

**SOCMA Webinar on
Manufacturing Operations & Best Practices**

in partnership with
**U.S. Department of Energy's Better Plant Program and
Celanese Corporation**

**October 1, 2019
1:00 - 2:00 PM Eastern Time**

<https://register.gotowebinar.com/register/892867613767576332>



socma

SOLUTIONS FOR SPECIALTIES



HOW CAN I FIND BUSINESS PARTNERS AND BE IN THE KNOW ON INDUSTRY INTELLIGENCE?

SOCMA's commercial network helps you find the right connections to develop partnerships with contract manufacturers and customers. We are your bridge to finding suppliers and customers through our lead sheet services, and we are your source of intelligence for end-market insights and product applications. Our ChemSectors network provides the industry intelligence to make key business growth decisions.

[GROW YOUR BUSINESS >](#)

WHAT RESOURCES WILL HELP ME STRENGTHEN MY OPERATIONS, TRAIN MY EMPLOYEES AND IMPROVE SAFETY?

Our compliance and stewardship programs promote and guide the implementation of safe, sustainable and environmentally responsible operations across the supply chain.

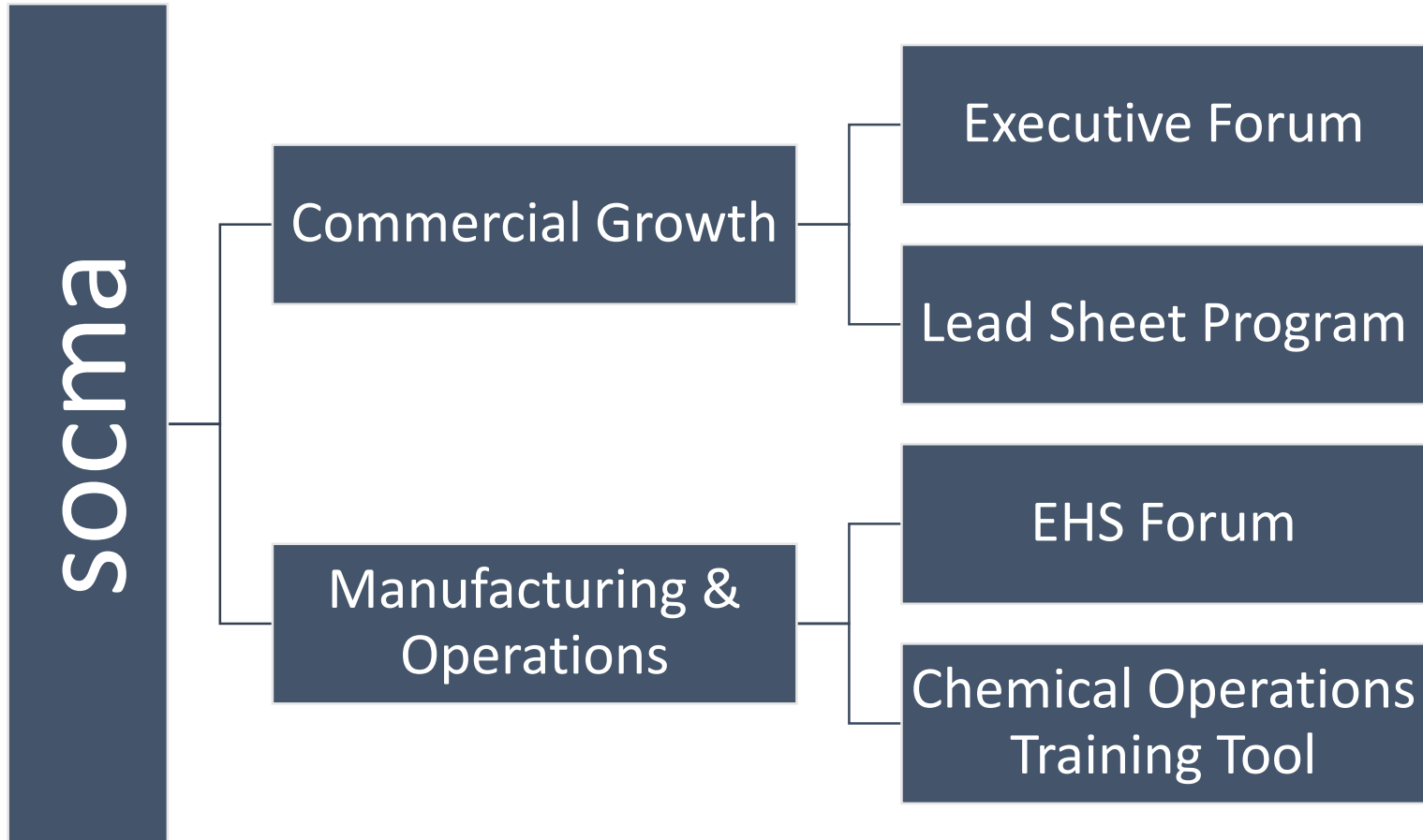
[DISCOVER YOUR RESOURCES >](#)

WHERE CAN I GET INTEL ON THE LATEST REGULATIONS AND POLICY SPECIFICALLY IMPACTING SPECIALTIES?

We are a powerful industry advocate. Our regulatory and legislative programs ensure you are always at the forefront of any issues or policies that may impact the way you do specialty chemistry.

[FIND POLICY SOLUTIONS >](#)

Upcoming Projects



Contact Us



Owen Jappen

Sr Manager, Industry Relations
and Strategic Partnerships

ojappen@SOCMA.org

571.348.5105



Emylyn Noma

Manager, Compliance &
Stewardship

enoma@SOCMA.org

571.348.5119

Upcoming Events

WEBINAR



October 1, 2019
Online

Manufacturing & Operations Best Practices
This webinar will highlight ways to improve plant operational efficiency through sustainable approaches to energy consumption, including resources offered through the US Department of Energy's Better plant Program.

[REGISTER NOW! >](#)

EXECUTIVE FORUM



October 10, 2019
Philadelphia, PA

The Business Case for Process Intensification
Learn and discuss what process intensification (PI) means to your business and operations through case study example. The implementation of PI can strengthen production yields & advance sustainability goals while reducing operational costs & energy consumption. This Executive Forum will be held at **EMD Performance Materials**.

[REGISTER NOW! >](#)

SOCMA WEEK



December 4-6, 2019
New Orleans, LA

Our inaugural event will enable professionals in the specialties value chain to trade operational best practices and discuss and identify solutions to pain points with colleagues facing the same challenges. In addition to networking opportunities, the event features educational sessions focusing on issues impacting fine and specialty chemicals industry.

[REGISTER NOW >](#)

COWBOYS AND CHEMICALS



February 10-11, 2020
Fort Worth, TX

Jump start your networking at Specialty & Custom Chemicals America and register to attend Cowboys & Chemicals. Join 350 friends and colleagues in Fort Worth for an Authentic Texas-style good time

[REGISTER NOW >](#)

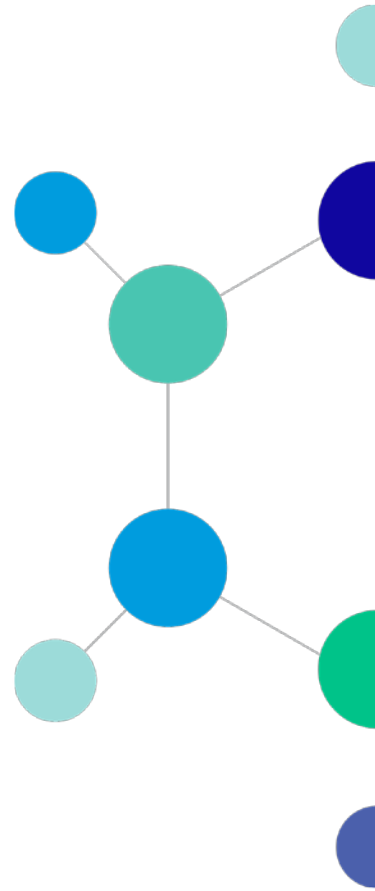
Presenters



Robert Bruce Lung
U.S. DOE, Advanced Manufacturing Office
Industrial Technical Assistance Fellow



David Reid
Celanese Corporation
Senior Manager, Global Energy and Productivity





BETTER PLANTS

Better Buildings, Better Plants

- **What is Better Plants?** A free, voluntary partnership program for **U.S. manufacturers** and industrial organizations that want to save on energy costs
- Through Better Plants:
 - Partners set long-term efficiency goals
 - Receive **technical assistance, networking platforms, national recognition and access to R&D**
- Manufacturers have two opportunities to engage in Better Plants:
 1. Broader-based **Program** level
 2. Higher-level **Challenge**



Productivity. Cost Savings. Competitiveness.

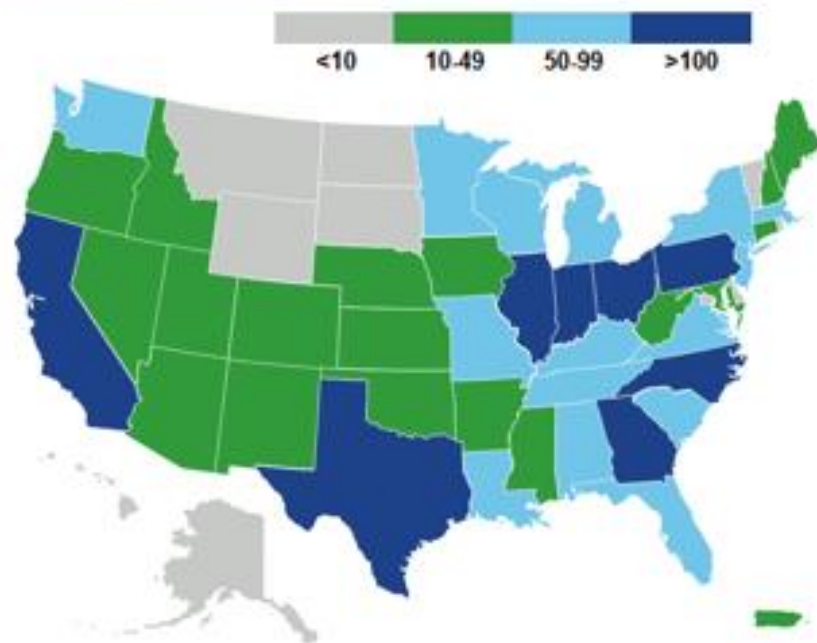
Better Plants Overview

Energy savings and program footprint continue to grow

Better Plants Snapshot

| Accomplishments | Total |
|---|-------|
| Number of Partners | 224 |
| Approximate Number of Plants | 3,200 |
| Percent of U.S. Manufacturing Energy Footprint | 12% |
| Reported Savings | |
| Cumulative Energy Savings (TBtu) | 1.35 |
| Cumulative Cost Savings (Billions) | \$6.7 |
| Cumulative Avoided CO ₂ Emissions (Million Metric Ton) | 77.8 |
| Average Annual Energy Intensity Improvement Rate | 2.6% |

Regional Distribution of Better Plants Facilities



60 goal achievers total, 7 this year

Better Plants: Chemical Sector Participation

| Accomplishments | Total |
|---|-------|
| Number of Partners | 24 |
| Approximate Number of Plants | 303 |
| Percent of U.S. Manufacturing Energy Footprint | 2.9% |
| Reported Savings | |
| Cumulative Energy Savings (TBtu) | 140 |
| Cumulative Cost Savings (Millions) | \$521 |
| Cumulative Avoided CO ₂ Emissions (Million Metric Ton) | 4.3 |
| Average Annual Energy Intensity Improvement Rate | 2.9% |

3M **EASTMAN**

 **Celanese**
The chemistry inside innovation™



 Bristol-Myers Squibb

abbvie

HUNTSMAN **FMC**



OMNOVA
SOLUTIONS



Ingevity

L'ORÉAL
USA



SHERWIN
WILLIAMS

MedImmune, LLC



Better Plants Challenge Partners



Why Partner with Better Plants?

- Technical Assistance
- National Recognition
- Peer-to-Peer Networking
- Connection to Innovation and R&D



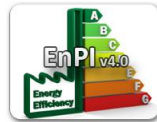
Fan system In Plant training, 2015



Networking at IETC, 2016

Technical Support: Technical Account Manager (TAM)

- Help with energy baselines and data tracking/reporting
 - EnPI regression-based tool
- Helps partners leverage DOE and external resources
- Helps partners develop a roadmap for achieving their goal(s)



TAM helping partner use EnPI tool at an INPLT training

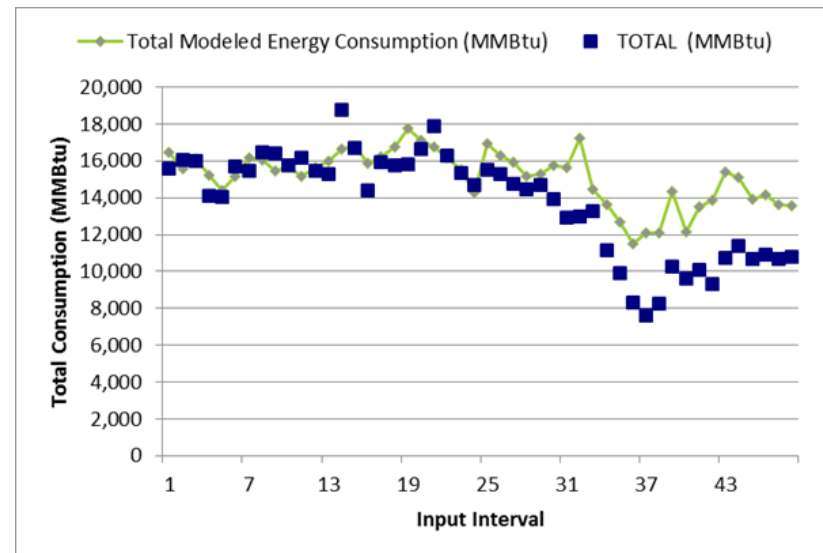
“Like having a free consultant on retainer”
Andy Terrey, City of Phoenix Water Services



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 tool includes GHG and cost savings calculations
- Free guidance document

| | 2014 | 2015 | 2016 | 2017 |
|---|------------|----------|----------|----------|
| Actual Source Electricity | 128,757 | 134,034 | 104,649 | 72,694 |
| Actual Natural Gas | 58,373 | 59,387 | 52,471 | 47,597 |
| TOTAL (MMBtu) | 187,130 | 193,421 | 157,119 | 120,291 |
| Adjustment Method | Model Year | Forecast | Forecast | Forecast |
| Modeled Source Electricity | 128,757 | 138,873 | 124,419 | 108,220 |
| Source Electricity Annual Savings | 0 | 4,839 | 19,771 | 35,526 |
| Modeled Natural Gas | 58,373 | 56,934 | 55,981 | 55,506 |
| Natural Gas Annual Savings | 0 | -2,453 | 3,511 | 7,999 |
| Total Modeled Energy Consumption (MMBtu) | 187,130 | 195,808 | 180,401 | 163,817 |
| Total Improvement in Energy Intensity (%) | 0.00% | 1.22% | 12.91% | 26.57% |
| Annual Improvement in Energy Intensity (%) | 0.00% | 1.22% | 11.69% | 13.66% |
| Total Energy Savings since Baseline Year (MMBtu/Year) | 0 | 2,387 | 23,281 | 43,526 |
| New Energy Savings for Current Year (MMBtu/year) | 0 | 2,387 | 20,895 | 20,244 |
| Adjustment for Baseline Primary Energy Use (MMBtu/year) | 0 | 8,678 | -6,729 | -23,313 |



Technical Assistance: In Plant Trainings

In Plant Training Topics:

- Compressed Air
- Pumping
- Steam
- Process heating
- Fans
- Energy Treasure Hunt Exchanges
- Water/Wastewater treatment
- Industrial Refrigeration
- 50001 Ready
- Industrial Water Efficiency (coming soon)



- Teach participants how to conduct assessments, use DOE tools, and implement projects
- Open to employees from host plant, peer companies, suppliers
- > 110 INPLTs, 1800 participants since 2011
- Identified > 5 TBTU and \$37 million in energy savings between 2011 and 2016
- Pre-INPLT webinars available on program website

Technical Assistance: Diagnostic Equipment Program

Helping Better Plants Partners measure operating data to evaluate equipment performance and quantify energy performance improvement



Field data is best for evaluating system performance

- Free of charge, including shipping
- Use equipment for up to four weeks
- TAM technical assistance with usage and interpreting results
- First come, first serve application

Technical Assistance: MEASUR Tools

Industrial System Software Platforms:

- User friendly
- Open source
- Developed by subject matter experts

[Steam System Modeler](#)



[Pump System Assessment Tool \(PSAT\)](#)



[Fan System Assessment Tool \(FSAT\)](#)



[MotorMaster+](#)



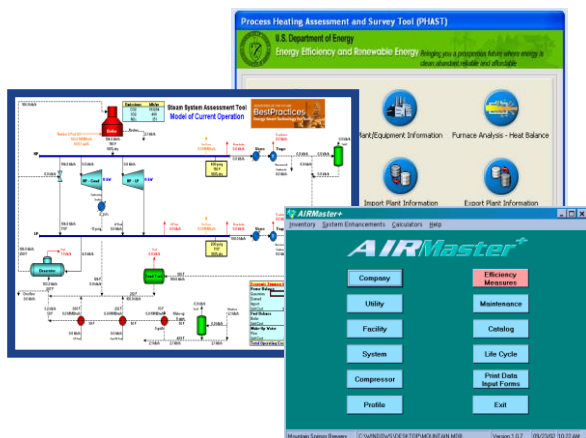
[AIRMaster+](#)



[Process Heating Modeler Tool \(PHMT\)](#)



Available at: www.energy.gov/eere/amo/measur

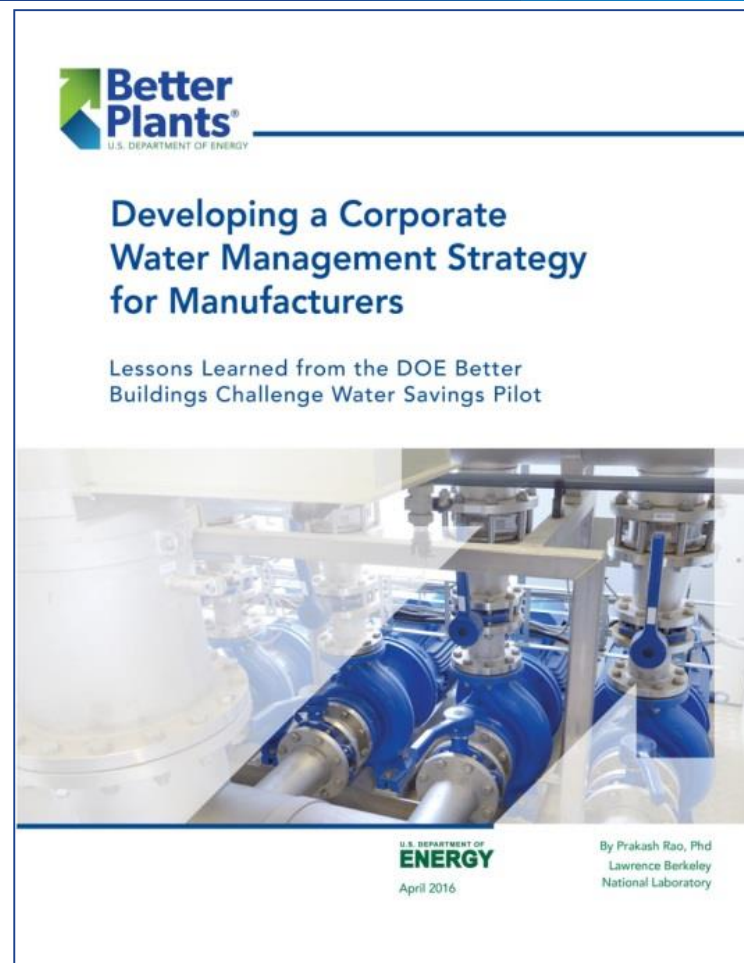


Technical Assistance: Supply Chain Initiative

| Legrand | UTC | Lockheed Martin | Honda NA | Volvo Group |
|-----------------------------|--------------------------------|--|-------------------------------|--------------------|
| Chapco | GKN Aerospace | Cascade Engineering Technologies, Inc. | KYB Americas | TitanX |
| Coilplus | Hitchiner | Clearwater Engineering, Inc. | Newman Technologies | GB Manufacturing |
| Complete Design & Packaging | MB Aerospace | Cooperative Industries Aerospace & Defense | Asama Coldwater Manufacturing | Durable Products |
| Durex | RTI International Metals, Inc. | The Harva Company, Inc. | American Mitsuba | Custom Glass |
| Lynam | Selmet, Inc. | Research Electro-Optics | NSK Americas | CVG |
| Magnetic Metals | Weber Metals, Inc. | Savage Precision Fabrication | Mahle Engine Components | Allumaloy |
| Rowley Spring & Stamping | Jedco, Inc. | Vanguard Space Technologies | Cardington Yutaka | Bendix |
| Stanley Spring & Stamping | | Tri-State Plastics, Inc. | | Mekra Lang |

Technical Assistance: Water Efficiency

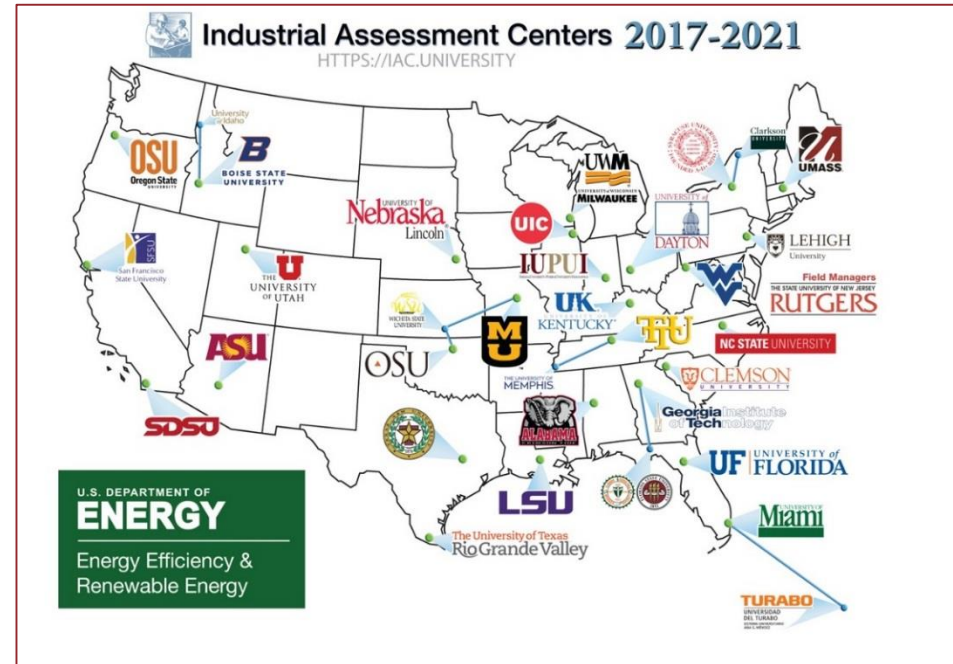
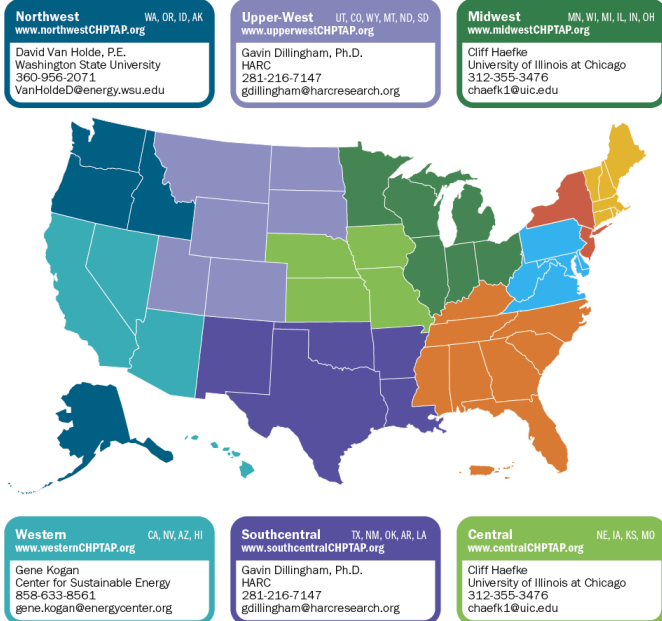
- FREE Water management guidance document – topics:
 - Making the business case for water efficiency
 - Prioritizing facilities to focus initial efforts
 - Establishing water baselines and targets
 - Industrial water efficiency examples
 - **NEW: Plant Water Profiler tool**
- Additional resource:
 - Webinar on starting a corporate water efficiency program



Technical Assistance: Access to Other AMO Programs:

Industrial Assessment Centers:

- No-cost energy assessments
- IACs provide training and recommendations
- Average IAC client saves \$47K energy costs



Combined Heat and Power Technical Assistance Partnerships

- Identify CHP opportunities
- Vendor, fuel, and technology neutral assessments.
- Additional technical assistance for end-users considering CHP

Access to other Programs: 50001 Ready

DOE's Energy Management Program

1. Implement ISO 50001 principles

Complete 25 Tasks in US DOE's 50001 Ready Navigator free, self-guided online tool

2. Present energy performance

Submit energy performance data. May use EPA's Portfolio Manager, DOE's EnPI Lite or FEMP/OMB energy reporting data

3. Self-attest to 50001 Ready

Sign-off by management of **50001 Ready** implementation and commitment

energy.gov/50001Ready



**50001 Ready
Facility**

U.S. DEPARTMENT OF ENERGY

Company Name

Is recognized for instituting global best practices in continuous energy improvement

Recognized by the U.S. Department of Energy

Dr. Kathleen Hogan
Deputy Assistant Secretary for Energy Efficiency

U.S. DEPARTMENT OF
ENERGY

DOE and others recognize
50001 Ready
achievement

Connections to Innovation and R&D

Better Plants hosts Technology Days at National Laboratories to:

Tour World-class research facilities

View Demonstrations of innovative technologies

Hear from lab experts and industry peers

Learn how to partner and leverage technology

Network with BP partners and lab technologists



New: National Lab Innovation Portal:

<https://betterbuildingssolutioncenter.energy.gov/better-plants/special-initiatives/national-lab-innovation-portal>

ORNL 2017



NREL 2018

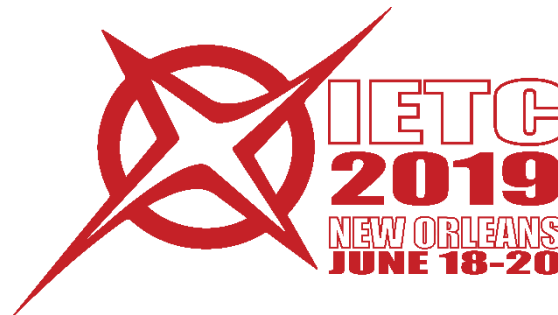


2019: LBNL & LLNL



Events & Networking

- Annual events:
 - Better Buildings summit
 - Industrial Energy Technologies Conference
 - AEE World (formerly World Energy Engineering Congress)
 - ACEEE Summer Study on Industry
- Networking:
 - Regional events
 - Technology-based working groups



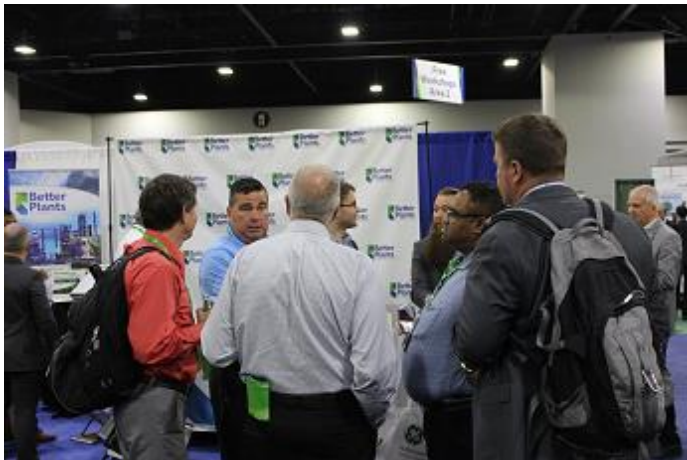
Networking

- Technology-based working groups
- Conferences: IETC, AEE World, Better Buildings Summit
- Regional events: IIEG
- Technology Days: 2017, 2018, 2019

Discussion: AEE World



Partners Networking: AEE World



Steam Working Group: IETC



National Recognition: Examples

Better Project/Practice Awards



DOE Visits



Social Media



Better Buildings

Tomorrow at 9:00am

Our Better Plants team held a successful Compressed Air In-Plant Training at Schneider Electric's Lexington, KY facility. Learn how In-Plant trainings may benefit your industrial workspace
<https://betterbuildingsinitiative.energy.gov/better-plants/activity/plant-trainings>

[Read Less](#)



Check out this link

betterbuildingsinitiative.energy.gov

National Recognition: Examples

Goal Achievers



Trade Press Articles

IndustryWeek. **Electrolux, TE** **Connectivity Partner** **with DOE to Improve** **Energy Performance**

The U.S. Department of Energy's Better Buildings, Better Plants Program and Challenge has cultivated a community of nearly 200 partners to reduce energy costs, increase productivity, create jobs and improve resiliency.

Eli Levine, Bruce Lung | Feb 13, 2018

Better Buildings Solution Center



Manufacturers and water and wastewater treatment agencies face many obstacles as they strive to improve energy efficiency in their facilities. The following individual technology focus area-webpages are meant to be one-stop shops for those seeking actionable solutions for energy efficiency challenges involving specific systems. Each page contains links to helpful resources, such as relevant Better Plants showcase projects and implementation models, DOE tipsheets and publications, software tools, webinars, and contact information for a subject matter expert:

[BUILDING ENVELOPE AND MODELING](#)

[COMBINED HEAT AND POWER \(CHP\)](#)

[COMPRESSED AIR](#)

[FANS](#)

[LIGHTING](#)

[MOTORS](#)

[PROCESS COOLING AND HVAC](#)

[PROCESS HEATING](#)

[PUMPS](#)

[REFRIGERATION](#)

[RENEWABLES, DISTRIBUTED GENERATION, AND MICROGRIDS](#)

[STEAM](#)

[WATER](#)

- More than 200 industrial solutions tested and proven by Partners
- Find solutions by topic, building type, solution type, building size, sector, technology, location, and more.
- **Technology Focus area:**
<https://betterbuildingsolutioncenter.energy.gov/better-plants/technology-focus-areas>

energy.gov/bbsc

Why Partner with Better Plants?

Better Plants is for you if:

- **Controlling** operating costs is important
- **You want unbiased Technical Assistance** with energy efficiency
- **Networking** with industry-sector peers & independent experts is helpful
- **Recognition/Validation** for energy efficiency/sustainability accomplishments is desired



Joining is Easy!

- Simple 2-page agreement
- Should be signed by CEO or a senior executive
- Fill out and email back to: robert.lung@ee.doe.gov



Partnership Agreement

Form

The Better Buildings, Better Plants Program is a national initiative to significantly improve energy efficiency across U.S. industry. Leading manufacturers in the program work to reduce the energy intensity of their business operations by 25% over ten years. The Energy Department helps these industrial partners develop energy management plans and performance metrics, evaluate energy-saving opportunities, train the workforce, and assess annual progress.

Better Plants Partners agree to:

- ▶ Adopt a goal to significantly reduce energy intensity over a 10-year period
- ▶ Report energy intensity, energy use data, and achievements annually to DOE

Additionally, within 12 months partners agree to:

- ▶ Establish an energy use and energy intensity baseline
- ▶ Develop an energy management plan
- ▶ Designate an energy leader or energy manager

DOE agrees to provide:

- ▶ National recognition including a feature on DOE's website, recognition letters from DOE leadership, and invitations to special events.
- ▶ Technical support to assist the company in developing energy management plans, identifying energy-saving opportunities, tracking energy performance metrics and reaching its energy goal.
- ▶ Additional resources, including access to DOE energy analysis software tools, training webinars, technical guidance documents, and peer-to-peer networking opportunities

Agreement:

My organization is committed to continuous improvement in energy efficiency and agrees to the General Terms of the Better Buildings, Better Plants Program.

Senior Executive Officer (Signature)

Date

Printed Name

Title

Company

Address

Note: DOE will send an official Better Plants Welcome letter to the contact and address listed above.

Learn more at http://www1.eere.energy.gov/manufacturing/tech_assistance/betterplants/partners.html

U.S. DEPARTMENT OF
ENERGY

For more Information

Eli Levine, Program Manager, eli.levine@ee.doe.gov, 202-586-9929

Bruce Lung, robert.lung@ee.doe.gov, 202-586-4411

Clifton Yin, clifton.yin@ee.doe.gov, 202-586-6151

TAM info

BetterPlants@ee.doe.gov

Better Plants Website:

<http://betterbuildingsolutioncenter.energy.gov/>

Partner Example: Volvo Trucks



- **Better Plants**

- \$2 million energy savings by implementing opportunities found in three In-Plant Trainings
- Eight IAC assessments: \$560,000 in energy cost savings
- Met Better Plants program goal 2014, re-pledged and expanded scope
- Received corporate award at IETC 2015
- Established supplier cohort 2019

- **Energy Management**

- Three plants certified to ISO 50001/Superior Energy Performance
- Reinvests energy savings into other energy reduction projects to improve continuously

\$15 million energy savings between 2009 and 2017

Partner Example: Celanese



Narrows, VA, plant

Case study on major boiler replacement project

- Validated energy dashboards energy savings = \$4.5 million/year
- Cumulative energy intensity improvement of >20% (goal achieved twice)
- Received 1 In-Plant Training (Steam)
- Awarded 1 In-Plant Training (compressed air)
- DOE developed two case studies



IETC Award, spring 2016



DOE AMO Director visit, December 2016

Celanese – DOE Better Plants Partnership

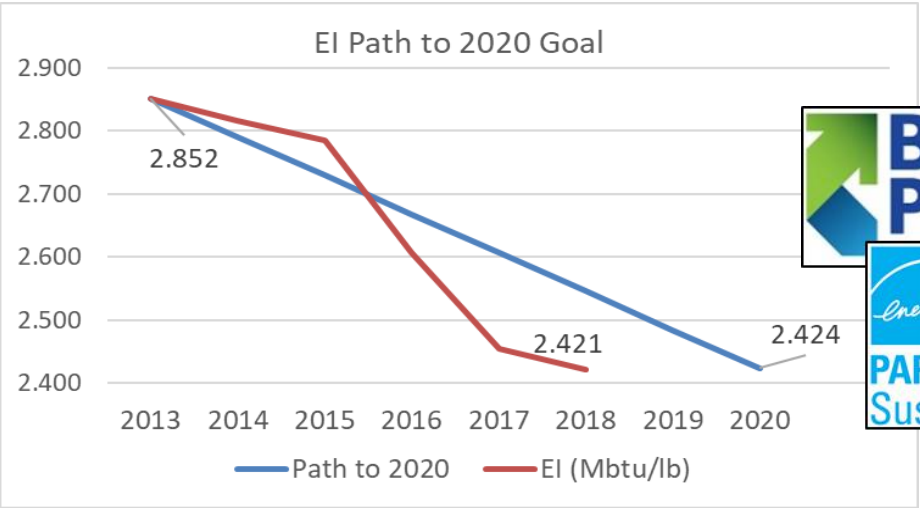
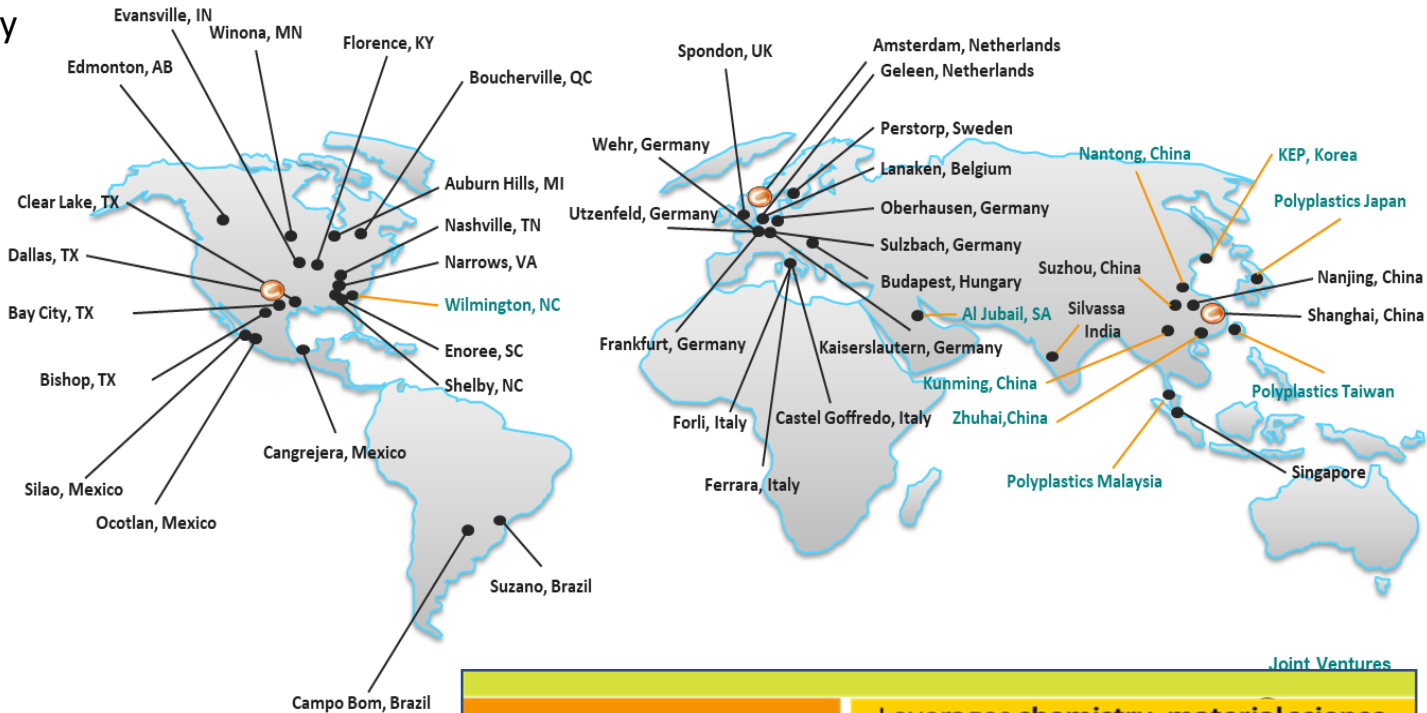


Celanese Corporation



We are a global technology and specialty materials company that engineers and manufactures a variety of products essential to everyday living.

- ~7,700 employees
- 43 global manufacturing facilities, 18 countries
- \$7.2 billion in net sales in 2018
- Number 455 on the 2017 Fortune 500 list
- Innovation is at the core of our business
- Strong Energy Management Program



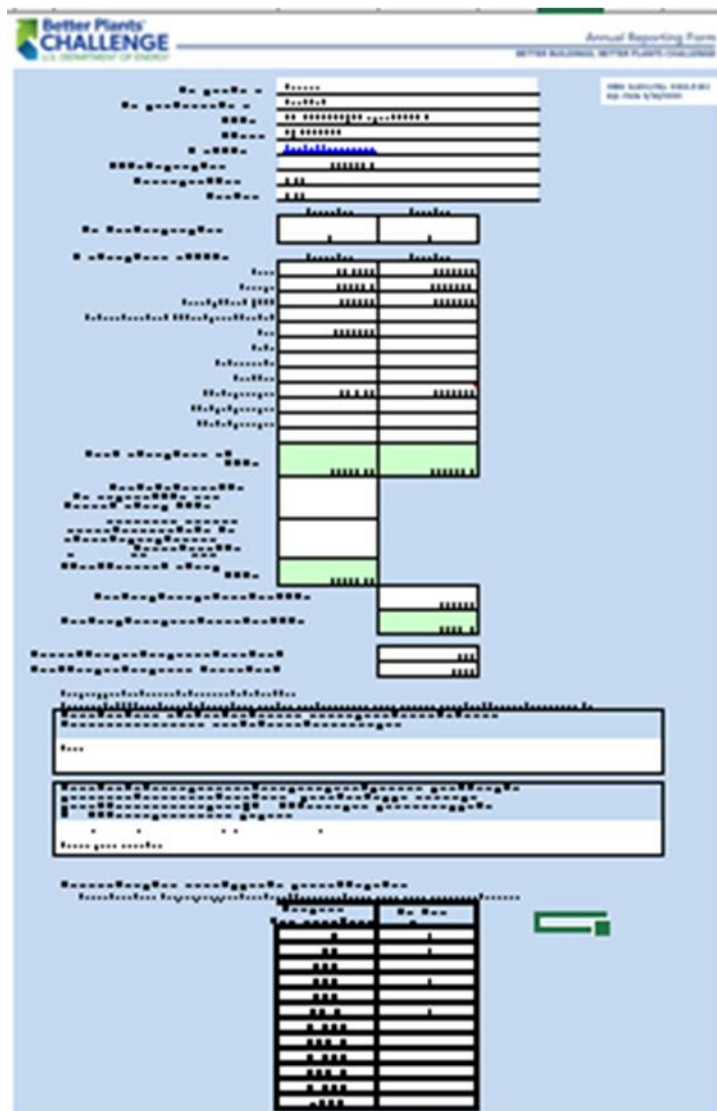
Water Conservation

Celanese Corporation

| Joint Ventures | |
|--|--|
| Engineered Materials \$2.6 Billion Net Sales | Leverages chemistry, material science and applications based on customer relationships and insight to create unique solutions and value |
| Acetyl Chain \$4.0Billion Net Sales | Leverages technology , our global production network and a deep understanding of global trade flows to create value |
| Cellulose Derivatives \$649 MILLION NET SALES | As a leading producer of cellulose acetate products, we are committed to delivering products, technological know-how and services that improve our customers' competitiveness and advance their goals |

- ▶ Better Plant Partner Status
- ▶ Committed to 25 % EI reduction for US plants
 - Achieved in 2014 and 2017
- ▶ TAM (Technical Account Manager)
 - Weekly update call with Tim Kolp
 - Resources, Advice, Networking, Validation
 - Quarterly review with Bruce Lung or Eli Levine
- ▶ Goal Setting and Achievement Recognition
- ▶ InPlant Training
- ▶ Resources
- ▶ Water Program

Energy Reduction Tracking and Recognition



Celanese Recognized as Leader in Energy Efficiency by U.S. Dept. of Energy

10/27/2014
9:27 AM

■ Kumar, Pawan, Celanese

Celanese is committed to making a positive impact on our communities. One aspect of being sustainable is reducing our energy intensity to increase efficiency, and to serve our communities and the environment. On October 2, The U.S. Department of Energy (US DOE) recognized Celanese's leadership in energy efficiency at the 2014 Better Plants Recognition Ceremony at the Walter E. Washington Convention Center in Washington, D.C. Steve Ridge, global director of EHS and operational excellence, received the award on behalf of Celanese.

Leading manufacturers in the Better Plants Program take on bold commitments to reduce energy intensity. The U.S. Department of Energy works with manufacturers to set aggressive energy reduction goals, improve energy management, and report progress.

Celanese partnered with the Better Plants Program to reduce energy intensity by 25% over ten years. Celanese had until 2017 to reach this goal. However, we were ahead of our pledge date. "This accelerated our strong commitment to protect our environment," said Darren Collins, vice president, chemicals operations. Companies that sign the pledge must report energy intensity and progress each year to the U.S. Department of Energy. Celanese sites were Clear Lake, Bishop, Bay City, and N.

Celanese Achieves Second Better Buildings, Better Plants Challenge Goal in Four Years

8/11/2017
12:44 PM

■ Reid, David A. Celanese

On May 16, the Department of Energy recognized Celanese Corporation for its goal achievement in the Better Buildings, Better Plants Challenge for the second time. After meeting its first energy-efficiency target in 2013, Celanese followed up with a new target and met that goal this year, reducing energy intensity within U.S. plants by an additional 21 percent.

Celanese Corporation is a global technology leader in the production of differentiated chemistry solutions and specialty materials used in most major industries and consumer applications. Celanese's highly-diversified product portfolio serves a broad range of end-use applications including paints and coatings, textiles, automotive applications, consumer and medical applications, performance industrial applications, filter media, paper and packaging, chemical additives, construction, consumer and industrial adhesives and food and beverage applications.



In Plant Training

In-Plant Trainings (INPLTs) are workshops led by Better Plants experts that train participants on how to identify, implement, and replicate energy-saving projects. Better Plant partners host an on-site, three-day training at one of their facilities, and invite others to attend. Technical expertise gained through the INPLTs help companies overcome common, critical barriers to adopting energy management practices and technologies.

- ▶ Awarded Steam In Plant training in 2016
 - 33 attendees at Bishop, TX facility
 - 3 Day training and plant assessment
 - On site presentation from Dr. Mark Johnson
 - Director of the Advanced Manufacturing Office (AMO) in the Office of Energy Efficiency and Renewable Energy (EERE).
- ▶ Awarded Compressed Air training in 2019



- ▶ Showcases a major energy project
- ▶ Conversion of Coal to Gas fired boiler – Narrows Virginia plant

Showcase Project: Natural Gas-Fired Boilers Upgrade

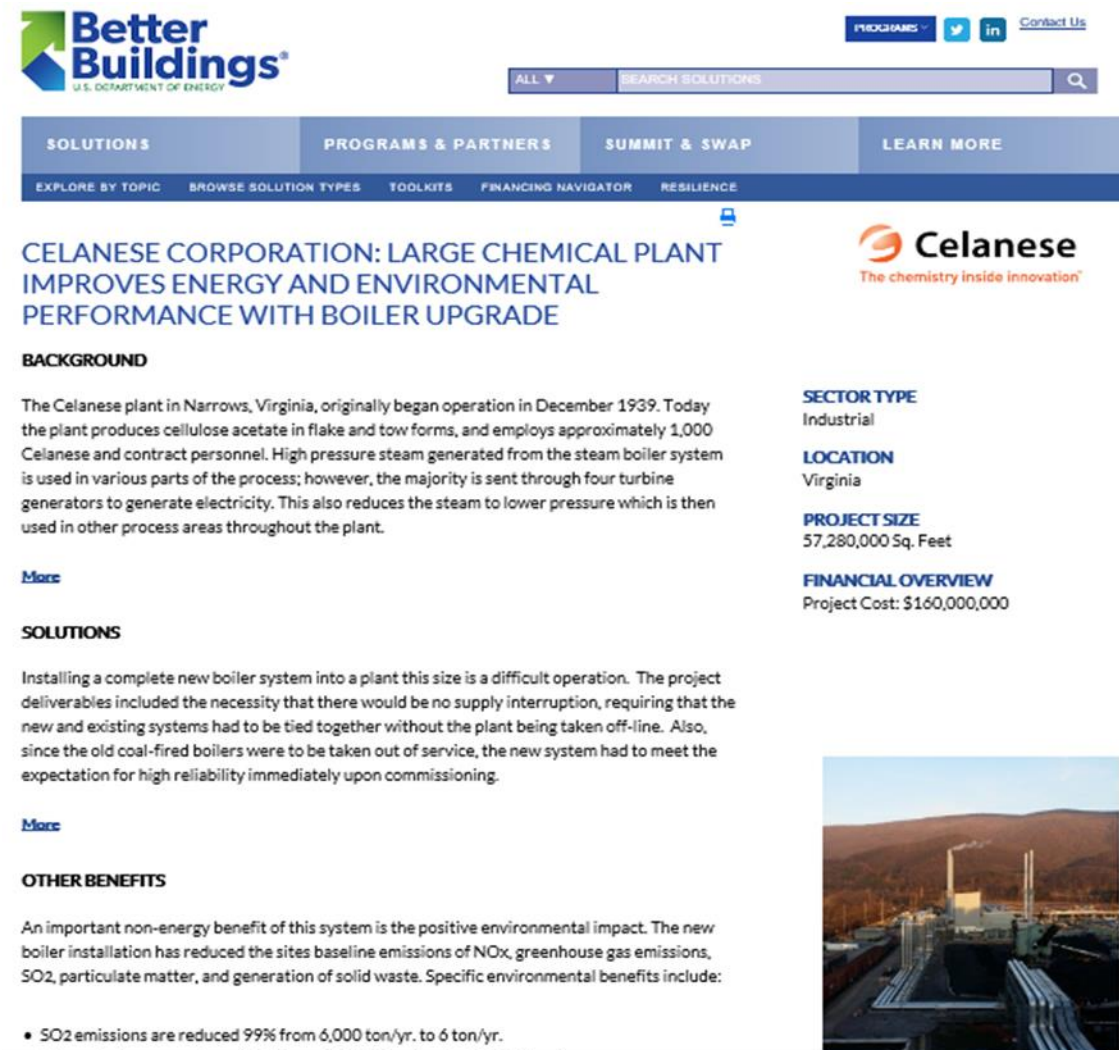
Sector Type: Industrial

Location: Narrows, Virginia

Size: Site footprint 1315 acres



Financial Overview: Project Cost: \$160 million



Title: Showcase Project: Large Chemical Plant Improves Energy and Environmental Performance with Boiler Upgrade



The screenshot shows the 'Better Buildings' website, a U.S. Department of Energy initiative. The page features a navigation bar with 'SOLUTIONS', 'PROGRAMS & PARTNERS', 'SUMMIT & SWAP', and 'LEARN MORE'. Below this is a search bar and a list of categories: 'EXPLORE BY TOPIC', 'BROWSE SOLUTION TYPES', 'TOOLKITS', 'FINANCING NAVIGATOR', and 'RESILIENCE'. The main content area is titled 'CELANESE CORPORATION: LARGE CHEMICAL PLANT IMPROVES ENERGY AND ENVIRONMENTAL PERFORMANCE WITH BOILER UPGRADE'. It includes a 'BACKGROUND' section describing the plant's history and the upgrade's goals, a 'SOLUTIONS' section detailing the boiler system installation, and an 'OTHER BENEFITS' section highlighting environmental improvements. A sidebar on the right lists 'SECTOR TYPE' (Industrial), 'LOCATION' (Virginia), 'PROJECT SIZE' (57,280,000 Sq. Feet), and 'FINANCIAL OVERVIEW' (Project Cost: \$160,000,000). A photograph of the plant is shown at the bottom right.

Better Buildings
U.S. DEPARTMENT OF ENERGY

PROGRAMS   [Contact Us](#)

ALL  SEARCH SOLUTIONS 

SOLUTIONS PROGRAMS & PARTNERS SUMMIT & SWAP LEARN MORE

EXPLORE BY TOPIC BROWSE SOLUTION TYPES TOOLKITS FINANCING NAVIGATOR RESILIENCE

CELANESE CORPORATION: LARGE CHEMICAL PLANT IMPROVES ENERGY AND ENVIRONMENTAL PERFORMANCE WITH BOILER UPGRADE

BACKGROUND

The Celanese plant in Narrows, Virginia, originally began operation in December 1939. Today the plant produces cellulose acetate in flake and tow forms, and employs approximately 1,000 Celanese and contract personnel. High pressure steam generated from the steam boiler system is used in various parts of the process; however, the majority is sent through four turbine generators to generate electricity. This also reduces the steam to lower pressure which is then used in other process areas throughout the plant.

[More](#)

SOLUTIONS

Installing a complete new boiler system into a plant this size is a difficult operation. The project deliverables included the necessity that there would be no supply interruption, requiring that the new and existing systems had to be tied together without the plant being taken off-line. Also, since the old coal-fired boilers were to be taken out of service, the new system had to meet the expectation for high reliability immediately upon commissioning.

[More](#)

OTHER BENEFITS

An important non-energy benefit of this system is the positive environmental impact. The new boiler installation has reduced the sites baseline emissions of NOx, greenhouse gas emissions, SO2, particulate matter, and generation of solid waste. Specific environmental benefits include:


- SO2 emissions are reduced 99% from 6,000 ton/yr. to 6 ton/yr.

SECTOR TYPE
Industrial

LOCATION
Virginia

PROJECT SIZE
57,280,000 Sq. Feet

FINANCIAL OVERVIEW
Project Cost: \$160,000,000



Implementation Model

- ▶ Opportunity to Contribute and share energy best practices
- ▶ Energy Dashboards
 - Led to IETC Top Project Award
 - Chemical Processing Magazine Article

One.Celanese > Pages > CelaneseReceivesAwardforExcellenceinEnergyEfficiency.aspx

Welcome Reid, David A. Celanese

This Site: One.Celanese

One.Celanese

One.Celanese About Us Business Strategy Our Vision, Mission and Values Human Resources Shared S


Celanese Receives Award for Excellence in Energy Efficiency


Celanese was presented with an energy award at the recent 2016 Industrial Energy Technology Conference (IETC). The award recognizes excellence in industrial energy efficiency and use. Celanese was nominated because of its coal to gas boiler project at the Narrows, Virginia site and implementation of its energy dashboards. Award winners were voted on by an advisory committee of energy professionals and preference was given to organizations that displayed leadership in industrial energy efficiency and yielded significant results.



The IETC focuses on industrial energy and waste reduction and is hosted by the Energy Systems Laboratory at Texas A&M University and the Louisiana Department of Natural Resources and is sponsored by the US DOE and the American Chemistry Council. Attendees include industrial energy managers, utility experts, government program managers and others in the industrial energy community.

Dave Reid accepted the award on behalf of Celanese at IETC's award luncheon on May 26, 2016.



 **Better Buildings**
U.S. DEPARTMENT OF ENERGY

PROGRAMS   [Contact Us](#)

ALL  SEARCH SOLUTIONS 

SOLUTIONS PROGRAMS & PARTNERS SUMMIT & SWAP LEARN MORE

EXPLORE BY TOPIC BROWSE SOLUTION TYPES TOOLKITS FINANCING NAVIGATOR RESILIENCE

CELANESE CORPORATION: ENERGY DASHBOARDS

One of the key objectives of Celanese is to drive energy efficiency and cost reduction in its plants. One way to accomplish this is to engage the entire organization in energy reduction.

[More](#)

POLICIES

A large chemical plant's energy consumption is complex and the optimum ranges of process energy consumption change often, based on production rate and many other factors such as equipment use or product mix. Because they continuously monitor the processes and process equipment, the process equipment operators are sometimes best positioned for making decisions and taking immediate action on energy usage and optimization in a manufacturing plant. Although the Celanese plant operating personnel understood the importance of energy management, the existing control screens (HMIs), did not give them the level of information required to optimize energy in real time.





PROCESS



TOOLS & RESOURCES

MEASURING SUCCESS

OUTCOMES

TOOLS

ORGANIZATION TYPE

Manufacturer of differentiated chemistry solutions and specialty materials

BARRIER

Lack of awareness of energy inefficiency – specifically by equipment / process operators due to inadequate information at the process control screen also called human-machine interface (HMI)

SOLUTION

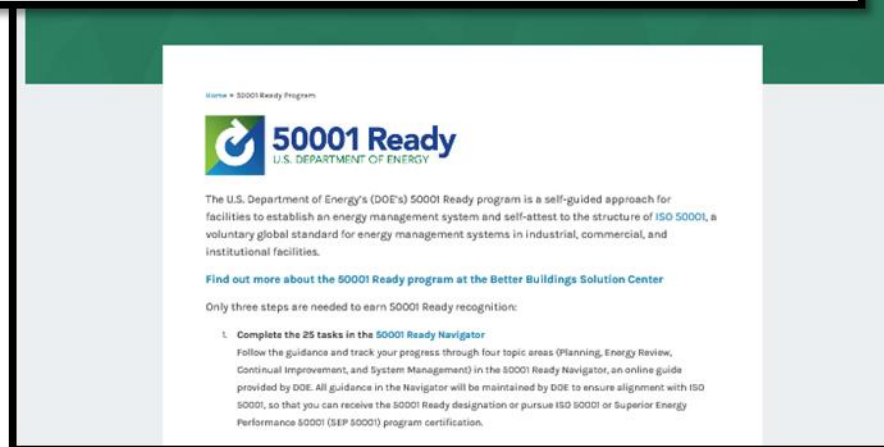
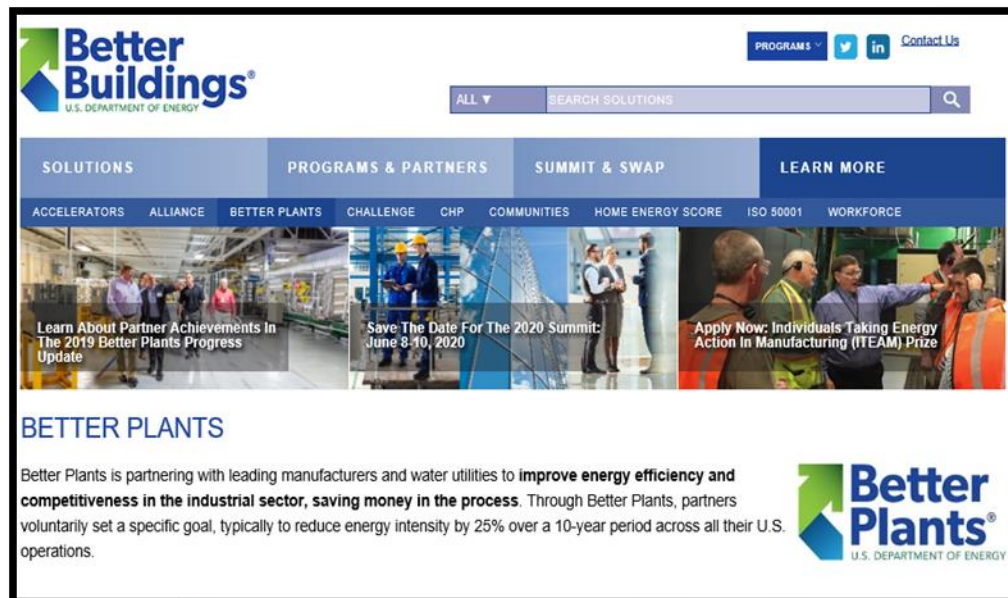
Upgrade controls and HMIs adding "Energy Dashboards" that present relevant, real-time energy consumption and dynamic energy target information to operators enabling operators to take appropriate actions to reduce energy consumption when possible

OUTCOME

\$300,000 in energy cost savings and identification of \$1.5 million in low to no-cost energy-saving opportunities at one plant leading to greater roll out across the enterprise

Other Resources

- ▶ Motor System Assessment – Narrows Plant
- ▶ DOE Better Plants Web Page
- ▶ 50001 Ready



U. S. Department of Energy
Motor System Market
Assessment Report
August 1, 2018
Celanese Acetate
Narrows, VA

The Cadmus Group, Inc.
An Employee-Owned Company • www.cadmusgroup.com

Opportunities for Recognition

- ▶ Goal Achiever
 - Two goal achievements
- ▶ Better Plant Projects Awards
 - Two top project awards (2018, 2019)
- ▶ DOE Conference Speaker
 - Multiple conference speaking opportunities
 - Plenary Session 2017 Speaker
 - IETC Conference (2X)



- ▶ Need
- ▶ Pathway to Development
- ▶ 11 Principles
- ▶ Implementation
- ▶ Energy and Water

Need for a Water Conservation Program

- ▶ Emerging Sustainability Initiative
 - Integration of Financial Sector, Customer metrics with Sustainability
- ▶ Risk Management
 - Strategically plan for external water scarcity factors
 - Regulatory mandates – permit to operate / expand
- ▶ Cost
- ▶ Employee Engagement



GLOBAL WATER CONSERVATION GUIDANCE DOCUMENT

Water use has always been an important part of UTC's Environment Health and Safety conservation goals. From a global perspective, population growth and shortages of renewable fresh water supply necessitates that sustainability planning include water management best practices. In addition to being inextricably linked to energy and climate change, water supply issues have the potential to significantly impact how and where manufacturing sites operate. UTC has a long and successful history of implementing water conservation projects. Since 2006 UTC has reduced annual water consumption 33%.

In addition to local water supply classification sites should be aware of other risk factors such as local water quality conditions. Water quality statistics are typically published by water suppliers or municipalities. Other risk factors include rising cost and increased regulatory requirements on water quality.

This guidance document provides details of UTC's gl



UTC Water Consumption
(billion gallons)



REQUIRED ACTIONS

Water reduction initiatives should be scalable to match local conditions. Sites will review the best practices listed below for applicability and will develop an implementation plan for the water management best practices that are considered practical. Project details will be tracked in the EH&S Project Tracking Module.

- ▶ Utilized DOE and UTC Water guidance document
- ▶ Standard Principles of a water program
- ▶ Scalable to local plant need

BEST PRACTICES

Water balance
Leak management
Eliminate once-through cooling
Cooling tower management
Flow meters
Low flow fixtures and flow resistors
Rinse tank overflow
Xeriscaping
Recycle process wastewater
Rain water harvesting

Principles of a Water Conservation Program

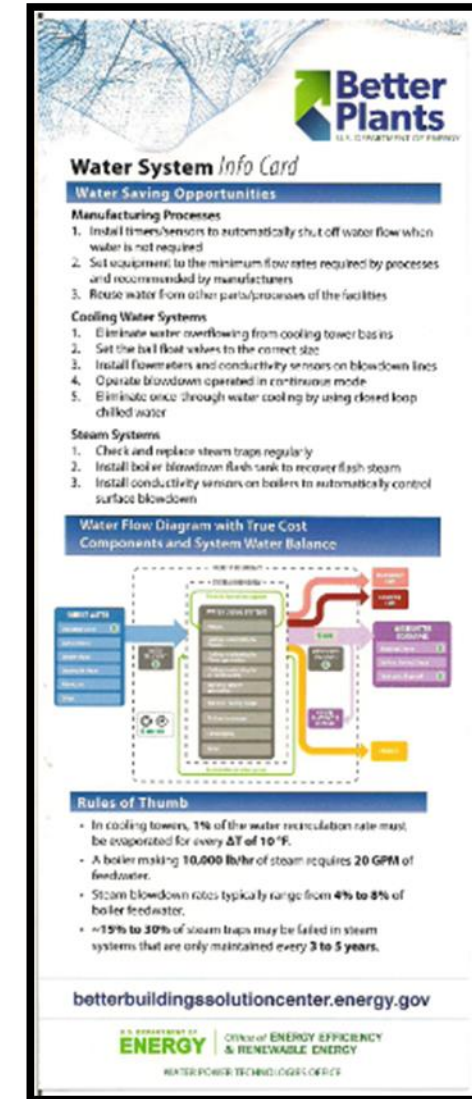
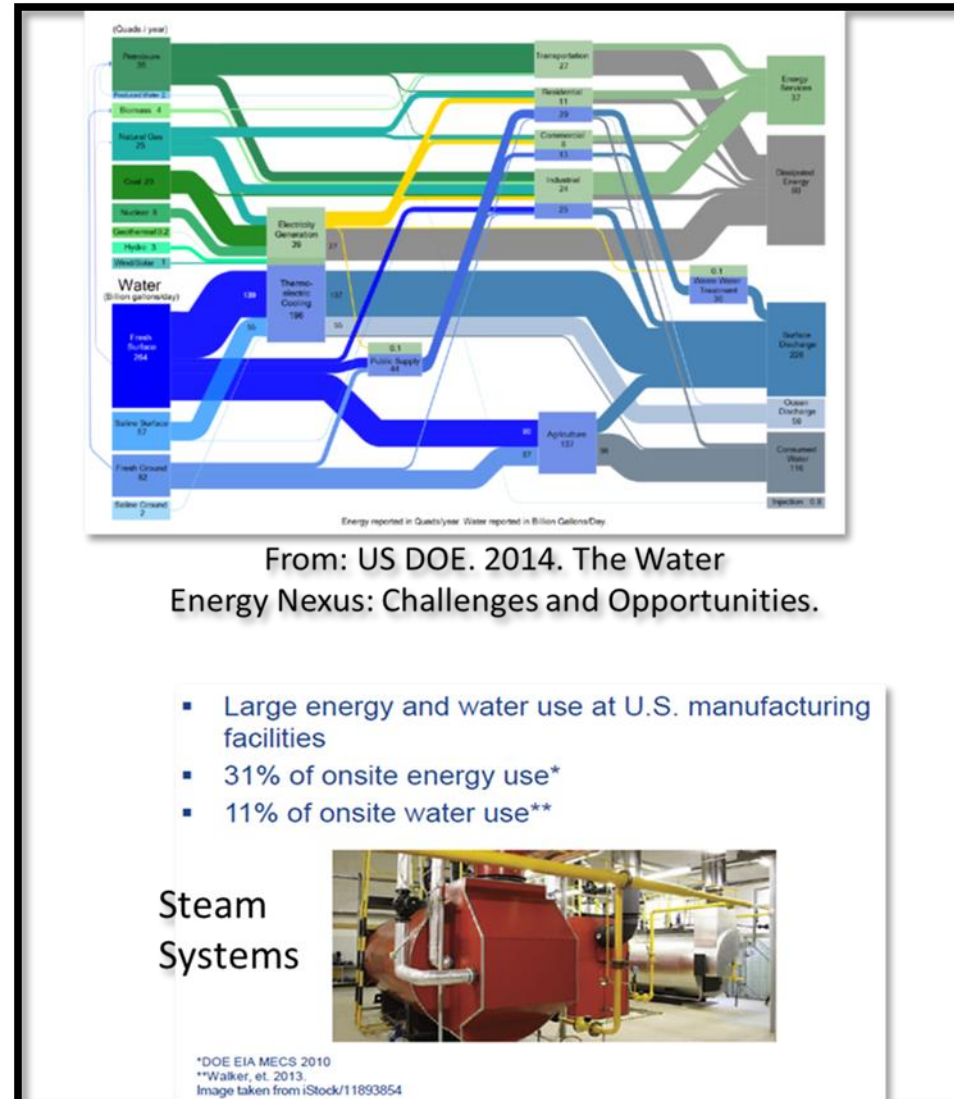
1. Water balance and knowledge of significant water users
2. Water usage and cost analysis / trending
3. Water distribution system and Leak management program
4. Cooling water systems management
5. Boiler and steam systems water management
6. Water treatment optimization
7. Eliminate once-through cooling
8. Water flow meters and submeters, analysis, calibration and process controls
9. Building water management to conserve water
10. Recycle process, and waste treatment wastewater
11. Enhance employee culture and behaviors for water conservation

| | |
|--|---|
| Water Balance And Knowledge Of Significant Water Users | Site has an up to date water balance including distribution system drawings and major input and consumption streams – 90% balance closure and list and water usage of significant water users in the site |
| Water Usage And Cost Analysis / Trending | Site reviews water usage and cost trends for reviewing of emerging issues and conservation project identification. Site reviews and understands billing practices from water vendors. Greater than 10% variation in usage or cost is investigated for root cause. |
| Water Distribution System And Leak Management Program | Site has an up to date water distribution system PM program including a leak management process for identification and repair of leaks |

Detailed Descriptions For Consistent Application

Energy and Water Nexus

- ▶ Steam Generation and Cooling
 - Boilers, Chillers, Cooling Towers
- ▶ Secondary Cost Impact
 - Affinity Laws → $\text{Flow}^3 \sim \text{HP}$
 - Waste and Incoming water treatment
- ▶ Management Systems
 - Common Principles
 - SEU → SWU Concept
- ▶ Design
 - Design for water and energy savings – often they align



Disclaimer

This publication was printed in September 2019 based on Celanese's present state of knowledge, and Celanese undertakes no obligation to update it. Because conditions of product use are outside Celanese's control, Celanese makes no warranties, express or implied, and assumes no liability in connection with any use of this information. Nothing herein is intended as a license to operate under or a recommendation to infringe any patents.

Copyright © 2019 Celanese or its affiliates.
All rights reserved.

Contact Information

Global Headquarters
222 West Las Colinas Blvd. Suite 900N
Irving, Texas 75039, United States

European Regional Headquarters
The Atrium, Floor 6 Strawinskylaan 3105
1077 ZX Amsterdam, The Netherlands

Asia Regional Headquarters
4560 Jinke Road, Zhang Jiang Hi Tech Park
Shanghai 201203, China

THANK YOU!

