Better Plants®
U.S. DEPARTMENT OF ENERGY

Progress Update

FALL 2020

A Year of Innovation and Industrial Leadership

The United States' industrial sector accounts for roughly one-third of the nation's energy consumption.[1] A recent study finds that the U.S. industrial sector has an energy efficiency savings potential of 7.5 Quads by 2030.[2] Greater energy efficiency is low risk, profitable, and helps shore up the resiliency of our manufacturing facilities. Through the DOE Better Plants program, partners set aggressive efficiency goals to save money, drive innovation, and enhance U.S. competitiveness.

Over 235 companies are now partners in the Better Plants Program, part of DOE's Better Buildings Initiative. These companies represent more than 3,200 facilities across all 50 states and, as partners, have adopted ambitious energy goals, as well as water and waste reduction targets. Partners further demonstrate leadership by sharing solutions and ideas with others. DOE supports them by providing technical expertise, convening peer exchange opportunities, highlighting successful solutions, and increasing access to innovative strategies.

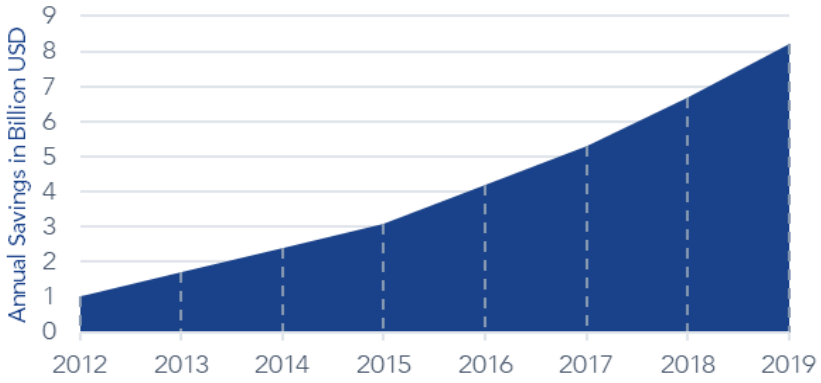
Above: Better Plants 2020 Goal Achiever, NEW Water's new solids handling facility is called the Resource Recovery and Electrical Energy generation system, or R2E2.

Better Plants 2020 Highlights

1.7 QBTU
of cumulative energy savings

$8.2B
of cumulative cost savings

Chart 1: Cumulative Cost Savings Over Time



2.5%
average annual energy intensity improvement rate

[1] U.S. Energy Information Administration, Use of energy explained: Energy use in industry, https://www.eia.gov/energyexplained/index.php?page=us_energy_industry
[2] U.S. Department of Energy, 2016 Industrial Energy Efficiency Potential Analysis,https://energy.gov/sites/prod/files/2017/04/f34/energy-savings-by-state-industrial-methodology.pdf

New Program and Challenge Partners

DOE welcomed 16 new partners to Better Plants in the past year, with 15 partners joining at the program level and 1 partner, McWane, Inc., joining directly at the Challenge level. Additionally, 4 partners, Alexandria Renew Enterprises, Lineage Logistics, Lockheed Martin, and Owens Corning expanded their commitment and joined the Better Plants Challenge. Better Plants partners now represent almost every facet of the U.S. industrial sector, from family-owned small businesses to members of the Fortune 100, with facilities in every single U.S. state and territory. All partners typically commit to a portfolio-wide reduction energy intensity of 25% over 10 years, with Challenge partners making the extra commitment to share their energy efficiency solutions so that other industrial companies may benefit.

New Challenge Partners

Alexandria Renew Enterprises cleans water for over 320,000 people in the City of Alexandria, Virginia, and Fairfax County.

Lineage Logistics is a warehousing and logistics partner that delivers cold chain solutions to food, retail, agriculture, and distribution companies.

Lockheed Martin is an aerospace, defense, arms, and security company with global interests.

McWane, Inc. casts ductile iron products, manufactures fire suppression systems and steel pressure vessels, and builds network switches and monitoring equipment.

Owens Corning produces insulation, roofing, fiberglass composites, and other related materials.

New Program Partners

Archer Daniels Midland (ADM) is a global food processing and commodities trading company.

Boardman Foods is an onion processor that processes frozen and whole peeled onions.

City of Fort Wayne – City Utilities provides 250,000 residents with water treatment and distribution, sewer collection and treatment, and stormwater conveyance services.

East Penn Manufacturing Co. manufactures lead acid storage batteries and battery connectors and cabling.

Gibraltar Industries is a manufacturer of building products for a wide array of markets.

Miami-Dade Water & Sewer Department provides drinking water and wastewater services to some 2.3 million residents.

ND Paper Inc. manufactures various types of high-quality pulp, paper, and paper-based packaging materials.

Occidental Chemical Corporation manufactures chemicals including polyvinyl chloride resins, chlorine, and caustic soda.

Sears Seating is a leading supplier of suspension and non-suspension seating for several work vehicle markets.

Silgan Closures is a global supplier of closure systems for food and beverages packed in glass and plastic containers.

Silgan Containers is the largest provider of metal food packaging in the United States.

Silgan Plastic Food Containers is a manufacturer of rigid, shelf stable food containers for food and pet food markets.

Southwest Cheese is one of the largest cheese and whey protein manufacturers in the world.

Valmont Industries designs and manufactures engineered products that support global infrastructure development and agricultural productivity.

Vitro Architectural Glass products include a range of energy-efficient low-e, low-iron, and performance-tinted glasses.

2020 Program and Challenge Energy Goal Achievers

1 Challenge partner and 3 Program partners achieved their ambitious energy intensity reduction goals in the past year. To date, 67 energy and water goals have now been met and exceeded by Better Plants partners, who are paving the way for the rest of the industrial sector.

Many goal achievers have gone on to set additional energy goals. See the full list of Better Plants goal achievers on page 22 of this report and, read below to see how this year's goal achievers reached their milestones.

Chart 2: Goals Achieved to Date by Better Plants Partners

Surpassed goal of 25% energy savings in 10 years and achieved 60% energy savings in 6 years

…by expanding their clean energy portfolio as one of the largest corporate purchasers of renewable energy, reducing scope 1 and 2 emissions and completing approximately 26,700 energy efficiency projects in 2019, which realized $39.8 million in savings.

Surpassed goal of 25% energy savings in 10 years and achieved 25% energy savings in 9 years

…by adopting RCI (Rapid continuous improvement) methods for facility optimization, a corporate grant matching program for financing energy efficiency projects, and undertaking HVAC, lighting and compressor upgrades and solar expansion

Surpassed goal of 25% energy savings in 10 years and achieved 33% energy savings in 7 years

…by installing large-scale wind turbines and by improving operating practices and other factors at its Fields Point Wastewater Treatment Facility, and instituting operational refinements at its Bucklin Point Wastewater Treatment Facility

Surpassed goal of 25% energy savings in 10 years and achieved 35% energy savings in 6 years

…by implementing their Resource Recovery and Electrical Energy (R2E2) project, which replaced the existing solids handling facility and installed two anaerobic digesters, allowing them to capture methane gas and produce electricity

5 Common Characteristics of Better Plants Goal Achievers

While the paths that many goal achievers have taken towards meeting their goal are varied, there are some elements that most, if not all, goal achievers have in common. Here are five common traits of all goal achievers:

Engage Management for Support and Funding

Goal achievers engage upper management for project support at individual facilities since Better Plants is a corporate program.

Use Data-Driven Approaches to Identify Energy Savings

Goal Achievers use data, internal assessments, In-Plant trainings, treasure hunts, IACs, and more to identify and implement energy efficiency projects.

Engage Colleagues from Other Departments

Goal achievers work with other teams within the organization is essential for making energy efficiency gains.

Communicate Energy Saving Successes

Goal achievers demonstrate thought leadership and assist other companies pursuing energy efficiency.

Leverage Available DOE Guidance

Goal achievers get the right support and training to improve employee competence in energy efficiency and management

Partners in Action

Better Plants partners consistently set a high standard for energy efficiency in the U.S. industrial sector, often going above and beyond to explore new approaches to monitoring, managing, and saving energy. See some of the highlights from the DOE's visits to Better Plants partner facilities, below.

Celebrating TE Connectivity's Energy Efficiency Gains

In October of 2019, TE Connectivity hosted Better Buildings Initiative Director, Maria Vargas, at its 254,000-square-foot plant in Lickdale, Pennsylvania. The visit highlighted efforts to reach the partner's energy-efficiency goals. Recent energy savings initiatives including a comprehensive compressed air-system optimization and an enterprise-wide policy of conducting periodic energy treasure hunts. These efforts have helped reduce annual energy costs by approximately $223,000.

TE Connectivity 's Treasure Hunt Savings

11%
reduction in annual facility compressed air costs

$223,000
reduction in annual facility energy costs

100+
Treasure Hunts across facilities portfolio

ArcelorMittal Showcases Cutting-Edge Cleveland Facility

ArcelorMittal welcomed DOE Deputy Assistant Secretary Alex Fitzsimmons to its Cleveland, Ohio steel mill in August 2019. Just days before, the 50001 Ready-certified facility (see page 20) piloted a water efficiency-focused In-Plant Training where employees learned how to create a water balance, calculate the true cost of water use, and more.

The Deputy Assistant Secretary toured the primary steel production area and saw liquid steel being casted into metal slabs. The highlight of the visit, however, was the partner's powerhouse, where the facility's off gases are repurposed to produce electricity and steam. This process enables the facility to generate 30% of its electricity needs, on-site.

NSK Americas Takes Advantage of Better Plants Resources

Members of the Better Plants team visited the headquarters of NSK Americas in Ann Arbor, Michigan in October 2019 to engage with new employees at the company. Since joining in early 2017, NSK Americas has been very active in Better Plants.

The partner joined Better Plants as part of a Honda supply chain cohort (see page 17) and has been sharing challenges and solutions with its fellow cohort partners. NSK Americas has also received 6 facility energy assessments at multiple facilities through DOE's Industrial Assessment Centers (see page 18). This year, the partner joined the new Waste Reduction Pilot (see page 16).

Better Plants Partners Showcase Industrial Resiliency

Few challenges have been as great as the 2020 COVID-19 pandemic. Manufacturers throughout the United States and the world have struggled to understand how to safely operate their plants. Some manufacturers shifted production lines to help produce hand sanitizer and personal protective equipment (PPE) in the early months of the pandemic as state governments shut down all nonessential businesses as part of "Stay at Home" orders.

Nearly all manufacturers have had to upend what was "business as usual" to adapt to the new reality. But while companies were confronted with dramatic operational changes, many rose to the challenge. In early June 2020, the Better Buildings, Better Plants Virtual Leadership Symposium provided a valuable forum for partners to share and brainstorm best practices to mitigate virus transmission and continue saving energy during the pandemic. See how some of our partners responded to the change, below.

*Above: Clips from media articles featuring Better Plants partners stepping up in response to the global pandemic. **Partners Featured from Top Left:** Textron, 3M, General Motors (GM), Commercial Metals Company (CMC), Ford Motor Company, NSK, L'Oreal USA*

Safe Practices Implemented by Better Plants Partners

- Screening Employees for Symptoms
- Wearing Face Masks
- Prioritizing HVAC Management
- Rearranging Plant Floor Work Stations
- Staggering Worker Shifts
- Ensuring Robust Facility Sanitation

SEE HOW PARTNERS GM AND L'OREAL ADAPTED TO THE PANDEMIC

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to read the latest industrial blog on the Solutions Center.

2020 Better Project and Practice Awards

The Better Practice award recognizes partners for innovative and industry-leading accomplishments in implementing and promoting practices, principles, and procedures of energy management and for implementing energy-savings projects.

Winners of both the Better Practice and Better Project (see next page) awards are recognized at the annual Better Buildings, Better Plants Summit, as well as other industry conferences. Speaking opportunities and other special promotional options are also given to award winners. Better Plants strives to highlight all applications, regardless of ultimate award status, by converting them into case studies published online.

***Above**: 3D modeling at work at Ford Motor Company's Better Project award-winning upgraded Dearborn Research and Engineering Campus Central Energy Plant*

Here are the 2020 Better Practice award winners:

For launching a "Zero-Kilowatt Challenge" that reduced energy usage during periods of facility in-operation by 50% at its Lancaster, Pennsylvania, facility.

For developing "Energy Sparks" fact sheets covering a wide variety of manufacturing-based energy topics to educate and engage employees.

For creating a roadmap to track plant energy and water projects from the idea stage to the implementation stage.

For developing and disseminating dust collector best practices that have led to reduced compressed air consumption across multiple facilities.

For developing a Landfill-Free certification option for facilities which helped the company landfill only 6% of the waste from North American facilities in FY 2019.

2020 Better Project and Practice Awards

The Better Project award is presented to partners for outstanding acomplishments in implementing industrial energy, water, and waste projects at individual facilities. Here are the 2020 Better Project award winners:

For launching a campaign to eliminate the use of hot water from the tire curing process and replace it with a Nitrogen process, resulting in an annual reduction of over 15,000 metric tons of CO2 emissions and nearly 13 million gallons of water saved, with a 3.6-year payback.

For pioneering the use of sphagnum moss for industrial water treatment, which improved water and energy efficiency, led to lower maintenance and waste disposal costs, improved water quality, and lowered odor and skin irritation exposure risks to plant personnel.

For implementing a series of upgrades and technological improvements to achieve a 50% reduction in energy and water use at its Dearborn Research and Engineering Campus.

For optimizing the blast freezing process, reducing freeze times by up to 50% and improving blast energy efficiency by up to 20% in a cold storage facility.

For using data loggers to identify significant energy users and optimize equipment efficiency, helping to fine-tune production processes and reduce compressor energy use by 65%.

For implementing a combined heat and power project at its Indianapolis Gatorade facility that led to annual electricity savings of $1 million and a 35% reduction in annual greenhouse gas emissions.

For identifying and implementing improvements to a decades-old structural oven, with a 35% reduction in oven gas consumption and 34% reduction in firing rate and oven hours.

For installing a blast-air dehumidification system to compensate for high humidity conditions, reducing annual coke usage by 2.5% and saving 16,728 MMBTU and $335,000 per year.

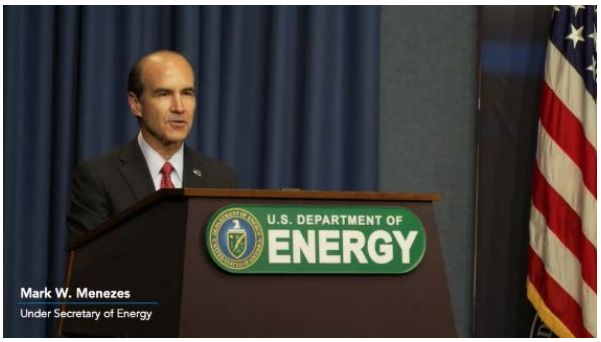
2020 Better Buildings, Better Plants Virtual Summit

In June 2020, the Better Buildings, Better Plants Summit transitioned from an in-person conference to a virtual leadership symposium, featuring an opening and closing plenary, sector meetups, interactive workshops, and engaging sessions from industry experts. In lieu of the face-to-face interactions that have historically characterized Summit attendance, organizers had to get creative to ensure that sessions were engaging, insightful, and inclusive for all 3,000+ attendees. However, the use of virtual meeting tools enabled the incorporation of personal touches like audience polling, digital Q&A with upvoting, trivia, and other icebreaker activities.

Sessions from the 2020 Industrial Track

Industrial and Manufacturing Sector Meet-up

Better Plants partners and stakeholders convened to hear an update on new tools and resources, celebrate partner achievements, and discuss current challenges in breakout rooms.



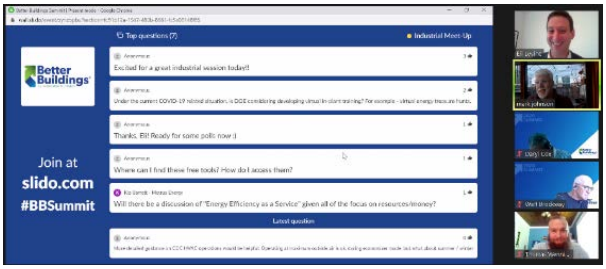
Above: *Keynote address from now-Deputy Secretary of Energy Mark W. Menezes.*

Best of the Betters – 2020 Better Project and Practice Presentation

2020 Better Project and Better Practice Award-winners (see pages 6-7) gave short, TED-talk style presentations.

PechaKucha on Industrial Energy Management

Presenters covered a variety of energy management topics using PechaKucha, a storytelling format based solely on images.



Above: *A screenshot from the Industrial and Manufacturing Sector Meet-up.*

Packaged CHP eCatalog and Accelerator Program

This session focused on the myriad benefits of packaged combined heat and power (CHP) and the open-source eCatalog of DOE-recognized packaged CHP systems.

Early Best Practices from the Waste Reduction Pilot

Participants in Better Buildings, Better Plants Waste Reduction Pilot (see page 16) discussed early finds from the pilot and relevant resources from DOE and beyond.

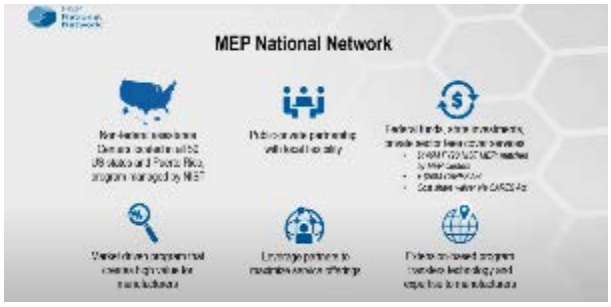
Above: *An image of Miami-Dade Water and Sewer Department's facility from the partner's PechaKucha presentation slides.*

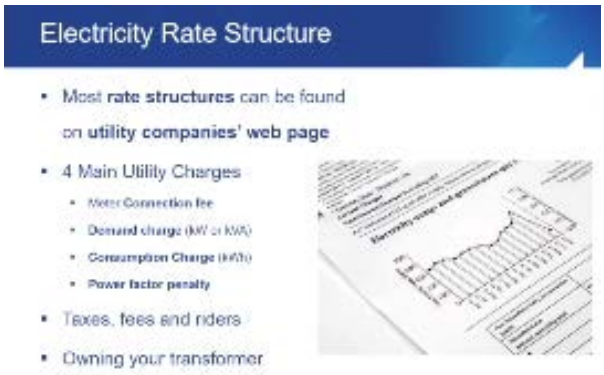
MISSED THE 2020 VIRTUAL SUMMIT?

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to be re-directed to the 2020 Summit recordings.

Online Learning Series

In light of the challenges that impacted the industrial sector during 2020, the Better Plants program continued to support partners and adapt to their needs during these unpredictable times. As noted throughout the Solutions Center and Better Plants platform, understanding energy management best practices can not only help industrial companies identify critical improvements in their facilities, but also realize tangible energy and cost-savings benefits that can be reinvested into other areas of a business.





Above: Slides from the Town Hall with GM, Energy Treasure Hunts with Tyson Foods and EPA, Resources you should know with MEP and USDA, and Basics of Energy webinars in the 2020 Online Learning Series

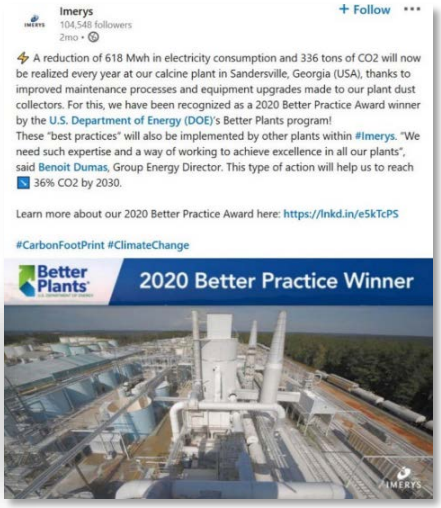
Webinar Topic	Speaker
Pt. 1 of Online Learning Series held: 04/16/20 – 05/21/20	
1. Better Plants Town Hall	Eli Levine (DOE), feat. Al Hildreth (General Motors)
2. Basics of Energy	Thomas Wenning (ORNL)
3. Lighting, HVAC, and Building Envelope	Thomas Wenning (ORNL)
4. Resources You Should Know: USDA Rural Development Programs and the Department of Commerce Manufacturing Extension Partnership	Venus Welch-White (USDA) and David Stieren (NIST-MEP)
5. Compressed Air Systems	Thomas Wenning (ORNL)
6. Water Efficiency	Kiran Thirumaran (ORNL)
Pt. 2 of Online Learning Series held: 08/20/20 – 10/01/20	
7. Energy Treasure Hunts with EPA	Walt Brockway (ORNL) and Walt Tunnessen (EPA)
8. Pumps and Fans	Thomas Wenning (ORNL)
9. Process Heating and Waste Heat Recovery	Sachin Nimbalkar (ORNL)
10. Industrial Technology Validation	Multiple Speakers (LBNL and DOE)
11. Energy Management During a Pandemic	Multiple Speakers (Partners and ORNL)
12. MEASUR Tool Suite	Kristina Armstrong (ORNL)
13. Process Cooling	Wei Guo (ORNL)

MISSED THE 2020 ONLINE LEARNING SERIES?

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to be re-directed to the list of recorded webinars.

Amplifying the Voice of the Industrial Sector

Better Plants partners know it's not enough to keep your head down and do good work – nowadays, its essential to share your sustainability story. Being an effective communicator can bring positive attention that can help make management approval of your next project easier, improve employee morale, attract talented people to want to join the company, and possibly even inspire the broader sustainability community to replicate your best practices. Recognizing this, Better Plants has been looking to partner with organizations in the program to **amplify leadership** and find new and creative ways to share stories.



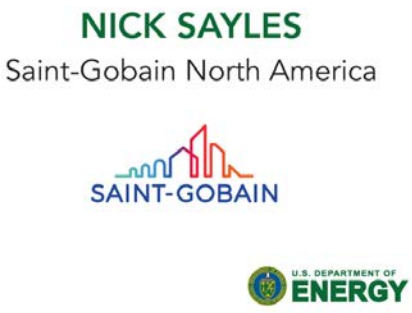
NEW

Follow Better Plants!

In 2020, the Better Plants Program **launched dedicated Twitter and LinkedIn channels** to deliver meaningful content to partners, affiliates, and industry leaders, while enhancing the Better Plants program through the unique, technical focus of our partners.

Twitter: @BetterPlantsDOE **LinkedIn: Better Plants**

Additionally, the Better Plants Program bolstered the recognition of its 2020 Goal Achievers, ITEAM prize awardees, by providing the 2020 Better Project and Better Practice award recipients with personalized promotional toolkit, developed infographics and tool cards, and boosted industrial successes through media channels. See some of the highlights from this past year's promotional efforts below.



New Industrial Technology Validation Pilot

Better Plants partners have set ambitious goals to drive energy, water and waste reduction in their plants. Process improvements can drive meaningful savings, but ultimately, many companies see an opportunity to **invest in innovation and new technologies to make big leaps in energy performance**. In recent years, Better Plants has made a concerted effort to help partners learn about and leverage DOE National Lab capabilities.

In 2020, Better Plants is launching a new Industrial Technology Validation (ITV) pilot to help partners identify and evaluate innovative technologies. This pilot will help identify and prioritize cost-effective, emerging, or underutilized technologies used in the industrial sector, that indicate large performance improvement opportunities and adoption potential. ITV will help partners obtain independent insights and evaluate technology suitability. Developing and evaluating the results of a test that objectively assesses the energy impacts of a new technology, especially in a dynamic manufacturing environment, usually necessitates additional expertise.

RECEIVE TECHNICAL ASSISTANCE

- Evaluate technology suitability
- Obtain independent insights

WORK WITH NATIONAL LAB EXPERTS

- Experts manage on-site testing
- Mitigate testing risks

ACHIEVE OBJECTIVE EVALUATION

- Explore innovative technologies
- Validate performance improvement

ITV aims to address a key challenge Better Plants has heard from partners over the years; manufacturers may be reticent to serve as first adopters for purportedly game-changing products that promise dramatic savings but lack a track record of proven results. Validating technology performance threatens to take technical staff and resources away from other priorities. Developing and evaluating the results of a test that objectively assesses the energy impacts of a new technology, especially in a dynamic manufacturing environment, usually necessitates additional expertise. This is where ITV can have an impact.

For each selected technology, a team of experts led by Lawrence Berkeley National Laboratory (LBNL) will design a measurement and verification (M&V) plan, conduct on-site data collection and testing, analyze performance, and draft a field validation report. Through validating real-world technology performance, this pilot can help inform public and private sector investment decisions and accelerate commercialization, while simultaneously ensuring America's manufacturing leadership position, strengthening U.S. competitiveness, and contributing to meaningful investments in innovation.

PARTNERS AND VENDORS - JOIN US!

- Respond to the Request for Proposal with your chosen technology vendor
- Applications will be evaluated on a rolling basis until March 2021
- Funding for this pilot is limited. Submit your application as early as possible, even if you are not ready to begin the project

To learn more about the ITV Pilot, click the link below or open the camera on your smartphone and hold it up to the QR code to be re-directed to the pilot webpage.

betterbuildingssolutioncenter.energy.gov/better-plants/industrial-technology-validation-pilot

Technical Assistance and TAMs

Better Plants provides every partner with access to technical assistance and expertise that gives them a competitive edge in the global marketplace as they pursue their ambitious energy efficiency goals. A key program benefit is support from Technical Account Managers (TAMs), dedicated energy experts assigned to each partner who help:

- Develop energy, water, and waste efficiency management plans for facilities
- Identify energy-saving opportunities
- Connect partners with DOE tools and resources
- Track energy performance metrics
- Troubleshoot energy efficiency challenges

TAMs are also subject-matter experts in a variety of technology focus areas such as motors, pumps, and compressed air.

"Our Better Plants TAM has been an invaluable resource for Ingevity. In multiple In-Plant training sessions, he has helped our company understand the "Art of the Possible" as it relates to energy efficiency at our industrial facilities. He has kept us up-to-date with the technology curve and has introduced and trained us on using DOE tools that help guide our company towards meeting our energy and GHG efficiency goals. Our TAM is a great representative of the DOE and we are indebted to him and the entire DOE for supporting energy efficiency in manufacturing."

… Dan Dunleavy; Sr. Manager Government Relations & Growth Initiatives, Ingevity Corporation; TAM: Paul Lemar

Helping Partners Collaborate with the National Labs

Above: Partners attending one of the dedicated Better Plants Technology Day showcase events at one of the National Labs to explore state of the art research facilities and new technology.

Offering unparalleled opportunities for public and private partnerships in the areas of research, testing, and publication, the National Labs' 17 user facilities offer Better Plants partners the chance to benefit from innovative equipment and technical expertise for the advancement of independent research projects.

For many years, the National Labs have been instrumental in solving a multitude of issues for industrial companies, such as addressing industrial cyber security, front lining DOE's efforts to assist with field validation of new technologies, and providing manufacturers the opportunity for state of the art research and development through partnership.

Despite the changing times in response to COVID, the National Labs are continuing to help partners take advantage of the equipment and expertise to advance private energy projects. Explore the capabilities of the National Labs on the Better Buildings Solutions Center to understand partnering opportunities.

LOOKING TO FIND A LAB TO WORK WITH?

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to be re-directed to DOE labs.

INPLTs and Training

Going Virtual with Energy Treasure Hunts

As industrial companies have continued to adjust to new safety, energy, and production standards, the Better Plants program has continued to explore new ways to help partners manage and reduce energy consumption. One such area is the exploration of **Virtual Energy Treasure Hunts** and other In-Plant Trainings (INPLTs) to help partners manage energy savings from a safe and socially responsible distance. Through a combination of using virtual meeting platforms to conduct trainings, meetings, and treasure hunt coordination activities, engaging smaller teams to explore facilities, remotely accessing energy data, exploring closed or reduced-operating capacity facilities, or a combination of all of the above, the Better Plants TAMs and partners are getting creative to pursue efficiency in a time of change.

EXPLORE ENERGY TREASURE HUNT RESOURCES

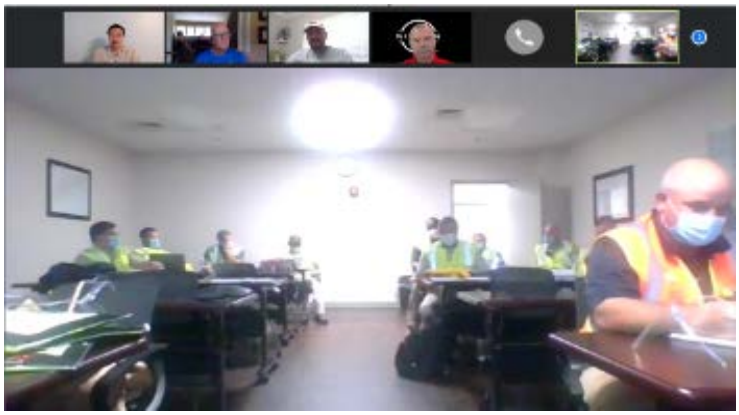
CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to be re-directed to our Treasure Hunt Resources.

Tyson Foods Virtual Treasure Hunt

From August 2nd to the 4th, **Tyson Foods** hosted a virtual energy treasure hunt for their plant in Carthage, MS. 18 people attended the treasure hunt in-person and 6 participants (4 from external companies and 2 from Tysons) joined the hunt virtually.

All on site attendees closely followed the CDC's guidance on the COVID-19 precautions. Together, the treasure hunt attendees identified about $309K in annual energy savings with an anticipated payback of 0.87 yrs.

The energy savings opportunities that were identified from this treasure hunt event covered wastewater treatment processes, ammonia refrigeration systems, compressed air systems and lighting systems.



Above (left): Staff at Tysons Foods taking part in their first virtual energy treasure hunt; (right) Screen shot of remote access energy data

Training and Workforce Resources

A skilled and qualified workforce is critical to making American manufacturers and industrial companies more energy efficient and competitive. DOE has been working to develop training tools, materials, and voluntary credentialing guidelines to advance different elements of the Better Buildings Workforce Framework, including resources for industrial partners. This collection of resources can help Better Plants partners as they continue to pursue energy efficiency improvements at their facilities through a more engaged and well-trained workforce. Learn more and explore available resources by visiting the Solution Center link on the right.

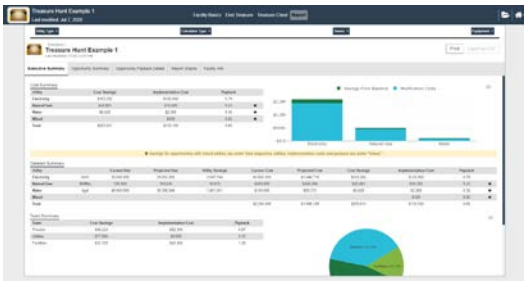
CHECK OUT OUR WORKFORCE AND TRAINING RESOURCES

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to be re-directed to workforce resources.

Industrial Toolbox

MEASUR Software Suite

MEASUR is a software suite that allows end users (such as energy engineers or facility personnel) to create a model, using facility data, that will optimize and improve the industrial systems for facilities. Using plant-specific operating data, MEASUR helps energy managers assess how much energy each piece of equipment uses annually, plus the estimated annual energy costs.



The open source software is continually adding new calculators to the suite, and can **analyze most major energy support systems** found within industrial plants, including compressed air, fans, process heat, pumps, and more. Through the various system modeling modules and 40+ **equipment calculators**, users can analyze and quantify energy savings. Over the past year there have been several additions to the software, including a **steam module** and a **treasure hunt module** to help plants find low or no-cost energy saving opportunities.

EXPLORE THE MODULES IN THE MEASUR TOOL SUITE

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to access the tool suite.

RENT DIAGNOSTIC TOOLS FOR YOUR FACILITY

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to learn more about the DEP.

Diagnostic Equipment Program

The **Diagnostic Equipment Program (DEP)** enables partners to borrow over 22 different kinds of tools to collect energy data and improve equipment performance. Through the DEP, partners can test tools before deciding to purchase their own or help justify the cost of purchasing tools by demonstrating their value first-hand.

- Anemometer
- Combustion Analyzer
- Conductivity Meter
- Current Transformer
- Digital Manometer
- Digital Thermometer
- Infrared Camera
- Infrared Thermometer
- Laser Distance Meter
- Light Meter
- Pitot Tube
- Power Logger
- Pressure Transducer
- Pyrometer
- Sonic Imager
- Strobe Tachometer
- Temperature/RH Logger
- Thermocouple
- Thermocouple Logger
- Time of Use Logger
- Ultrasonic Flow Meter
- Ultrasonic Leak Detector

Above: A picture and description of an Anemometer, which is one of the 22 diagnostic tools available to Better Plants partners through the Diagnostic Equipment Rental Program. To see the full listing of diagnostic tools available to partners, understand their functions and applications, and download an application form, visit the Diagnostic Tools web page on the Solutions Center.

New Resources

Quick Start Guide

DOWNLOAD THE QUICK START GUIDE FOR SMALL TO MEDIUM MANUFACTURERS

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to access the document on the Solutions Center.

The **Quick Start Guide** aims to serve as an introduction to energy efficiency for small to medium manufacturers, explaining why energy management is important and achievable for all organizations, not just well-resourced, energy-intensive large organizations. It also makes connections to the tools and resources available from DOE to help small to medium manufacturers drive energy savings and sustain the progress. Finally, it provides a list of common energy efficiency opportunities for energy-consuming systems such as steam, process heating, and motor-driven systems. Explore the guide to see how smaller manufacturing companies can get started with energy efficiency.

Baseline Guidance Document

The **Energy Intensity Baselining and Tracking Guidance Document** has been updated and posted on the Solution Center. It describes the steps necessary to develop an energy consumption and energy intensity baseline for industrial facilities, as well as to calculate consumption and intensity changes over time. The updated version also addresses special circumstances and issues, such as:

- Accounting for byproduct fuels (such as biogas from wastewater treatment, food processing, chemicals, etc.)
- Baseline adjustments within a facility that undergoes an expansion or consolidation or does remanufacturing
- Re-baselining (when, why, and the banking approach)
- Including a Modified Energy Intensity (MEI) approach
- Accounting for unexpected events such as natural disasters, accidents, or embargoes

DOWNLOAD THE BASELINE GUIDANCE DOCUMENT

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to access the document on the Solutions Center.

Science Based Target Document

GET HELP WITH SETTING SCIENCE-BASED TARGETS FOR YOUR ENERGY GOALS

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to access the document on the Solutions Center.

The Science-Based Targets (SBTs) initiative, a collaboration between CDP, the World Resources Institute, the World Wildlife Fund for Nature, and the United Nations Global Compact, helps companies set goals to reduce emissions and identify transformational actions they can take to align with climate science. Many Better Plants partners have set a SBT or are considering doing so. This document will help partners understand how the progress they've made at driving energy savings can translate to a science-based target goal, additional ways Better Plants tools, technical assistance and resources can help, and lessons from other partners along the same journey.

Waste, Water, and Supply Chain

Waste Reduction Pilot

Better Plants is working with 20 industrial partners to increase waste reduction, improve energy performance, and reduce operating costs. The partners have continued to make progress in waste reduction and share meaningful information with DOE and other partners, thereby affirming their leadership in this important area.

Participating partners have convened for several quarterly calls, focused on topics such as waste data reporting, food waste, and plastics recycling. Early best practices from the pilot was also the focus of a Virtual Summit session (see page 8) this year. Going forward, the pilot will establish ad hoc working groups on specific topics, such as plastics recycling, to facilitate networking, create forums for sharing challenges and solutions, and inform the development of needed resources.

LEARN MORE ABOUT THE WASTE PILOT

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to learn more on the Waste Pilot.

Inaugural Industrial Partners in the Waste Reduction Pilot

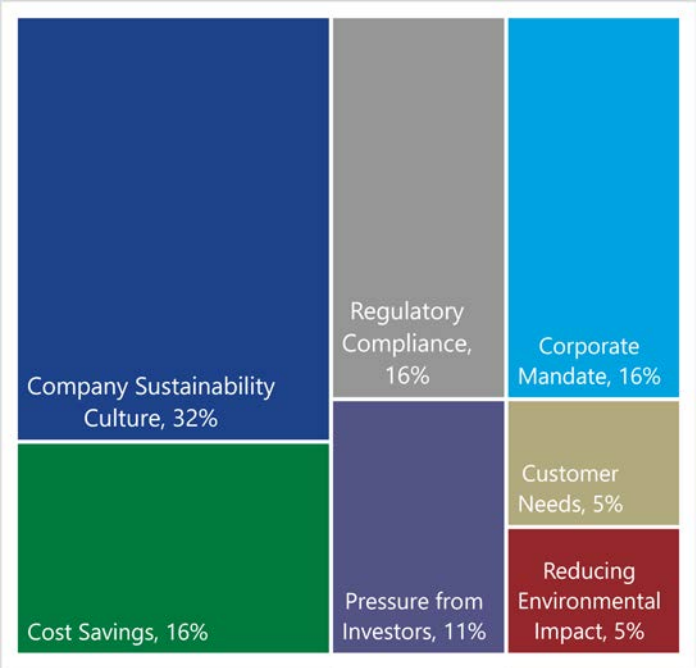
Armstrong FLOORING
AstraZeneca
Bristol Myers Squibb
J.F. Martin & Co. EST. 1833
Electrolux
Flowers Foods
FMC
GM
HARBEC
Johnson Controls
LA DWP Los Angeles Department of Water & Power
NISSAN
MOTION & CONTROL NSK
PaperWorks
PPC Innovate. Connect.
Raytheon Technologies
Schneider Electric
Steelcase
SugarCreek
VOLVO VOLVO GROUP

Bristol-Myers Squibb Shares a Solution-at-a-Glance on Applying the Principles of Green Chemistry to Reducing Material Waste

View the Solution and learn more at:
https://betterbuildingssolutioncenter.energy.gov/solutions-at-a-glance/bristol-myers-squibb-application-principles-green-chemistry-leads-significant

Above: A BMS employee holds the larger carton that "Opdivo" avoided by switching to an "e-label," and its current carton.

Chart 4: Primary Motivation for Pilot Partners Setting Waste Reduction Goals



Waste, Water, and Supply Chain

Suppliers Continue Forging New Energy Savings Through 2020

During the past year, the supply chain cohorts in the Better Plants Supply Chain initiative continued to make strong energy gains. Since launching the Supply Chain initiative 6 years ago, 5 cohorts, **Legrand, UTC, Lockheed Martin, Honda North America** and **Volvo Group,** have been established with 38 Better Plants partners that are supplier companies – approximately 17% of Better Plants partners.

Better Plants launched this important initiative because supply chains are a significant part of the U.S. manufacturing base, accounting for approximately 70% of manufacturing jobs and facilities and up to 85% of the energy consumption before final product assembly. In addition, a growing number of industrial companies that are upstream within supply chains and have not been working on energy efficiency or sustainability are coming under growing pressure from larger, downstream customers to show progress in this area.

Supply Chain Cohorts Getting it Done: Honda North America and Volvo Trucks

In November 2019, Better Plants delivered a webinar trainings series entitled **"Energy Warriors Training"** to KYB Americas, a supplier in the Honda cohort. The webinars covered fundamental energy efficiency topics that included the basics of energy, lighting, HVAC and building envelope, compressed air, pumping and fan systems as well as process heating and cooling systems.

A companion "homework assignment" helped the KYB energy team better understand the concepts and identify energy conservation opportunities. More than 10 people from the energy team attended this webinar and received professional development hours certificates. Later in 2020 **Honda** and **Fiat Chrysler Automobiles** used this webinar series to sharpen the skills of their energy teams during the pandemic.

Above: *Volvo Trucks, USA Parts and Manufacturing Facility*

Water Savings with INPLTs and the Plant Water Profiler Tool (PWPEx v1.0)

A 2.5 day in-plant training on industrial water efficiency developed by the Better Plants team was piloted at three different partner sites; **ArcelorMittal (OH)** *(pictured bottom left)*, **Owens Corning (TN)** *(pictured top left)* and **Saint Gobain (MI)**. More than 40 participants were trained on the tools and methods to effectively perform a water balance, determine the true cost of water and identify water efficiency opportunities at the facility. The workshop leveraged **DOE's Plant Water Profiler tool (PWP),** an excel based site level water assessment tool developed at ORNL, to train participants and analyze the facility's water consumption. The feedback from the events has helped the team update the PWP tool with features tailored to specific industrial systems.

EXPLORE THE UPDATED PWP

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to access the updated version of the PWP tool (PWPEx v1.0) is available on the DOE website

Complementary Programs

Industrial Assessment Centers

DOE **Industrial Assessment Centers (IACs)** help small and medium-sized U.S. manufacturers save energy, improve productivity, and reduce waste by providing no-cost energy assessments conducted by university-based teams of engineering students and faculty. Currently, there **are 31 Centers at universities across the country**, including the 3 new Extension Centers, Colorado State University, University of Delaware, and Case Western Reserve University, which began operations in September 2019. After each site visit, the IAC team provides a comprehensive report with specific details on all identified opportunities for improving energy performance, including applicable rebates and incentives.

IAC Savings for all Industrial Facilities

19,300
industrial assessments conducted by IACs, to date

145,000
total industrial recommendations for energy savings

$137,000
estimated cost savings per facility

IAC Savings for Better Plants Partners

83
energy and water-savings recommendations for Better Plants Partners

50%
of recommendations implemented within 1 year of assessment

$330,000+
average value of implemented savings

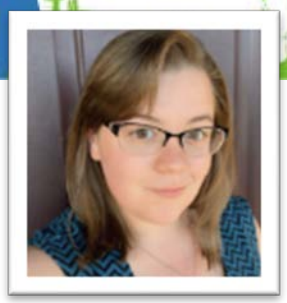
IAC Energy Assessments for Water Resource Recovery Facilities (WRRFs)

Summary of Assessments	2019 Results
Number of Assessments	46
Percentage of Recommendations Implemented	44%
Average Percentage Savings Identified per Plant	25%
Average Cost Savings Potential	$159,000
Total Potential Savings	$7.3 Million

Women for Energy Efficiency (We²) Network

The Industrial Assessment Center Program We2 Network strives to enhance women's experience in the IAC program by creating a comfortable, inviting environment to share their work experiences, build a network of mentorship, provide an opportunity for leadership development, and facilitate the exchange of ideas with other women in the energy industry. The WE2 Network Mentorship program was launched in 2019 to help both mentees and mentors strengthen their leadership, communication, networking, and professional skills in the energy industry. The program's goals include professional skills development, workforce development, and an increase in diversity and retention in both the IAC program and the energy engineering industry.

There are currently **28 IAC student mentees** and a total of **109 female students in the WE2 IAC network.** The IAC program has encouraged female student participation in the IAC distinguished Student Program , Alumni award and student research award with meaningful success. The network has also influenced appointments to leadership positions within the IAC program with an addition of 3 new assistant directors during the last fiscal year.



*Right: Two of our Better Plants Technical Account Managers (TAMs) are alumni of the IAC program. **Alexandra Botts** (Left) who specializes in compressed air systems, and **Shelby Saji** (right) who specializes in energy system engineering.*

Complementary Programs

CHP Systems

Combined Heat and Power (CHP) is an efficient and clean approach to generating on-site electric power and useful thermal energy from a single fuel source. DOE's CHP Technical Assistance Partnerships (TAPs) are available to help identify CHP market opportunities through vendor, fuel, and technology-neutral assessments of CHP viability.

Better Plants partner **PepsiCo**, one of the largest food and beverage companies in the world, utilizes CHP as a key piece of the company's efforts to increase efficiency and reduce greenhouse gas emissions. Andy Lempera, Pepsi Beverages North America (PBNA) Supply Chain Sustainability Director, is a former student of the Midwest CHP TAP staff and oversees the environmental programs in 62 Gatorade, Tropicana, and Pepsi manufacturing facilities in North America. PepsiCo completed CHP projects in two Gatorade Facilities: a 3.6 MW CHP system in the Indianapolis, Indiana Gatorade Plant and a 2 MW CHP system at the Mountain Top, Pennsylvania Gatorade Plant.

Above: Production line from one of Pepsico's Gatorade manufacturing facilities.

PEPSICO

"With CHP, we generate electricity onsite where we can capture the heat, which means we can operate at increased net efficiencies of more than 70%. In the course of making Gatorade, we have a very high thermal demand, so we're able to recover heat from the generator set and put it to good use, offsetting our consumption of natural gas."

… Andy Lempera, Pepsi Beverages North America (PBNA) Supply Chain Sustainability Director Pepsico

The Indianapolis plant CHP system resulted in a 35% reduction in GHG emissions at the facility and overall **the plant has seen an 86% reduction in purchased electricity and a 20% reduction in purchased fuel**. DOE's CHP TAPs are collaborating with **PepsiCo** to identify and evaluate additional CHP opportunities throughout their North American portfolio including technical assistance to the Quaker Oats facility that commissioned an 800 kW CHP system in 2019 in Bridgeview, Illinois.

The CHP systems use three different heat sources in the beverage-making process: exhaust gas is used to generate steam; jacket water used for cooling the engine is utilized in a heat recovery loop; and the aftercooler water is used for preheating Gatorade before the pasteurization process.

New: CHP eCatalog

Launched in 2019, the Packaged Combined Heat and Power (CHP) Systems eCatalog was developed by DOE to increase the deployment of CHP in commercial, institutional, multifamily and manufacturing plants. The eCatalog is an open source, web-based system that hosts DOE-recognized Packaged CHP systems, and allows users to screen results based on key items such as system size (kW), prime mover (reciprocating engines, microturbines, gas turbines, or fuel cells), heat recovery (hot water, steam, cooling, or a combination), and other system attributes. The eCatalog is focused on Packaged CHP Systems less than 10 MW (individual system capacity) and is routinely updated to add new packaged CHP systems, packagers, and solution Providers.

ACCESS THE CHP E-CATALOG

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to access the CHP e-catalog.

50001 Ready

The DOE 50001 Ready Program can help organizations adopt an energy management system that aligns to the globally-accepted ISO 50001 energy management standard. The program's online 50001 Ready Navigator tool is a self-paced, no-cost way for organizations to build a culture of continual energy improvement. More than 360 new domestic users have taken advantage of the Navigator this year to date, with 14 sites ultimately recognized as being 50001 Ready, including Better Plants' partners GM and Whirlpool:

- Whirlpool Corporation's Amana, IA, facility was its first to earn 50001 Ready recognition. The implementation helped the plant save over $450,000 with very little capital investment in the initial year. Whirlpool now plans to expand 50001 Ready to all 9 of its North American plants.
- General Motors earned 50001 Ready recognition at 25 of its U.S.-based manufacturing facilities. Using the Navigator multi-site feature helped the company to streamline energy management processes across all sites. The 50001 Ready implementation kicked off with an In-Plant Training session for its energy conservation engineers. GM then developed an energy management manual to standardize key best practices and sustain the newly adopted process improvements.

Updates to the 50001 Ready Navigator

- Technical guidance aligns to ISO 50001:2018 Navigator content and its accompanying Playbook files reflect the latest updates to the globally accepted energy management standard.
- The 50001 Ready Navigator Playbook will help organizations keep track of their progress using templates for each task that save time in establishing the energy management system.

Learn more at energy.gov/50001Ready

Industrial Cybersecurity

Advanced approaches to manufacturing and supply chain management increasingly rely on data collection, data analysis, and technological connectivity to achieve energy and other efficiency gains. These additional connectivity points, along with the increased number of attacks by hackers and other bad actors on manufacturing facilities, require new approaches and increased diligence to avoid downtime, loss of intellectual property, and other damages that can be realized through cybersecurity vulnerabilities.

As systems to control energy-using manufacturing equipment become more connected to the internet, it is important for plant operations staff to understand cybersecurity risks and to coordinate **risk management activities** within their organization. By addressing risk areas, you can protect your business from damage to information or systems, intellectual property theft, regulatory fines/penalties, decreased productivity, or a loss of trust with customers. DOE's National Labs have decades of research and development experience that industrial partners can benefit from, including approaches to **industrial cybersecurity**. Capitalizing on this specialized expertise, the labs can address large-scale, complex challenges like cybersecurity with a multidisciplinary approach that translates science into industry innovation.

87% of manufacturing companies have a disaster recovery plan in place for data security breaches, yet only 37% of these companies have documented and tested their plans.*

* Deloitte, Manufacturers Alliance for Productivity and Innovation

EXPLORE OUR RESOURCES FOR CYBERSECURITY

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to be directed to our cybersecurity resources.

DOE Recognizes Employees of Better Plants Partners

Orange Water and Sewer Authority Wins DOE Water Resource Recovery Prize – Phase One

Better Plants Challenge partner **Orange Water and Sewer Authority (OWASA)** is 1 of 10 phase one-winners of the DOE Water Resource Recovery Prize, which was launched in January 2020. The Prize accelerates resource recovery from municipal wastewater across the United States by seeking novel, systems-based solutions from multidisciplinary teams at small- to medium-sized water resource recovery facilities.

The team at OWASA proposed an innovative process to treat wastewater sludge and eliminate contaminants and pathogens in an energy-efficient way, winning Phase One of the Prize and moving into the second phase which would allow two winning teams to receive $250,000 in cash.

Eight Better Plants Employees Win Individuals Taking Energy Action in Manufacturing Prize

In 2018, DOE launched the Individuals Taking Energy Action in Manufacturing (ITEAM) Prize to recognize individuals who have implemented creative, specific, and innovative ideas and practices that led to measurable energy savings at their manufacturing facilities.

The eight winners are:

- George Anglin, **Toyota Motor Engineering, North America**
- Jeff Feyen, **Charter Steel**
- Marcus Johnson, **Eastman Chemical**
- Terry McMichael, **3M**
- Mike Rogers, **3M**
- Rochelle Samuel, **Saint-Gobain Corporation**
- Nick Sayles, **Saint-Gobain Corporation**
- David Turkes, **Bentley Mills**

Above: 3M's Terry McMichael and Mike Rogers (left) and Toyota's George Anglin (right) were winners of the ITEAM Prize, which celebrates creative and innovative ideas and practices for industrial energy savings.

ITEAM prize winners will receive a cash prize of $5,000 and will be recognized at the virtual Association of Energy Engineers World Energy Conference and Expo. To facilitate sharing of successful strategies and examples of leadership, winners' ideas and practices are highlighted on the Solutions Center website for the benefit of U.S. manufacturing facilities.

LEARN MORE ABOUT THE ITEAM WINNERS' IMPRESSIVE WORK

CLICK THIS LINK, or open the camera on your smartphone and hold it up to the QR code to learn more about these winning solutions.

"Through the ITEAM Prize, DOE celebrates employees on the plant floor who are improving their companies' energy efficiency. Their innovative leadership is driving cost savings and strengthening competitiveness for manufacturers across the U.S."

- Alex Fitzsimmons, Deputy Assistant Secretary for Energy Efficiency.

Better Plants Challenge Energy and Water Goal Achievers

3M
BENTLEY
J.M. Martin & Co. EST. 1833
Celanese The chemistry inside innovation
BCWSA
Cummins
ENCINA WASTEWATER AUTHORITY
General Mills
GM
HARBEC
Holcim
ingevity
Johnson Controls
legrand
NEW Water
NISSAN
Schneider Electric
TE connectivity
TOYOTA
United Technologies
VVWRA
VOLVO

Better Plants Program Energy and Water Goal Achievers

AT&T
BPM Inc A Specialty Paper Mill
BRADKEN
Cardington Yutaka Technologies Inc.
COMAU
COMPLETE Design & Packaging
DAIKIN
EATON
EXPERA specialty solutions
GENERAL DYNAMICS
Graphic Packaging INTERNATIONAL
Ingersoll Rand
Johnson & Johnson
JBT
JM
Kingspan
LENNOX INTERNATIONAL
environment LA SANITATION CITY OF LOS ANGELES
LOCKHEED MARTIN
METAL INDUSTRIES, INC.
The Narragansett Bay Commission
NAVISTAR
OSRAM SYLVANIA
OWENS CORNING
PATRICK CUDAHY
PATRIOT FOUNDRY & CASTINGS
P&G
Roche
Shaw FLOORS
SHERWIN WILLIAMS.
TEXAS INSTRUMENTS
thyssenkrupp
VERSO.
Weyerhaeuser

Partners as of September 2020

3M*

AbbVie Inc.

Agropur

Alcoa

Alexandria Renew Enterprises

Alumalloy Metalcastings

Amcor Rigid Plastics

American Mitsuba Corp.

ArcelorMittal USA*

Archer Daniels Midland (ADM)

Armstrong Flooring

Asama Coldwater Manufacturing

AstraZeneca

AT&T*

Autoliv

Avon Lake Regional Water

Ball Corporation

BD

Bendix Commercial Vehicle Systems

Bentley Mills*

Boardman Foods

Bosch Rexroth

BPM, Inc.*

Bradken*

Bridgestone Americas, Inc.

Briggs & Stratton Corporation

Bristol-Meyers Squibb

Bucks County Water and Sewer Authority*

C. F. Martin & Company*

CalPortland Company*

Campbell Soup Company

Cardington Yutaka Technologies*

Carlton Forge Works

Cascade Engineering Technologies, Inc.

Celanese Corporation*

Chapco Inc.

Charleston Water System

Charter Steel*

Chippewa Valley Ethanol Company

Citrus World, Inc.

City of Fort Wayne – City Utilities

City of Grand Rapids Water Resource Recovery Facility

City of Phoenix Water Services Department

City of Roseville, Environmental Utilities Department

Clearwater Engineering, Inc.

Co-Operative Industries Aerospace and Defense

Coilplus Inc.

Comau LLC*

Commercial Metals Company

Commercial Vehicle Group

Cooper Standard

Cummins, Inc.*~

Custom Glass Solutions

Daikin Applied Americas*

Darigold

Delta Diablo

Denison Industries

Des Moines Water Works

Deschutes Brewery

Didion Milling

Dixline Corporation

Donsco Inc.

Dow Chemical Company

DSM North America

Durable Products

Durex Inc.

EARTH$_2$O

Eastman Chemical Corporation

East Penn Manufacturing, Inc.

Eaton Corporation*

Eck Industries

Electrolux

Encina Wastewater Authority*

Estée Lauder

Expera Specialty Solutions*

Fiat Chrysler Automobiles

Flambeau River Papers

Flowers Foods

FMC Corporation

Ford Motor Company

GB Manufacturing

General Aluminum Manufacturing Company

General Dynamics Ordnance and Tactical Systems Scranton Operation*

General Electric

General Mills*

General Motors~

General Stamping & Metal Works

Gibraltar Industries

GKN Aerospace

Golden Renewable Energy, LLC

Goodyear Tire and Rubber Company, U.S. Tire Plants

Graham Packaging

Graphic Packaging*

HARBEC, Inc.*

Harley-Davidson

Harrison Steel Castings Co.

Harva Company

Haynes International

HNI Corporation

Holcim (US) Inc.*

Honda North America

Huntsman Corporation

Imerys Carbonates North America

Ingersoll Rand*

Ingevity*

Intel

International Paper

Intertape Polymer Group

Intralox LLC

Ithaca Area Wastewater Treatment Facility

J.R. Simplot*

JBT Corporation*

Jedco, Inc.

Johnson & Johnson*

Johnson Controls*

Johnson Matthey Emission Control Technologies Division

Kent County Department of Public Works

KEY

Bold – Better Plants Challenge Partner

Underline – New Partner

Asterisk* – Energy Goal Achiever

Tilde~ – Water Goal Achiever

Partners as of September 2020

Kenworth Truck Company

Kingspan Insulated Panels, Inc.*

Krage Manufacturing

KYB Americas Corporation

L'Oréal USA

Land O' Lakes

Leggett & Platt

Legrand North America*

Lennox International*

Lineage Logistics

Lockheed Martin

Los Angeles Bureau of Sanitation

Los Angeles Department of Water & Power

Lynam Industries, Inc.

Magnetic Metals Corp.

MAHLE Engine Components USA, Inc.

Manitowoc Grey Iron Foundry

Mannington Mills

Marquis Energy

Marquis Energy Wisconsin

Massachusetts Water Resources Authority

MB Aerospace East Granby

McCain Foods USA, Inc.

McWayne Inc.

MEKRA Lang

Metal Industries, Inc.*

Miami-Dade Water and Sewer Department

Michels Corporation

Mitsubishi Electric Automotive America

Mohawk Industries

Mulgrew Aircraft Components, Inc.

Narrangansett Bay Commission*

Navistar International*

ND Paper LLC

Neenah Foundry

NEW Water (Green Bay Metropolitan Sewerage District)*

Newman Technology

Nissan North America, Inc.*

Novati Technologies

Novelis Inc.

NSK Americas

NY DEP – Bureau of Wastewater Treatment

O'Fallon Casting

Occidental Chemical Corporation

OFD Foods, Inc.

OMNOVA Solutions Inc.

Orange Water and Sewer Authority

Oshkosh Corporation

OSRAM SYLVANIA*

Owens Corning

Ozinga Brothers

Pactiv

PaperWorks Industries

Parker Hannifin

Patrick Cudahy, Inc.*

Patriot Foundry & Castings*

PepsiCo

Pharmavite

Philadelphia Water Department

Pima County Wastewater Reclamation Department

Plastics Engineering Company (Plenco)

PPC Broadband

PPG Industries

Procter & Gamble*

Quad/Graphics, Inc.

Raytheon Technologies

Research Electro-Optics

Richmond Industries, Inc.

Roche Diagnostics Operations*

Rowley Spring & Stamping

Saint-Gobain Corporation

Saputo Dairy Foods

Savage Precision Fabrication

Schneider Electric*

Sears Seating

Selmet, Inc.

Shape Corporation

Shaw Industries Group, Inc.*

Sheboygan Regional Wastewater Treatment Facility

Sherwin-Williams*

Silgan Closures

Silgan Containers

Silgan Plastic Food Containers

Solberg Manufacturing, Inc.

Sony DADC

Southwest Cheese

Spirax Sarco, Inc.

St. Petersburg Water Resources Department

Stanley Spring & Stamping Corporation

Steelcase, Inc.

SugarCreek Packing Company

SunOpta, Inc.

TE Connectivity*

Tenaris

Texas Instruments*

Texas Nameplate Co.

Textron

ThyssenKrupp Elevator*

TitanX Engine Cooling, Inc.

Toyota Motor Engineering and Manufacturing North America*

TPC Group

Tri-State Plastics, Inc.

Tyson Foods

United Mechanical and Metal Fabricators

Valmont Industries

Vanguard Space Technologies

Vermeer

Verso Paper Corporation*

Victor Valley Wastewater Reclamation Authority*

Vitro Architectural Glass

Volvo Group North America*

W. L. Gore and Associates

Waupaca Foundry

Weber Metals Inc.

Western Lake Superior Sanitary District

WestRock

Weyerhaeuser*

Whirlpool Corporation

Xerox

Zimmer Biomet

KEY

Bold – Better Plants Challenge Partner

Underline – New Partner

Asterisk* – Energy Goal Achiever

Tilde~ – Water Goal Achiever