



Industrial Assessment Center

U.S. DEPARTMENT OF ENERGY

Newsletter

Executive Information

The work described in this newsletter is for the period of 01/01/2019 to 02/28/2019 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.

Website: WVU-IAC

Email: Dr. Bhaskaran Gopalakrishnan, Director, WVU-IAC

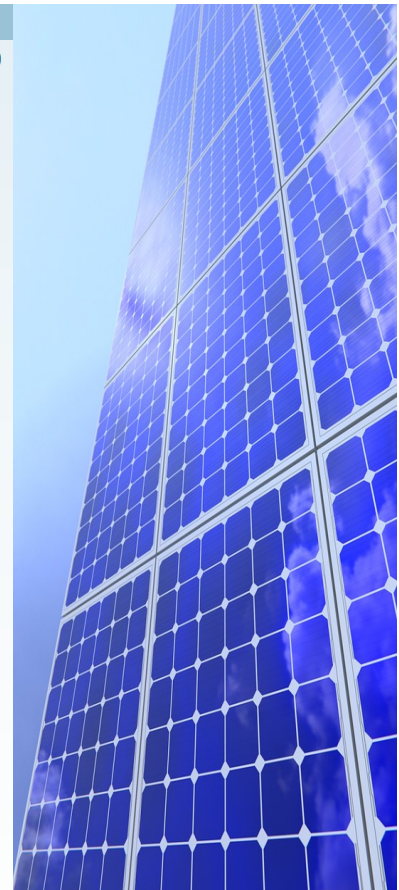
bgopalak@mail.wvu.edu

Dr. Ashish Nimbarte, Assistant Director, WVU-IAC

ashish.nimbarte@mail.wvu.edu



The newsletter is prepared by Mr. Pavan Kumar Koppula in collaboration with the WVU-IAC students.



Inside this issue

- Overview of Programs.....2
- A Glimpse of this Cycle.....3
- Recommendations from On-site Assessments.....4
- Cyber Security.....6
- Center Activities.....7
- Resources available for efficiency enhancement.....7
- Peer-Reviewed Papers Published through Assessment Inspired Research.....7
- The Team of IAC.....8

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.

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 program's.
- All the students working with [WVU-IAC](#) were awarded tuition scholarships for Spring 2019.
- Vivek Komarina Research Assistant staff member and Unique Karki, an MSIE student have joined the [WVU-IAC](#) in Spring 2019.
- Alexandra Davis, Lead Student of [WVU-IAC](#) received [Student Research Award](#) from [U.S Department of Energy](#).
- [WVU-IAC](#) students received certificates from [U.S Department of Energy](#).
- [WVU-IAC](#) students conducted a information sharing session at [Westwood Middle School](#), Monongalia County, WV.

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

WVU-IAC Assessment Recommendation Huntington, WV

Install Smart Industrial Surge Protection

Installing Industrial Surge protection to keep equipment and related processes up and running reliably without disruption or damage due to electrical surges.

Energy Savings: 6.66 MMBtu/yr Natural Gas consumption is reduced as a result 753 lbs of CO₂ emission is reduced.

Implementation Cost: \$8,050

Total Savings per year: Energy Cost Savings: \$139/ yr

Avoided Costs: \$40,000/yr

Total Annual Cost Savings: \$40,139/yr

Payback Period: 3 months.

WVU-IAC Assessment Recommendation Clarksburg, WV

Install Smart Controls to Automatically Adjust the Boiler Firing Factor

Install automated smart sensors and timer to adjust the firing factor of the boiler to conserve natural gas when possible.

Energy Savings: 1,896 MMBtu/yr Natural Gas consumption is reduced as a result 214,248 lbs of CO₂ emission is reduced.

Implementation Cost: \$8,000

Total Savings per year: Energy Cost Savings: \$ 14,168/yr

Payback Period: 7 months.

WVU-IAC Assessment Recommendation Huntington, WV

Develop a Demand Monitoring System to Reduce Demand Cost

Installing a demand controller to monitor demand pattern, and schedule the equipment accordingly to reduce the demand cost.

Implementation Cost: \$5,600

Total Savings per year: Demand Cost Savings: \$5,472/yr

Total Annual Savings per year: \$5,472

Payback Period: 13 months.

P2 Assessment Recommendation Huntington, WV

Improve the Controls on the Compressors

Increase in the efficiency of the compressor system by improving controls for the Air compressors. [AirMaster+ Best practice software tool](#) was used during analysis phase of this recommendation.

Energy Savings: 136,556 kWh/yr Electricity Consumption is reduced as a result 299,057 lbs of CO₂ emission is reduced.

Implementation Cost: \$8,000

Total Savings per year: Energy Cost Savings: \$8,930/yr

Total Annual Savings per year: \$8,930

Payback Period: 11 months.

P2 Assessment Recommendation Fraziers Bottom, WV

Improve Productivity at Weigh Station with Engineering Improvements

Installing a weigh table (Weigh scale included) at the end of conveyors to reduce weighing time and increase productivity.

Reduction of weighing time on one line: 260 hrs/yr

Implementation Cost: \$1,500

Total Savings per year: Equivalent Cost Savings: \$7,800/yr

Total Annual Savings per year: \$7,800

Payback Period: 3 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: Organizational:

- Identify individuals with system security roles and responsibilities.
- Make the system design and implementation process such that it defines the security roles and responsibilities for the users of the system.
- Appoint a senior security officer with the mission and resources to coordinate, develop, implement, and maintain an organization-wide security program.

Area of concern: Communication Protection:

- Cryptographic keys need to be established and managed using automated mechanisms.
- Maintain communication cryptographic mechanisms in comply with applicable regulatory requirements, policies, standards, and guidance.

Area of concern: System Protection:

- Define external boundaries of the system..
- Develop Enterprise architecture in consideration with security and the resulting risk.

Area of concern: Training:

- Provide basic security awareness training to all system users before authorizing access to the system.
- Review the effectiveness of security awareness training at least once a year..

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](#) team conducted a [industrial assessment](#) at The Homer Laughlin China Company, Newell WV under IAC program.
- [WVU-IAC](#) team conducted an [energy efficiency study](#) on manufacturing equipment at Level 1 Fastners, Huntington WV.
- [WVU-IAC](#) team conducted a [industrial assessment](#) at Mister Bee Potato Chips Co, Parkersburg WV under P2 and USDA program.
- [WVU-IAC](#) team conducted a [industrial assessment](#) at EMI Corporation, Jackson Center OH under IAC program.
- [WVU-IAC](#) team conducted a [industrial assessment](#) at Goldsmith & Eggleton Inc, Wadsworth OH under IAC program.

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 \(NxEAT\)](#)

Peer-Reviewed Papers Published through Assessment Inspired Research

- 1) Chowdhury, S.K., Nimbarte, A.D., Hsiao, H., Gopalakrishnan, B., and Jaridi, M., [A Biomechanical Shoulder Strain Index Based on Stabilizing Demand of Shoulder Joint](#), Journal of Ergonomics, DOI: 10.1080/00140139.2018.1499967, 2018.
- 2) Hasan H. Latif, Bhaskaran Gopalakrishnan, Ashish Nimbarte, Kenneth Currie, [Sustainability index development for manufacturing Industry](#), Sustainable Energy Technology and Assessments Journal, <https://doi.org/10.1016/.seta.2017.01.010>, 2017.
- 3) Kanneganti, H., Gopalakrishnan, B., et al., [Specification of Energy Assessment Methodologies to Satisfy ISO 50001 Energy Management Standard](#), Sustainable Energy Technology and Assessments, Vol. 23, pp. 121-135, 2017.

The Team of IAC

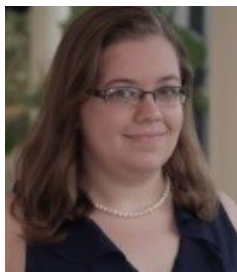


Dr. Bhaskaran Gopalakrishnan
Director, WVU-IAC
Website: [Dr. Gopala](http://Dr.Gopala)
Email: hgopalak@mail.wvu.edu
Phone Number: 304-293-434



Dr. Ashish D. Nimbarte
Asst. Director, WVU-IAC
Email: ashish.nimbarte@mail.wvu.edu
Phone Number: 304-293-434

Students



Ms. Alexandra Davis
Lead Student



Mr. Josage Chathura Perera
Co- Lead Student



Mr. Vivek Komarina
Research Assisstant II



Mr. Omar Al-Shebeeb



Mr. Goutham Kumar Reddy Challa



Mr. Kyle Gillis



Ms. Rupa Das



Mr. Pradyumna Bettagere Jagadish



Mr. Pavan Kumar Koppula



Mr. Unique Karki



Mr. Muztoba Ahmad Khan