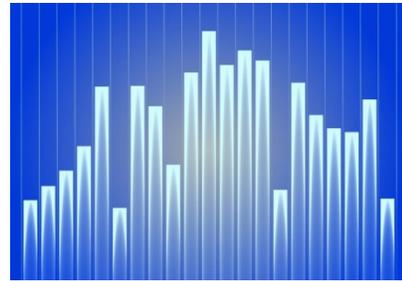


## HOW TO CUT ENERGY COSTS

### USING A DATA LOGGER

#### Multi-Value Devices Record, Analyze and Graph Data for Energy Savings

While it's well-known that heavy industry stands the most to gain from energy audits and the resulting improved process efficiency, it's also true that businesses and organizations in all fields have room for improvement when checking their energy bills. In fact your own facility likely has many unrealized areas where you can cut or otherwise optimize your energy usage for substantial long-term savings.



If you're a facilities technician or engineer, you can use a **data logger** (aka **data acquisition system**) to identify these savings areas. These devices can measure and record many different values including current, voltage, power and more. Often these devices also include software to trend, analyze and graph data. In this latest White Paper, [CAS DataLoggers](#) outlines the basics of how data logger users can monitor energy usage as part of an energy audit with an eye to future savings.

#### How Can a Data Logger Help Save Energy?

Although it's well known that an energy audit can reduce energy usage and improve performance, many people don't know how to perform one themselves. Your facility's energy data can tell you a lot historically, but what it can't tell you is:

- **Where** the energy went;
- **Which** equipment, circuits, buildings or divisions consumed the energy;
- **When** all this usage occurred.

To answer these questions, you need to record data over a period of time, and data loggers are designed for this purpose. For example, data loggers installed in plants are frequently used to monitor current, voltage and/or power of heavy machinery for later presentation to supervisors. However the possibilities don't stop there—many facilities monitor other values such as temperature or flow, again with the goal of reducing energy consumption or avoiding costly process delays.

Additionally, intelligent data acquisition systems are available which combine data collection with control & analysis functionality. These systems have the computation power to self-reference data historically for both analysis and alarm notification purposes.

Data loggers have several features which make them useful during the energy auditing process:

- **Data Measurement**—Identify opportunities to save energy;
- **Continual Recording** - Identify performance issues with electrical supply and equipment;
- **Data Analysis**—Calculate the monetary value of future energy savings with trend capabilities;
- **Reliable Operation**—Many loggers can operate in standalone mode independent of a PC;
- **Analysis & Graphing Software**—Analyzes data such as power consumption over the duration of the logging period. Users can also produce charts and graphs as proof of savings.

## Which Types of Data Can You Collect?

Data loggers can monitor and record:

- **Generator or PV Cells:** Voltage and Current Output; PV string matching; Rotational Speed, Force, Strain, Torque; Component Temperature
- **Inverters:** AC Voltage, Current, Power Output; RS-232/485 Interface for Data Collection from Smart Inverters
- **Storage Batteries:** Voltage, Current In/Out; Battery Temperature

Typical energy-wasters include heavy engines, compressors, ovens, boilers, HVAC systems and more.

Unlike many existing energy-efficiency devices installed in industrial facilities, data loggers can monitor several values simultaneously. Loggers can either be **single** or **multi-value**. For example, if you only need to monitor a solar collector, you can connect a solar datalogger to a pyranometer to measure the solar radiation, while a multi-value logger could also connect with a tilt sensor to track solar panel angle to the sun while also monitoring current and/or voltage via transducers.



A **universal datalogger** is a multi-value recorder which uses universal analog inputs enabling connection with many different types of sensors (transducers, thermocouples, RTDs, etc.). Many universal data loggers can serve as a single solution to monitor all the required values and also to play a key role in HVAC validation processes.

Data loggers also allow you to choose the speed at which you want to record data (aka the sample rate) and also to check for alarms (the alarm sample rate). Adjusting the sample rate allows you to get a more general view of conditions or to 'drill down' into specific areas of concern.

## What Do You Need to Know to Perform an Energy Audit?

While it's true that to correctly measure power and energy you need to measure voltage, current, power factor and time, it's also true that you don't always need to go to those lengths for your particular energy audit. In fact in many situations users only need to measure current! For the purposes of an audit or comparative test, you can rely on just the collected current data. This makes it much easier for you to get started recording data and locating savings.

It's always a good idea to document an energy audit. This documentation should note where you logged the data and should also include a brief summary containing production data, weather data, and other business-related data over the logging period. All this will help you to correlate the information in future and to spot factors which may have caused anomalies.

### Green/Smart Energy Financing:

'Green' or 'Smart' energy rebate programs are a common way facilities are cutting costs. The federal government and many states are offering these financial incentives to help businesses and organization to afford solar energy system installations. These rebates and tax credits commonly offer full ROI in a short amount of time.

For this purpose, data loggers are the ideal way to record your solar system's wattage capacity and compare it against what was promised. This is a low-cost way to help you qualify for these rebates and, once you're approved, to prove that you're getting the savings.

Keeping a close eye on your facility's energy generation and viewing your actual patterns of use helps to prevent you from being overcharged. For example, using a solar data logger, you can see for yourself if your solar-power systems are performing as promised—and see if your installer is overcharging you or not!

## Data Transfer: Wired or Wireless?

To save energy as part of an audit, it's critical to not only collect accurate data, but also to ensure that this data is readily available to factory and plant supervisors, etc. in comprehensible form. This way decision-makers have the information they need to take remedial action to realize potential savings.

Wireless capability becomes even more desirable if you want to link data collection to one or more control systems on your network. This is an ideal way to optimize energy efficiency across the entire site. As an example, a common data logger application is to monitor boiler or tank temperature and simultaneously send the data to a PID control system for real-time process optimization. A wireless datalogger also bypasses the need for personnel to install costly wiring.

For these applications, many logger models have remote communications capability to automatically push various data sets with varying time elements over the company's network via FTP. Many wireless communication protocols are available including WiFi.

In contrast, wired dataloggers may be more preferable if you prioritize data security, need to save on device cost, or if you simply want to use an existing wired setup.

## Graphs and Charts Prove Savings:



While plant technicians and supervisors know that they need to collect energy data, many are unsure what to do with the information once it's in their hands. To this end, data logger software commonly features trend and analysis capabilities to view power consumption and to target actionable savings areas. Today's software typically has filters and zoom functions allowing you to focus on only the data that you're interested in. Data can be viewed by time, temperature, power factor—any value or variable.

Using the green energy rebate example again, if you're looking to install a smart energy system, you can also use software to prove to your financiers that you're in compliance with their post-installation regulations and that you're benefitting from the promised savings. This is especially important when federal or state money is involved.

### Summary:

In summary, your facility likely has unexplored energy savings areas if you can just get the data in front of you. While in the past this required installation of multiple devices--each monitoring a single value--today's multi-value data loggers can collect process data and also perform basic control features. Combined with analysis software, these capabilities can transform the vague need to save energy into realizable steps and savings.

For further information on our selection of [Data Acquisition Systems](#), or to find the ideal solution for your application-specific needs, contact a **CAS Data Logger Applications Specialist** at **(800) 956-4437** or visit our website at [www.DataLoggerInc.com](http://www.DataLoggerInc.com).

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