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West Virginia University

Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

Newsletter

Executive Information

The work described in this newsletter is for the period of 09/01/2019 to 01/31/2020 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, WV Office of Energy grants, 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.

Inside this issue

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

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

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 medium-sized manufacturers. A team of students and professors conduct the engineering measurements in assessing how each facility utilizes energy and other 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 from the date of the assessment 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.

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 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 sixty days from the on-site P2 assessment. The report contain several recommendations concerning

- Energy Efficiency
- Water and Material Waste Reduction
- Lean Practices
- Greenhouse Gas Emissions

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

Based on 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

- Twelve on-site assessments have been completed during this cycle under IAC, P2, and USDA programs.
- WVU-IAC students received certificates from U.S Department of Energy.
- Gage Donovan (BSIE student), Vivash Karki (MSIE student) and Houssem Younes (MSESE student) have joined WVU-IAC in Fall 2019.
- Akash Mehta, Saroj Lamichane (MSIE students) and Autumn Richards (BSIE student) have joined WVU-IAC in Spring 2020.
- WVU-IAC student Pradyumna Bettagere Jagadish joined as Associate Engineer-Energy Efficiency Co-Op position at Eversource Energy.
- WVU-IAC student Alexandra Davis started a new position as Post-Master's Research Associate at Oak Ridge National Laboratory.
- WVU-IAC student Josage Chathura Perera joined as Pre-Master's Research Associate at Oak Ridge National Laboratory.

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 developed several energy efficiency , lean, waste, water and smart manufacturer recommendations to improve the functionality of the manufacturing facilities.

Sample Recommendations

IAC Assessment Recommendation—Huntington, WV

Install Smart Sensors to Shut Off the Fume Hoods During the Weekends

Install smart sensors to shut off the fume hoods during the weekend and adjust the Heating, ventilation, and air conditioning (HVAC) system according to the demand. The recommendation will reduce the cost of running fume hoods and the equipment .

Energy Savings: 462,882 kWh/Year, Electricity consumption is reduced as a result 1,013,712 lbs of CO_2 emission is reduced.

Total Savings per year: Energy Cost Savings: $32,679/Year

Implementation Cost: $11,750

Payback on Investment Period: 5 months.

IAC Assessment Recommendation—Morgantown, WV

Implement automatic modulation of Variable-frequency drive's in filtrate pump stations

Install Variable-frequency drives on the pumps in the pumping stations to improve modulation of their energy use and save energy .

Implementation Cost: $10,000

Energy Savings per year: 132,631kWh/Year, Electricity consumption is reduced as a result 290,462 lbs of CO_2 emission is reduced.

Total Savings per year: Energy Cost Savings: $5027/Year.

Payback on Investment Period: 24 months.

IAC Assessment Recommendation—Prichard, WV

Install Doors for the Oven Entry and Exits on Filter Production Lines

Install doors on the entry and exit of the oven on the filter production lines. The door will prevent heat from escaping the oven and prevent infiltration, thus reducing energy usage.

Energy Savings: 2,514 MMBtu/Year, Natural Gas consumption is reduced as a result 284,082 lbs of CO_2 emission is reduced.

Implementation Cost: $12,580

Total Savings per year: Energy Cost Savings: $14,254/ Year.

Payback on Investment Period: 11 months

U.S EPA P2 Assessment Recommendation—Parkersburg, WV

Install Make-Up Unit to the Kettle Fan

Install make-up air unit for kettle fan to reduce heating and cooling load on Heating, ventilation, and air conditioning (HVAC) unit.

Energy Savings: 61 MMBtu/yr Natural Gas consumption, and 395 kWh/Year, Electricity consumption is reduced as a result 7,324 lbs of CO_2 emission is reduced.

Implementation Cost: $1900

Total Savings per year: Energy Cost Savings: $507/Year.

Payback on Investment Period: 45 months.

U.S EPA P2 Assessment Recommendation—Bruceton Mills, WV

Recover Carbon Dioxide from the Fermentation Process

Recover carbon dioxide from the beer fermentation process and use it for carbonization and packaging and other in-house uses .

CO_2 Produced : 54lbs/week

Implementation Cost: $10,000

Total Savings per year:$2,808/Year.

Payback on Investment Period: 12 months.

WVOE Assessment Recommendation—Clarksburg, WV

Install a Condensing Turbine/Generator for On-Site Electricity Generation from Waste Heat

Install a waste heat boiler and a condensing turbine/generator system to utilize the waste heat from the compressor burner for on-site electricity generation. This measure will result in electrical power generation at a very low cost. DOE's BestPractices software Steam System Modeler Tool (SSMT) was used to calculate the quantity of power generation using steam turbines.

Electricity Produced : 1325 kW/hour.

Implementation Cost: $3,00,900

Total Savings per year:$1,099,517/Year.

Payback on Investment Period: 33 months.

WVOE Assessment Recommendation—Clarksburg, WV

Install a PLC-based Control System to Improve Operation of Reboiler

Install Programmable Logic Controller (PLC) based automated control system to reduce the energy consumption of the reboiler. This measure will result in the reduction of idle operation time of the boiler thus saving natural gas.

Energy Savings: 3,080 MMBtu/Year, Electricity consumption is reduced as a result 348,040 lbs of CO_2 emission is reduced.

Implementation Cost: $7,000

Total Savings per year:$9,240/Year.

Payback on Investment Period: 10 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 (ICS CSAT). The tool promotes awareness of cybersecurity risk areas associated with Industrial Control Systems 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 ICS CSAT Tool.

Area of concentration: People:

- Develop training procedures for employees that inform them about cybersecurity best practices.
- Assign and train staff to respond to a cybersecurity event to help avoid downtime and repair costs that represent the largest expenditures.
- Work with your vendor to determine how strong their internal security practices are and whether their remote access is a risk for your plant. Consider implementing an enhanced login procedure for vendors to be able to access systems remotely .
- 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

- Engage a cross-functional team to develop a cyber incident response procedure that outlines roles, responsibilities, and necessary training for the team to respond to cybersecurity events.
- Run or install software to scan equipment for cybersecurity issues. Where possible, select settings for routine and automatic scheduling of these scans.
- 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 students attended "The Governor's Energy Summit" held in Roanoke, WV.
- WVU-IAC team attended the "2019 TransTech Energy Business Development Conference" held in Canonsburg, PA.
- WVU-IAC team conducted a industrial assessment at a metal fabrication facility in Brookville, PA
- WVU-IAC students attended "World Energy Engineering Congress" held in Washington, DC.
- WVU-IAC conducted "Energy Efficiency, Productivity Improvement, and Pollution Prevention (P2)" workshop in Vienna, WV .
- WVU-IAC team conducted a industrial assessment at a water treatment facility in Morgantown, WV.
- WVU-IAC conducted "Energy Efficiency, Productivity Improvement, and Pollution Prevention (P2)" workshop in Huntington, WV .
- WVU-IAC team conducted a industrial assessment at a engine filtration and vehicle suspension manufacturing facility in Prichard, WV.
- WVU-IAC team conducted a industrial assessment at a electrical wire harness and seating systems manufacturing facility in Dublin, VA.
- WVU-IAC team conducted a industrial assessment at a automated tank gauge monitoring device manufacturing facility in Duncansville, PA.
- WVU-IAC team conducted a industrial assessment at a vacuum technology solutions manufacturing facility in Jefferson Hills, PA.

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	USDA	EPA
WV ASHRAE	Oakridge National Laboratory	WV DEP
WV MEP		

The Team of IAC

Dr. Bhaskaran Gopalakrishnan
Director, WVU-IAC
Website: Dr. Gopala
Email: bgopalak@mail.wvu.edu
Phone Number: 304-293-434

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

Students

Mr. Unique Karki
Lead Student

Ms. Rupa Das
Co– Lead Student

Mr. Pradyumna Bettagere Jagadish

Mr. Vivash Karki

Mr. Akash Mehta

Mr. Josage Chathura Perera

Mr. Saroj Lamichane

Mr. Pavan Kumar Koppula

Ms. Autumn Richards

Mr. Gage Donovan