Introducing the Kentucky Industrial Assessment Center – A Resource to Help Find $$s in Your Facility

Improving the efficiency of facilities is a key to adding black to the bottom line. A new resource is now available to assist KY manufacturers in finding ways to be more energy efficient, the Kentucky Industrial Assessment Center (KIAC) at the University of Kentucky. The Advanced Manufacturing Office of the US Department of Energy (US DOE) sponsors KIAC and IACs at 23 other universities around the United States (see Figure 1 below for locations), with two primary goals: a) teaching engineering students about performing energy and waste assessments and b) simultaneously helping small-to-medium size U.S. manufacturing companies improve profits.

It’s recognized that manufacturing a quality product in the most efficient manner is the highest priority for Kentucky manufacturers. Efficient use of energy is often a very low priority or possibly not even considered as being able to be changed by some manufacturing facilities. With the growing popularity of sustainable manufacturing and increasing utility rates, energy usage is becoming an important consideration in manufacturing.

Whether it involves lighting, motors, compressors, ventilation, ovens, or any other equipment, improving energy efficiency plays a critical role in producing more finished products per unit of energy expended. That basic principle translates into reducing energy waste, which results in reduced out-of-pocket expenses and improved profits.

IAC teams consisting of faculty and upper-class and graduate students in engineering, will conduct a free assessment of your facility. The team examines the utility bills, plant site, facilities and operations and then makes recommendations for potential savings. The average of the annual savings of the recommendations included in the KIAC reports over the last two years has been $108,000 per facility. These energy assessments are free-of-charge to the company because they are being funded by a DOE grant to the IACs.
Who is Eligible for Assessments

In order to receive a no-cost plant assessment DOE requires a company to meet some basic requirements, which include the following:

- Meeting one of the Standard Industrial Classification (SIC) manufacturing codes within the range of 20-39 or one of the North American Industry Classification System (NAICS) codes within 31-33.
- Annual utility bills below $2.5 million
- The facility usually needs to be located within the state where the IAC is located or within at least 150 miles from the nearest IAC location.

In addition, three of the following items also need to be met:

- Gross annual sales below $100 million.
- Fewer than 500 employees at the facility site.
- Annual utility bills above $100,000.
- No in-house professional staff to perform an assessment.

How the Process Works

There are a series of steps followed to ensure that the time and money involved in performing the assessment are efficiently used and the maximum learning opportunities are experienced. These steps include:
1. Setting up the assessment. Firms wanting to have an assessment performed on their facility can make a request by emailing directly to kiac@engr.uky.edu or submitting information through KIAC’s website at: http://www.engr.uky.edu/power/kiac/

After determining that the plant meets the eligibility requirements, an experienced lead student will be assigned the responsibility for the assessment. This individual will have primary responsibility for scheduling the assessment, leading the assessment team during the site visit, supervising the analysis of the potential recommendations, and developing the report.

This student, in coordination with other students, will make up an assessment team. The team will also include the faculty involved in the DOE/IAC project and potentially other faculty with working knowledge in the industrial processes used at the participating facility.

2. Gathering information. In preparation for an on-site visit, information is gathered to understand the facility better and determine what steps might be required to complete the assessment. These data usually are collected from a questionnaire.

The questionnaire will cover multiple items like the facility’s background and processes performed, its energy goals, and financial guidelines regarding expected minimum/maximum payback periods for potential investments.

The questionnaire also will examine usage of energy resources and energy and/or material flows (e.g., electric, gas, sewage, and water bills), site operating and consumption profiles, operating hours and load profiles of major equipment, maintenance policies, and any past energy assessment efforts.

3. Analysis of questionnaire. Information obtained from the questionnaire is used to determine the major sources of energy usage, identify equipment that might be metered, and anticipate potential assessment recommendations that might be investigated further.

4. Plant visit. The IAC assessment visit is completed in one day, which requires good scheduling and time management. Typically there will be four to seven students and one or more faculty members participating in the plant visit. They will come with typical proper personal protective equipment and an extensive set of monitoring equipment.

After an initial meeting with the facility’s management and personnel to establish expectations and to describe the assessment process, a quick walkthrough of the facility is performed to help the team become more familiar with the facility, its material flow, and the processes used.

Afterwards, the students convene to brainstorm potential recommendations to be investigated and analyzed. This will be based on what’s been seen, from analyzing the pre-assessment data, and from any ideas or special requests made by the plant personnel. The students then determine what further data needs to be collected and will then divide into smaller specialized teams to investigate and gather the necessary data.

5. Specialized team investigations. The smaller teams usually are organized by general categories of major energy usage such as lighting, HVAC, motors, compressors, boilers, dryers, processing equipment,
etc. Examples of the types of data collected on major pieces of equipment include nameplate information, run-time, instantaneous voltage and current readings, motor speeds, pressure, temperature, humidity, light levels, airflow, combustion efficiency, infrared thermography of heat flows, compressed air leaks, etc.

Often small data loggers will be placed on major motors to record the current draw over time. These data loggers may be left on-site for one to two weeks to get detailed readings over a workweek and then they are mailed back to KIAC. In all cases, plant personnel (or their contractors) will be responsible for opening any electrical panels and installing or uninstalling any equipment.

Finally, at the end of the visit, the team will meet with the facility’s management for a debriefing on what implementation ideas are being considered for further analysis. The team also will seek feedback from management about the ideas being considered and ask if there are other recommendations that it might want evaluated.

6. Analysis and recommendations. An analysis on all the recommendations being considered is completed by the students and reviewed by the IAC faculty. It is up to the facility’s management to engage with other professionals in implementing any of the recommendations or in doing any design work. The IAC personnel are forbidden to do consulting or design work to implement the recommendations they have made. However a follow-up will be done to get feedback on implementation of these recommendations.

7. Final report. A final report will be issued to the plant within 60 days after completing the facility site visit.

Typically, these reports run from 50 to 150 pages and include an executive summary, general background (including facility data, process descriptions, best practices being used currently, and energy usage breakdowns), assessment recommendations, and appendices.

The recommendations are documented thoroughly, including what is to be done, the energy engineering analysis (e.g., assumptions and methods of calculating the results), the estimated implementation costs, the anticipated payback period, and an estimate of carbon dioxide reduction if the recommendations are implemented.

8. Implementation follow-up. Within two to six months, the facility will be contacted to determine what ideas have been implemented and to see if there might be additional questions.

The implementation rate is included in the IAC database of recommendations made by the SIC/NAICS codes. This is useful, so others may determine industry specific best practices and what recommendations are most commonly implemented. The importance of the privacy of company information and data is realized; therefore the name of the company is not included on any reports or databases, nor are the recommendation/implementation data included in the database linked to a specific plant.
Typical Assessment Results

Since its inception in 2012 KIAC has performed many one-day assessments at a variety of types of manufacturing facilities. The average of the annual savings of the recommendations included in the reports has been $108,000 per facility. A breakdown of the different types of savings is presented below in Figure 2. For a variety of reasons however, not all the recommendations are implemented. Feedback on previous assessments performed by the KIAC indicates that the average facility has implemented procedures and/or equipment to achieve an average of $70,600/yr savings per facility. As an illustration of the type of things investigated, the top ten most frequent recommendations made by all the IACs in the last ten years include:

- Utilize higher efficiency lamps and/or ballasts
- Eliminate leaks in inert gas and compressed air lines/ valves
- Reduce the pressure of compressed air to the minimum required
- Install occupancy sensors
- Use more efficient light source
- Install compressor air intakes in coolest locations
- Insulate bare equipment
- Utilize energy-efficient belts and other improved mechanisms
- Use multiple speed motors or VFDs for variable pump, blower and compressor loads
- Use most efficient type of electric motors

![Figure 2: Breakdown of Average Recommend Savings per Assessment](image-url)
For More Information

To apply to have an assessment or to get more information please see www.engr.uky.edu/power/kiac