NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Energy Efficiency for Compressed Air

Compressed air is often considered an on-site generated energy source since energy is needed to convert electricity into compressed air. It can be one of the most expensive sources of energy in a plant. Very often, the actual cost of generation is unknown. Only 10% to 20% of the energy required to generate compressed air ever reaches the point of use, while the remaining energy is wasted in the form of heat. The over-all efficiency of a typical compressed air system can be as low as 10%-15%. A study by the U.S. Department of Energy suggests that more than 50% of industrial compressed air systems could see significant energy savings through low-cost improvements. One example of this is a chemical company that found 160 leaks during a leak detection project. Fixing those leaks saved the company over $57,000! The following information includes tips to help ensure that compressors are running as efficiently as possible:

1. Reduce the pressure

Using more pressure than is required to run equipment increases energy consumption and compressed air costs. Reducing the system supply pressure in small increments can determine if a system's pressure is set higher than optimal. For every 2 psi reduction in compressor discharge pressure, compressor energy use can be reduced by 1%. Reducing pressure by 10% can lead to 5% savings in energy. Make small, incremental reductions, checking that operations are not affected.

1. Reduce the pressure by 1 PSI.
2. Take time in between to check for performance.
3. Repeat until you reach the optimal pressure with the lowest PSI as possible
4. Start saving money

2. Test for and fix leaks

As much as 20 to 30 percent of a compressor's output can be wasted through system leaks. Fortunately, a leak assessment can be very cost effective and minimizing leaks can drastically reduce system demand requirements. Identifying and repairing leaks can reduce run time, increase equipment life and reduce maintenance, as well as save energy. If you do have leaks, locate them by listening for them when the equipment is not operating or by applying soapy water to areas you suspect may have a leak and look for bubbles. In noisy environments or for a more thorough detection process, an ultrasonic detector may be needed to locate leaks.

Leaks you can't feel or hear consume $100/year of energy
Leaks you can feel but not hear consume $400/year of energy
Leaks you can both feel and hear consume $700/year of energy
A 1/8" diameter hole in a 100 psi system can cost more than $1,200/year in wasted energy!

3. Best use of compressed air

Compressed air is expensive to run and better options are available for certain jobs. If an application can be powered more efficiently by alternative methods, these methods should be identified and considered. Educate your staff NOT to use compressed air for blow offs (e.g. cleaning benches).

Tip: *Use a leaf blower to blow off benches and machinery.*

4. More efficient delivery of compressed air

If compressed air is appropriate for the job, could it be delivered more efficiently? For example, many blow guns are simply open-ended pipes: fitting a venturi-type nozzle can use 30% less compressed air and make operation much quieter, improving the work environment.

5. Switch off compressors when not in use

An idling compressor uses around 40% of its full load. Where appropriate, turn compressors off when they're not being used (e.g. during breaks, and certainly overnight), to save energy.

6. Heat recovery

As much as 80 to 90% of the electrical energy used by an air compressor is converted to heat. A properly designed heat recovery unit can recover 50 to 90% of this heat for heating air or water. Approximately 50,000 BTUs per hour are available per 100 cfm of compressor capacity when running at full load. For example, consider a 100hp compressor that generates 350cfm at full load for 75% of the year. If 50% of heat loss is recovered to heat process water, the savings, at $0.50 per therm, would be about $4,100 per year in natural gas. The most basic heat recovery is seasonal capture of waste heat for space heating applications.

7. Cooler intake air

Using cooler air, which is denser, allows compressors to use less energy to produce the required pressure. For example, if 90 degree F intake air is tempered with cooler air from another source (outside air during cooler temps) to 70 degree F, the 20 degree F temperature drop will lower operating costs by almost 3.8%.

8. Measure air use

A flow meter can be installed quickly, even when equipment is operating.

If you can't measure it…you can't manage it!

Resources:

Calculate the cost of compressed air use at your facility using this tip sheet.

Learn about compressed air energy usage and identify conservation opportunities.

The typical manufacturing facility could reduce total or system energy use by 17% by installing energy efficiency improvements with a simple payback of less than three years.

NH P NEW HAMPSHIRE POLLUTION PREVENTION PROGRAM

The New Hampshire Pollution Prevention Program is available to help with more waste reduction strategies. Please feel free to contact us at 603-271-6460 or email nhppp@des.nh.gov.

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