

# Energy Savings Guide for Industrial Facilities

**This guide has been prepared by the Technical Staff at Sensor Synergy, Inc.  
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Edited by James Wiczer, PhD

## i. Forward

If your company is spending \$10,000 a month or more for electricity, there is a high probability that you could reduce your power consumption by 10% or more and use the savings from the reduced electric bill to pay for all of the necessary changes -- in less than 1-year and sometimes in just a few months. However, there is no free lunch and there is no magic bullet to reduce your electricity use. If there was a gadget that automatically reduced your electric bills by 10%, news of this invention would be plastered on headlines around the world.

But, by understanding where your energy dollars are going you can make good decisions and receive good return on every dollar invested in reducing your electricity use. In our experience during the past 11 years, we have found many energy saving opportunities that achieved 10% electric bill reductions. In all cases, we first identified which pieces of equipment were the big energy hogs by remotely monitoring the power-used by various pieces of equipment and power distribution panels. Once we zeroed in on the most energy-hungry items, we worked to find ways to reduce electricity use through equipment upgrades, equipment replacement and small process modifications..

Your electricity bill is really an aggregate metric that represents the monthly total power used by many different pieces of equipment, lights, HVAC, computers and more. Savings come from a collection of small and large steps that can add up to significant overall monthly savings. Energy saving actions do not have to be costly.

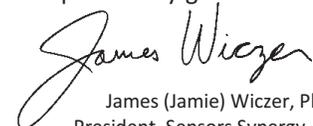
Simple steps like identifying machines that are powered on when they should be off can contribute to an overall electric bill reduction along with complex steps like adding variable speed drive electronics to existing HVAC blower units. Machines that have maintenance issues -- such as a leaky compressed air fitting -- are also ripe for energy saving repairs that can have a big impact on the monthly electric bill.

And remember, saving energy is an on-going issue. Small changes each day can contribute to undoing your energy saving efforts. A small "bump" into a production machine using compressed air can cause an increase in leakage at the connection fitting that brings compressed air into the machine. Although any single event may not seem significant, when these types of small issues are added up across your facility, every day, and every week, by the end of the month your electricity bill may begin to creep up again.

Continued vigilance and continued monitoring is required to maintain your energy savings. Without real-time power use measurements, it can be difficult to know what addition, modification or enhancement to your facility is responsible for that "extra jump" in electricity consumption. Although in the recent past, the cost of such monitoring equipment outweighed the potential savings. New technology, as implemented in Sensor Synergy's Watts Aware solution, has made real-time, remote monitoring of machinery affordable to even the smallest manufacturing operations.

This "Energy Savings Guide for Industrial Facilities" provides detailed information to help you and your team better identify and implement energy saving projects. This guide also highlights the value of electricity-use monitoring in manufacturing and industrial facilities. However, not all of the suggestions in this guide will fit every situation. To get a better understanding of how electricity-use monitoring can benefit your company, contact Sensor Synergy for a free introductory consultation.

All of the staff at Sensor Synergy hope that sharing our experiences with you through this complimentary guide will help give you a head-start on reducing your electricity use.



James (Jamie) Wiczer, PhD -  
President, Sensors Synergy, Inc.  
November, 2010 -- Buffalo Grove, IL

## ii. Content Summaries

### Electricity Use Monitoring in Manufacturing and Industrial Facilities

*Although it may seem straight-forward, the consumption of electricity by manufacturing machines may not always track with production activities. Physical measurements of power-use during the work day can help you understand the relationship between electricity consumption at your facility and your production activities. Since manufacturing facilities are so diverse, the same machine in two different manufacturing facilities can have very different energy operating costs. Learning the details of this relationship can go a long way toward reducing electricity costs. Detailed examples are described in this section.*

#### Are You Paying Too Much Trying to Save Money on Your Electricity Bill?

*It is well known that you can't fix a problem until you know what the problem is. But, in some cases it just costs too much to determine where the power is being used at a facility. Smart-meters, smart-buildings, smart-grid, and smart building automation systems are just a few of the "buzz-words" swirling around these days -- and all represent technology options to help you get a better handle on the important question "where are my electricity dollars going?" But, a key question is - "How much will it cost to find-out how we are spending money on electricity to run our machines?" Not all power monitoring solutions are the same. Some monitor power-use and power-quality, others just one or the other. If you want to focus on reducing your electricity bill, it may be adequate to focus on tracking your power-usage and leave the power quality issues for another day.*

#### Should I Monitor the Whole Plant or Individual Equipment Power Use?

*A question often asked by our customers relates to the recommended strategy to save the most money on their electric bill. Specifically, the question most often asked is " ... to save the most money, would it be better to continuously monitor all the power coming into our plant or to monitor individual pieces of equipment connected to power distribution panels scattered throughout our facility.*

*In many cases, monitoring individual equipment gives you better insights into saving money. As is usually the case with these types of decisions, there are lots of engineering trade-offs and no simple, always correct answer, but here are some guidelines that we used to reach our answer. Many of these issues may apply to your situation. Although these guidelines are not perfect, they may help you select the best approach for your needs.*

## Monitoring Electricity Use in Compressed Air Equipment

*A "power-use" monitoring system can help you identify costs associated with various pieces of production and support equipment - such as extrusion machines, air compressors, pumps, mixers, heat treatment ovens, and HVAC equipment. The total power consumed by any single machine in a "typical" week will depend greatly on the details of your week. Physical measurements are needed due to the duty cycle variations associated with production loads, environment changes, operator issues, shift issues, and many, many other factors.*

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## 2. Are You Paying Too Much Trying to Save Money on Your Electricity Bill?

It is well known that you can't fix a problem until you know what the problem is. But, in some cases it just costs too much to determine where the power is being used at a facility. Advanced metering initiative (AMI), smart meters, sub-metering, smart-buildings, building automation systems, and smart-grid are just a few of the "buzz-words" swirling around the technology options you might consider to help you get a better handle on the important question "where are my electricity dollars going?"

### What Can I Do?

Make intelligent choices about the type of power monitoring that is most appropriate for your needs. **One size does not fit all!**

Should you be monitoring all of the power used in your plant or measure the power used by some key power-hungry pieces of equipment with a portable tool?

### Permanent or Portable Installation.

Should you use a permanently installed solution or a mobile solution that can be easily moved around to various power distribution panels or pieces of equipment. Permanent installations frequently require a more involved (and expensive) installation that requires power interruption, new wiring in conduit and often a more expensive set of hardware to complete the solution. Permanent solutions can be more accurate than portable solutions. Portable solutions can provide a "quick view" of power

consumption status, may require much less expensive installation and less expensive hardware and may be 95% accurate compared to permanent solutions that may be "revenue grade" 99.8% accurate.

### Determine your goal and stick to it.

Are you trying to verify the accuracy of your electric bill from your utility or are you trying to reduce electricity consumption in your facility by understanding where the power is going and then developing a plan to reduce your usage?

This issue will help you determine what level of accuracy you need for your situation.

Concerns about the accuracy of your utility provided electric meter (which is used to determine your monthly "electric bill") can be handled by a call directly to your utility. Either they will replace your meter or explain their quality control processes about when your meter was last calibrated.

### Select the accuracy you need for your goal.

The world is full of trade-offs that we make all of the time. Measuring power use is subject to similar engineering trade-offs that you apply to other parts of your job. No magic here - just common sense.

Trade-off monitoring system cost for accuracy of the results.

Do you really need "revenue grade" measurements that are accurate to 0.2 % of the "actual value" or can you settle for a +/- 3% accuracy for 1/10 the cost?

## Appendix B -- Useful Links for Additional Information

Compressed Air Challenge - Initiative launched by the U.S. Department of Energy in 2001.

[www.compressedairchallenge.org/](http://www.compressedairchallenge.org/)  
[www.compressedairchallenge.org/library/index.html](http://www.compressedairchallenge.org/library/index.html)

U.S. Department of Energy - Overview on Saving Energy

[www.energy.gov/energyefficiency/index.htm](http://www.energy.gov/energyefficiency/index.htm)  
[www.energysavers.gov/tips/](http://www.energysavers.gov/tips/)

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[www.sensorsynergy.com/WattsAware.htm](http://www.sensorsynergy.com/WattsAware.htm)