



# Newsletter

## Executive Information

The work described in this newsletter is for the period of 05/01/2021 to 7/31/2021 based on the activities of the West Virginia University Industrial Assessment Center ([WVU-IAC](#)). The center supports and carries out 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 improvements” through structured on-site 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) across the state of WV.

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*Dr. Bhaskaran Gopalakrishnan along with the students at the industrial assessments.*

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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 collect data from facilities about various energy consuming equipment and model the facility in terms of energy and resource usage. 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 are 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](#)

### WV Office of Energy Sponsored Energy Assessments (WVOE):

This program caters to all businesses and government organizations in West Virginia. Activities include energy assessment and benchmarking. The assessments are provided at no cost to the businesses and organizations.

Recent assessments in West Virginia include those conducted for an automotive stamping and sub-assembly, a plastic injection molding company, a metal fabrication company, and an OEM distribution and vibratory equipment manufacturer for the mineral industry. We sincerely thank [Ms. Karen Lasure](#), Program Manager at WVOE for continued support.

### U.S. EPA Pollution Prevention (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](#) offers Technical Assistance and Training Programs for the food and beverage manufacturing and processing facilities, and the Metal Manufacturing 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 manpower use. The data and inputs from the facility personnel 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 contains several recommendations concerning

- Energy efficiency
- Water and material waste reduction

- Lean implementation
- Air Pollutants 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 businesses 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**

- [WVU-IAC](#) will receive a proposed \$2.19 million in total project funding for the next five years to accomplish that and to train the energy workforce of tomorrow.
- Eleven on-site assessments have been completed during this cycle under IAC, P2, and USDA programs.
- [Dr. Ashish Nimbarte](#), Assistant Director of [WVU-IAC](#) has been named interim chair of the [Industrial And Management Systems Engineering](#) effective August 1, 2021.
- [WVU-IAC](#) students received certificates from [U.S Department of Energy](#).
- [WVU-IAC](#) student [Akash Rajesh Mehta](#) started a new position as Process Improvement Engineer at American Builders Supply.

## Recommendations from On-site Assessments

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

### Sample Recommendations

#### **IAC Assessment Recommendation (West Virginia)**

##### **Preheat the Charge Using Flue Gas from Exhaust of Furnace**

The facility has seven hot-stamping furnaces that does not have any preheat zone to preheat the charge material. It is recommended to install a heat exchanger and necessary ductwork to preheat the charge before entering the furnace using the flue gas from the exhaust of the furnace, thereby reducing the natural gas consumption and cost.

**Energy Savings:** 2,677,938 kWh/yr Electricity consumption is reduced as a result 5,864,684 lbs of CO<sub>2</sub> emission is reduced.

**Total Savings per year:** Energy Cost Savings: \$239,770/yr.

**Implementation Cost:** \$208,058

**Payback Period:** 11 months.

#### **IAC Assessment Recommendation (West Virginia)**

##### **Install Variable Frequency Drives on Hydraulic Motors**

The facility has nine hydraulic motors on the injection molding machines that have a single speed drive. It is recommended to replace the single frequency drive with a variable frequency drive (VFD) on the hydraulic motors, thereby reducing the electrical energy consumption and cost.

**Energy Savings per year:** 2,772,008 kWh/yr Electricity consumption is reduced as a result 6,070,698lbs of CO<sub>2</sub> emission is reduced.

**Implementation Cost:** \$88,353

**Total Savings per year:** Energy Cost Savings: \$199,765/yr

**Payback Period:** 6 months.

### **IAC Assessment Recommendation (Maryland)**

#### **Install Variable Speed Drives on the Chiller Compressors**

The facility thirteen chiller compressors that run on single speed drives. It is recommended to replace the single speed drives on all thirteen chiller compressors with variable frequency drive (VFD) that will help to increase the part-load efficiency of the chiller compressors and consequently reduce the electrical energy consumption by the chiller compressors.

**Energy Savings:** 2,213,126 kWh/hr Electricity consumption is reduced as a result 4,846,746 lbs of CO<sub>2</sub> emission is reduced.

**Implementation Cost:** \$434,645

**Total Savings per year:** Energy Cost Savings: \$124,837/ yr

**Payback Period:** 42 months

### **USDA Assessment Recommendation (West Virginia)**

#### **Replace The Old Laundry Finishing Tunnel With An Energy Efficient Unit To Improve Productivity**

The facility uses an old-fashioned laundry finishing tunnel that uses steam from boilers to finish the clothes at the end of the laundry process. It is recommended to replace the old laundry finishing tunnel with energy efficient units to reduce the energy consumption and improve productivity.

**Energy Savings:** 64,182 kWh/yr Electricity consumption, and 1,994 MMBtu/yr Natural Gas consumption is reduced as a result 140,559 lbs of CO<sub>2</sub> emission is reduced

**Implementation Cost:** \$89,721

**Total Savings per year:**\$21,809/yr

**Payback Period:** 7 months.

### **USDA Assessment Recommendation (West Virginia)**

#### **Replace The Natural Gas Boilers With Instantaneous Water Heaters**

The facility has two natural gas boilers to deliver a constant supply of hot water throughout the building spaces. It is recommended to reaplce the natural gas boilers with instantaneous water heaters in the facility, thereby reducing the consumption of energy.

**Energy Savings:** 1,783 MMBtu/yr Natural Gas consumption, and 103,809 kWh/yr Electricity consumption is reduced as a result 227,342 lbs of CO<sub>2</sub> emission is reduced.

**Implementation Cost:** \$22,003

**Total Savings per year:** Energy Cost Savings: \$18,632/yr

**Payback Period:** 14 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 Industrial Control Systems Cyber Security Assessment Tool. 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 (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 concentration: People:**

- Work with your vendor to determine how strong their internal security practices are and whether or not their remote access is a risk for your plant. Consider implementing an enhanced login procedure for vendors to be able to access systems remotely.
- Critical equipment should be protected with firewalls, secure hardware that does not allow for memory transfer with USBs or other external media devices, and alarms that sound when operating under unusual parameters.
- Speak with your vendors about their cybersecurity training, practices, and certifications. Consider adding a clause requiring cybersecurity training in future contracts with vendors.
- Develop training procedures for vendors who work on-site that inform them about cybersecurity best practices. You could also develop guidelines on what equipment vendors are allowed to bring into your facility/plant to increase on-site security.

#### **Area of concentration: Process**

- Work with your plant manager to create a central repository, containing information on all IT systems and ICS. Consider maintaining this resource offline, separate from the plant's IT system (i.e., on an isolated computer, on a mainframe, or in a physical file), to ensure that information remains accessible when the IT system is shutdown during a cyberattack or system outage.
- Explore which, if any, software programs have the ability to schedule automatic scanning of equipment and select those settings.
- Consider restricting the use of external media devices for cybersecurity issues to reduce contamination.

#### **Area of concentration: Technology:**

- Install firewalls to control data flow between different machinery components and ICS computers.
- Ensure that remote connections are made using a virtual private network or VPN. Consider implementing an enhanced login procedure for vendors to be able to access systems remotely.
- Regularly scan PCs for malware and viruses. For added protection, consider isolating the PCs from internet and email to avoid outside contamination .



## Center Activities.

[WVU-IAC](#) has conducted assessments in West Virginia and Maryland having the following NAICS codes.

NAICS Code	State
332119	WV
326199	WV
423510	WV
333131	WV
336390	MD
424490	MD
236210	WV
812320	WV
325411	WV
322130	WV

## 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 \(NxEAT\)](#)

## Student Activities:

- New students Ms. [Fabiha Islam](#), Mr. [Nahian Ismail Chowdhury](#) and Mr. [Yugesh Dhungel](#) have joined [WVU-IAC](#) in May 2021.

## 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 WVU-IAC



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