

WVU POLLUTION PREVENTION NEWSLETTER

OCTOBER 2025

ADVANCING ENERGY EFFICIENCY: HVAC OPTIMIZATION AND COMBINED HEAT & POWER (CHP) SYSTEMS

Welcome to the October edition of the WVU Pollution Prevention Newsletter! This issue explores two key energy efficiency strategies for shaping a sustainable industry: **HVAC system optimization** and **Combined Heat and Power (CHP) technologies**. Discover how modern HVAC systems, equipped with smart controls and efficient design, can reduce energy use, enhance comfort, and improve air quality across facilities. Learn how CHP systems integrate power and heat generation to achieve higher efficiency, fuel flexibility, and lower emissions. Together, these initiatives advance West Virginia's commitment to cleaner, more productive, and energy-smart manufacturing. Stay connected as we continue driving innovation for a sustainable future.

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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** in West Virginia by assisting with the identification, development, and implementation of P2 methods. The recommendations provided to industries are designed to help businesses lower operational costs by reducing expenditures, water and energy usage, waste, and disposal costs, while 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.

POLLUTION PREVENTION FOCUS

ENERGY-EFFICIENT HVAC & BUILDING SYSTEMS FOR SMART AND SUSTAINABLE FACILITIES

The HVAC and Building Systems Optimization focuses on enhancing comfort, improving air quality, and optimizing energy efficiency across industrial facilities. HVAC systems often account for around **30% of a facility's total energy use** ([U.S. Department of Energy, 2024](#)), making them one of the most significant opportunities for cost savings and emissions reduction.

Modernizing HVAC systems with high-efficiency equipment, smart controls, and proper maintenance can reduce energy use by **20–30%** while enhancing safety, productivity, and sustainability.

Focus on NEAs

- **Food & Beverage Manufacturing** – Stable temperature and humidity control ensure product quality and food safety. Energy-efficient HVAC systems also minimize heat loss during refrigeration and process operations.
- **Chemical Manufacturing & Processing** – Right-sized equipment and improved ventilation help maintain consistent environmental conditions, essential for process integrity and worker safety.
- **Automotive Manufacturing & Maintenance** – Zoned and occupancy-based HVAC systems reduce unnecessary operation in low-use areas and improve worker comfort in active assembly zones.
- **Aerospace Manufacturing & Maintenance**– Maintaining controlled temperature, humidity, and airflow in assembly and inspection areas ensures precision, protects sensitive components, and supports accurate fabrication.
- **Metal Manufacturing & Fabrication** – High-efficiency HVAC units and sensor-based ventilation manage high heat loads while maintaining indoor air quality and safety.

Key Strategies for Efficiency

- **Conduct System Audits:** Evaluate current HVAC performance, duct condition, and control settings to identify inefficiencies.
- **Right-Size Equipment:** Avoid oversized systems that waste energy by matching capacity to actual load requirements.
- **Use Air-Side Economizers:** Leverage outdoor air for free cooling when conditions permit.
- **Implement Smart Controls:** Apply occupancy sensors, scheduling, and variable-speed drives (VSDs) to reduce energy during low-occupancy periods.
- **Enhance Building Envelope:** Improve insulation, seal air leaks, and use energy-efficient windows and doors to reduce HVAC load.
- **Maintain Regularly:** Clean filters, coils, and ducts to ensure proper airflow and heat exchange.
- **Recover Waste Heat:** Capture exhaust or process heat for pre-heating fresh air or water where feasible.

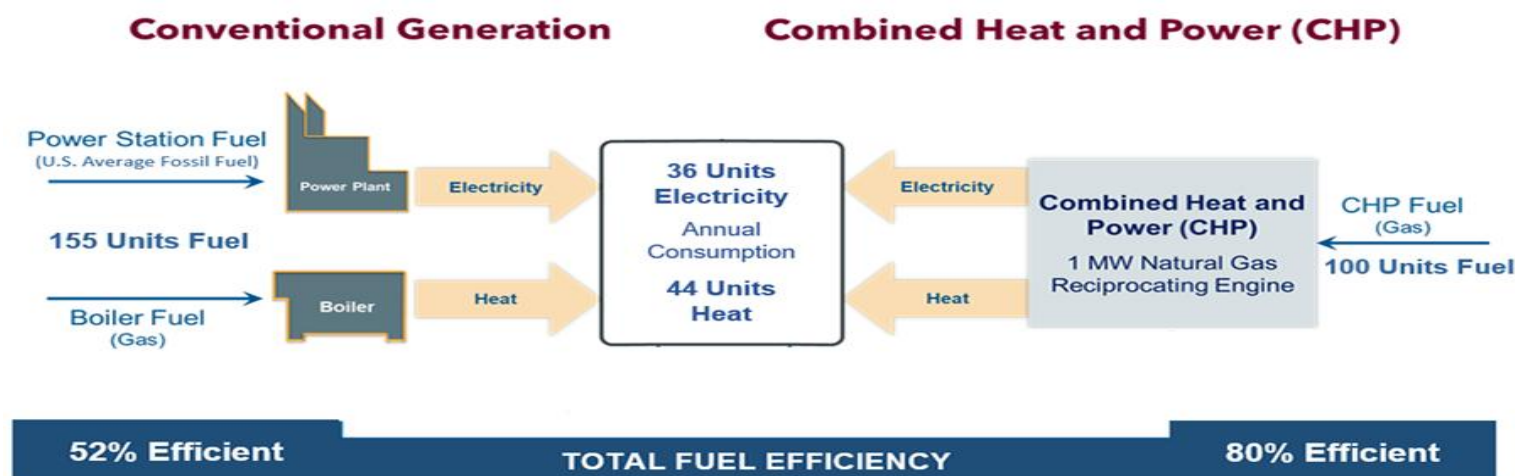
Why It Matters

HVAC optimization directly supports safety, comfort, and sustainability goals. Adopting efficient technologies could provide approximately 10% energy savings ([U.S. Department of Energy, 2024](#)) for commercial buildings, lowering both operating costs and emissions.

For further information, visit our [Website](#).

COMBINED HEAT AND POWER (CHP) - ADVANCING ENERGY EFFICIENCY AND SUSTAINABILITY ACROSS WEST VIRGINIA

CHP, also known as **cogeneration**, according to the [U.S. Department of Energy \(DOE\)](#), CHP is “the concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy.” Unlike central station generation (which transmits electricity across the grid and then uses separate boilers/furnaces for heat), CHP is typically located on-site or near load, so electrical and thermal integration yields improved efficiency, reduced transmission/distribution losses, and lower fuel consumption.



Fuel Flexibility: CHP systems can operate using a variety of fuels, and part of the evolving strategy is to emphasize fuel flexibility for decarbonization. Typical fuel categories include:

- **Natural Gas:** the most widely deployed fuel in the U.S. CHP market.
- **Renewable Natural Gas (RNG) / Biogas:** derived from landfill, wastewater treatment, and agricultural residues.
- **Biomass:** e.g., wood chips, residues, forestry byproducts relevant in timber/wood product regions.
- **Hydrogen or Hydrogen Blends:** emerging technology enabling low- or zero-carbon fuel input.
- **Other fuels** (less common): e.g., waste fuels, syngas, fuel-cell-based systems in specialized circumstances.

Why It's Particularly Important for West Virginia:

Resource and Industrial Context: West Virginia has significant natural-gas infrastructure (Marcellus, Utica, Rogersville shale plays) and existing industrial thermal loads (paper, wood products, metals, chemicals). A [study](#) titled “*The Case for Promoting Utilization of West Virginia’s Vast Natural Gas through CHP Facilities*” underscores the state’s opportunity to stimulate natural-gas demand via CHP to stabilize prices and support economic development.

Technical Potential: The DOE’s state-by-state analysis indicates that West Virginia has approximately 929 MW of technical CHP potential across around 1,630 candidate sites, yet only about 277 MW ($\approx$ approximately 30%) is installed/operational. This gap suggests a large market opportunity for businesses, institutions, utilities, and developers.

Economic and Regulatory Environment: West Virginia benefits from favorable fuel prices, existing gas pipelines, relatively underserved industrial and commercial heat/electric loads, and potential for incentives or technical assistance via the [Mid-Atlantic CHP Technical Assistance Partnership \(TAP\)](#).

Fuel Diversification Opportunity: While many CHP installations today in West Virginia will use natural gas, there is growing potential for biomass (wood residues), and landfill/wastewater biogas, which is plentiful in the Appalachian region. This fuel diversification supports local waste management and renewable energy goals, aligning with decarbonization strategies.

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 CO₂ 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! →

31 Energy Efficiency/P2 Assessments

67 Recommendations

With Annual Savings of...

\$556,774 in Energy Costs

3,908 MWh of Electricity

13,448 MMBtu of Natural Gas

3,366 Metric Ton CO₂ Equivalent

CONTACT US

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P2 Website



Inquire about or services



Questions or Comments?

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