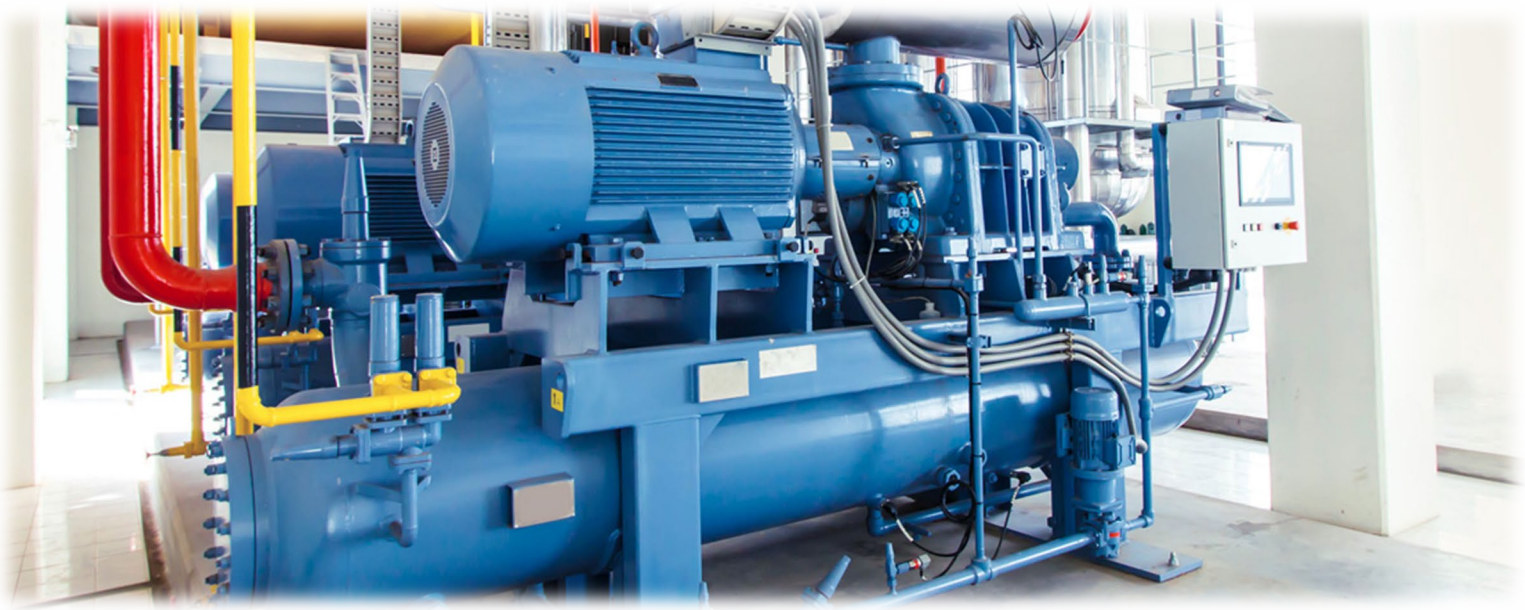
WVU POLLUTION PREVENTION NEWSLETTER

FEBRUARY 2025

INDUSTRY FOCUS: COMPRESSORS & COMPRESSED AIR SYSTEMS

Welcome to the latest edition of the WVU Pollution Prevention Newsletter! In this issue, we are excited to introduce the dedicated members of the WVU Pollution Prevention Team, committed to environmental stewardship. Explore valuable insights as we share best practices for enhancing energy efficiency and reliability and reducing operating costs of compressors and compressed air systems in industrial facilities. Lastly, discover the range of services we offer to support Small and Medium-sized Enterprises and businesses throughout West Virginia. Stay informed, inspired, and engaged with our commitment to environmental excellence and community impact.

FEATURED IN THIS EDITION



WHAT IS POLLUTION PREVENTION

Pollution Prevention (P2) is one of the key approaches towards an initiative to improve the energy efficiency and productivity of key industries while prioritizing environmental sustainability. The initiative focuses on reducing or preventing pollution at its source.

The primary objective of our Pollution Prevention program is to provide technical assistance to Small and Medium Enterprises in **key industries** and within **disadvantaged communities** in West Virginia by assisting with identification, development, and implementation of P2 methods. The recommendations provided to the industries are designed to help the business lower operational costs by reducing expenditures, water and energy usage, waste, and disposal costs, while at the same time maintaining and often improving productivity.

Key Industries:

1. Food and Beverage Manufacturing and Processing
2. Chemical Manufacturing, Processing, and Formulation
3. Automotive Manufacturing and Maintenance
4. Aerospace Product and Parts Manufacturing and Maintenance
5. Metal Manufacturing and Fabrication

OUR SERVICES

1. **Pollution Prevention Assessments:** The project team will make a planned visit to your facility to assess and gather data on energy, water, material, and personnel use. Assessment data along with input from the facility managers will be used to develop P2 recommendations. A detailed report based on the findings will be submitted to the facility shortly after the on-site assessment.

2. **Energy Audits/Assessments:** Applying for a USDA-REAP grant and need an assessment? Want to save money? The project team will visit your facility and identify opportunities to improve energy efficiency. A detailed report will be provided to the business, including estimates of implementation costs, energy use savings, energy cost savings, and simple payback period for each identified opportunity.

3. **Training Workshops:** Training workshops will be conducted to help businesses learn P2 Best Practices, tools, techniques, and resources available, and how to modify their process or site to improve energy efficiency, productivity, and environmental sustainability.

4. **Technical Assistance:** The project team can provide on-site or off-site technical assistance on a variety of industrial concerns related to topics including pollution prevention, energy efficiency, sustainability, environmental impact, and process improvement. Contact us for assistance!

5. **USDA-REAP Application Assistance:** Applying for grant funding can be a challenge, especially for the small businesses that do not have an expert at grant-writing on the payroll. Our project team can help you navigate the application process and assist with completing the application for USDA-REAP funding.

P2 INDUSTRY FOCUS

Tips for Energy Efficiency in Compressors & Compressed Air Systems

Air compressors are inherently energy-inefficient devices, with efficiencies that range from about 10% to 20%. The remaining 80% - 90% of the energy is lost as heat. Therefore, compressed air should be treated as a valuable resource.

- **Eliminate Unnecessary Use of Compressed Air:** Compressed air should only be used when necessary. For tasks such as blowing, sparging, aspirating, personal cooling, and padding – where low-pressure air is sufficient – it is more efficient and sustainable to use alternatives like blowers and electric fans. These options will significantly reduce energy consumption while meeting operational requirements effectively.

- **Periodically Re-Assess and Optimize Operating Pressures:** In many cases, air compressors are operated at pressures higher than what the air-driven process equipment requires. Achieving and maintaining pressures that are higher than necessary represents a significant waste of energy. By evaluating the system's pressure requirements and reducing the compressor's operating pressure to match the actual demand, significant energy savings can be achieved.

  It's important to re-evaluate your needs periodically, as processes, equipment, demand, and workload can change over time, affecting the operating pressure needs. Periodic re-assessment and optimization of operating pressures will minimize energy use while maintaining process quality.

- **Switch to Synthetic Lubricants for Air Compressors:** Most compressors currently rely on petroleum-based lubricants. Switching to synthetic lubricants – when compatible with the process – will have many benefits:
  - Improved energy efficiency
  - Fewer oil changes
  - Improved performance in extreme conditions
  - Increased air compressor lifespan
  - Lower flammability

  Replacing petroleum-based lubricants with synthetic alternatives can achieve energy savings of approximately 3% to 7%, contributing to both operational efficiency and sustainability.

- **Utilize Outside Air for Compressor Intake:** Compressors generate a significant amount of heat. Nearby equipment may also generate heat. Compressors run more efficiently when intake air is cooler. When outdoor air is cooler than indoor air, utilizing outdoor air for air compressor intake can improve efficiency – typically by 3-5% for every 18°F (10°C) decrease in intake air temperature. This simple change improves efficiency, reducing energy use and lowering operating costs.

- **Locate and Repair Compressed Air Leaks:** Compressed air leaks are wasted energy. With the low inherent efficiency of compressors. Even a small leak can have a significant cost, with larger leaks potentially costing upwards of $20,000 per year in wasted air. Systems with multiple leaks can be even more costly. The additional run-time on the compressor will also reduce its lifespan.

  Furthermore, finding and correcting the leaks is relatively easy and inexpensive. A basic ultrasonic leak detector is an affordable and easy to use tool to identify these leaks.

HIGHLIGHTING OUR IMPACT

The WVU Pollution Prevention (P2) team takes great pride in the impact we have within the borders of West Virginia since January of 2023. From energy savings to CO_2 reduction, the recommendations we develop for these businesses not only help these businesses improve their sustainability, but also their bottom line!

Look at the impact of the opportunities we have found! →

27 Energy Efficiency/P2 Assessments

57 Recommendations

With Annual Savings of…

$513,309 in Energy Costs

3,672 MWh of Electricity

12,452 MMBtu of Natural Gas

3,153 Metric Ton CO_2 Equivalent

UPCOMING EVENTS

Webinar: P2 Series – Pollution Prevention Best Practices for Aerospace Product and Parts Manufacturing and Maintenance Industry
March 31, 2025 @ 12:00 – 1:00 PM EST

Topic: Save money AND the environment with these Pollution Prevention Best Practices for the Aerospace Product and Parts Manufacturing and Maintenance Industry. Part 4 of a 5-part series.

Register Here **or use the QR Code!**

Webinar: P2 Series – Pollution Prevention Best Practices for the Metal Manufacturing and Fabrication Industry
April 28, 2025 @ 12:00 – 1:00 PM EST

Topic: Save money AND the environment with these Pollution Prevention Best Practices for the Metal Manufacturing and Fabrication Industry. Part 5 of a 5-part series.

Register Here **or use the QR Code!**

THE P2 TEAM

Faculty & Staff

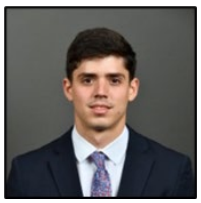
Dr. Ashish Nimbarte
PhD, PE, CEM
Principal Investigator

Dr. Christopher Moore
PhD, CEM
Project Manager, Co-PI

Dr. Imtiaz Ahmed
PhD

Dr. Avishek Choudhury
PhD

Students



Juan Marino

Sagar Timilsina

Akshay Patel

Tilak Bhusal

Ryan Stas

Aastik Sharma

Shihab Ullah

Aman Dhakal

Ummul Farah

Sagar Panthi

Sterly Pauliscat

CONTACT US

ASHISH NIMBARTE, PHD, PE, CEM
Principal Investigator, Department Chair
Industrial and Management Systems Engineering, WVU
Email Address: ashish.nimbarte@mail.wvu.edu

CHRISTOPHER MOORE, PHD, CEM
Co-PI, Project Manager, Research Associate
Industrial and Management Systems Engineering, WVU
Email Address: chris.moore@mail.wvu.edu

P2 Website

Inquire about Services

Questions or Comments?