IAC INDUSTRIAL ASSESSMENT CENTERS

A Program of the 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.

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PROGRAM HIGHLIGHTS

SECRETARY GRANHOLM HOSTS ROUNDTABLE HIGHLIGHTING NEW IAC AWARDS

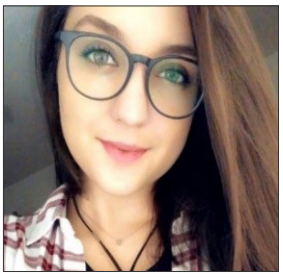
During her second full week at the Department of Energy, Secretary Granholm hosted a roundtable entitled *Strengthening America's Manufacturing and Industrial Workforce* during which she announced a record $52.5 million for IACs that help American manufacturers and wastewater treatment facilities improve their efficiency, save money, and reduce their carbon footprint. These university-based training programs also create a pipeline for students looking to join the growing clean energy economy.

"These programs are proof that big climate investments can help small businesses reduce their emissions and increase their efficiency, while saving them thousands of dollars," said Secretary Granholm. "This new funding is an investment in both the infrastructure and next-generation clean energy workforce we need to tackle the climate emergency and meet President Biden's goal of net-zero carbon emissions by 2050."

As a part of this funding opportunity, DOE is also launching a pilot project to expand IAC engagement with underserved communities. Applicants were encouraged to propose training partnerships with technical programs or community colleges to train and provide continuous learning for students and professionals in conducting assessments of existing small to medium-sized commercial and other buildings – including those located in disadvantaged communities – and to identify and provide on-the-spot efficiency improvements.

Roundtable participants featured a diverse group of professionals who spoke about each of their individual experiences with the IAC program, including:

Hannah Atkins
Technology Engineer, Clearon Corporation
West Virginia



Hannah Atkins graduated from West Virginia University in 2017 with a B.S. in Chemical Engineering where she was a member of the WVU IAC. She joined Clearon Corporation soon after graduation as a production engineer and, after three years, now serves as Technology Engineer. In this role, she is responsible for managing all the plant utilities, which is what led her to re-engage with WVU on energy assessment activities. Hannah spoke about how IAC assessments have helped Clearon improve its energy efficiency improve efficiency in steam, upgrading lighting, cut back on electricity demand usage.

PROGRAM HIGHLIGHTS

Brian DeLuca
Director, New Jersey Clean Energy Program, Commercial & Industrial Programs, TRC Companies
New Jersey

Brian DeLuca is an IAC alum with a background in mechanical engineering and over 15 years of energy efficiency experience. Mr. DeLuca is a program director for TRC Companies where he serves as the lead of the statewide New Jersey Clean Energy Program Commercial & Industrial Programs on behalf of the New Jersey Board of Public Utilities. The role involves managing over $200 million of program funds each year to meet the participation and energy savings program goals.

Brian spoke about how the IAC program frequently serves as a portal to the workforce by offering students insights into how the manufacturing sector works as they learn the fundamentals of engineering. He highlighted that his exposure to different facilities and managers was incredibly helpful as he started his career out of college.

Marco Gonzalez
Corporate Energy Manager, Waupaca Foundry
Wisconsin

Marco Gonzalez is an electrical engineer and certified energy manager. Marco currently serves as the corporate energy manager at Waupaca Foundry, Inc. He is responsible for leading the energy-use reduction efforts to achieve Waupaca's sustainability goals at all facilities. In this role he works directly with the IACs, which have identified approximately $2.5 million in energy savings for Waupaca to-date. Marco spoke to the impact in implementing assessments' low-cost, high-impact options can have for manufacturers' energy efficiency.

In addition, Marco is a board member of the Wisconsin Industrial Energy Group and a co-chair of the Wisconsin Cast Metals Association Energy committee. Over the course of his career, Marco has accumulated over 19 years of experience in the energy sector in utilities and manufacturing companies, with more than 100 energy assessments completed in industrial and manufacturing facilities across the U.S. and internationally.

Dr. Sachin Nimbalkar
Group Leader, Manufacturing Energy Efficiency Research & Analysis Group, Oak Ridge National Laboratory
Tennessee

Dr. Sachin Nimbalkar is the group leader of Oak Ridge National Laboratory's (ORNL) Manufacturing Energy Efficiency Research & Analysis Group. Sachin and his group analyze and disseminate knowledge on energy, water, and material efficiency in the manufacturing sector. During the panel, Sachin highlighted that more than 70% of his team have an IAC background, which helped prepare them for their roles through hands-on experience.

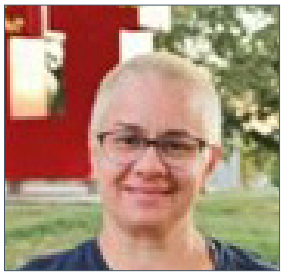
Before joining ORNL, Sachin worked for the Industrial Assessment Center (IAC) field manager at Rutgers University where he reviewed IAC assessment reports, developed technical resources for the IACs, trained the new IAC directors on DOE software tools, and performed energy assessments at manufacturing facilities in New Jersey. Sachin emphasized developing communication skills is among the many benefits of the IAC program, and that students' ability to work with corporate energy managers sets them ahead as they embark on their careers.

Farah Nourin
Graduate Student, University of Wisconsin-Milwaukee IAC team
Wisconsin

Farah Nourin is a graduate student who joined the University of Wisconsin-Milwaukee (UWM) IAC team in 2019. She was one of five students among nearly 500 active IAC students nationally that was selected to receive an IAC Student of the Year award for 2020.

Farah emphasized the value of visiting and learning about the operations of a diverse range of companies as a student. She has performed more than 22 assessments and has frequently served as lead student. Farah has presented summaries of UWM IAC outcomes at numerous conferences and has also led operational training sessions for her IAC colleagues. Lastly, she has published eight journal papers and three conference papers in the field of renewables and energy efficiency, with a particular emphasis on gas turbine blade performance. Farah spoke about how these opportunities for IAC students foster valuable leadership skills.

Dr. Julie Sieving
Co-Director, University of Utah IAC and founding member, IAC Women for Energy Efficiency (WE2) initiative
Utah



Dr. Julie Sieving is Co-Director of the University of Utah IAC. Julie spoke about how IACs often serve as an engine for a university, driving current and market-connected research around clean energy and efficiency. She also highlighted how partnerships with local employers create opportunity for student jobs.

As a founding member of the IAC's Women for Energy Efficiency (WE2) initiative, Julie emphasized the importance of diversity, which is reflected in this year's solicitation:

> "A diverse workforce is a better workforce. Engineering, by design, is a profession about critical thinking at its core. The more perspectives we bring, the better that critical thinking will be."

Prior to her current position, Julie was a business owner, contributing over 15 years of growth to a nationally recognized, impact-driven sustainability and energy engineering firm. Julie has a mechanical engineering degree from Colorado State University, where she was also an IAC undergraduate team member and a co-opportunity engineer at DOE's Golden Field Office located at the National Renewable Energy Laboratory.

To view a recording of the event, visit DOE's YouTube channel: bit.ly/3bPCK3F

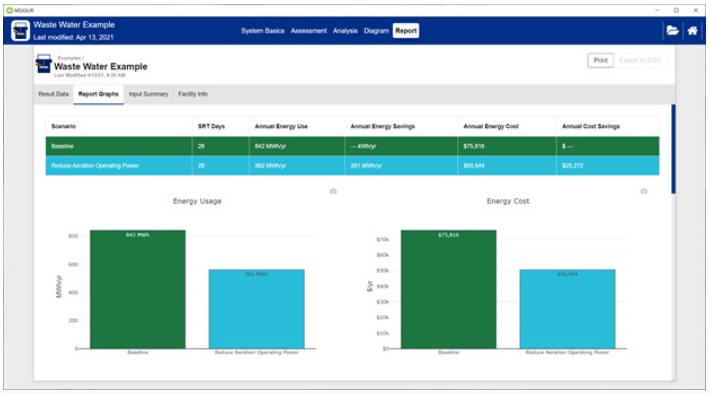
DOE LAUNCHES NEW WASTEWATER TREATMENT TOOL

MEASUR

MEASUR's new IAC-based wastewater module can be used to simulate, analyze, and optimize activated sludge processes in wastewater treatment facilities. This module can help users make process decisions for optimizing their activated sludge process, achieving energy savings via better aeration system control, and improving effluent quality (especially effluent total nitrogen reduction).

Like the other MEASUR modules, users can evaluate their process at current conditions and develop and evaluate alternative scenarios such as alternate process design conditions, the use of alternative or turning off aeration equipment, reducing dissolved oxygen (DO) concentration in the reactor, changing influent loadings, and more. Using basic process data and equipment information, MEASUR's wastewater treatment module can help users determine:

- The oxygen requirements of the biological process
- The oxygen supplied by aeration equipment
- The quantity and cost of energy consumed by the aeration equipment
- The impact of using alternate operating strategies or systems on meeting the biological demands more efficiently
- The impact of alternate scenarios on system energy use and cost



MEASUR Wastewater module results screen

This module is based on the Bio-Tiger Model developed by Dr. Larry Moore, Director of the IAC satellite center at the University of Memphis, and is derived from the biokinetic equations found in Wastewater Engineering Treatment and Reuse (4th edition, 2003) by Metcalf & Eddy.

MEASUR is accessible in an open-source environment and can be downloaded from the DOE site. Visit https://www.energy.gov/eere/amo/measur for more.

CENTER HIGHLIGHTS

UNIVERSITY OF UTAH CONDUCTS ASSESSMENT WITH FIRST ALL-FEMALE, STEM-UNDERREPRESENTED TEAM

In 2021, the University of Utah created the first all-female, STEM-underrepresented assessment team, with six female students, one female alumni, and one female professor from multidisciplinary and diverse backgrounds.

The design of the assessment team was deliberate, purposefully spearheaded by the IAC's Co-Director Julie Sieving and Brooke Yardley. Across IACs nationally, there are few opportunities to have a STEM-Underrepresented

assessment team, whether because of the number of students participating in a university's IAC program, or because of the limited number of female engineering students. Today, women earn about 20 percent of national engineering degrees.1 But the University of Utah's program has multiple female students they can bring together for an assessment.

The team performed an assessment for Autoliv, an automotive safety company that designs and manufactures airbags, seatbelts, and electronic systems. The company requested an assessment on their location in Brigham City, Utah after a successful assessment of their Trementon site. Brandon Bauer, the Autoliv Technical Support Manager, was extremely impressed with the assessment team and their expertise. "I think overall they were both very good. If anything, the Brigham City one was slightly more detailed and thorough, but again, they were both fantastic."

The assessment team identified six assessment recommendations with four additional considerations resulting in an estimated $170,000 in electricity and natural gas savings with an average payback period of less than three years. Recommendations ranged from using vacuum generators to installing variable-frequency drives to designating a corporate energy manager.

Led by Brooke Yardley, the team included Yunzhi Chen, Anne Dougherty, Abby Hall, Moriah Henning, Tess Jorgensen, and Sai Pandit. Each team member came to the IAC with unique experiences and goals. One student recently returned to school after years in the energy industry, another wanted to understand the real-world application of the theory in her PhD, and another wanted to understand how her engineering degree could be used to advance sustainability. Collectively, this team represented an array of educational backgrounds, work experiences, and cultures.

Despite the high number of female students in their program, this assessment would not have happened organically. Jorgensen and Pandit were already assigned to other assessments and agreed to double their workload to make this historic team happen. Given classwork obligations, availability, and ongoing assessments, the team commented that this structure would likely not have occurred without this extra commitment.

When asked about their perspective about being the first STEM-underrepresented team, the students voiced a range of perspectives. Chen, a self-proclaimed women's rights advocate, said "I'm really proud and I think it's a really good thing to have an all-women team. I hope women can stand up and be leaders, to show that women can do a very good job," an opportunity she found to be rare in her homeland of China. Doughtery agreed, "I was really excited to be a part of this all-female group, this is something I have not seen before. This is an opportunity for us to demonstrate that women belong in STEM and that we're highly capable."

Pandit was surprised by the emphasis on women, as she always felt included and supported in her pursuit of science and math by her family and peers - "I don't feel like I need any help to feel like I belong, I'm here and I do my work, so I belong."

For Jorgensen and Yardley, they want the focus to remain on the quality of work but also recognize the value of women in engineering. Yardley clarified, "I think our report was just as solid, exact, and precise as any others...But there is something to be said about having enough females in our IAC, and being able to train them and help them to reach the quality where we can have a perfectly fine, good quality report, just with all females." Jorgensen said, "We should highlight that women are in STEM without acting like it's a unique thing."

For recent alumni, Henning, she observed the stark contrast between this assessment and her workplace. "It was just cool to get to come back and do an all-female assessment because going into the workplace, you're mostly working with men. And I understand the hesitancy, of wanting to be recognized for the quality of your work outside of gender. But being able to acknowledge that we have awesome women who are doing great work is cool, too."

Undoubtedly, this assessment team produced a compelling, detailed, and thorough report, and they happened to all be women. In addition to appreciating the value of women-led and STEM-underrepresented teams, it is critical to note that diversity is defined and occurs in all sorts of ways. While this case study largely focuses on one dimension of this team's diversity, that does not ignore all the other facets of diversity these women bring to the table.

For more information, please contact Julie Sieving at julie.sieving@utah.edu. ■

CLIENT TESTIMONIALS

Tennessee Tech University

"It was a pleasure working with the students during the inspection. Their interest and energy were most appreciated. I have hope for the next generation of Tech engineers."

– **Don Haynes, Environmental Manager, Florim USA**

Texas A&M University

"Very helpful and informative evaluation of our operations. Looking forward to the final report and recommendations. Overall, it was a good experience."

– **Jim Adams, Control Flow**

IAC Program Quarterly Results

Between October and December of 2020, IACs conducted 82 assessments (Table 1). This represents the first full quarter for which assessment activities returned to levels that approached those commonly experienced prior to the COVID-19 pandemic. During these assessments, IACs made 563 recommendations that identified nearly $13.8 million in potential cost savings.

IDENTIFIED SAVINGS

Total Assessments	82	
Total Recommendations	563	
	Total Recommended Annual Savings	**YTD**
Energy Savings	14.9 M Therms	14.9 M Therms
Electricity Savings	128,581,978 kWh	128,581,978 kWh
Generation Reduction (approx.)	14.68 MW	14.68 MW
Natural Gas Savings	0.4 M Therms	0.4 M Therms
CO_2 Reduction	0.1 tons	0.1 tons
TOTAL Cost Savings	$13.78 million	$13.78 million
- Energy Related Savings	$11.70 million	$11.70 million
- Productivity Savings	$1.71 million	$1.71 million
- Waste & Water Savings	$0.38 million	$0.38 million

Table 1. October – December 2020

LOCATIONS

Plants assessed were located in 26 states (Figure 1). The assessed plants represent a broad range of industries, fabricated metals, transportation equipment, plastics and rubber products and machinery manufacturing being the most common (Table 2).

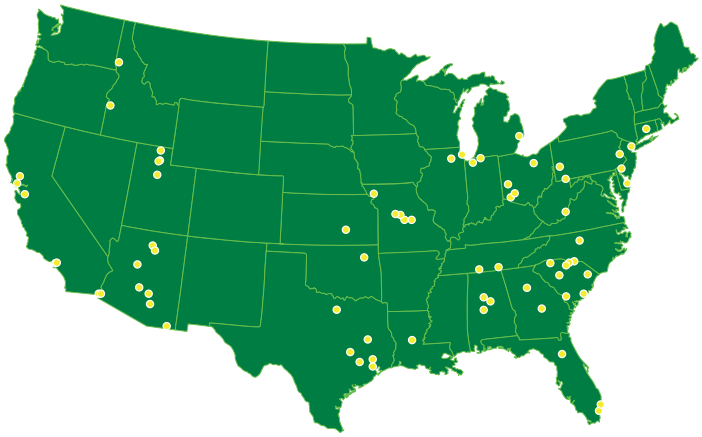


Figure 1. IAC Assessments Nationwide, October – December 2020

INDUSTRIES

Industrial Category (NAICS #)	Assessments
Fabricated Metal Product Manufacturing (332)	9
Transportation Equipment Manufacturing (336)	9
Plastics and Rubber Products Manufacturing (326)	8
Machinery Manufacturing (333)	7
Food Manufacturing (311)	6
Chemical Manufacturing (325)	5
Electrical Equipment, Appliance & Component Manufacturing (335)	5
Beverage and Tobacco Product Manufacturing (312)	4
Nonmetallic Mineral Product Manufacturing (327)	4
Computer and Electronic Manufacturing (334)	2
Primary Metal Manufacturing (331)	2
Paper Manufacturing (322)	2
Apparel Manufacturing (315)	2
All Other Manufacturing	3
Others	14

Table 2. October – December 2020 Assessments by NAICS Industrial Category

A total of 246 engineering students were active during the quarter in the IAC program across the 31 centers; and more than one-fourth of these were new to the program.

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

For more information contact:
John Smegal
Advanced Manufacturing Office
U.S. Department of Energy
(202) 287-6225
john.smegal@ee.doe.gov

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