



Industrial Assessment Center

U.S. DEPARTMENT OF ENERGY

Newsletter

Executive Information

The work described in this newsletter is for the period of 06/01/2019 to 07/31/2019 based on the activities of the West Virginia University Industrial Assessment Center ([WVU-IAC](#)). The center supports and carryout activities that are funded by US DOE Industrial Assessment Center program, EPA's [Pollution Prevention](#) (P2) program and USDA's [rural energy audit program](#). The center promotes "efficiency improvement" through structured on-sight assessments that target energy efficiency, environmental and process waste, lean and smart manufacturing. Technical assistance and training is also provided to the interested entities. Our clients range from local small businesses in the rural settings to small and medium sized enterprises (SME) nationwide.

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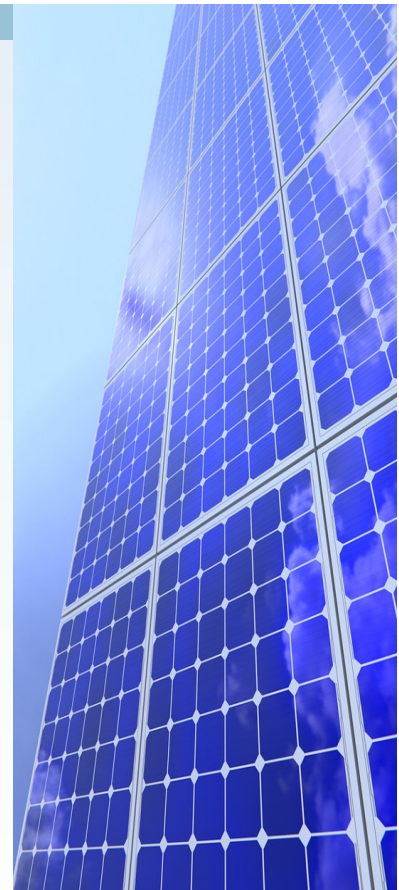
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The newsletter is prepared by [Mr. Pavan Kumar Koppula](#) in collaboration with the [WVU-IAC](#) students and Directors.



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Overview of Programs

IAC Program:

The [Industrial Assessment Center](#) at [West Virginia University \(WVU-IAC\)](#), is one of many centers around the country, funded by the [U.S. Department of Energy](#) to provide no-cost energy, waste, water, cyber security, and smart manufacturing assessments to small and mid- sized manufacturers. A team of students and professors do the engineering measurements in assessing how each facility utilizes energy and resources. Then, the [WVU-IAC](#) identifies the opportunities to save energy, reduce waste, and improve productivity through application of smart sensors and controls, and alleviate cyber security threats.

Small and medium sized manufacturers may be eligible to receive a no-cost assessment provided by the [WVU-IAC](#). The [WVU-IAC](#) team performs detailed process analysis to generate specific recommendations with cost and resource savings, implementation cost, and payback on investment. Within 60 days the plant receives a confidential report detailing the analysis, findings and recommendations.

Eligibility for IAC Assessment:

- Within Standard Industrial Codes (SIC) 20-39 and NAICS 33-39
- Water and waste water treatment facility or institutional facility
- Within 3 to 4 hour drive from Morgantown
- Gross annual sales below \$100 million
- Fewer than 500 employees at the plant site
- Annual utility bills more than \$100,000 and less than \$2.5 million
- No in-house professional staff to perform the assessment

More info about [IAC Program](#)

P2 Program:

Reduction of waste at the source level by providing Technical Assistance and Training is one of the most effective methods to assist facilities with identification, development and adoption of [Pollution Prevention](#) (P2) approaches.

The [Industrial Management and Systems Engineering Program](#) at [West Virginia University](#) is offering Technical Assistance and Training Programs for the food and beverage manufacturing and processing facilities in the state of West Virginia to assist facilities with identification, development and adoption of Pollution Prevention (P2) methods.

Technical Assistance program involves on-site P2 assessments. The project team makes a planned visit to the facility to assess and gather data on energy, water, material and human use. The data and inputs from the facility managers is used to develop P2 recommendations. A detailed report based on the findings of the on-site visit are submitted to the facility within a few days from the on-site P2 assessment. The report contain several recommendations concerning

- Energy efficiency
- Water and material waste reduction
- Lean implementation
- Air Pollutant and Greenhouse Gas Evaluations

Training Workshops are organized to train businesses/facilities about the source reduction techniques to help them adopt and implement P2 approaches, and to increase the development, adoption, and market penetration of greener products and sustainable manufacturing practices.

- [Participate in the Technical Assistance program and/or Training Workshops](#)
- To learn more about the [P2 program](#)

USDA Program:

This program is specifically designed to provide energy efficiency assistance to agricultural producers and for-profit small business located in the rural parts of West Virginia. The project team conducts on-site energy audits specifically developed for agricultural producers and rural small businesses and a detailed [energy assessment report](#) is submitted to the client.

Eligibility: Rural agricultural producers and for-profit small business are eligible to receive energy audit through this program. A for-profit small business is defined as any business that employs less than 500 people in a designated rural area and makes under a certain revenue based upon the type of business.

Benefits: Our energy audit recommendations can help save from 5 to 10 % of energy costs in areas of lighting, HVAC and building envelope thermographic analysis per year. The analysis of high energy consuming processes could result in even higher cost saving recommendations.

Using the [energy assessment report](#), the clients can apply for financial assistance through [USDA-REAP](#) grants and guaranteed loans programs. The grants range from \$1,500 to \$250,000, and cannot exceed 25% of total project costs. The maximum guaranteed loan is \$25 million, which may not exceed 75% of total project costs.

Audit costs: As a participant in this program the client is only expected to pay \$125 for a full energy audit of their facility and will receive a comprehensive [energy assessment report](#). This type of audit normally averages around \$3,000 but funding from the [USDA](#) covers the majority of the cost. [More info about program](#)

A Glimpse of this Cycle

- Eight on-site assessments have been completed during this cycle under IAC, P2, and USDA programs.
- Dr. Bhaskaran Gopalakrishnan, Director [WVU-IAC](#) and Dr. Ashish Nimbarte, Assistant Director [WVU-IAC](#) attended '[2019 Industrial Assessment Center Directors' Meeting](#)' held in Chicago, IL.
- Dr. Bhaskaran Gopalakrishnan, Director [WVU-IAC](#) attended and made a presentation at [U.S DOE Advanced Manufacturing Office Peer Review Meeting](#) held in Arlington, VA.
- Dr. Ashish Nimbarte, Assistant Director [WVU-IAC](#) participated in discussions at the [WVOE](#) conference on "[Connecting Communities through Energy](#)" and promoted the IAC program to potential clients.
- [WVU-IAC](#) student Omar AlShebeeb found employment as instructor at [Greenville Technical College](#).
- [WVU-IAC](#) team attended [3rd Annual WV High Performance Building Conference](#) organized by [WV Office of Energy](#) and [WV ASHRAE](#).

Recommendations from On-site Assessments

The [WVU-IAC](#) has conducted several assessments at various manufacturing facilities in the states of West Virginia and Ohio. The team has given several energy efficiency, lean, waste, water and smart manufacturer recommendations to improve the functionality of the manufacturing facilities.

Sample Recommendations

IAC Assessment Recommendation Fairmont, WV

Install Back Pressure Turbines/Generator for On-site Electricity Generation

Install back pressure turbine/generator system to utilize the high-pressure steam from the boiler for on-site electricity generation. This measure will result in electrical power generation at a very low cost. Best Practice software tool [Steam System Modeler Tool \(SSMT\)](#) was used to calculate the quantity of power generation using steam turbines.

Implementation Cost: \$160,314

Total Savings per year: Cost savings due to reduction in purchasing Electricity + Cost savings due to reduction in peak demand: \$33,741 + \$18,849 = \$52,590/yr.

Payback Period: 37 months.

IAC Assessment Recommendation Pittsburgh, PA

Install Air-Curtain on the Annealing Furnace Opening

Install an air curtain on the opening of the annealing furnace. An air curtain will prevent heat from escaping the oven and it will help reduce heating load. Two 1-hp fan motors will be required to operate the air curtain.

Energy Savings: 9,977 MMBtu/yr Natural Gas consumption is reduced as a result 1,127,401 lbs of CO₂ emission is reduced.

Additional Energy Usage & Additional Demand: Additional Energy usage for two 1-hp fan motors is 10,828 kWh/yr, and additional demand is 15 kWh/yr

Total Savings per year: Energy Cost Savings - Additional Energy cost - Additional Demand cost: \$38,308 - \$632 - \$139 = \$37,537/yr.

Implementation Cost: \$5,500

Payback Period: 2 months.

IAC Assessment Recommendation Triadelphia, WV

Shut Off Compressed Air Supply for Machines

Shut off compressed air supply for machines when not in use, in order to reduce the power loss due to compressed air within the facility. Best Practice software tool , [AIR Master+](#) was used during the development of this assessment recommendation.

Energy Savings: 225,427 kWh/yr Electricity consumption is reduced as a result 493,685 lbs of CO₂ emission is reduced.

Implementation Cost: \$0

Total Savings per year: Energy Cost Savings: \$7,439/ yr

Payback Period: Immediate

P2 Assessment Recommendation Webster Springs, WV

Optimize freezer and cooler space

Rearrange current freezer and cooler space and reduce the total volume, Install thermal insulated plastic partitions to separate the room to decrease required cooling volume.

Energy Savings: 33,312 kWh/yr Electricity Consumption is reduced as a result 72,953 lbs of CO₂ emission is reduced.

Implementation Cost: \$3600

Total Savings per year: Energy Cost Savings: \$3,454/yr

Payback Period: 13 months.

P2 Assessment Recommendation Wardensville, WV

Install Spark Ignited Pilot Lights and Ventilation Hoods

Install instantaneous pilot lights on the stove and ovens and install a ventilation hood in the kitchen

Energy Savings: 56 MMBtu/yr Natural Gas consumption is reduced as a result 6,328 lbs of CO₂ emission is reduced.

Implementation Cost: \$3000

Total Savings per year: Energy Cost Savings: \$974/yr

Payback Period: 37 months.

Cyber Security

Cyber terrorism is a real and growing threat. Standards and guides have been developed, vetted, and widely accepted to assist with protection from cyber attacks. WVU-IAC has conducted cyber security assessment for one of the participating SMEs using the Cyber Security Evaluation Tool (CSET). The CSET includes a selectable array of available standards for a tailored assessment of cyber vulnerabilities. Once the standards were selected and the resulting question sets answered, the CSET creates a compliance summary, compiles variance statistics, ranks top areas of concern, and generates security recommendations.

WVU-IAC is planning to use new cybersecurity assessment tool Industrial Control Systems Cybersecurity Assessment Tool provided by U.S Department of Energy. The tool promotes awareness of cybersecurity risk areas associated with Industrial Control Systems (ICS) in Industrial facilities. Tool includes 20 simple questions to characterize ICS and plant/facility operations and produces a preliminary assessment of risk (i.e high, medium, or low). It also generates a customized list of action items to help improve preparedness for a cybersecurity event

Recommendations given using CSET Tool

Area of concern: Access Control:

- Employ multifactor authentication for remote access and for access to privileged accounts.
- Grant access to the system based on a valid need-to-know or need-to-share that is determined by assigned official duties and satisfying all personnel security criteria and intended system usage.
- Authenticator's content must be protected from unauthorized disclosure and modification.

Area of concern: Physical and Environmental Security

- Authenticator's content must be protected from unauthorized disclosure and modification.
- Coordinate the results of reviews and investigations with organization's incident response capability.

Area of concern: Security Awareness and Training:

- Provide basic security awareness training to all the users before authorizing them into the system.
- Review the effectiveness of security awareness training at least once a year.
- Define and document system security roles and responsibilities throughout the system development cycle.

Area of concern: Incident Response:

- Coordinate incident handling activities with contingency planning activities.
- Implement incident handling capability for security incidents that include preparation, detection and analysis, containment, eradication and recovery.
- Perform backups of a user level information on a defined frequency.

Center Activities

- [WVU-IAC](#) developed a [case study](#) to showcase the implemented assessment recommendations for galvanized steel sheets manufacturer.
- [WVU-IAC](#) developed a [case study](#) to showcase the implemented assessment recommendations for boom lift & scissor lift manufacturer.
- [WVU-IAC](#) developed a [case study](#) to showcase the implemented assessment recommendations for railroad and utility products and services manufacturer.
- [WVU-IAC](#) team conducted a [industrial assessment](#) at the manufacturing facility of eye care products, Huntington, WV under IAC program.
- [WVU-IAC](#) team conducted a [industrial assessment](#) at a waste water treatment facility, Stephens City, VA under IAC program.
- [WVU-IAC](#) team conducted a [industrial assessment](#) at the manufacturing facility of rubber gaskets, New Philadelphia, OH under IAC program.
- The [WVU-IAC](#) students were provided an opportunity to interact with well established [WVU-IAC](#) alumni for purposes of career guidance and training in key focus areas.
- A training session on [AIRMaster+](#) was conducted by the Director for the [WVU-IAC students](#).

Student Activities

- [WVU-IAC](#) student [Alexandra Davis](#) is working with the Director on a special project to evaluate the efficiency of blower heater non-purge desiccant dryers.
- [WVU-IAC](#) student [Josage Chathura Perera](#) is working on a special project to ascertain the sustainability impact of additive manufacturing versus conventional machining processes.
- [WVU-IAC](#) student [Rupa Das](#) is working on a special project to simulate the energy profile in buildings with varying occupancy and system parameters over time.
- [WVU-IAC](#) student [Unique Karki](#) is working on a special project for determining the sensitivity analysis pertaining to energy in [cogeneration](#) systems.

Resources available for efficiency enhancement

- 1) [AIRMASTER+](#)
- 2) [Pumping System Assessment Tool](#)
- 3) [Fan System Assessment Tool](#)
- 4) [Mechanical Insulation Assessment and Design Calculators](#)
- 5) [Steam System Tool Suite \(SSTS\)](#)
- 6) [Industries Facilities Scorecard](#)
- 7) [Plant Energy Profiler/Integrated Tool Suite \(ePEP\)](#)
- 8) [Combined Heat and Power\(CHP\) Application Tool](#)
- 9) [NOx and Energy Assessment Tool \(NxEAT\)](#)

Partners of WVU-IAC:

[WV Office of Energy](#)
[WV ASHRAE](#)
[WV MEP](#)

[USDA](#)
[Oakridge National Laboratory](#)
[AMP-Ohio](#)

[EPA](#)
[WV DEP](#)
[EEWV](#)

The Team of IAC

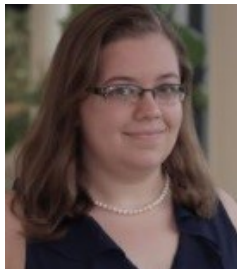


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Students



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Lead Student



Mr. Josage Chathura Perera
Co- Lead Student



Mr. Pradyumna Bettagere Jagadish



Ms. Rupa Das



Mr. Unique Karki



Mr. Kyle Gillis



Mr. Pavan Kumar Koppula



Mr. Muztoba Ahmad Khan