INDUSTRIAL ASSESSMENT CENTERS

Student and Alumni Newsletter

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Energy Awareness—No Longer Politics as Usual

Amidst this past year's economic downturn, there has been a monumental uprising in energy awareness.

Proposed energy and climate legislation and green workforce development have become hot topics in Washington. Granted, healthcare reform and wartime policies are grabbing the headlines; however, energy and climate reform are rapidly gaining strength—a hopeful sign that we are nearing a long-awaited political landscape in which energy issues are no longer swept under the rug. Nearly every presidential speech related to energy is laced with the need to develop a green workforce. Really? "Mr. President, the IACs are here to help!" Although the President has signed off on Executive Order 13514, which mandates consumption and emissions requirements for federal facilities, meaningful energy and climate legislation still has a long way to go. Regardless, all this commotion looks like a positive sign for those concerned about the environment and interested in working in any energy-related field.

Unfortunately, the attention energy issues have been receiving in Washington hasn't yet translated into great news for the IACs. Despite largely underfunded budgets, practically all centers continue to provide exceptionally high levels of service and expertise to the industries that need it most. During this long funding drought, many centers have found creative funding sources including partnerships with states, utilities, and manufacturing programs. And even in today's harsh job market, the IACs are still producing and placing the most highly sought after engineering students.

This newsletter features articles from alumni, students, and energy efficiency organizations on international assessments, interesting work being performed at the centers, current technologies, and an international ESCO market. And due to the continued high demand for IAC graduates, there is a section highlighting organizations that actively recruit our graduates.

This is only my first newsletter; but I look forward to years of continued involvement with the IAC program. I encourage you to keep in touch with Michaela and me. Your stories and successes validate the importance of the IAC program. With all the energy buzz in Washington, it's only a matter of time before the political machine takes notice of the IACs' successes!

Thomas Wenning
IAC Student Activities Coordinator
R&D Staff, Oak Ridge National Laboratory
wenningtj@ornl.gov

Editor's Note: *Thomas Wenning, UD IAC alumnus, is taking over IAC student activities for Michaela Martin, who has accepted a program management role at ORNL but will remain with the IAC in an advisory capacity.*

Join Our IAC LinkedIn Group!

An IAC group has been established within the LinkedIn professional networking website to promote and develop a network of IAC students and alumni. As of December 2008, the group has 140 members. Please take advantage of this network to share ideas and identify and pursue new opportunities. Joining the IAC Student and Alumni LinkedIn group is by invitation only. Interested? Please contact Thomas Wenning at wenningtj@ornl.gov or Susie Allen at allensc@ornl.gov.

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IAC Alumni's New Engineering Firm Offers a Unique Service

Nathan Block, Alumnus, NCSU
Joe Sinodis, Alumnus, NCSU
Co-Founders, Red Wolf Associates
nathan.block@redwolfassociates.com
joe.sinodis@redwolfassociates.com

Red Wolf Associates (RWA) provides engineering services and analysis solutions for energy engineering projects, facility managers, ESCOs, and others. Founded in 2008 by NC State University IAC Alumni Joe Sinodis and Nathan Block, the mission of RWA is to provide value-added solutions for its customers efficiently and with integrity. In addition to providing typical energy auditing services for industrial, commercial, and governmental facilities, RWA offers a unique service that sets it apart from other ESCOs and consultants—RWA personnel have specialized backgrounds in energy auditing *and* thermal-hydraulic analysis. They became experts at a unique computer code, GOTHIC, while performing analyses for the commercial power industry.

GOTHIC is a general purpose thermal hydraulics program that has been developed and maintained by the Electric Power Research Institute (EPRI) for more than 25 years. Unlike many of the tools available to energy engineers, GOTHIC's solution algorithms are based on thermodynamic first principles and basic conservation equations, not best-fit curves and crude correlations. This makes the program extremely flexible for modeling a wide spectrum of thermal-fluid situations from full building HVAC analyses to air bubble propagation and water hammer phenomena in piping systems. GOTHIC is capable of modeling all three phases of matter (solid, liquid, and gaseous) encountered in typical engineering applications. In addition, it includes capabilities for modeling many engineering components including fans, pumps, valves, heat exchangers, boilers, condensers, spray nozzles, piping and HVAC networks, and thermal storage media, to name a few. It also models heat transfer between surfaces and fluids due to conduction, convection, radiation, condensation, and boiling.

RWA is pioneering the use of GOTHIC in the energy engineering industry. The company has used GOTHIC to assess the feasibility of a ventilation exhaust system modification to reduce energy consumption at an industrial equipment manufacturing facility. The ventilation system was required to maintain welding waste gases below regulatory limits but was not operating efficiently. RWA used GOTHIC to verify that reduced ventilation flow rates could be achieved without significantly impacting the air quality at the facility and optimized the design of the new ventilation system, yielding a significant cost savings with a short payback period.

Another project aimed to optimize the efficiency of a glycol run-around energy recovery system installed at a large federal facility. A number of factors affected the system's efficiency, including the glycol pump flow rate, fan flow rates, and outside and building temperature. No commissioning or verification of the original system had been completed to ensure energy savings were being maximized. RWA modeled the system and performed a parametric study to determine optimal control set points for the system. The optimized control system increased system efficiency significantly with no capital expenditure and minimal upfront expense to the client.

Mr. Block and Mr. Sinodis both served as Lead Students in the NC State IAC, and both graduated with an M.S. in Mechanical Engineering in 2005 and 2001, respectively. Together, they have participated in more than 45 IAC audits while at the NC State IAC under the direction of Drs. Jim Leach, Herb Eckerlin, and Steve Terry.

For more information about RWA, please visit the company website at www.redwolfassociates.com. Detailed case studies of the projects discussed above are available upon request.

University of Florida IAC Team Visits Chile

Cinthia Perez, IAC Lead Student, UF
Dr. Cristian Cardenas, IAC Assistant Director, UF
ccperez@ufl.edu

The Department of Industrial and Systems Engineering (ISE) at the University of Florida (UF) organizes an International Industrial Energy Management Consulting course for undergraduate and graduate students every year and as Summer C course. Open for only 12 students in the UF College of Engineering, the course has been taught for the past six years by Dr. Cristian Cardenas, a UF-ISE faculty member and the UF IAC Technical Manager.

From left to right: F. Chavez, C. Perez, J. Amaya, B. Lopez, D. Grimmer, S. Burnup, S. Reich, A. Bihan, W. Rosario, K. Vallar and F. Sarmiento. In the front: Dr. C. Cardenas and K. Pocater.

The course is structured to mimic an energy engineering consulting office performing energy audits with global scope. This year, two UF-IAC students participated in the trip: Cinthia Perez (currently a Team Leader) and Freddy Sarmiento, UF-ISE students. Both did an outstanding job of leading and mentoring their less experienced classmates.

The team in the library of the Baron de Rothschild's Los Vascos estate's French decorated guest house.

The course started with a visit to the coastal cities of Valparaiso and Viña del Mar where students attended a seminar on current energy issues hosted by The Chilean College of Professional Engineers at Universidad de Viña del Mar. Several team members presented select topics, including state-of-the-art energy research.

The next stop was Viña Los Vascos, a vineyard owned by the Baron of Rothschild, a successful French banker. Here the team performed the first of two energy audits, analyzing all production aspects ranging from the main facility to the pumping stations throughout the vineyard. After touring the facilities and understanding all involved processes and problem areas, focus groups were formed to gather and analyze data and specific activities that the company wanted to improve.

The team's hard work was rewarded with delicious food, wine, great hospitality, and lodging in the Chilean countryside at the French-decorated guest house on the beautiful estate. At the end of the three day visit, the team made a presentation highlighting the resulting recommendations.

The team visiting El Chiflón del Diablo (*The Venting of the Devil*), an old coal mine.

The next stop was the southern city of Concepción, where the team visited various cultural centers, plus El Chiflón del Diablo (The Venting of the Devil), the world's only naturally ventilated coal mine, as well as the only one to go so deep under the ocean (45 km) via land-based entry points.

The team's second energy audit took place at Norske Skog, a Norwegian-owned paper mill. Team members used learned concepts and principles and applied knowledge from UF courses such as Industrial Energy Management. After the various plant presentations and tours, they split into groups and gathered the necessary information to evaluate the processes and propose some energy conservation recommendations.

During the Norske Skog audit, another academic session was held at the Universidad del Bio Bio to promote the UF in Chile program. Several team members presented topics relative to energy efficiency.

One participating student, Andre Bihan Thomas, commented that studying abroad "…helped us to broaden our horizons on culture, learn about the energy industry, and apply classroom learned skills to the real world…this kind of program should be promoted…let students know that there are some possibilities to get a plus in their education as engineers. It is time to move beyond theoretical concepts…in the classroom towards the real engineering world under the guidance of experts like Dr. Cardenas and the support of the industry."

From our perspective, six years of this unique "study abroad" program have proven that the teams gain invaluable experience and confidence through their hard work. This group, like the others before it, was well prepared for the energy audits, the seminar presentations, and the discussions with local faculty, students, and plant engineers. They worked as a team of professional engineers doing consulting abroad. I received extremely good comments from colleagues in Chile on the exemplary performance and behavior of our students. They were certainly great ambassadors of the University of Florida and the United States.

The team with faculty from Universidad del Bio-Bio brainstorming at Norske Skog.

Finally, we want to express our sincere gratitude to Mr. Jim and Mrs. Tammy Pope for their generous contribution to help reduce the trip cost; to Prof. Reinaldo Sanchez from Universidad del Bio-Bio; to Dr. Joseph Harman, Professor and Chair of UF-ISE; and to Dr. Angela Lindner, Associate Dean for Students Affairs, UF College of Engineering.

Variable Exhaust for Vintage High-Rise Residential Buildings

Matthew D. Swanson, Alumnus, UIC
Brian M. Malone, Alumnus, UIC
matt.swanson@elaraengineering.com
brian.malone@elaraengineering.com

One of the largest energy consumers in high rise residential buildings is the ventilation system. Up to 50% of the common building energy consumption can be attributed to the ventilation system. (The common building energy consumption excludes the separately metered individual residences). The three major components of a typical ventilation system in a high-rise residential building are the bathroom exhaust, the kitchen exhaust, and the makeup air systems. In most cases, the air is distributed to or collected from the residences by a series of duct risers terminating to a fan or makeup air handler.

Any energy evaluation of a ventilation system must consider the local building codes, which influence its size and design. For example, the city of Chicago currently requires that each residential kitchen and bathroom have 1.5 cfm/ft^2 of mechanical exhaust of which 100% must be made up with outdoor air from a mechanical system. In earlier versions of the code, it was not required to makeup all the exhaust air with conditioned outdoor air. As a result, most ventilation systems were designed with negative imbalances. In most cases, less than 70% of the exhaust is made-up by a mechanical system. Negative imbalance increases potential for damage to the façade and results in high levels of infiltration (drafty windows). Additionally, most ventilation systems use constant volume exhaust in an effort to control indoor air quality. Constant volume exhaust systems can improve indoor air quality except when used with negative imbalances where unfiltered outdoor air infiltrates the building.

Each cubic foot per minute of outdoor air costs approximately $3.00/yr (Chicago's average) to condition and supply. In light of this and the recent focus on energy efficiency, variable exhaust systems in newly constructed high-rise residential buildings have become standard practice. Converting constant exhaust to variable exhaust in vintage high-rise residential buildings is highly recommended.

The typical approach to variable exhaust involves installing automated dampers in each exhaust duct branch and variable frequency drives (VFDs) on all ventilation system fans. The dampers are then typically interlocked with the light switch. However, this approach has many complications. Retrofitting dampers into ductwork requires modification to aesthetic features and electrical power wiring within residences, which causes inconvenience to tenants and increased cost to implement. In most cases, this option is not feasible. A practical alternative is a product developed in Europe that uses a battery operated damper actuator in combination with an infrared occupancy sensor. Although most installations require a sheet metal adapter that replaces the existing exhaust grille(s), the extraction unit does not require power wiring or modification of aesthetic features and is simple to install.

Aereco extraction unit.

By exhausting air from the occupied kitchens and bathrooms, the system can take advantage of non-occupied periods to reduce the overall energy usage without compromising indoor air quality. Based on implementations in Chicago high rise residential buildings, average exhaust rates are reduced by 50% and common building energy consumption is reduced by up to 30% with payback periods of less than three years.

Surprises from the UK ESCO Market

Adam Knapp, P.E., C.E.M., Alumnus, Syracuse University
adam.knapp@oba.co.uk

When I moved to England last year to complete my MBA, I was given the opportunity to explore the differences between the U.S. and U.K. markets for ESCOs. While I found many differences, the most surprising were their relative sizes, the expectations of their customers, and their respective regulatory environments.

Regarding the U.K. market's relative size: In 2007, the European Union estimated the total revenue of the U.K. ESCO market to be $1,215 million or 0.44% of GDP despite having a population that is only 1/5 the size of the U.S. population. Further comparison showed that in 2006 the National Association of Energy Service Companies estimated total U.S. market revenue at $3,500 million or 0.27% of GDP. Much to my surprise, these numbers suggest that the normalized U.K. market is approximately 60% larger than the U.S. market. Not bad for an island the size of Michigan.

My next surprise was the market itself. Discussions with a host of stakeholders suggest that the U.K. market is different in subtle but important ways. For example:

- While people are familiar with the term ESCO, they interpret it differently. In particular, many individuals apply the term solely to third-party owned and operated district heating and cooling plants.
- A greater acceptance of thermal discomfort and more modest design temperatures mean that buildings have lower capacity HVAC systems. While this may result in fewer energy conservation opportunities of magnitude, the economics of these opportunities may be balanced by the higher cost of energy in the United Kingdom.
- The players in the market are different. In the United States, major equipment providers dominate the ESCO market, while in the United Kingdom, independent, medium-sized players hold a larger percentage of the market.
- Before arriving in England, I knew that the United Kingdom held a greater sense of environmental awareness. Nonetheless, I was still surprised to see how this awareness manifested itself into legislation. Here are a few examples of legislation that incentivizes the U.K. ESCO market differently.
- The European Union implemented the 20/20/20 target in an attempt to reduce carbon emissions and energy consumption by 20% while simultaneously increasing the percentage of renewable generation to 20% by 2020. A carbon trading market has also been implemented to support this target.
- A "name and shame" style law, titled the Energy Performance Building Directive, requires all public buildings to display a standardized energy rating certificate. This certificate assigns a comparative energy rating to the building and creates social pressure for buildings to become more efficient.
- Rather than relying on a collection of distributed and disjointed energy offices, practical assistance with building energy efficiency is provided by The Carbon Trust, a national government-supported non-profit agency. In addition to providing funding for energy audits, The Carbon Trust also provides interest-free financing for energy improvement projects.

In conclusion, while the U.K. ESCO market bears many resemblances to the U.S. market, it is also very different in both subtle and direct ways. The normalized market is larger in the United Kingdom; interpretations and expectations are also different. Finally, legislation has shaped the U.K. ESCO market very differently by creating distinct incentives.

Save Energy Now LEADER Program

Lindsay Bixby, BCS Incorporated
LBixby@bcs-hq.com

Under Section 106 of the Energy Policy Act of 2005, the Industrial Technologies Program (ITP) of the U.S. Department of Energy (DOE) was given the directive to reduce industrial energy intensity by 25% over the next 10 years. ITP recognized that the most effective way to achieve this goal is through strategic partnerships. Industrial manufacturers now have the opportunity to partner with ITP to reach this goal through the *Save Energy Now* LEADER initiative.

How companies can help

The first step to becoming a *Save Energy Now* LEADER Company is to review ITP informational materials that address the requirements of participating in the program and that list the benefits a company will receive. After deciding that participation is a good fit, a company will then sign the voluntary pledge, which commits their company or plant to reducing its energy intensity by 25% or more over the next 10 years (2.5% annually). The next step in the process is for the company to establish an energy-intensity baseline. This baseline will be used to determine a company's annual intensity reduction.

Georgia Institute of Technology and Rutgers, The State University of New Jersey

Participating in an IAC energy assessment is integral to becoming a *Save Energy Now* LEADER Company. As part of an Integrator Team, the Georgia Institute of Technology IAC will help establish baselines. Rutgers will help perform follow-up to determine how the *Save Energy Now* LEADER Companies are progressing to reach their 25% reduction goals.

Each LEADER Company will designate an energy leader or manager who will work with ITP and one of the two *Save Energy Now* Integrator Teams—Oak Ridge National Laboratory or Project Performance Corporation—to develop an energy-management plan. The plan may involve conducting a cost-benefit analysis; participating in an energy assessment to identify opportunities to save energy and money and improve the efficiency of plant processes; and identifying and providing technical assistance to implement projects or technologies that will improve efficiency. Also, each company will be required to report energy consumption, savings, and reductions in energy intensity each year.

Companies that sign the pledge are encouraged to use the *Save Energy Now* LEADER logo on their company materials, including press releases, media alerts, and web sites.

How ITP will help companies achieve their goals

ITP will help each company that signs the pledge reach its 25% reduction goal. For example, *Save Energy Now* LEADER Companies receive priority access to ITP tools and resources. These resources can also be used to encourage companies' supply chains to consider participating in the program as well. ITP will

- Provide personalized technical assistance to help develop a company's energy-intensity baseline; required documents; and no-cost energy assessments.
- Identify financial resources outside of DOE that can help mitigate costs for the implementation of energy efficiency projects and/or technologies.
- Offer workshops, education, and training on a variety of topics, including energy management, energy-analysis tools, financing energy efficiency projects, and energy efficiency equipment.
- Provide companies with national recognition for pledge participation and additional recognition for validated energy savings.

Current Save Energy Now LEADER companies

In September 2009, the Save Energy Now LEADER program officially commenced during the Mid-west Industrial Energy Efficiency Alliance in Detroit, Michigan. At that time, the following companies had pledged to participate in the program, committing to voluntarily reduce their energy intensity 2.5% annually through 2019.

- 3M
- Briggs & Stratton
- Didion Milling
- The Dow Chemical Company
- Flambeau River Papers
- Manitowoc Grey Iron Foundry
- Owens Corning
- Quad/Graphics, Incorporated
- Thilmany Papers
- ThyssenKrupp Waupaca

A formal signing event is scheduled for December 2, 2009, at the U.S. Capitol Visitors Center in Washington, D.C. At that time, 32 companies from around the United States will officially sign the pledge. (Some companies are re-signing at the December event on behalf of their company instead of a specific plant.)

- 3M
- AT&T
- BPM, Inc.
- Bridgestone
- Briggs & Stratton
- Cummins Diesel
- Danfoss

- Didion Milling
- Dow
- Flambeau River Papers
- Honeywell
- Ingersoll Rand/TRANE
- JR Simplot
- Kenworth Truck Company – Renton
- Manitowoc Grey Iron Foundry
- Mohawk Industries
- Neenah Foundry
- Nissan North America
- Osram Sylvania
- Owens Corning
- PPG Industries
- Quad/Graphics, Inc.
- Schneider Electric
- Serious Materials
- Shaw Industries
- Sherwin-Williams, Richmond
- Spirax Sarco Inc.
- Thilmany Papers
- ThyssenKrupp Waupaca
- United Technologies Corporation
- Verso Paper Corp.
- Volvo Trucks, Inc.

Save Energy Now ALLY organizations

Even if a company is not an industrial manufacturer, it can still partner with ITP. Organizations, including industry associations, states, utilities, utility associations, suppliers, universities, nonprofits, and private consultants can help ITP reduce industrial energy intensity through the *Save Energy Now* ALLY program. Participation in this program will also increase an organization's recognition as an energy efficiency pioneer.

As an ALLY Organization, an association will have the opportunity to help its customers, stakeholders, or members lower their energy intensity and related greenhouse gas emissions. ALLY organizations can do this through disseminating ITP tools and resources to these groups, co-branding documents and materials with the *Save Energy Now* ALLY logo, and hosting workshops and trainings. ALLY organizations are also encouraged to promote the program and its resources at various events, including conferences, trade shows, and forums.

For more information on becoming a *Save Energy Now* LEADER or ALLY, please visit http://www1.eere.energy.gov/industry/saveenergynow/

SDSU-IAC Alumna Joins CEC's Energy Team

Akasha Kaur Khalsa, Alumna, San Diego State University
aKhalsa@energy.state.ca.us

As of October 8, 2009, the California Energy Commission (CEC) had opportunities for 15 experienced engineers. This is a tremendous opportunity for those interested in a rewarding energy career to give back to the community. The CEC's entry process does require some steps above and beyond what most private employers require, but the fulfillment offered by these Energy Analyst and Energy Engineer positions is well worth the extra effort.

To be considered for the CEC, you must score well on the required state examination. This exam is usually administered on the third Saturday of every other month in Sacramento. The exam date is not advertised until 5 days before the exam, unless you are politely persistent and convincing. After missing a previous opportunity to take the exam because I did not have enough notice, this past June I was able to fly to Sacramento for the day, 530 miles from San Diego State University, and sit for the test.

To prepare for the exam, I studied the Engineer-In-Training material but found that, in reality, statistics and ethics were more prevalent themes. The exam is half essay and contains a section of math that should not prove too challenging for an IAC student. If you pass, the State will send you notice announcements of openings. You must apply immediately to these notices by return mail or they drop you from the eligible list. You can view the CEC examination announcement at http://www.energy.ca.gov/careers/exams/2009-08-28_Energy_Analyst_Exam.pdf

If you are hired, the CEC offers a new grad almost $3,000 a month for the first year as an Energy Analyst. Then it is possible to move up to an engineering position. All positions offer work in the state capital.

Before joining the CEC, I worked at the IAC at San Diego State University for a year and a half and participated in a dozen energy audits. Those audits helped me develop the skills needed to be successful in my present position. At the CEC, I also do energy audits, as well as review those submitted. In addition to my audit work, I have had an abundance of training. Currently, I am helping to

distribute federal stimulus money to small cities and counties for energy efficiency in public works.

For more information on the very worthy work being done at the CEC, go to www.energy.ca.gov.

University of Illinois at Chicago Involved with O'Hare Modernization Program

Jim Gibson, UIC
jgibso7@uic.edu

This past summer Jim Gibson worked with Primera Engineering on the O'Hare Modernization Program. O'Hare International Airport is one of the busiest airports in the world with nearly 70 million people passing through each year. With the continued growth in the number of flights landing at O'Hare every year, the need for making a more modern airport capable of sustaining an increase in the amount of air traffic became a necessity. That is why the City of Chicago approved a six billion dollar plan to increase O'Hare's capacity by nearly 60%. The O'Hare Modernization Program is one of the largest programs in the city's history, and completion of the project is essential to the growth of Chicago.

During his summer internship, Jim performed various tasks to assist engineers from various firms including Bowman Barrett & Associates, CH2M Hill, and Primera Engineering. At any given time, there are a massive number of construction projects going on at O'Hare. Diverse in size and type, management of these projects is very difficult due to the scope of the entire program.

Because of the projects' rapid pace, Jim's tasks varied from day to day. One of the major tasks Jim completed was updating CADD files used to note where essential utility lines are located on the airfield. This was important because of the continuation of projects in those areas involving the installation of new utilities necessary to the expansion project. Taking the massive size of the airfield into consideration, it was necessary to provide information on the location, type, size, and other important information on the utilities in the ground. The CADD files were updated constantly since new lines being installed every day had to be represented.

In addition to the CADD work, Jim was also involved in the editing and printing of several construction documents. Every project on the airfield is detailed in one of these documents, which detail every aspect of each project and include items such as notes, maps, and construction plans. These too are constantly being revised as the situation on the field changes.

Near the end of his internship, Jim created an electronic database for organizing and storing computer files imperative to the modernization program. A centralized place to store all of these files was appropriate to aid in the design, construction, and continuation of projects in Phase II, and now it will be easier to track down relevant information about these projects. Thousands of files that the engineers used daily were stored in this database.

Jim was also able to visit several construction sites on the field, as well as learn about and test different types of concrete used in the construction of runways, taxiways, and other surfaces. Samples from recently constructed portions of runways, taxiways, and other areas were retrieved using boring techniques. These samples were then tested to ensure quality and strength. This quality control process occurs for every completed project on the airfield. The O'Hare Modernization Project is slated to be completed in 2014.

UIC Participates in The Midwest States *Save Energy Now Partnership Program*

Dylan Matthews, UIC
dmatth5@uic.edu

The University of Illinois at Chicago's (UIC's) IAC is teaming with DOE's Industrial Technology Program to enhance awareness of energy conservation across all industries in the Midwest. Officially called "The Midwest States *Save Energy Now* Partnership Program," this program will focus on expanding energy conservation strategies in Ohio, Illinois, Indiana, Iowa, and Minnesota, with a possibility to expand to Michigan, Wisconsin and Missouri. The main objective for this project is to increase the number of DOE's assessments through the program called *Save Energy Now* (SEN), which is a national initiative set to lower energy usage among industrial companies by 25%.

Currently, UIC's IAC branch is tracking the progress of implementation of DOE recommendations by contacting the plants three times over the course of two years. Information such as status of the implementation project, actual cost, and actual savings are recorded, which goes toward quantifying the success rate of recommendations and the overall mission of reducing energy by 25%. The feedback obtained thus far has been so successful in

proving the effectiveness of the SEN program that the government wants to continue to expand the program's reach.

The plan is to build a coalition of cooperating industrial associations and companies to champion the message of saving energy. UIC's IAC will compile a list of viable industrial associations, utilities, engineering firms, and industrial companies within the Midwest that are willing to participate in SEN and become involved in best practices, assessment protocols, and data collection techniques. Once the coalition is built, IAC will take the next step—designing a website catered to businesses in the Midwest. The website that will meet two distinct needs. First, it will be a central communications hub for updates on newly offered training, newsletters, and progress reports, among other things, for all the members of the coalition. These members will find the website an easily accessible forum to express new ideas or gather other resources made available. Second, it will attract new clients. The website will describe what SEN is, what it can do for a typical business, and who to contact if interested. It will also contain several briefings on new, applicable technologies that impact energy conservation, like geothermal heating and cogeneration.

Over the course of the upcoming year, UIC's IAC will work as a subcontractor in support of the Energy Resources Center in Chicago, IL. Through a sizeable grant from the government, these groups will work toward boosting the SEN's outreach. The requirements of the tasks at hand require a blend of marketing, promoting, and engineering to meet the goals set. Eventually, DOE sees this program becoming self-sustaining among its members with little assistance from the government. The UIC IAC is proud to have been chosen to help.

The University of Dayton Industrial Assessment Center: Columbus E3 and Beyond

Steve Mulqueen, University of Dayton
steve_mulqueen@hotmail.com

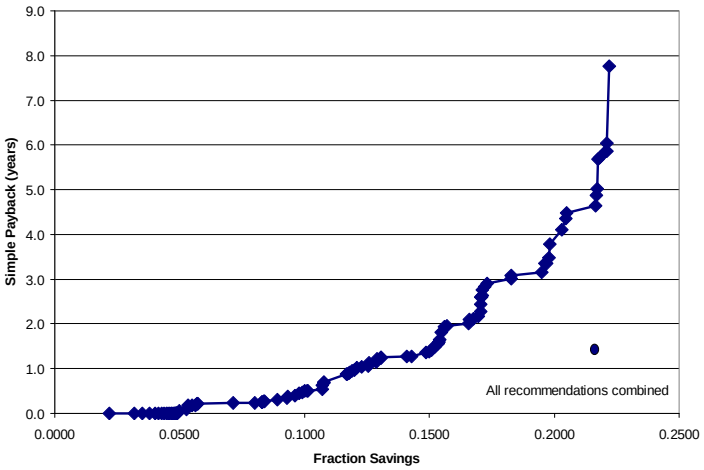
The University of Dayton IAC continues to attract and produce qualified energy engineers eager to provide innovative solutions for a sustainable energy future. In summer 2009, former Lead Student Tom Wenning began employment with Oak Ridge National Laboratory in Oak Ridge, TN, and current Lead Student Steve Mulqueen has accepted employment with Cascade Energy Engineers in Portland, OR. Andrew Chiasson, PhD., PE, and Franc Sever joined the UD-IAC in fall of 2009. Andrew, an assistant professor in the Department of Mechanical and Aerospace Engineering, brings world-class expertise in geothermal systems and ground source heat pump systems to the UD-IAC. Franc, a LEED accredited professional and 2005 Dayton graduate in Mechanical Engineering, brings several years of building energy simulation and HVAC design experience to the UD-IAC.

Throughout the summer of 2009, Dawit Ayele and Nathan Lammers continued providing energy recommendations for clients in Ohio. Dawit, a graduate student from Addis Ababa, Ethiopia, has built upon his professional experience in HVAC analysis and design to make a significant contribution on 13 audits to date. Nathan, a senior mechanical engineering student, made substantial contributions on three audits during the summer of 2009 while interning full time as a research engineer at Wright-Patterson Air Force Base. Meanwhile, two other team members, Brian Abels and Faizan Ahmad, continued their education and contribution to a sustainable energy future outside the IAC. Brian, a senior mechanical engineering student who joined the UD-IAC in fall 2008, spent the summer providing innovative energy solutions at Waibel Energy Systems, a local firm specializing in building energy management. Faizan, a May 2009 Dayton graduate in both mechanical engineering and physics, organized a photovoltaic workshop in his home town of Karachi, Pakistan. This workshop, under the leadership and guidance of Dr. Richard Komp, introduced photovoltaic assembly as a cottage industry for the first time in Pakistan.

The combined skills and abilities of all aforementioned persons were instrumental in the successful completion of the Columbus E3 (Economy, Energy, and Environment) pilot program. The Columbus E3 program is a government initiative aimed "to improve manufacturing competitiveness through greater energy efficiency, waste reduction and other sustainable practices" in communities like Columbus, OH. Six Columbus area manufacturing plants, with products ranging from cold beverage bottling to steel coil galvannealing, participated in the project.

Techsolve, a Cincinnati-based Edison Technology Center, served as the project's technical lead and contracted the UD-IAC to perform the energy assessment component of the project. The UD-IAC generated a total of 108 recommendations, with a total quantified annual savings of $1,716,288 per year. This corresponds to a reduction in total annual energy use of 22% per year, a reduction in annual CO_2 emissions of 21,757 tonnes per year and a combined simple payback of 17 months. UD-IAC director Kelly Kissock presented these results to various

government officials and corporate executives at the "Smart Companies Star with "E3": An Energy and Sustainability Event" at American Electric Power's corporate head quarters in Columbus, OH, on October 27th, 2009. Several UD-IAC members attended the event. The figure below shows the fraction savings versus simple payback for all 108 recommendations.



Oklahoma State IAC Continues Long History of Service to Regional Manufacturers

Michael McCombs, Oklahoma State University
m.mccombs@okstate.edu

Left to right: M. Bhutada, S. Negi, V. Madanayakanahalli, M. McCombs, and Dr. W. Kolarik (IAC Director and Chair, OSU School of Industrial Engineering), on-site, on the roof, next to a cooling tower. Outside temperature: 105°F.

Despite the serious national recession, industrial activity in the service territory of the Oklahoma State University IAC has been surprisingly resilient, and plant managers are keenly interested to receive OSU industrial assessments—there is a waiting list with a substantial backlog. OSU serves all of Oklahoma, portions of north Texas, and in cooperation with industrial engineering programs at the University of Arkansas and at Wichita State University, portions of western Arkansas and southern Kansas.

OSU's IAC has a long history of service to industry in the South Plains, having just completed its 784th industrial assessment since the program's inception. The center expects to have completed its 787th assessment by the close of 2009.

The largest and most technically interesting assessment this year required the team to travel to Amarillo, TX, for two days to assess the massive ASARCO copper refinery. One of the key areas of the assessment was a complete lighting survey of this facility, which required careful retrofit specification due to the corrosive and high ambient environment. Further, the IAC team provided extensive recommendations to reduce heat loss from furnaces and to improve thermal efficiency of the refining processes. This report also included a major recommendation to install a wind-electric generation system, though the payback was lengthy due to the low cost of industrial power in this area, even allowing for the federal and state tax incentives.

OSU's other assessments during this year spanned a wide range of industrial processes, including Rush Metals (powdered metal castings for agricultural equipment manufacturers), ETS (radio-frequency test chambers), Paragon Films (plastic stretch film), Central Machine & Tool (high-pressure couplings for the petroleum and chemical industries), OSECO (pressure relief devices), Planters Company-division of Kraft (packaged peanuts and various tree nut products), PGI (agricultural baling twine), MacSteel (rolled and flat steel processing), and Sherwin-Williams (industrial paints), among others.

Left to right: S. Negi, P. Jadhav, M. Bhutada, V. Madanayakanahalli, and Dr. W. Kolarik (IAC Director and Chair, OSU School of Industrial Engineering), on-site in a boiler-chiller room.

On the personnel side, there were several changes during the year. Both Satyajit Patil and Vishwaraj Naik Nimbalkar completed their master's degrees in IEM and landed career-track energy-engineering positions in California. Vivin Madanayakanahalli, Lead Student, completed both his master's degree in IEM and his PMP certification and was then admitted as a doctoral student at OSU with an energy management focus. In addition, Shailesh Negi completed both his master's in IEM and his CEM exam,

and is now commencing a national job search for an energy-engineering position. Finally, the center welcomed three new team members, all of whom hold bachelor's degrees in either mechanical or industrial engineering: Roman Gorodov from Russia (in August), and Mithun Bhutada (in May) and Pratap Jadhav (in January), both from India.

University Briefs

University of Alabama. Over the past year, the AIAC has been especially busy performing many regular IAC assessments as well as three large energy user (LEU) assessments for National Gypsum Company, Nucor Steel, and U.S. Pipe. Through these LEU assessments, students in the center have gained experience using DOE software tools including AIRMaster, PHAST, SSAT, VisualDOE, and CWSAT. Additionally, a group of four students and AIAC Director Dr. Keith Woodbury performed a SEN-type visit for DCH Regional Medical Center, a local hospital. The assessment team evaluated two of the hospital's essential energy consuming systems, steam and chilled water. Energy savings calculations emphasized usage of the Steam System Analysis Tool (SSAT) and the Chilled Water System Analysis Tool (CWSAT). The assessment team calculated potential energy savings of 50,600 MMBtu/yr equating to $746,000 in energy cost savings for the total recommendation, some of which was already planned for implementation.

Several of the students at the center spent part of the summer creating Excel spreadsheets to perform standard assessment recommendation calculations such as preheating combustion air, installing an economizer, installing efficient lighting, and insulating process equipment. These Excel spreadsheets were designed to assist students in assessment recommendation and report writing for the increased workload of the coming fiscal year. The center's experienced students have mentored the large number of incoming undergraduate new hires on the use of these spreadsheets, solidifying both the basis for the calculations as well as the knowledge gained from teaching assessment recommendation writing.

In addition to the standard implementation follow-up with our clients, the AIAC has also begun sharing our assessment results and report with the client through web conference meetings. The web conference meeting occurs immediately after completion of the report, unlike the implementation follow-up, which occurs 6–12 months after the visit. Through the WebEx service provider, the center effectively shares video feed as well as any necessary documents to describe and discuss end point energy results and major savings calculations. The assessment team is in attendance to answer any questions or concerns that the client proposes.

In the past year, three of the AIAC's students have accepted job placements in the energy industry including Sean McCarty for Aramark, Ross Morgan for Alabama Power Company, and Bryson Rogers for TVA. Additionally, four of the center's students received IAC certificates this year.

DOE recognized a previous assessment client, Johnson Controls, with an Energy Saver Award after the facility implemented nearly all of the center's recommendations.

The AIAC's two graduate students, Joseph Chappell and Adam Roget, will be attending the 2010 IAC Lead Student Meeting.

Ryan Esch (far right) discusses IAC services with interested participants at Bradley's display.

Bradley. Mechanical Engineering graduate student Ryan Esch and IAC staff engineer Martin Wiesehan represented the Bradley IAC at the Midwest Industrial Energy Efficiency Exchange in Detroit, Michigan, September 9–10, 2009. At the evening reception, one of our clients, the Flex-N-Gate Master Guard plant in Veedersburg, Indiana, was recognized as a DOE *Save Energy Now* Champion for achieving a 15% total energy savings following our assessment in 2006. The Bradley IAC was one of more than 50 exhibitors at the Business Exchange the following afternoon, where organizations were able to promote their services to industry.

Colorado State. It's been a year of new faces and new places for the Colorado State University IAC. Now into its second year of assessments, our staff continues to mature. Last year, we started with a team of all juniors and added a freshman in the spring and another senior this fall, and can now claim an electrical engineering student amidst an otherwise all-mechanical engineering team. As can be expected, all of the students are enjoying

their site time and are learning a lot about the real world of engineering in this challenging economy.

Every plant is a new experience for our team, but we've been to some interesting places in 2009: a high-tech door manufacturer in Denver, the world's largest hot mix asphalt plant, a tortilla plant in Albuquerque (with the best green chili for lunch), and a manufacturer of solar receivers at an undisclosed location with a process so secret that no one was allowed to take notes!

We've also developed a fan team that has been getting a lot of experience in analyzing fan systems using the DOE's Fan System Assessment Tool and another team of students developing experience with air compressors using the AIRMaster+ and LogTool software. We've found some big opportunities in these areas, which just serves to increase student interest. Some are gaining practical experience in learning about fans (and pumps) before taking their fluids classes. So the CSU-IAC is also helping to improve our students' grades!

For the first time in many years (perhaps ever), we did not graduate a single active student in 2009 and we don't get to brag about our graduates this year. But we're hoping to continue our strong tradition of graduating several qualified, highly valued engineers in 2010.

University of Dayton. Steve Mulqueen is currently serving as Lead Student and participated in 34 assessments thus far for the Dayton IAC.

Delaware. The University of Delaware performed assessments this past year at plants ranging from paint-producers to refrigerator-makers, with recommended savings averaging 18%. While it seems we have to hunt for every recommendation (as our fearless field center leader once said, "Pay Attention!"), we have seen a few common themes at some plants.

Ventilation of treated air seems a general problem at the plants we've assessed, from the small roof vent pumping out cold air in the summer (where does that come from ?!), to a plant that was set up to return its dust collector system into the plant in the winter, but the vane switch was frozen in place. For the latter, there was so much venting that it was quadrupling their plant heating costs. Another theme that other centers are probably also seeing is "downsizing" due to the recession, where the challenge is to remove HVAC or lighting costs from an unused area, or to balance reduced load/operations with existing oversized equipment. (We hope this situation is not as common in the future!) All in all, a very productive IAC year for the University of Delaware center!

Florida. Ayyoub Mehdizadeh Momen has been selected to attend the 2010 IAC Lead Student Meeting on behalf of the University of Florida IAC.

Georgia Institute of Technology. The GT IAC has been very busy addressing the high level of interest of industrial clients for assistance with energy efficiency. The number of our center's completed IAC assessments recently reached 870! In addition, this year, the GT IAC was pleased to have six recent IAC client plants recognized by DOE through the Energy Saver and Energy Champion award program.

One student highlight of 2009 was centered around a request by the City of Savannah to conduct energy assessments on two of its buildings. Although not an "IAC" assessment, this request for assistance was handled by staff engineer Mike Brown, who has been leading IAC assessments since the first days of the program. Mike took two IAC students, Jay Rudd and Jeff Croxall, with him to conduct these building assessments. The students completed a detailed survey of both buildings and their completed report serves as a building master energy-efficiency plan. In addition, this project resulted in both students having their contributions to the assessment captured on video and shown on Savannah's local "Government Channel 8." The 15-minute spot summarized the energy assessment work done for the city, and was a unique example of IAC students increasing public awareness on the importance of energy efficiency.

In addition, the GT IAC continues to support other U.S. DOE programs such as *Save Energy Now* Leaders and Superior Energy Performance. Both programs are reaching new levels of maturity and are poised to help industry achieve new levels of energy performance. Details on both programs can be found at www1.eere.energy.gov/industry/saveenergynow/ and www.superiorenergyperformance.net .

The University of Illinois at Chicago. David Garon and Matt Johnson will be attending the 2010 IAC Lead Student Meeting. Mr. Garon will be giving a presentation on induction lighting during the meeting.

Iowa State University. Three students from Iowa State earned IAC student certificates in 2009.

Lehigh. The Lehigh University Industrial Assessment Center has been very active in 2009, undertaking a broad range of assessments. These include injection molding companies, aluminum manufacturers, an engineering yarn plant, a wire brush plant, and an Italian Ice plant, among others. Due to earlier budget cuts, Lehigh IAC

conducted only 12 energy assessments last year, however, the total energy cost savings from our recommendations to the manufacturing companies were about $2 million in 2009. Meanwhile, we continue to make great progress in our student training program. Timothy Guide and Matt Devlin graduated with master's degrees in 2009, and both are pursuing energy engineering career paths in Pennsylvania and New Jersey. Graduate student Valentina Baio and Sophomore Robert Harrison joined the Lehigh IAC this year and have started to contribute to energy audit and report writing with the help of Lead Students. A key improvement for 2009, Lehigh IAC tried to apply more high-tech and cutting edge energy conservation tools in energy audits. We are trying to ensure more accurate measurements and data logging during plant visits by employing better measurement devices. Valentina Baio and YiJun Yang registered for Webinar lectures and learned how to use ultra-sonic devices to detect compressed air leaks and steam leaks on steam pipes and steam traps. In February, Lehigh IAC Lead Student YiJun Yang attended the IAC student meeting in Washington D.C. During the meeting, the Lehigh IAC exchanged energy audit experience with other centers and shared some energy savings calculations. The Lehigh students learned from other centers as well and applied self-developed software from other centers to Lehigh's calculation system.

During the months of May through August, YiJun Yang and Josh Kezele interned at the Electrotechnology Applications Center (ETAC) in Bethlehem, Pennsylvania. ETAC conducts energy assessments for clients in Pennsylvania in both the industrial and commercial sectors. During the internship, both of the students were active in participating in the energy assessments and meetings with energy engineers. Lehigh IAC also seeks the opportunities to cooperate with other organizations, such as PenTap and MEP, to help companies in Pennsylvania efficiently manage energy use for manufacturing.

Overall, 2009 has proved to be a successful year. Lehigh IAC is pleased with the work it has accomplished and hopes to do better in the coming year. More students are interested in our cause and are eager to join the IAC office. With the growing concern about conserving energy, more companies are also seeking our advice. We look forward to a busy year full of exciting new challenges and companies to work with.

University of Louisiana–Lafayette. Britany Aulds will represent Louisiana-Lafayette at the 2010 IAC Lead Student Meeting.

University of Massachusetts. Hariharan Gopalakrishnan has been selected to attend the 2010 IAC Lead Student Meeting in Washington, DC.

University of Miami. The University of Miami IAC is currently working on several interesting projects such as a brewery, a tuna canning plant, and a landing gear facility. We have a new graduate student member from Turkey who is seeking a Ph.D. in industrial engineering. He is replacing a recently graduated member who was took a job in the private energy management sector. We have some new equipment to aid in our assessments including an infrared thermometer with a touch probe as well as a sophisticated thermal imaging camera, which details accurate measurement of energy losses in areas of interest throughout the plant. Our center continues a productive working relationship with our designated MEP. The next scheduled assessment is a paper recycling facility.

University of Michigan. The University of Michigan IAC has had an exciting past year completing its 12 energy audits in Michigan and Indiana. This year we had a great new crop of undergraduate students, including Brian LaFrance, who will be graduating in spring and staying with the IAC as he contemplates graduate school. Brandon Kerrins has another year left at the University but is already seeing his IAC experience pay off—he received an internship this spring at General Electric. Paul Teini is nearing the completion of his Ph.D. but plans to revamp the Michigan IAC website before his tenure at the University ends. Pawel Olshzewski and Sean Berhan have both finished their work with the IAC. Pawel is working internationally part time as a professor and part time for the oil industry. Paul, Brian, and Brandon all recently received recognition from the IAC for their efforts at the Michigan center.

In September, the team attended the Midwest Energy Exchange. At this conference, we made new contacts and reconnected with a few recently visited companies. Additionally, awards were given to regional companies showing significant reductions in energy consumption. Two companies that the IAC visited received this award from the Michigan Governor Jennifer Granholm, and the Michigan IAC was recognized for its contribution. The Michigan IAC is excited for the new fiscal year, and hopes

to complete all its IAC-mandated visits, but also to visit a few large companies with large energy savings potential.

The Michigan IAC will continue to work hard to produce industrial energy savings.

University of Missouri. The Missouri IAC has had a productive year for energy audits. This year, we have been to plants that manufacture chemicals, rubber belts, plastic packing, food, printings, aluminum castings, and more. Several companies are still lining up for us to investigate their energy usage. Our past lead undergraduate student, Jason Fox, earned an IAC Certificate in April 2009. He has been to at least 20 assessments before his graduation in May 2009. The center is developing an online tool that would assist the educational material for energy audits, links, and calculations. This webtool will also soon be able to generate a brief summary of recommendations covering lightings, compressors, boilers, process heating, HVAC, process improvements, and more. The ongoing web development can be viewed at http://iac.missouri.edu/webtool/. Chatchai Pinthuprapa will be attending the 2010 IAC Lead Student Meeting to share the web development work and interesting experiences from energy audits.

Mississippi State University. Bobby Thomas will attend the upcoming IAC Lead Student Meeting on behalf of MSU.

North Carolina State University. NC State continues to work with industry in North Carolina, South Carolina, and Virginia. Students Michael Simon, Justin Gibides, and Brock Frisbee accepted positions at energy related companies this summer, after receiving several job offers—a rarity in this job market. All three students believe that their IAC experience was instrumental in their success in finding a job.

IAC staff and students have completed several additional assessments as part of another DOE contract. The surveys were conducted in the style of a regular IAC survey with a presentation of the final report to the client. The clients were also referred to the State Energy Office's low cost targeted energy surveys for additional follow-up.

Assistant Director Dr. Stephen Terry was invited to speak to the American Public Power Association's Customer Connections Conference in Colorado Springs to promote the IAC program. The presentation sparked interest in the program, which will hopefully lead to more surveys at plants served by APPA member utilities.

David Hughes assumes the role of Lead Student this year. He is a graduate student in mechanical engineering. His research includes testing of residential geothermal and air source heat pumps installed throughout the area.

Oklahoma State University. Shailesh Negi and Vishwaraj Naik Nimbalkar have earned IAC Student Certificates.

Oregon State University. The past year has seen several interesting developments for the Oregon State IAC. At the 2009 Lead Student Meeting, Michael Koch of OSU and Kevin Ng of San Francisco State presented the idea of developing a centralized "Energy Efficiency Reference" to more effectively connect and share information between IACs. The OSU and SFSU IACs have been working hard to develop this reference, which will house information related to principles surrounding energy efficiency, how to perform comprehensive energy audits, subsystem specific information (e.g., motors) as well as outside resources. Currently, the project is in its early phases, but is already beginning to show significant potential. The long-term goal of this project is to allow all IACs to contribute to the reference in hopes of creating a robust resource centered on energy efficiency. In addition, funding for sections on agricultural and residential energy efficiency has been acquired and will be utilized over the coming year. Industrial funding was provided by the DOE, agriculture funding was provided by the OSU Department of Agricultural Sciences, and residential funding was provided by the Northwest Institute for Community Energy (www.nice.org).

The Energy Efficiency Reference can be found at http://eeref.engr.oregonstate.edu.

On a different front, the Oregon State IAC has been looking to expand operations over the last year, with focus on the agricultural and commercial/institutional sectors. Recently, the OSU IAC received a USDA grant to perform 90 audits over the coming 2 years. In addition, funding from the OSU Department of Agricultural Sciences and the Oregon Processed Vegetable Commission is being utilized to expand work in this area. On the commercial and institutional side, the OSU IAC has been working with the Oregon University system to perform audits on campus buildings, as well as with the fraternities and sororities to perform audits on the Greek houses.

San Diego State University. Aman Khippal has been selected to attend the 2010 IAC Lead Student Meeting.

San Francisco State University. 2009 has been a busy but productive year for the SFSU-IAC team, with the completion of 15 audits and an IAC first. SFSU-IAC worked with the Federal Energy Management Program (FEMP)

and the Department of Transportation Maritime Administration (MARAD) in the assessment of two ships, part of the government's Ready Reserve Force (RRF), stationed in Alameda, California. These audits are a first of their kind for any IAC, making the first step in reducing the energy consumed by our government ships while stationed in port. This was an exciting experience that tested our ability to adapt and generate viable energy conservation opportunities in a completely foreign environment. In addition to these audits, the SFSU team has incorporated our planet's renewable energy resources, solar and wind, in our efforts towards creating a more energy efficient industry.

The SFSU-IAC has had four team members earn IAC certification in 2009, two of whom have since graduated with Bachelor degrees in mechanical engineering and one working toward finishing his thesis to acquire a Masters in civil engineering. With four new 2009 hires eager to learn and excel, there is a bright future for the Center's continuing success in producing industry-ready engineers. Supported by a DOE grant, the Center will be a participant in Pacific Clean Energy Application Center along with University of California, Berkeley; University of California, San Diego; and San Diego State University. In October 2009, our Center hosted a delegation from India on a tour of energy efficiency activities throughout the United States at the invitation of DOE. SFSU-IAC shared the IAC experience with the Indian delegation.

Syracuse University. The Syracuse University IAC has enjoyed yet another productive and enlightening year. The center has expanded, adding new graduate student Rebecca Altman from Florida State University, where she completed her undergraduate work. We have also added an additional undergraduate student: senior Evan Beckerman. We had two students graduate last May. Wade Williatt earned his M.S. degree in mechanical and aerospace engineering and Ross DiLiegro earned his M.S. in engineering management. Both are hard at work for energy auditing companies. The Syracuse IAC also engaged in a pro bono endeavor with the Syracuse Center of Excellence to help a small local restaurant lower its utility bills through HVAC and lighting upgrades.

Sadly, we lost one of our team members and friends over the summer. Kelly Farmer passed away in a tragic accident. Kelly lit up the Syracuse IAC office every day with her smile. She truly brought us together both as a team and as a family. We will always remember her.

Tennessee Tech. Tennessee Tech University welcomes Anthony Griffith, who joins Ben Hassler as a Lead Student. Nine undergraduate engineering majors round out our crew. Alumni Dustin Boyett and Jimmy Kitchens are working for the Tennessee Valley Authority at the Watts Bar Nuclear Plant and Ray Bowker is employed by AGC Industries, a flat glass manufacturer.

The University of Memphis satellite center has completed a full year's worth of audits. Interest in the IAC is strong at U of M: they have 15 students ranging from freshmen to a Ph.D. student! Their Lead Student is Joseph Meadows, who will be attending the Student Conference in Washington DC representing U of M for the first time.

East Tennessee State University's satellite center employs 3 graduate students and 2 undergraduates. Their Lead Student, David Ward, will be graduating soon and has accepted a job performing industrial energy audits. Another ETSU alumnus, Brian Hayes, is also employed in the energy management field with TVA.

Texas A&M University. Over the past year, Texas A&M performed 14 assessments and had 6 people earn IAC certificates. Travis Jones served as team leader before graduating in May 2009.

University of Washington. The University of Washington IAC has successfully completed its third year in existence and provided much needed assistance to local industries in Washington State. We provided 10 assessments to many manufacturers of products from advanced fighter jet composites to wine bottles. Many of the assessments we conducted were facilitated alongside utility representatives who often provide funding for project implementation. In particular, an assessment at an organic cereal factory stemmed an implementation of a moisture sensing system, which is being used to reduce moisture in product prior to entering a dryer. The plant received incentive funding for the moisture sensors, and the company is expected to reduce its natural gas usage by approximately $30,000 per year.

We ended our year with a warm send-off into the professional world for six students earning IAC certification. Gina Hicks is currently working as a mechanical and electrical engineer for SBW Consulting in Bellevue, Washington. Daniel Hemmons finished his undergraduate degree in electrical engineering and is now working on his M.S. in electrical engineering at the University of Washington specializing in controls and power systems. Brian Pepin received the Dean's medal from the College of Engineering upon graduation (the highest honor in our institution) at the UW and is now attending the PhD program at UC Berkley where he is specializing in MEMS with an application in power electronics for energy efficiency. Michael Anderson is

working as a mechanical engineer for SIEMENS Industrial Technologies in Anchorage, Alaska. Alex Berres is an engineer in training (electrical engineering) for Puget Sound Energy in Bellevue, Washington. Brian Lovely is working as an industrial systems specialist for US Naval shipyards in Bremerton, Washington.

Returning IAC students were busy over the summer participating in internships and preparing for other opportunities. Lead Student Anthony Simon worked as an energy intern for Washington State University Extension Energy Program, Industrial Services, in Olympia, Washington and also won a student scholarship to attend the ACEEE Summer Study on Industrial Energy Efficiency in Niagara Falls, New York. Student Alfonsus Tanoto is awaiting the notice of his MBA application.

This autumn quarter, we had 9 new engineering students join the team—7 are electrical engineering students and 2 are mechanical engineering students. We are currently looking for additional mechanical, chemical, and electrical engineers to round out the team. Although many of the new students are seniors, they will have a full year of IAC experience to put on their resumes before entering the work force.

Our program has made a big effort to provide many training opportunities for new and old members. We have partnered with many professional organizations such as Seattle Lighting Design Center, the University of Washington Power Plant, and King County Court House among others to provide hands-on experience in preparation for assessments. By valuing teamwork and training, our growing organization can be more effective in what we do while providing a great learning environment for our students.

Also, our program purchased a thermal imaging camera that been very helpful identifying insulation opportunities to mitigate infiltration on furnaces, ovens, buildings, and steam pipes. We look forward to continued success in helping industry save energy while training students for the workforce.

West Virginia University. The West Virginia University IAC has enjoyed a fruitful year of wide variety of energy assessments and several notable accomplishments. The WVU-IAC conducted 12 assessments, and the reports focused on QuickPEP, MotorMaster+, 3E Plus, SSST, and other Best Practices Software tools. The assessments and reports were well received by the facilities. The facility personnel scheduled follow-up conference calls/meetings with IAC Director Dr. Bhaskaran Gopalakrishnan and Lead Students to facilitate a plan for implementation. Currently, two plants, Penn-Union Corp. and Joy Mining Equipment, are potential awardees of the Energy Champion Award.

Snyder Manufacturing, General Plug, and Marlite are potential Energy Saver Plants as recognized by DOE. A case study was developed on Quad Graphics for exceptional implementation. The company won "Governors' Award for Excellence in Industrial Energy Efficiency" from the West Virginia Division of Energy Office.

From left to right: N. Banuri, IAC-WVU; Dr. E. Crowe, IOF-WV; Ms. D. Clayton and Mr. B. Klingelsmith, Quad Graphics; S. Chaudhari, IAC-WVU.

Dr. Gopalakrishnan, along with IAC student Nishit Banuri took trained and tested for Qualified Specialist in FSAT. The Lead Student, Subodh Chaudhari attended PSAT training held by the Southern California Gas Company in Downey, California. The directors and Lead Students provided a seminar to a local utility company, Allegheny Power. The effort was directed towards forming a partnership with the utility company for providing IAC services to their clients in the region. The IAC directors, along with students, are working on many other energy projects supported by DOE, WV IOF, and the West Virginia Division of Energy (WVDE). Local news channels WBOY-TV and WOWK-TV identified the WVU IAC's efforts to serve manufacturers, and a news story was broadcasted by the channels, helping to create a good public image for us. Ruben Avagyan, Nishit Banuri, and Subodh Chaudhari participated in Global Venture Challenge, a business plan competition held by ORNL. The group was selected as one of the semi-finalists and received a Certificate of Achievement.

Dr. Gopalakrishnan is actively working on the project with IAC students on enhancement of (Galvanizing Energy

Anne Mallow, WVU-IAC, at a wind farm.

Profiler and Decision Support System) GEPDSS model in continuous galvanizing lines for increased productivity. As principal investigator, Dr. Gopalakrishnan attended the Galvanizers Autobody Partnership (GAP) meeting held in Liege, Belgium.

In June 2009, Anne Mallow traveled to Germany to participate in the Transatlantic Renewable Energy Exchange Study Tour. While visiting Freiburg and Bonn, she studied cutting-edge technologies, best practices, and Germany's innovative public policy that is keeping the country and its companies at the forefront of the renewable energy movement. Anne met with representatives of multiple German firms that have emerged as leaders in the emerging global renewable energy market.

Lead student Subodh Chaudhari and Ruben Avagyan attended the student meeting held in Washington, DC. IAC Student Krishna Maddula accepted employment in the energy management field. Dr. Gopalakrishnan and his graduate students authored three articles in peer-reviewed journals and one article in a conference proceeding. Dr. Gopalakrishnan served as Energy Efficient Manufacturing session chair at the SAE International World Congress.

Recruiters' Corner

Because of their specialized and highly sought after training, knowledge, skills, and abilities, IAC students and alumni are heavily recruited throughout the energy sector. Listed below are corporate profiles of several companies that routinely post positions on the IAC web site and actively recruit IAC students and alumni. For more information on these and other prospective employers and opportunities, see the career section of the IAC Student and Alumni web site at http://www.iacforum.org/iac/app?service=page/RecruitersCorner.

ERS, Inc. is a progressive energy engineering consulting firm based in Haverhill, Massachusetts, with additional offices in New York, Maine, and Texas. Our areas of specialization include assessment and implementation of energy projects, energy analysis and utility program management, technology assessment, industrial process evaluation, efficiency lighting design, and energy code compliance.

ERS, Inc., has hired 5 IAC Alumni.

Contact Recruiting, 978-521-2550

Cascade Energy Engineering is a consulting firm specializing in industrial energy efficiency projects. We are industry leaders in evaluating, implementing, and commissioning these projects. We work strategically with corporate clients to implement broad energy management plans focused on industrial energy efficiency. Cascade serves a broad array of industries, including food processing and distribution, oil and gas, pulp and paper, and chemical industries. We also serve a wide range of electrical energy efficiency demand-side programs wherein utilities or public agencies assist their industrial customers in implementing energy efficiency projects. Cascade is focused on providing excellent technical work and customer services. This emphasis, along with heightened awareness of energy and energy costs within industry, has allowed Cascade to grow steadily since its inception in 1993. We have a highly skilled and loyal engineering staff. Marcus Wilcox, president of Cascade and one of its founders, is an IAC alumnus. Cascade has offices in Portland, OR; the Salt Lake City, UT area; and Walla Walla, Washington.

Cascade Energy Engineering has hired 1 IAC Alumnus.

Contact Dan Brown, 503.287.8488

NORESCO is one of the nation's most experienced energy service companies, building self-funding energy-efficient infrastructure improvements and renewable energy installations for a wide range of educational, government, commercial, correctional, public housing, and industrial customers. NORESCO hires and retains a highly skilled, multi-disciplinary team of energy engineers, project managers, sales executives, construction managers, and M&V engineers. Headquartered in Westborough, Massachusetts, we have offices located throughout the United States and currently have openings for engineers across the country. We recognize the great value of IAC energy auditing experience as we continue to look nationwide for talented engineers to join our growing team.

NORESCO has hired 1 IAC Alumnus.

Contact Anthony Sclafani or Tina Boydston, Recruiter, 508-614-1049

The Cadmus Group is an environmental consulting firm headquartered in Watertown, Massachusetts. Our energy services team has engineering staff in Watertown, Massachusetts; Portland, Oregon; Boulder, Colorado; and Santa Monica, California. We assist clients including EPA and other government agencies, utilities, and private companies with energy efficiency and renewable energy projects throughout the United States and around the world.

The Cadmus Group has hired 2 IAC alumni.

Contact Lauren Mattison, 617-673-7107

Enovity, Inc. is a sustainability consulting firm that provides customized energy and operational solutions for high performance buildings. Based in San Francisco and with offices in Irvine, Seattle, and Phoenix, Enovity has provided California state and local governments, utilities, and school districts with functional solutions for energy efficiency. Our firm specializes in commissioning, energy engineering, sustainable design, facility operations and maintenance and energy efficiency incentive programs.

Enovity, Inc. has hired 3 IAC alumni.

Contact Pamela Boyes, 415-974-0390

CHA is an ENR Top-100 Engineering Firm and was recognized in 2008 among Zweig White's 100 Hottest Firms in North America. CHA is a highly diversified, full service engineering firm. One of our largest and fastest growing sectors is our Facilities & Energy Division, which houses the Mechanical/Energy Services Group. From our offices located throughout the Eastern, Southeastern, and Southwestern United States, CHA supports a variety of industrial, institutional, commercial and municipal clients with all aspects of energy and power projects. Our Energy Services are geared towards assisting our clients with identifying energy conservation measures and implementing the design of those measures for an overall benefit of reducing energy costs within a reasonable payback period. Our resume for Energy Services has been solid for the last ten years and our backlog of work in this area is tremendous. CHA is heavily involved in alternative energy design, performance contracting, and LEED/sustainable design projects. We offer both full-time positions and internships in the energy field. Please visit our website for more details.

CHA has hired 2 IAC alumni.

Contact Jennifer Schembari/Ann Devost, (518) 453-4500

Geo-Marine, Inc. Geo-Marine, Inc. (GMI) has more than 30 years of experience in delivering innovative, cost effective engineering and environmental services to our clients. GMI has successfully completed more than 3,500 projects ranging in value from a few thousand dollars to more than $32 million, in locations covering every state in the continental United States, and in Canada, Mexico, the Caribbean, South America, and Asia. Our Energy Services Group is dedicated to helping our clients maximize their utility budgets by achieving optimal levels of efficiency within their facility operations. Our staff of engineers includes multi-state licensed Professional Engineers, Certified Energy Managers, and LEED Accredited Professionals with the expertise and experience to provide comprehensive energy management services ranging from facility audit and analysis through design, construction and system commissioning.

Geo-Marine, Inc. has hired 1 IAC alumnus.

Contact Steve Silva, 817-226-8385

Energy Solutions Energy Solutions was founded in 1995 to tap the power of the California market to address climate change and sustainability issues through energy efficiency and renewable energy sources. As one of the leading consulting firms in our field, we specialize in energy efficiency program design, implementation, and marketing as well as solar feasibility studies and financing and water conservation programs. Energy Solutions currently has 55 employees and is rapidly expanding our client base as well as developing new services for clients. We are currently seeking full-time junior, mid-level, and full or part-time senior energy engineers to join our growing engineering group. More information is on our website under "Job Opportunities" www.energy-solution.com

Energy Solutions has hired 1 IAC alumnus.

Contact Kate Merrill, 510-482-4420 x223

Siemens Building Technologies As a leading provider of energy and environmental solutions, building controls, and fire safety and security systems solutions, we make buildings more comfortable, safe, secure, and less costly to operate. The Building Technologies Division, based in Buffalo Grove, IL, provides a full range of services and solutions from more than 100 locations coast-to-coast. We have positions open each summer for entry-level energy engineers through our Operations Development Program. Position locations vary each year.

Siemens Building Technologies has hired 25 IAC alumni.

Contact Kristin Junia, 847-215-1000

Elara Engineering ELARA Energy Services, Inc. is a 9 year old Mechanical, Electrical, Plumbing, Fire Protection and Information Technology (MEPFPIT) consulting engineering firm located in Hillside, Illinois. Our focus is in construction retrofit projects of existing commercial buildings and campuses with concentration in energy-related heating, ventilation and air conditioning (HVAC). Many of our projects have been recognized by ASHRAE, LEED, and Energy Star for excellence in engineering and energy performance.

Elara Engineering has hired 2 IAC alumni.

Contact Caitlin Levitsky, (708) 236-0300

Ameresco, Inc. is an independent energy solutions company delivering long-term customer value through innovative systems, strategies, and technologies. We work with customers on both sides of the meter to reduce operating expenses, upgrade and maintain facilities, stabilize energy costs, improve occupancy comfort levels, increase energy reliability, and enhance the environment. Founded by George Sakellaris, one of the pioneers in the energy services business, Ameresco has offices throughout North America to better serve you. We have all the resources needed to successfully plan and execute a comprehensive energy management program that will create real, sustained economic and operating benefits.

Ameresco, Inc., has hired 6 IAC alumni.

Contact Trish Puopolo, 508-661-2200

IAC Program Contact Information

Newsletter Editor and IAC Student Activities Coordinator: Thomas Wenning, wenningtj@ornl.gov

IAC Student Activities Advisor: Michaela Martin, martinma@ornl.gov

IAC Student Activities Administrative Assistant: Susie Allen, allensc@ornl.gov

U.S. Department of Energy Golden Field Office, IAC Project Officer: Bill Prymak, bill.prymak@go.doe.gov

Rutgers IAC Field Management

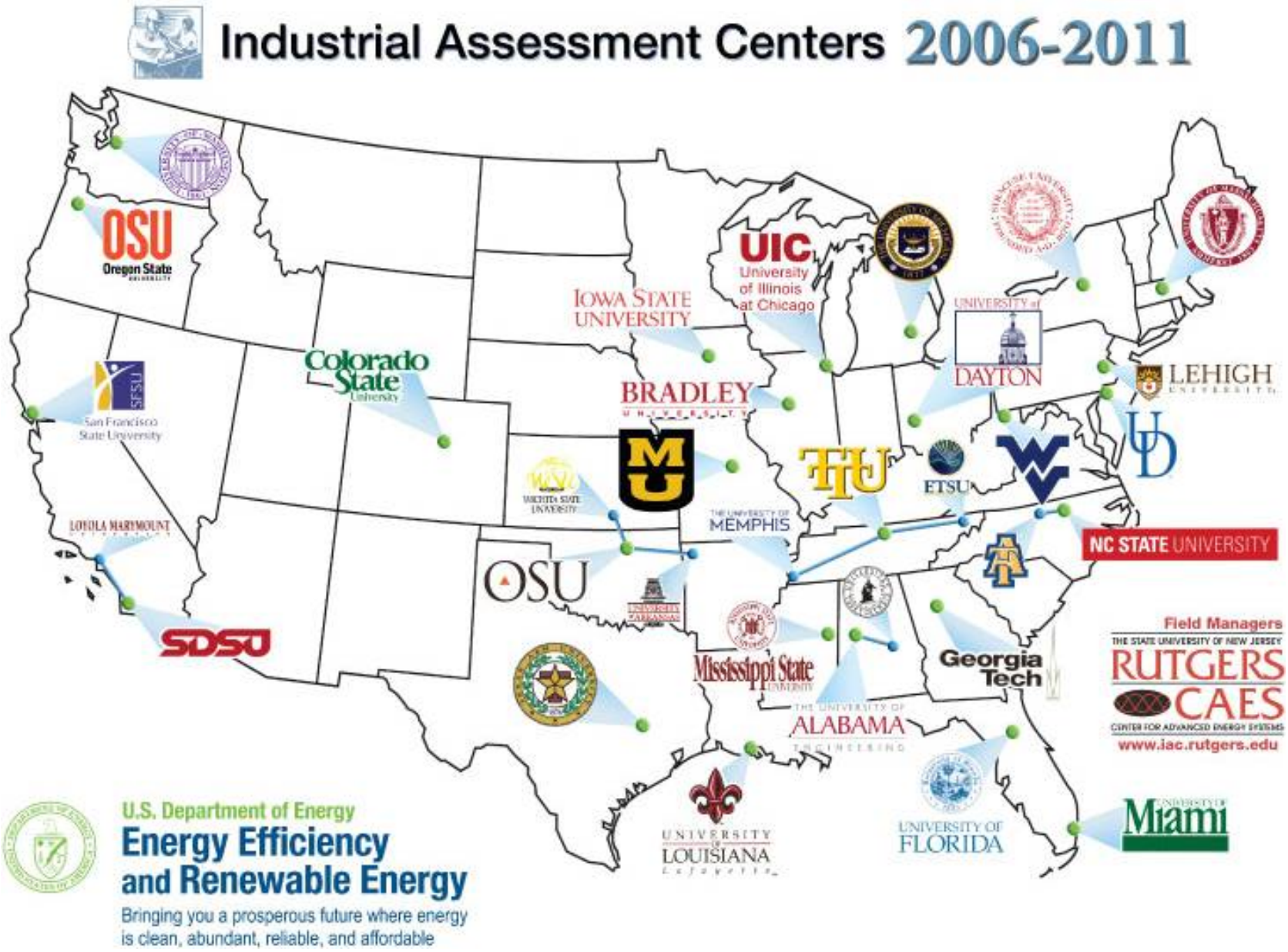
Director: Dr. Mike Muller, muller@caes.rutgers.edu

Manager of Technical Operations: Don Kasten, Kasten@caes.rutgers.edu

IAC Database: Mike B. Muller, mbmuller@caes.rutgers.edu, database location: http://iac.rutgers.edu

Calendar of Events and Training

- **2010 IAC Lead Student Meeting**, February 4–5, 2010, Washington, D.C. Past proceedings at www.IACforum.org
- **ASHRAE Winter Meeting (Building Sustainability from the Inside Out)**, January 23–27, 2010. Orlando, FL, http://www.ashrae.org/events/page/2478
- **Industrial Energy Technology Conference (IETC)**, May 19–22, 2010, New Orleans, http://esl.eslwin.tamu.edu/ietc/home.html
- **AEE World Energy Engineering Congress**, December 8–10, 2010, Washington D.C., http://www.energycongress.com/
- **DOE Industrial Technologies Program Qualified Specialists and End-User Training,** throughout 2010, http://www1.eere.energy.gov/industry/bestpractices/professional_development.html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UIC
University of Illinois at Chicago
IOWA STATE UNIVERSITY
Colorado State University
BRADLEY
UNIVERSITY of DAYTON
LEHIGH
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TTU
ETSU
WVU
LOYOLA MARYMOUNT
THE UNIVERSITY OF MEMPHIS
NC STATE UNIVERSITY
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