



TAKE ACTION TO AVOID SKYROCKETING ENERGY UNIT COSTS

A whitepaper by Summit Energy, a leading energy management firm headquartered in Louisville, KY, USA, with offices in Belgium, France, Mexico the Netherlands and the United Kingdom.



INTRODUCTION

It happens everywhere – the energy component of conversion cost skyrockets when production is scaled back. The cause is clear and avoidable. You can avoid this pitfall by taking immediate action to reduce the fixed component of energy consumption.

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Consider this recent example: A large Chicago area manufacturing facility significantly reduced production schedules. This 24/7 operation scaled back to just five full shifts per week with limited activity on five additional shifts. It was essentially a 65% reduction in output.

The following month, however, the company's electric and gas bills reflected only a 10% reduction in energy usage. Just 10%. That small reduction in energy, paired with a 65% reduction in production, resulted in an increase of 257% in energy per unit of production! Figure 1 below illustrates this relationship between production and the energy cost component.



Figure 1 – Energy Component Cost Skyrockets During Production Cut

An analysis determined that 69% of the energy consumed in October was used during plant-idle periods. That means that only 31% of the purchased energy was used during production. Imagine the financial result if 69% of the facility's labor and materials were consumed while producing nothing.

The culprit is fixed energy cost, or the energy that is consumed even when the facility is not producing. Direct labor and material costs are closely related to production. Proportional reductions in labor and materials are realized when shifts are eliminated. However, in the case of energy, a large fixed component causes much higher energy usage than anticipated when production is reduced. The operators of that Chicago area facility were convinced there was a mistake in the utility meters. Energy usage was high enough to cast doubt on the accuracy of the bill. Unfortunately, the meters were verified to be correct. They were left holding bills for energy that they did not need.



ENERGY USAGE AND PRODUCTION

Production facilities are often designed for 24/7 operation. Facility designers normally focus on meeting maximum utility requirements and give less thought to controls and methods necessary to scale back usage when the lines are idle. The result is an energy usage profile similar to that shown in Figure 2. Note the large energy requirement at zero production – that represents the fixed load.

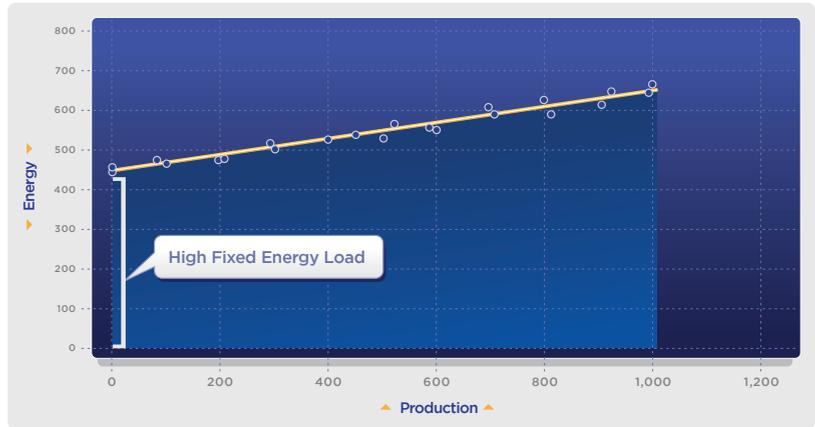


Figure 2 – Energy vs. Production with Large Fixed Energy Usage



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Manufacturing plants use labor, materials and energy to make products. All of these factors of production must be minimized during periods of low or no production. Labor and materials are often well-managed. If the facility doesn't need the labor, the workers aren't scheduled and raw materials aren't purchased. Energy usage, however, usually represents a significant opportunity to improve management of resources.

Some facilities require energy for refrigeration or freezers that will not correlate to production; in these cases, a fixed component as high as 50% may be acceptable. However, many facilities, like this example from south Florida, can make significant improvements, resulting in energy usage like that shown in Figure 3 below.

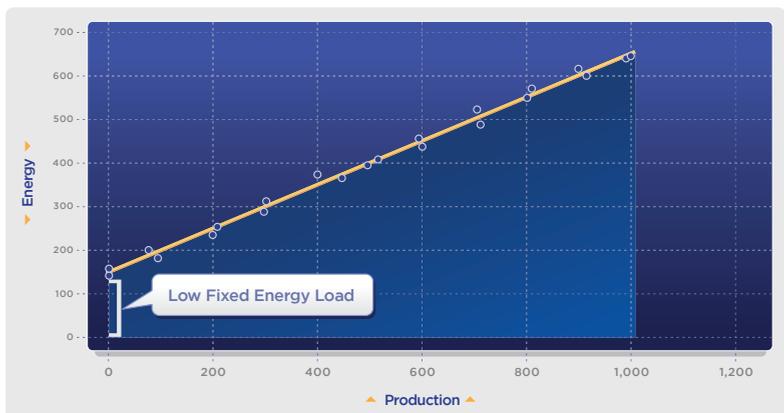


Figure 3 – Energy vs. Production with Small Fixed Component

There are several energy reduction opportunities to evaluate during idle times, including:

- Building ventilation
- Compressed air
- Lighting
- Space heating and cooling



BUILDING VENTILATION

Ventilation maintains acceptable atmosphere – people need fresh air. However, excess ventilation serves no useful purpose and can cause energy waste by heating or cooling large amounts of outside air. The key is to know your ventilation requirements and exactly meet them. No more, no less.

Demand controlled ventilation is best in office areas. In this case, sensors monitor carbon dioxide (CO₂) levels and control make-up air to maintain a maximum allowed CO₂ level. ASHRAE standard 62 suggests that a CO₂ level no more than 700 ppm above ambient is sufficient. Ventilation is also needed in factories to maintain temperature levels, expel smoke, dust or excess moisture. A slightly positive pressure is usually required to assure contaminants are not pulled into food processing areas.

Ventilation requirements are usually not constant throughout the week. More or less ventilation is required depending on the level and nature of production activity. Again, the key is to know your ventilation requirements and exactly meet them. No more, no less. Some positive steps you can take include:

- Make sure exhaust hoods run only when necessary
- Fix economizer and ventilation controls (20-30% are usually bypassed or otherwise not functional)
- Know your ventilation requirement (total cfm or m³/h) under various operating conditions (How many air changes per hour do you need?)
- Verify that the requirement is being served – no more, no less



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LIGHTING

Lighting is required primarily for people to see. There should be less lighting during daylight hours if your facility is able to harvest some natural light from the sun. Additionally, as the number of people working goes down, so should the lighting load.

Light fixtures in many facilities are simply installed in a grid pattern to flood the interior with light, without specific regard to where the lines, equipment and people are located. This is a luxury we can no longer afford. Modern lamps, motion sensors and timers make it practical to provide all the required light without wasting energy on light that is not needed.

Observe lighting levels at your facility on the weekend or at night. It's likely there are many areas being over-served. Also, do not overlook lighting maintenance. Light levels can often be increased with no additional energy by cleaning the fixtures.



COMPRESSED AIR

Air compressors required for production should be turned off when the plant is idle. Too often, large compressors are left running to accommodate a very small requirement for maintenance activities. These oversized units mostly blow air out of leaks in the distribution piping and provide air to idle production equipment, lacking the proper valves to stop waste. As much as 30% of compressor load is not providing any benefit to the plant. Consider purchasing a small compressor to use for maintenance activities when necessary.

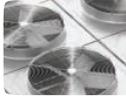
Use a simple recording device and measure your air compressor loads for one week. From this information, you can estimate the weekly cost of compressed air. Suppose you could save 20-30% of this amount. Compare the power levels to production for the same period. Air compressor energy usage should track closely with production.

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SPACE HEATING AND COOLING

Many manufacturing facilities have plenty of heat sources and some areas are likely air conditioned in the summer as well. Make sure the thermostats in these areas are set back to avoid heating or cooling when not necessary. There are many examples of when midnight surveys have revealed air conditioned offices so cold there is condensate on the windows with not a person in sight to enjoy the comfort.

Space heaters and air conditioning are for people comfort. They serve no useful purpose when there are no people present.



FINALLY - TAKE A WALK

Take a walk around your facility at midnight and on a weekend. Look for the following things that will increase your fixed energy usage and prevent you from seeing significant energy savings.

- Compressed air leaks
- Compressed air flowing to idle production equipment
- Lighting in unoccupied areas
- Constant lighting in areas only intermittently occupied
- Ventilation not required at that time
- Heating or air conditioning equipment not required at that time
- Idle production lines with some support equipment still running



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In these challenging economic times, we are all tasked with doing more with less. One of the ways that you can do this is by avoiding energy expenses that are not necessary. Your goal is to reduce fixed energy cost as much as possible. You will see a dramatic reduction in energy consumed per unit of production during periods of low activity, and also enjoy the benefits of lower energy costs at all levels of production.

About Summit Energy

As a leading global energy management company, Summit Energy has provided leadership and guidance to some of the world's best companies in the areas of strategic energy procurement, risk management and carbon emissions reporting and reduction. The information expressed in this document is backed by more than 300 energy management professionals who serve hundreds of regional, national and global organizations. As an independent company, Summit Energy is an unbiased advocate for industrial and commercial companies as well as institutions and municipalities. It exists to help companies mitigate the impact of rising and volatile costs associated with energy commodities.