Benchmarking Tools • Survey Results
4. Technology Roadmap	<ul style="list-style-type: none"> • Quarterly Calls • Online Activities • Technology Webinars 	<ul style="list-style-type: none"> • Advanced Technology Roadmaps

Better Plants Industrial Focus Groups – Roll Out Plan



Other Collaboration Points

Other Items:

- Driving towards more technology deployment
 - Will host an “Industry Day” for Better Plants Partners
 - March 15-16
- Leverage and develop an industrial-focused GSA Green Proving Grounds Model (or HIIT)
 - Many companies come forward looking for the “next big thing” & PMM’s
 - Develop objective information about performance of underutilized technologies
 - Accelerate adoption of industrial technologies that cost-effectively reduce national energy consumption
 - Benefit manufacturers – one submission, two programs, larger portfolio
- Leverage the Crowdsourcing platform for industrial-related technologies

Questions?

