Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

Beginning in 1976, the Industrial Assessment Centers (IACs) have provided small and medium-sized manufacturers with site-specific recommendations for improving energy efficiency, reducing waste, and increasing productivity through changes in processes and equipment.

SPRING NEWSLETTER 2018

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or contact your nearest center.

IAC PROGRAM HIGHLIGHTS

IACs and the Technical Field Manager

Field Manager staff lead a tour of the Rutgers Cogeneration Facility as part of a recent Directors meeting.

A Technical Field Manager is the person behind the scenes working to facilitate all 28 Industrial Assessment Centers (IACs) and to ensure that Department of Energy (DOE) priorities are being met. Starting a new five-year stint this spring, the current field management team is located at the Center for Advanced Energy Systems at Rutgers University. And they are not new to this role, having served as a primary technical interface for the DOE in the IAC program since 1992. However, as has always been the case, the role of the Field Manager evolves over time – just as the IACs do – to adapt to changes in technology and the economy, as well as DOE priorities. Recently, a number of new program initiatives have been launched with an increased emphasis on cybersecurity, water resource management, smart manufacturing, and energy management systems. The Technical Field Manager is tasked with supporting centers in developing responses to those initiatives and ensuring that everyone is on the same page.

At the core, the duties of the Technical Field Manager are three-fold. First, there is the management and quality assurance for the primary products: technical assistance to small- and medium-sized manufacturers and training the next generation of energy engineers. Historically, centers have been encouraged to be creative and to develop many of their own protocols, but a minimum standard has

PROGRAM HIGHLIGHTS

been set and the Technical Field Manager keeps everyone accountable. Each report is read and critiqued, and follow-up reports are tracked and recorded.

Almost as important as the quality assurance and program administration is the development and maintenance of the valuable resources generated by and for the IACs. The Technical Field Manager hosts and maintains the database for the program – a unique resource available to the public on the internet. The IAC website (https://iac.university) is the entrance to the database that welcomes many users interested in industrial energy savings including academics, government policy makers, and industrial end-users. The database of more than 18,000 assessments contains information on nearly 140,000 recommendations and is offered free of charge, both in the aggregate format as well as an interactive, searchable interface.

The Technical Field Manager also maintains a variety of other resources including guidance for the application of evolving technologies. It routinely provides training and materials to both experienced and new centers, as well as outside entities. A new interface, aptly named DOE-101, will provide a video-based, industry-facing series of brief trainings in a variety of common energy systems later this year.

The Technical Field Manager can help broaden the impacts of the program. At the center-level, the IACs focus on leveraging the program in academics and in collaborations and partnerships. This includes integrating center activities with state agencies and private organizations, developing curricula related to IAC work, and using multidisciplinary approaches to enhance energy efficiency. Centers are also encouraged to maintain an alumni network as a method of spreading the word about the IAC program. The Technical Field Manager will complement these efforts by maintaining a dialog with industrial, NGO, and governmental connections to continue to deliver excellent results for students, manufacturers, and other partners.

IACs Show Flexibility in the Aftermath of Hurricane Maria

In the aftermath of Hurricane Maria, 100% of power went down in Puerto Rico. All aspects of life in Puerto Rico were hit hard. Five weeks after Maria made landfall, only 25% of power generation was recovered and people had about 70% access to water and around 50% access to communications. The recovery process has been slow due to many factors, but the main constraint has been the absence of electrical power, which is used for the processing and distribution of water and to operate the telecommunications networks.

Puerto Rico's manufacturing sector was hit particularly hard, due to damages to infrastructure and confined use of backup power units to restart production. These backup power units are typically much more expensive to run than using power from utility companies. One of the main challenges has been

A team from the Universidad del Turabo IAC help install a solar power project to support water distribution at Barrio Mariana in Humacao, Puerto Rico.

that most of the power generation infrastructure is located in the southern part of the island, whereas most of the population lives in the northern part of the island. Additionally, the industrial density in the north is considerably higher.

Another urgent problem has been the power supply to hospitals. The Puerto Rican government put this sector as a priority in the reestablishment of power, but the reality is that most hospitals did not have the power systems to fully operate in the aftermath of the hurricane, nor did they implement best practices for energy use. By optimizing energy consumption, hospitals can provide better services and reduce their vulnerability to similar events – which is where the IACs come in.

The Universidad del Turabo, a satellite IAC of the University of Miami, has done its part to assist in the recovery efforts. In the immediate aftermath, the Turabo IAC team assisted the hard-hit communities of Buenos Aires in Caguas, as well as Mariana in Humacao. In both locations, students and faculty at the IAC helped install donated solar power systems for the local water distribution and community centers. In addition, the IAC established a hotline to support local residents with the installation and operation of backup power generators and solar photovoltaic (PV) systems.

In the longer term, the Turabo IAC has adjusted its "standard" assessment process to account for severely impacted operating conditions. These adjustments include the following:

For five selected industrial clusters, identifying industrial power needs and suggesting alternative power solutions such as on-site generation, combined heat and power (CHP), and alternative energy; including potential microgrid applications using local power sources/thermal generation from a third party that can improve relief efforts and resiliency.

Performing IAC type assessments on hospitals to optimize the power usage and find alternatives for on-site generation and cogeneration.

Through these recovery efforts, Turabo IAC students and faculty have shown a strong commitment to their community and the ability to adapt and remain flexible while still advancing the mission of the IAC program.

CENTER SPOTLIGHT

Wastewater Treatment Plants Assessments: University of Wisconsin-Milwaukee

Dr. Ryo Amano, Director of the UWM IAC, leads students in a discussion of WWTP equipment maintenance.

With the latest iteration of IACs (2017 – 2021), the Department of Energy (DOE) placed an increased emphasis on conducting assessments of wastewater treatment plants (WWTPs) and water supply facilities – including active partnerships with DOE-sponsored programs such as Better Plants and the Sustainable Wastewater Infrastructure of the Future initiative. During the first 30 years of the program for which data are available, IACs conducted only a handful of assessments at water treatment and water supply facilities; however, during the last five years, there have been more than60 assessments conducted. The University of Wisconsin-Milwaukee (UWM) IAC has been a leader in this area, conducting eight assessments during Fiscal Year 2017 alone.

WWTPs are considered significant energy consumers due to 24 hours a day, 365 days a year operations. According to the ENERGYSTAR Portfolio Manager, the energy use intensity of WWTP varies from 5-50 kBtu/GPD, and the median WWTP treats approximately 3 millions of gallons a day, thus the energy consumption ranges from 15,000 to 150,000 Mbtu/day. Most of the energy is consumed in activities related to pumping influent to and within the plant, aeration to increase the oxygen in water providing an aerobic environment for the microbial degradation of organic matter, and heating the digesters to allow the growth of the micro-organisms during the solid waste treatment process. Despite significant energy requirements, there are still opportunities for WWTPs to improve energy efficiency.

The energy saving recommendations of the eight WWTPs audited by UWM are categorized into eight groups, including:

1. Installing Variable Frequency Drives (VFDs): Most of the visited plants have constant speed influent screw pumps that are used to pump the influent (incoming to the plant) through the different stages in the treatment process. However, since the influent flow rate is variable due to the fluctuation of incoming flow through the city sewerage network, the VFD can control the speed of pumps based on the demand and signals from a float sensor.

2. Motors: The majority of the savings in this group is related to the synthetic lubricant recommendations since most of the pumps are either directly coupled to motors or via chains.

3. Lighting: Recommendations include changing indoor and outdoor lights into energy efficient fixtures in addition to utilizing lighting controllers like motion sensors in less frequent occupied areas.

4. Heating, Ventilating, and Air-Conditioning (HVAC): Ambient temperature can be lowered significantly in areas of the building that are not occupied most of the time. Energy can also be saved by replacing old HVAC equipment with newer and more energy efficient systems.

5. Load Management: Recommendations include shifting some of the processes within the treatment to off-peak hours such as solid waste treatment to reduce the demand and thus the energy cost.

6. Maintenance to eliminate air leaks: Air leaks in the blower ducting system were detected in one plant and conducting regular maintenance to eliminate air leaks showed a significant energy saving due to the enormous energy consumption of these blowers.

7. Compressors: While compressors are not widely used, small amounts of energy can be saved by reducing the setpoint pressure and installing the air intake in the coolest location.

8. Heat Recovery: Waste heat can be recovered and reused to reduce the amount of heat lost to the environment.

CENTER SPOTLIGHT

Figure 1 shows the energy and cost savings per audited WWTP by the UWM IAC. Overall energy use/energy cost savings averaged more than 10%, with the highest energy savings being 19.4% and the highest cost savings of nearly 16%. It is

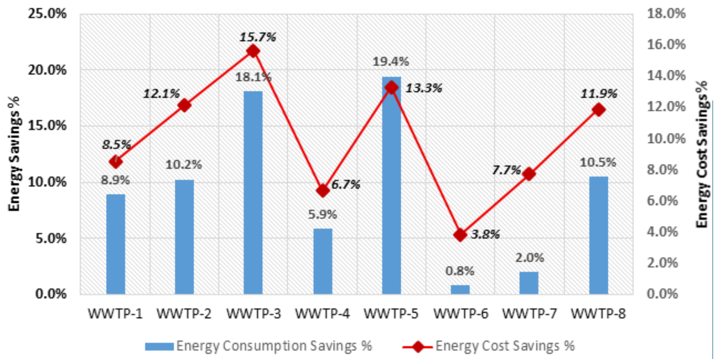

Figure 1: Energy and cost savings percentages in the audited WWTPs

also worth noting that the average payback period of these recommendations did not exceed two years.

Expanding WWTP Savings: The Case for Combined Heat and Power

These more conventional energy savings opportunities do not include the potential benefits of exploring CHP systems. In general, CHP is the simultaneous production of electricity and heat from a single fuel source, such as natural gas, biomass, biogas, coal, or oil. In the context of WWTP, a CHP system can be employed in a WWTP through using the biogas as a primary fuel to energize the CHP. Biogas is produced in the process of solid waste treatment as a by-product and can be utilized in generating electricity and heat through the addition of a microturbine or reciprocating engine in the WWTP. Such a system can help to cover 30-60% of the annual energy consumption.

As more IACs begin doing water and wastewater treatment assessments, they can learn from the work the UWM IAC has already done. ■

CLIENT TESTIMONIALS

University of Wsiconsin - Milwaukee

“I was very impressed with your team and their performance. They identified a lot of items that would normally be missed or not pursued by many assessments. The “brainpower” of your team is impressive and any company that gets an assessment from your team needs to tap into your team’s knowledge. I look forward to working with you and your team again.”

– Richard Feustel,

CEM, Senior Energy Advisor at Leidos/Focus on Energy (Oshkosh, Wisconsin)

University of Missouri - Columbia

“Working with [the Mizzou IAC] team was a delight. They were knowledgeable, professional and asked great questions to understand our process completely before generating a report with suggestions. The report highlighted some improvement areas that we had not thought of yet which was fantastic. Thank you very much for your time to help us continuously improve our energy reduction plans.”

– Christina Stage,

Lean Manager at Silgan Plastic Food Containers (Union, Missouri)

Introducing the New IAC Logo

Throughout the last 40 years of the program, the IACs have strived to stay current, whether it be on the latest manufacturing trends/technologies, emerging opportunities for energy efficiency and productivity improvement in industrial settings, or with advances in the hardware and software tools and equipment used to conduct their assessments.

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We are pleased to introduce the new Industrial Assessment Center logo. It replaces the current art-deco inspired logo with a cleaner, more contemporary logo that complements the suite of technical partnership/assistance programs within the DOE Office of Energy Efficiency and Renewable Energy.

IAC Program Quarterly Results October - December 2017

IDENTIFIED SAVINGS

	This Quarter	Annual
Energy Savings	13.6 M Therms	109.3 M Therms
Electricity Savings	87,713,310 kWh	790,302,277 kWh
Generation Reduction (approx)	10.01 MegaWatts	90.22 MegaWatts
Natural Gas Savings	2.1 M Therms	21.2 M Therms
Energy Related Savings	$9.03 Million	$74.26 Million
Productivity Savings	$0.43 Million	$10.97 Million
Waste & Water Savings	$0.44 Million	$4.82 Million
TOTAL Cost Savings	$9.91Million	$90.04 Million

Table 1. October - December 2017 Assessments (note: Metrics are delayed by one quarter)

LOCATIONS

Plants assessed were located in 32 states (Figure 2). The assessed plants represent a broad range of industries, with food, fabricated metals, transportation, and chemicals being the most common (Table 2).

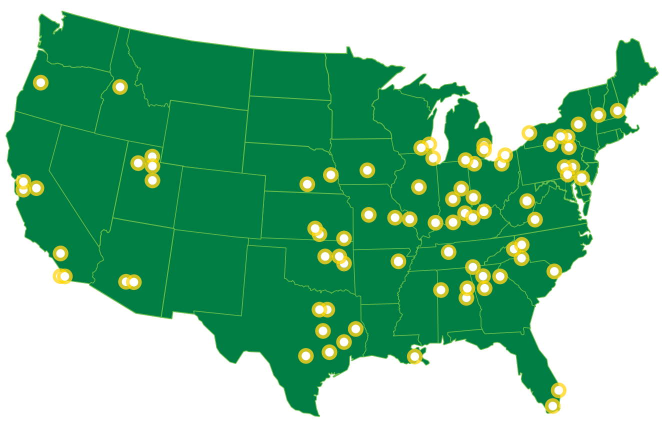

Figure 2. October - December 2017 Assessments

PARTICIPATION

A total of 274 engineering students were active during the quarter in the IAC program across the 28 centers; and nearly one-quarter were new to the program. IACs issued 53 certificates to students for the quarter. To earn a certificate, students must master a set of core skills and participate in at least six assessments.

INDUSTRIES

Industrial Category (NAICS #)	Assessments
Food Manufacturing (311)	14
Fabricated Metal Product Manufacturing (332)	13
Transportation Equipment Manufacturing (336)	9
Chemical Manufacturing (325)	8
Beverage and Tobacco Product Manufacturing (312)	6
Plastics and Rubber Products Manufacturing (326)	5
Wood Product Manufacturing (321)	5
Primary Metal Manufacturing (331)	4
Textile Mills (313)	3
Machinery Manufacturing (333)	2
Printing and Related Support Activities (323)	2
Nonmetallic Mineral Product Manufacturing	2
All Other Manufacturing	7
Others	11

Table 2. October - December 2017 Assessments

More information on the services and results of assessments performed since 1981 can be found in the IAC database located at https://iac.university/#database.