



Utility Incentive Programs: How to Get More Money Quickly and Easily

by Emma Bassein, Director of Impact,
Carbon Lighthouse



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Introduction

Utility incentive programs have been a multi-billion-dollar motivating force for the energy efficiency industry for a long time, yet utility decision-making can appear mysterious and downright frustrating to service providers trying to work with efficiency programs.

Understanding how utility program administrators think is an important first step in making the process of applying for and receiving energy efficiency incentives and rebates faster, easier, and more rewarding. Getting lots of high quality data through the precise application of data loggers is an important part of this process. This paper will provide some context on why the programs are the way they are, and how you can get the most out of them for your company or your clients.



How Utility Incentive Programs are Born

Let us follow a complete utility program from conception to evaluation. It will be long. It will be confusing. It will make you glad that you work on things that are easy to understand, like pump curves and psychrometric charts.

1. Public Utility Commission (PUC) mandates that the utility invest in energy efficiency

This is where it all starts. The PUC for a given state decides, for whatever reason, that efficiency is in the public good and mandates that utilities incorporate efficiency into their investments. This could stem from directives from the governor or legislature, commissioner prerogative, or pressure from other stakeholders.

2. The utility and/or independent companies propose efficiency programs

Depending on the design, utilities either propose programs themselves or accept proposals from independent program administrators they evaluate and then propose to the PUC, or the independent program administrators can propose directly to the PUC along with the utility.

Proposals will have an overall design, target customer, estimate of savings that are realizable, and a budget that covers incentives, marketing, and overhead. Program designs try to emphasize their cost-effectiveness, as well as any other special interests being targeted (e.g. job creation, load reduction in specific geographic regions or distribution grid areas, etc.).

3. PUC approves/denies/modifies proposals

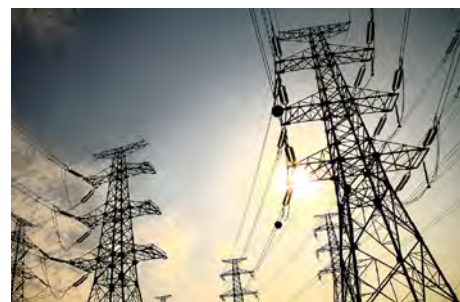
The PUC can decide to accept, in whole or in part, modify, or deny any proposal. Often there's a public comment period or hearing during this step where stakeholders are free to state their opinions about the known proposals. The PUC (or its staff) may ask for clarification on various points, but can mandate a change to a program design without giving the program proposer a chance to respond. This means that a utility can find itself administering a program whose design was not under its control.

4. Utility or 3rd party runs the program

Unless you work in a PUC or utility, this is when you are most likely to interact with the program. At this point, the program exists. There is paperwork you can fill out to apply for incentives for your efficiency project, and the program has a given budget and requirements, and is trying to engage clients. If it is a new program, you might find yourself the guinea pig for working out any number of kinks.

5. Independent engineering firm reviews the program (under contract to the utility or PUC)

Sometime after you complete your project and get your money, an independent engineering firm evaluates how effective the program was as a whole. This is an important step for avoiding widespread fraud, so it will be covered in greater depth below. This is also the part of the process that brings about the seemingly endless paperwork and questions you typically go through when you are applying for an incentive in Step 4.



Programs have to go through a regular budget approval process and there is no guarantee that any program will make it.

6. PUC rewards or penalizes utility for performance

Depending on the regulatory structure of the utility, they may face financial penalties for missing targets or gain rewards for meeting or exceeding goals.

7. Start over (about every 3 years)

Programs have to go through a regular budget approval process and there is no guarantee that any program will make it. Commissioners serve somewhere around a six-year term, depending on the state, and decisions are very dependent on the individual commissioners. It can be hard on both utility program administrators and service providers when programs start and stop unexpectedly.

California's Investment in Energy Efficiency

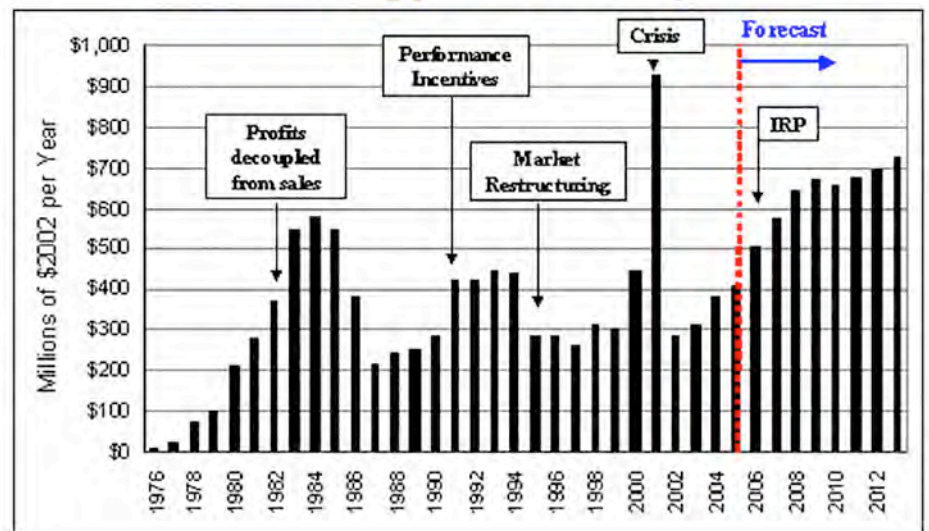


Figure 1: Variability in Energy Efficiency Investments over Time. Source: California Energy Action Plan II <http://docs.cpuc.ca.gov/published//REPORT/51604.htm>

Stakeholders

You may think that your energy efficiency project is really a private matter between you and your client (or your service provider if you are an owner), but once you seek utility incentives, you are actually joining a vast ocean of stakeholders, each of which is hoping to achieve something slightly different with the dollars received. This means programs have been pieced together to please all of these different people. So who are they?

1. Public Utility Commission

As the decision maker, the PUC has a vision that it is trying to create. Its primary role is to ensure the regulated utilities are operating as efficiently as possible and providing reliable service to clients. Some commissioners may have personal motivations as well, such as general environmental controls, protection of specific areas, or any number of other things.

2. Utility

Utilities are huge organizations with many internal components, each with different desired outcomes. At the corporate level, the goal is to make it as easy as possible to comply with regulations and ensure shareholders receive their expected profits.

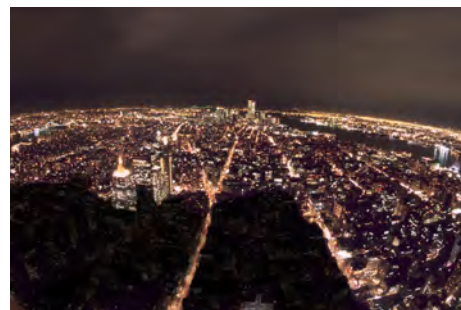
The team responsible for the operation of the grid wants to avoid blackouts at all costs and may think that efficiency is a less reliable source of “generation” than traditional generation assets. It might also be concerned with where efficiency and demand response resources are located. Efficiency in an area that is resource-constrained is worth a lot more than efficiency in areas with excess capacity.

Account managers are individual employees within a utility whose main goal is to make their key customers happy. In some utilities, such as PG&E, account managers have efficiency targets to meet, so they want to achieve those as well. Now that efficiency has become ingrained in many utilities, they have whole energy efficiency (or demand side management) groups. These groups often draw in people who are personally motivated by efficiency and care a lot about running good programs that reduce energy use and serve ratepayers well.

3. Third Party Program Administrators

These are independent engineering firms, nonprofits, consultants, or project management teams that operate (or want to operate) energy efficiency programs on behalf of the utility. They sometimes work closely with the utility, and other times run programs in competition with utility-run programs. They have specific energy reduction targets approved by the PUC and are often paid per unit of equipment installed, audit completed, savings achieved, or something similar. As stakeholders, they will advocate that independent companies are more cost-effective, agile, or have more expertise to meet a specific customer-base than the utility.

Efficiency in an area that is resource- constrained is worth a lot more than efficiency in areas with excess capacity.





4. Ratepayers

Ratepayers refers to anyone who pays a utility bill. In general, it is assumed that the main objective of the ratepayers is to pay as little as possible. It is also assumed that not very many of us will show up to commission hearings, so we are all represented by Ratepayer Advocates – basically lobbyists employed by the state to argue on the people’s behalf at all stakeholder meetings. Other topics of particular concern are protections for low-income ratepayers, and when a utility can or cannot shut off service for non-payment. Certain groups, like large industrials, employ their own Ratepayer Advocates privately to lobby on their behalf.

5. Environmental Groups

Environmental groups have been strong advocates for efficiency programs, but can be more mixed on renewable energy because of land-use implications. They are often most concerned with proposals to build new generation, repower old units, or build new transmission.

Environmental justice groups are related to, but different from, traditional environmentalists. They are most concerned about localized pollution in communities that have historically been burdened with disproportionate amounts of environmentally hazardous industry (power plants, wastewater treatment plants, refineries, manufacturing facilities, landfills, etc.) and have a population that is predominantly minority or low-income and has been disenfranchised from the policy-making process. They are often concerned about programs that may shift generation from one location to another, potentially causing local pollution hotspots, even if it results in a system-wide reduction in emissions.

6. Independent Power Producers

Independent power producers own generation plants that sell energy to the utility. They want to ensure a continued market for their energy as well as garner any additional financial support available. They might make arguments such as that it would be more cost-effective per energy unit saved to spend program dollars on repowering old power plants than spending money retrofitting individual buildings. They also are likely to point out that efficiency is not a substitute for generation because it is difficult to quantify and (supposedly) undependable.

7. Industry or Geographically Specific Groups

All efficiency programs are funded through a ratepayer surcharge on electricity bills, which amounts to some fraction of a cent per kWh consumed. Industrial groups, large commercial regions, or urban regions often feel that they are not getting their fair share of the dollars collected. Many programs have been created to target specific industries or locations to appease this concern, despite the fact that efficiency programs by design make all electricity cheaper for everyone, whether or not a specific industry or customer class receives the incentives directly. This is because the whole point of efficiency programs is that they are more cost-effective than building new generation.

8. Energy Efficiency Service Providers

Energy efficiency service providers generally want efficiency programs to be well funded, reliable, and easy to use. There is also some sentiment in the industry that the programs should be stringent enough to keep disreputable providers from getting incentives for projects that do not create real savings. They might also advocate for open enrollment programs that any company can utilize vs. programs that specify a specific company customers will have to work with to get incentives.

So that is the run down on stakeholders. This may not be a comprehensive list, but it demonstrates some of the diverse views that are being balanced by the commission during their decision-making process.



When using a custom or calculated incentive program, you will need to prove that the savings you are claiming are real, and hard data is the best way to do that.

How the Utility Programs Work

You are now a regulatory expert, so what does this all mean for your day-to-day projects? And, how can you use this information, and portable data loggers, to get more money more quickly and easily?

Types of programs

There are typically two types of efficiency programs in the market. Rebate programs (also called “deemed savings” or “prescriptive programs”) offer rebates per piece of equipment installed, such as \$4 per LED light, or \$75 per horsepower of VFD. There are usually specific efficiency requirements for the new equipment, and to apply for the incentive you just need to fill out the form, include the cut sheet and an invoice, and mail it in. These are simple and relatively low dollar rebates. The program administrators like them because they are easy to run and do not require a lot of overhead, but the savings resulting from them is impossible to quantify in any one building, and challenging to quantify even across an average of 10,000 buildings.

“Custom calculated,” “performance based,” or “measured” savings programs typically offer larger incentives and pay based on the amount of energy reduced, rather than per piece of equipment installed. Because the incentives are significantly higher and vary from project to project, this type of program is subject to a great deal of scrutiny. These programs usually require a pre-installation inspection, actual data measurement, engineering calculations, and a post-installation inspection. Additionally, you will still need to provide cut sheets, invoices, etc.

How Data Loggers Fit In

When using a custom or calculated incentive program, you will need to prove that the savings you are claiming are real, and hard data is the best way to do that. Here are a few examples of areas where loggers can help you support incentive applications.

Lighting

Lighting projects depend heavily on run hours. Using occupancy/light loggers will let you accurately measure how long lights are on and how often the lights are on when no one is in the room. If the facility has a regular schedule, as little as one week of data could be sufficient. For facilities with more variable schedules, such as community centers, it is a good idea to get a month or more of data and combine it with staff interviews about typical schedules.

Scheduling for Motors, Pumps, and Fans

Motor runtime loggers are a great way to tell if your motors, pumps, and fans are operating outside of building hours. They detect changes in magnetic field and are an easy way to measure run hours without accessing live electricity. To calculate energy savings from scheduling changes, you can either use the nameplate horsepower and assume an 80% load factor for a ballpark number, or take a spot measurement of power when the motor is operating.



HOBO UX90 Occupancy/Light logger

Economizers, Supply Air Temperature Resets, or Measure Involving Conditioned Air

Temperature/Relative Humidity data loggers are ideal for demonstrating broken economizers, leaking heating valves, or any number of other measures. By placing sensors on diffusers in the space, you can measure the discharge air temperature to see if thermostats and VAV boxes are working accurately. Deploying sensors in the supply air, mixed air, return air, and outside air chambers of an air handler will give you enough information to evaluate if the economizers are working correctly, if the sensors in the unit are calibrated, and if there is a supply air temperature reset.

Boiler Operations, Condenser Water Loops, etc.

Temperature/Relative Humidity loggers with external temperature sensors can tell you how much heat is being supplied by a boiler or dissipated from a condenser water loop. This can help with calculations for boiler lockouts, and cooling tower optimizations. For water in pipes, put the sensor directly against the pipe and cover completely with insulation. For open water, put the external sensor directly into the water.

Motors, Pumps, Fans, and Compressors

Current transducers along with spot measurements on voltage and power factor can give you relatively accurate information on motor loading for fans, pumps and compressors. For example, showing that a VFD-equipped supply fan is never ramping down by measuring the current over a period of a few weeks could support a project to fix VAV boxes whose dampers are not functioning by doing a pneumatic-to-DDC conversion.

In short, custom-calculated incentive programs pay you based on a \$/kWh, \$/kW, plus \$/therm saved basis. To demonstrate these savings and make it easy for every stakeholder to sign off on the project, use data loggers to measure the baseline accurately so you can predict savings in a difficult-to-argue-with manner. Installing a Building Management System does not usually qualify for “deemed savings” rebates or the easy kind of rebates. But nothing makes it easier to get a large incentive for your new building management system than measured columns of numbers showing that every pump and fan in the building is operating 24/7.



HOBO UX90 Motor On/Off logger

Program Evaluation



Individual projects are reviewed as they are installed, but the program as a whole is also evaluated. To do this, an independent firm revisits several representative projects to see if the project that was documented in the application actually took place. It is important to note that the projects selected are representative, but not random; they can be selected for review because they are large or contain a particular type of technology.

Evaluation team members do not get to talk to the original utility project manager, so they are just working off of the file and are primarily looking to see if the exact equipment specified is actually what is on site, rather than if the actual savings calculations match up. This is why programs are so insistent on doing site visits and collecting pictures and data.

$$\text{Final program savings} = \left(\frac{\text{Savings from Evaluated Projects that were Accurately Documented}}{\text{Total Savings from Evaluated Projects}} \right) * (\text{Raw Program Savings})$$

The outcome of this evaluation is a ratio of the total efficiency measures found, installed over the amount that was reported for the representative projects. This value, which will be between 0 and 1, is called a realization rate or de-rating factor, which is then multiplied by the total reported savings for the program to get the total savings for which the program administrator can take credit.

Considering that utilities face financial penalties for not meeting their targets, this process is important to them and they understandably want to make sure that all of the projects are well-documented and will hold up to scrutiny. Notice how the above equation has nothing to do with savings calculations? This is why utilities care so much about cut sheets. Their programs are getting judged based on what was installed compared to what people claim they installed, not based on actual energy savings realized. If you want to make your application go faster, provide accurate cut sheets for every piece of equipment you are installing, as well as lots of pictures showing the equipment.



The Utility Program Team

You will likely encounter many different utility personnel during your journey through incentive land, and we will use the framework we just established to figure out how to make each of them happy and open the door for the maximum incentive for your great energy efficiency project.

The first thing to remember is that if you are a service provider, the person you are working with for your incentives will likely be someone you interact with several times a year. Try not to make that person's life difficult!

1. Account Managers

Account managers are on your side. They have efficiency quotas from their supervisors, so they want to hand out incentive dollars as quickly as possible. That being said, they also want to protect their customers and are not allowed to recommend specific service providers unless they have been selected through a competitive bid process. They also do not want to be found negligent if the projects do not pass evaluation. Lastly, efficiency is likely not the account managers' primary job function, so be respectful of their time.

To make them happy:

- Make the client happy
- Fill out your paperwork carefully and on time (i.e. before the project is started)
- Provide good documentation and data to justify the project
- Bring them projects with therm or demand savings, since these are the usually the hardest for them to achieve

Since account managers want to maximize the savings from their efficiency projects, they are generally a "safe" utility person to query. So, if you have questions about the incentive application, they are a good first place to start.

2. In-house Energy Efficiency Program Administrators

This team probably designed the incentives you are using and should be familiar with everything that is going on. It is fine to bring up concerns about the programs, but try not to just flat out say that the programs are terrible if you want easy approval. Their main goals are to hand out their money as quickly as they can, while ensuring there are not free riders – e.g., people who would do the project without the utility incentive, which is basically defined as people who started the project before applying for the incentive – and that energy savings are real so that the program as a whole does not get de-rated.

To make them happy:

- Bring in projects, particularly ones with therm or demand savings, since these are the hardest for them to acquire
- Provide good documentation of the project
- Cut sheets for any new equipment
- Relatively simple calculations with lots of supporting data
- Lots of pictures
- Wherever you can, emphasize that the project is being made possible by these incentives.

Account managers are on your side. They have efficiency quotas from their supervisors, so they want to hand out incentive dollars as quickly as possible.





3. Third-Party Engineering Review

These are engineering firms hired to technically review all custom calculated applications. They are paid by the hour to catch people abusing the program, and in some cases to provide technical support to clients who are having a hard time doing their own calculations. They tread a fine line between trying to be easy to work with and trying to ensure that the program's money is being spent effectively.

To make them happy:

- Provide lots and lots of documentation
- Data is best - document exactly where it is coming from and how it was measured
- Provide well explained calculations
- Provide cut sheets
- Provide lots of pictures
- Provide invoices

4. Third-Party Program Administrators

These administrators are operating their own program either in cooperation or competition with the utility. They are directly responsible to the PUC for meeting savings goals and are often targeting specific sectors. They want to make sure they survive the next program review cycle, so meeting targets and not having their efficiency numbers de-rated are their top priorities.

For individual projects, third-party program administrators are their own technical reviewers, so you will only be dealing with one entity here. Be nice!

To make them happy:

- Bring in projects and get them done quickly
- Provide documentation, data, and pictures

California vs. United States

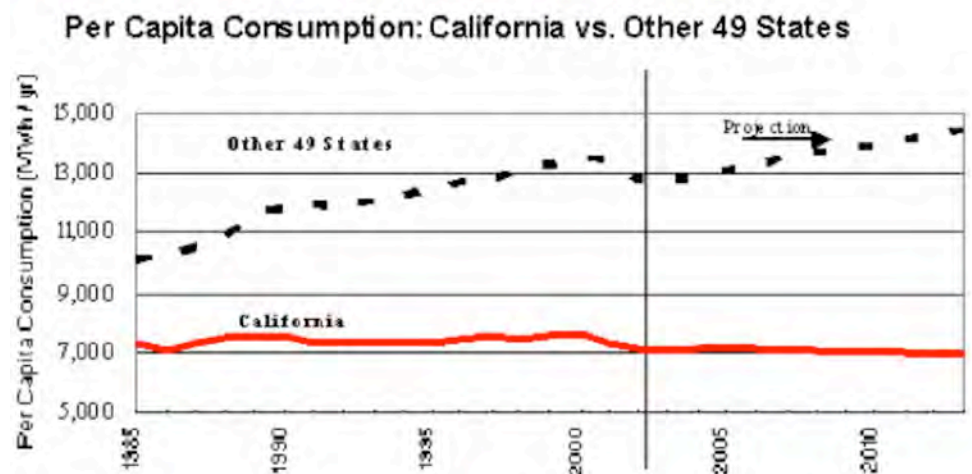


Figure 2: Per Capita Energy Consumption. Source: California Energy Action Plan II <http://docs.cpuc.ca.gov/published/REPORT/51604.htm>

Conclusion

If utilities and energy efficiency programs seem complicated, they are. Years of entrenched processes, diverse stakeholders, and new innovations have created a complicated and often conflicting web of programs and regulation. However, understanding the ultimate goals of the programs, motivations of the people you are working with, and how best to use appropriate data to make everyone's life easier can make efficiency programs your best friend.

Amidst all the confusion, it is also important to remember that in the end, efficiency does work as an alternative to new generation. Due to its efficiency programs, California alone is avoiding about 15,000 MW of new generation and \$65 billion in costs, and there is still plenty more left to mine. Happy hunting.

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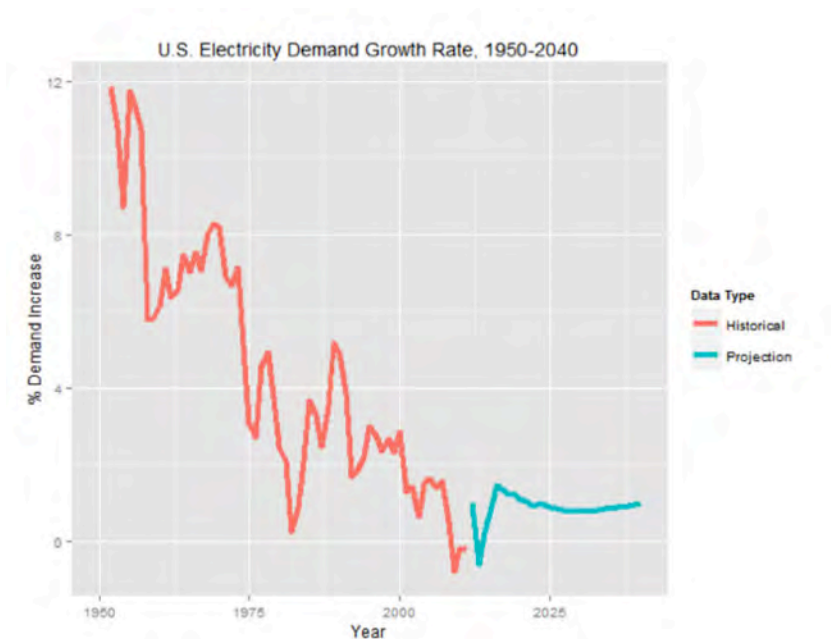


Figure 3: Rate of U.S. Electricity Demand Growth. The year over year increase in electricity demand has decreased from 12% to -0.22% in 2011. Future projects show less than 1% growth per year. Source: Annual Energy Outlook 2013, EIA [http://www.eia.gov/forecasts/aeo/pdf/0383\(2013\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf)

About the Author



Emma Bassein, Director of Impact,
Carbon Lighthouse

Carbon Lighthouse is an energy firm that makes it profitable for commercial and industrial buildings to eliminate their carbon footprint. They collect and analyze 1,000x more data per site than normally observed, which results in energy savings delivered at half the cost of market. Since its founding in 2010, Carbon Lighthouse has completed 100+ projects in the Western United States.

Emma joined Carbon Lighthouse in early 2012 and is responsible for ensuring the organization's mission-driven growth through the evaluation of implemented engineering outcomes, strategic partnerships, and the identification of new technologies and solutions. Previously, Emma worked with the New York State Energy Research and Development Authority (NYSERDA) where she designed and ran multi-hundred-million dollar energy efficiency programs for large commercial and industrial properties. She also served as the first Executive Director of Wave One, a Palo-Alto based not-for-profit that developed innovative solutions to deliver energy efficiency solutions for small commercial and retail buildings.

Emma holds a B.S. from the Massachusetts Institute of Technology, in Earth, Atmosphere, and Planetary Science, and an M.S. in Environmental Engineering from Princeton.

Other informational resources available from Onset:

Facility Manager's Guide to Data Logging

The energy required to operate buildings in the United States is the largest sector of our energy use and represents about 40% of U.S. energy demand. Measuring building performance can help facility staff better manage this energy use. The focus of this best practices guide is on monitoring strategies and techniques that can be utilized by building professionals looking to reduce energy use and optimize performance of their facilities.

Data Logger Basics

In today's data-driven world of satellite uplinks, wireless networks, and the Internet, it is common to hear the terms "data logging" and "data loggers" and not really have a firm grasp of what they are.

Most people have a vague idea that data logging involves electronically collecting information about the status of something in the environment, such as temperature, relative humidity, or energy use. They're right, but that's just a small view of what data logging is.

Analyzing Air Handling Unit Efficiency with Data Loggers

Operating a heating, ventilation, and air conditioning (HVAC) system at optimum efficiency in a commercial setting is complicated, to say the least. There is a very real chance that any number of setpoints, levels, and feedbacks at boilers, chillers, pumps, fans, air delivery components, and more can cause costly inefficiencies.

Finding Hidden Energy Waste with Data Loggers: 8 Cost-Saving Opportunities

The first step to reducing building energy costs is identifying energy waste. Statistics on utility bills or name plates on equipment, while useful, are not enough to identify what practices and equipment are contributing to high energy use. Portable data loggers can be used to obtain critical energy use information in a wide range of commercial building types – from manufacturing plants to office buildings.

Monitoring HVAC Performance with Data Loggers

Building operators and managers have the difficult job of providing comfortable working conditions and coaxing aging mechanical equipment to operate at peak performance while minimizing energy costs. If the mechanical equipment is old or has inadequate controls, maintaining comfort at a reasonable cost may prove difficult or impossible. Although energy costs typically represent only 1% of a building's operating expense when occupant salaries are included, they are easily managed expenses. Energy cost savings flow directly to the bottom line as increased profits.

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The Energy Professional's Guide to Data Loggers & Building Performance

This 30-page guide, developed in conjunction with Stetz Consulting LLC, details how portable data loggers can be applied in a number of building monitoring applications, such as HVAC systems monitoring, commissioning, Measurement & Verification, and load profiling. The guide offers practical tips and techniques on a range of topics, including data logger installation, monitoring plan development, safety, and data interpretation.

Addressing Comfort Complaints with Data Loggers

This paper provides facility managers, HVAC contractors, and others with valuable tips on how low-cost data loggers can be used to validate temperature-related comfort complaints.

Optimizing Solar Thermal Performance with Data loggers

This paper discusses how solar thermal systems, with the help of portable data loggers, can be optimized to deliver the financial benefits residential and commercial users hope to achieve through their investments. The paper shows installers and engineers how portable data logging devices can be used to measure performance of solar thermal systems, pinpoint any defects or inefficiencies, and optimize performance for greater return on investment.

Monitoring Green Roof Performance with Weather Stations

Data logging weather stations are the ideal tools for documenting green roof performance. A weather station can measure weather parameters such as rainfall, stormwater runoff, temperature, relative humidity, wind speed, solar radiation, and a host of non-weather parameters such as soil moisture on a continuous basis (say every five minutes, hourly, or an interval appropriate to the situation). For the purpose of this discussion, "weather station" may refer to a data logger that measures and stores data from weather sensors. The information a weather station collects can help you make wise choices about designing, tuning, and maintaining a green roof.

Measurement & Verification: Tapping into ARRA Stimulus Funds

This paper provides guidance on identifying potential sources of ARRA stimulus funding for energy performance monitoring projects. It details new programs from the ARRA, explains the growing importance of Measurement & Verification (M&V) services, and discusses specific ways ESCOs can apply portable data logging technology to document building energy savings.

About Onset

Onset is a leading supplier of data loggers. Our HOBO data logger products are used around the world in a broad range of monitoring applications, from verifying the performance of green buildings and renewable energy systems to agricultural and coastal research.

Based on Cape Cod, Massachusetts, Onset has sold more than 2 million data loggers since the company's founding in 1981.

Contact Us

Our goal is to make your data logging project a success. Our product application specialists are available to discuss your needs and recommend the right solution for your project.



Sales (8am to 5pm ET, Monday through Friday)

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- ▶ Fax 1-508-759-9100

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Onset Computer Corporation
470 MacArthur Blvd.
Bourne, MA 02532