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How Compressed Air System Improvements Save Businesses Money

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Manufacturers, food producers, healthcare companies and more rely on compressed air systems. Upgrades can improve efficiency and save you big on energy costs.

Compressed air systems are more common than you'd think.

Compressed air systems are more common than you'd think. Many businesses—manufacturers, food and beverage producers, pharmaceutical companies, healthcare, construction and more—rely on compressed air in daily operations, whether for powering pneumatic lifts, operating lab equipment, or sealing bottles and cans.

Though electricity consumption varies by industry and individual operations, compressed air systems generally eat up 10%–30% of total electricity usage, according to the U.S. Department of Energy (DOE).[1] They are "one of the most expensive sources of energy" in industrial plants, and their on-site systems require maintenance and upkeep.

Why? For all their utility, compressed air systems are prone to inefficiencies. Air leaks, old equipment, poor design, infrequent maintenance and even poor air quality rob businesses of the energy they pay for.

(Not to mention all the time and energy they rob from owners, when they find themselves dealing with broken-down, outdated compressed air systems.) Considering energy losses month to month, the costs stack up, creating a drag on your business that can be just as bad as breakdowns or slowed production.

Fortunately, upgrades to compressed air systems are a key energy-saving opportunity. The U.S. DOE estimates improving the efficiency of a compressed air system can reduce electricity usage by 20%–50%.[2] Here is a brief guide to common sources of inefficiencies in compressed air systems—along with solutions that will benefit your business. We also highlight one PECO customer's success story: Lavazza, a coffee product manufacturer, which upgraded its production facilities, saving $278,490 annually in energy costs and receiving a $210,360 incentive from PECO Ways to Save to cover the project cost.

Common Sources of Inefficiencies in Compressed Air Systems

PROBLEM 1: Air Leaks

Compressed air systems, especially older ones, tend to develop leaks. Leaks can account for 20%–30% of the total compressed air production at an industrial facility. These leaks can occur anywhere in the system, though some of the most common problem areas are couplings, hoses, tubes, fittings, pipe joints, quick disconnects and point-of-use devices.[3]

SOLUTION: Regular Leak Detection & Repair

Modern ultrasonic acoustic detectors recognize high-frequency hissing sounds that are caused by leaks in compressed air systems. Portable units are small and effective, though costs and sensitivities vary. Routine leak detection with one of these units—and fixing any found leaks promptly—can limit losses, improve system performance and lower energy costs.

PROBLEM 2: Inadequate Air Treatment

Not all compressed air systems use the same air quality level. Levels of particulate, moisture and lubricant contaminants must match their end use; even when appropriate, lower air quality can increase wear and tear on compressors and systems. It's a fine line to walk, though: Overtreating air can cause inefficiencies, too. And dryers and filters, while important for some applications, can create pressure drops and increase a system's energy draw.[4]

SOLUTION: High-Efficiency Air Treatment

Installing dryers and filters that are appropriately sized for their application is key to energy savings. If it's not required, don't filter the entire airflow. Dryers should be sized to the maximum anticipated rate of airflow and matched to air quality requirements, since overdrying can waste energy. Regular maintenance of these air treatment elements ensures minimal pressure drops, improving performance and lowering your monthly energy bills.

PROBLEM 3: Fixed-Speed Equipment

Fixed-speed air compressors have two speeds: on or off. Because they cannot be adjusted to meet low demand, they can potentially waste energy.

SOLUTION: Variable Frequency Drives

Variable Frequency Drives, or VFDs, handle fluctuations in compressed air demand by varying the motor speed without wasting energy. That means your facility uses only the compressed air it needs, when it needs it, reducing wear and tear—and energy expenses.

PROBLEM 4: Improper System Design & Piping

Efficient system design and properly sized piping are vital for the usefulness (and energy efficiency) of compressed air systems. If your system is old or was designed without efficiency optimization in mind, you're likely wasting energy and experiencing inconsistencies in pressure.

SOLUTION: Optimized System Design

Reevaluated and redesigned systems can benefit from improved airflow, consistent pressure and reduced energy consumption. When properly sized and paired with strategically placed air receivers, your system will work better and save you money on energy bills.

PROBLEM 5: Inadequate Maintenance

Even occasional use produces wear and tear on compressed air system components such as compressors, hoses and fittings. If a system is being used daily, inadequate maintenance can become a serious issue. First, it increases energy consumption when air leaks or pressure fluctuates. Next, it adds to wear and tear through higher temperatures and poor moisture control. If prolonged, inadequate maintenance can cause unsafe working environments.

SOLUTION: Scheduled Preventive Maintenance

Most maintenance issues are not serious ones and can be fixed with some time and expertise. Establishing a preventive maintenance program that includes regular inspection, cleaning and replacement of parts can extend equipment life and reduce unexpected downtime. The maintenance of compressed air systems is not unlike work performed on cars: Keep your machines well tuned, and they'll reward you with optimal performance.

DID YOU KNOW?

Beat the Heat, Increase Energy Savings

A significant amount (some 80%) of the electric energy that goes into air compressors is lost as heat. This means that reducing your compressor's pressure settings by 2 PSIG results in a 1% energy savings.[5] Lowering your compressor inlet air temperature by 10 degrees Fahrenheit results in a 2% energy savings. So remember: It's better not to blow hot air.

PECO Customer Success Story: Lavazza

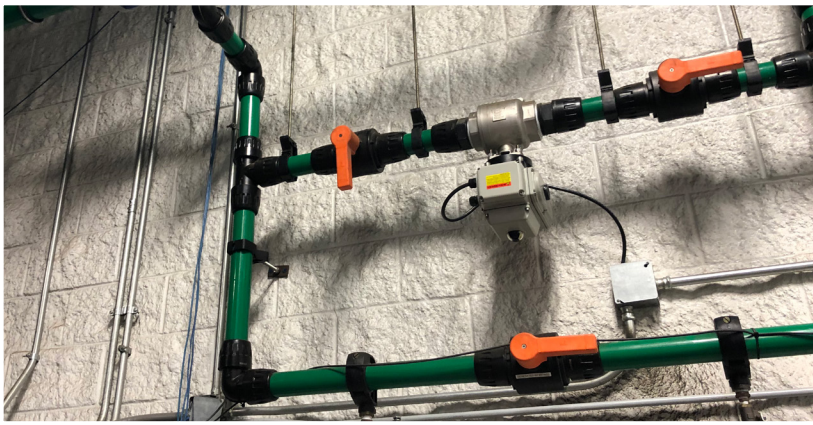
Coffee product manufacturer Lavazza had a problem: Its nitrogen compression system, used on its packaging line, accounted for 37% of the company's energy usage. For a company prioritizing sustainability, that was a big energy inefficiency.

Recently the company **worked alongside PECO** to upgrade its compressed air system. Improvements included reducing air leaks, repiping with efficiency in mind, and installing new controls systems. Taken together, the new compressed air system saves over $278,490 in estimated annual energy costs (that's 2.5 million kilowatt-hours). And because they worked with PECO, Lavazza was approved for $210,360 in incentives—enough to cover the entire cost of the upgrades.

"It was a huge opportunity for Lavazza to be more responsible with our energy use, and also just reduce our monthly spend on electricity"

—Lavazza manufacturing engineer Josh Miller

▶ Visit **peco.com/business** to learn about PECO Ways to Save incentives for compressed air system improvements.



[1] "Determine the Cost of Compressed Air for Your Plant; Industrial Technologies Program (ITP) Compressed Air Tip Sheet #1 (Fact Sheet)." Department of Energy, energy.gov/eere/amo/articles/determine-cost-compressed-air-your-plant. Accessed 2 July 2024.

[2] "Compressed Air | Better Buildings Initiative." Better Buildings Solution Center, betterbuildingssolutioncenter.energy.gov/better-plants/compressed-air. Accessed 2 July 2024.

[3] "Minimize Compressed Air Leaks; Industrial Technologies Program (ITP) Compressed Air Tip Sheet #3 (Fact Sheet)." Department of Energy, compressedairchallenge.org/data/sites/1/media/library/tipsheets/tipsheet03.pdf. Accessed 2 July 2024.

[4] Maintaining System Air Quality; Industrial Technologies Program (ITP) Compressed Air Tip Sheet #12 (Fact Sheet)." Department of Energy, compressedairchallenge.org/data/sites/1/media/library/tipsheets/tipsheet12.pdf. Accessed 2 July 2024.

[5] "Compressed Air | Better Buildings Initiative." Better Buildings Solution Center, https://betterbuildingssolutioncenter.energy.gov/better-plants/compressed-air. Accessed 2 July 2024.

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