

Product & Technology Review

Energy Director™

An equipment controller designed to reduce electric peak demand charges.

Product

Energy Director, models Kompakt, Klassik, and Intellekt (Swedish spellings). We do not distinguish between the models in this review, and refer to all of them as the Energy Director.

Manufacturer

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Distributor

Serving the Pacific Northwest
Bob Zak, President and General Manager
Powerit Solutions
Contact information same as Manufacturer

Product History

The original technology was developed in Sweden in 1994 by a group of engineers associated with Lund University. The U.S. operation was formed in 2002 as Powerit Solutions, LLC. Currently, Powerit Solutions™ is a wholly-owned subsidiary of Powerit Holdings, Inc. (located in Seattle).

The Predikt™ software, now standard with all three models, was introduced in 2005.



Photograph courtesy of Powerit Solutions, LLC, Seattle, WA

Product Function and Application

The following information was provided primarily by the manufacturer and is not evaluated in this section. Ideally, the Energy Director works in conjunction with a facility's existing Energy Management Control System (EMCS) or other centralized energy management information system. However, it can also control equipment that is not connected to the control system, and it can function independent of any other control system. It monitors energy usage for a facility and limits the usage

Product & Technology Reviews (PTR) are developed for Northwest electric utilities. EnergyIdeas Clearinghouse engineers review published literature for objective, independent test results. No primary testing was conducted by the reviewer for the preparation of this document. PTR factsheets describe the technology, discuss available data, and suggest additional testing needed to verify energy saving claims.

For more information: www.EnergyIdeas.org/ptr

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during each peak demand sampling period to keep the monthly peak demand under a pre-specified target. When usage during a given period approaches the target, key equipment is shut down, unloaded, or cycled to reduce usage for that period and keep the demand under the target. Override criteria can be set.

Use of a demand controller such as this is particularly appropriate if a facility has an especially sharp demand peak and peak demand rates are high. An important requirement is that facility operators must identify equipment that can be shut down or cycled without undue detriment to the product or discomfort for the occupants. Control of the Energy Director is through any web-enabled computer on the network of the facility using an Internet browser. Access will vary with the application. Typically, you can access system information remotely, but control of equipment can only be done on a computer on the local network.

With the introduction of the Predikt software in 2005 came several new information-handling capabilities. The Energy Director, with Predikt, is now capable of submetering, trend logging (tracking energy use of a particular piece of equipment or process), and some energy accounting capabilities, such as predicting utility bills to check for billing errors and malfunctioning meters. In addition, the products are capable of automatically participating in utility demand response,¹ curtailment, or time-of-use programs. The customer can program several choices of scenarios to reduce energy use to different levels.

The Energy Director is most cost-effective in very large applications. It is currently being targeted to industrial applications with peak loads of about 70 kW and up.

¹ A utility demand response program is similar to a curtailment program. It involves customers receiving a favorable electrical rate in exchange for agreeing to reduce load at the utility's request within a short period – typically 15 or 30 minutes – by a specified amount. The utility will then pay the customer for that additional load that is now available on the grid. In some cases, they may have a choice of what level to cut power to. This allows the utility to meet peak demand for a short period without starting up new generation.

Energy Savings Claims

The following information was provided primarily by the manufacturer and is not evaluated in this section. From the manufacturer's website: "On average, the Energy Director saves customers 10–30 percent on their electricity demand charge. This results in an overall electricity bill savings up to 15 percent. Bills exceeding \$100,000 per year typically produce a payback period of less than 24 months with larger facilities often realizing project payback in half that time." The manufacturer currently does not provide a savings guarantee.

Non-Energy Benefits

The following information was provided primarily by the manufacturer and is not evaluated in this section. The Energy Director monitors sensors and controls equipment. Other functions may take advantage of this capability in addition to energy saving strategies. The Energy Director can monitor process variables such as temperature or flow and, if desired, provide alarms (remotely, if desired) and trend log the data. It can also act as an ON-OFF timer for lighting or equipment, perhaps for starting up equipment prior to the start of a shift, for instance.

Independent Testing Results

The Energy Director is UL listed. Other than that, we know of no independent laboratory testing. One of the difficulties in getting unbiased third party information is that a laboratory test makes little sense for this device; a laboratory test would only be able to establish that the device operates as intended. It would not establish whether or not a particular customer could save money with the technology.

Case Studies

The one case study using the Energy Director that we were able to find in addition to those on their website was featured in the September 2007 issue of *Automated Buildings* magazine. Taking advantage of Southern California Edison's (SCE) aggressive demand response program, Trojan Battery Company of Santa

Fe Springs, California, designed a system for reducing their demand on request. If requested by the utility, they can shed up to 3400 kilowatts, or 85% of their load, within 15 minutes. Though the system cost nearly \$600,000 to set up, almost the entire system was paid for with an incentive from SCE's Technical Assistance and Technology Incentives Program. By participating in the program, they receive a lower utility rate, saving about \$90,000 per year, plus get paid a premium when requested by SCE to reduce their load (a "demand response event"). The first summer after the system was installed, the industry earned over \$30,000 for demand response events in June and July, over and above the \$90,000 annual rate savings.

Shedding that much load does impact their process temporarily, which many industrial plants are reluctant to do, but they have worked out a system that causes no net impact on production over a typical month.

The Energy Director controls about 30% of the controlled load, and at the time the article was written, the industry was happy with the performance. Though they integrated this system themselves, they said that one of the lessons they learned is that if they were doing it again, they would bring in Powerit Solutions and say, "You hire the contractors, you run the job."

For the complete article, see:

<http://www.automatedbuildings.com/news/sep07/articles/enrgypr/070821114303dubois.htm>

Cost

Prices are almost always provided by a customized bid that will depend on your equipment and existing control systems, so it is not useful to quote manufacturer's list price. Recently installed systems start in the range of \$20,000 installed (serving a total load of up to 800 kW) and go up to as high as \$2 million (serving a total load of up to 12 MW).

Some utilities with demand response programs (few, if any, in the Northwest) will pay an incentive to have the system installed. Southern California Edison and Pacific Gas & Electric

have paid as much as the entire cost of the system for several customers.

Alternative Products and Strategies

A few other manufacturers make equipment that could be used to achieve a similar result to the Energy Director. Two companies in particular sell a combination of hardware and software that allows monitoring and control of equipment over the Internet. The equipment information tasks can include monitoring and controlling loads for peak demand limiting and time-of-use pricing, energy accounting, generating load profiles, trending, and submetering. In short, they can do most of what the Energy Director can, and perhaps have additional features. These solutions work most easily in cases where a centralized energy management system already exists, as in most large commercial buildings. Neither company was able to give clear prices over the phone. Apparently, as with Energy Director, it varies according to the complexity of the project. The indication is, however, that their solutions may be somewhat lower in cost than the Energy Director. In an industrial application where a centralized control system is not already in place, the Energy Director may be simpler to install.

A demand-limiting strategy similar to what you could achieve with the Energy Director may be able to be accomplished by programming existing energy management control systems from any of the major building controls manufacturers. However, this involves custom programming that may be expensive. This may not be practical for some industrial applications where a direct digital control system is not already in place. Costs and benefits need to be compared. For a list of controls manufacturers, go to the National Building Controls Information Program website (a service of the Iowa Energy Center) <http://www.ddc-online.org/manufacturers>.

In addition to these product alternatives, there are other approaches to reducing electric demand charges. Again, the basic goal with the Energy Director is not to save energy per se, but rather to save energy costs by reduc-

ing the electric utility's peak demand charge. Before installing such a device, a customer should check with their utility to see if they have suggestions on how to achieve the same result. Perhaps they could suggest another rate schedule that would be more favorable. Some utilities, for instance, have a curtailment program that offers the customer a discount on the demand charge or other compensation in exchange for an agreement to curtail load at times when the utility load is particularly high. While the Energy Director can respond to a call for curtailment automatically, you may decide that it is more cost-effective to perform the curtailment (turn off equipment) manually. Some utilities have software with which they can directly control customer loads when needed. Using this strategy, a customer would need to consider safeguards for their systems. For example, if they agree to allow control of a freezer compressor and their product could be damaged if the freezer goes above a given temperature, they would need to ensure that they could override the control or have appropriate safeguards negotiated and programmed into the control system.

The largest plants may want to consider installing a generator to generate their own power during peak events. This has the added advantage of being able to provide some emergency power in the case of a power outage.

Suggestions for Further Research and Testing

While laboratory testing of this product would provide questionable benefit, it would be worthwhile for Powerit Solutions to notify a disinterested third party, such as a utility, that they are planning to perform some case studies on typical facilities within selected target markets, have a trusted laboratory or engineering firm do before and after monitoring and verification, and agree to publish the results, positive or negative. Even so, this will only establish that it may or may not work in that particular industry with similar conditions. Each potential application must be evaluated separately for the appropriate operating conditions and utility rate structure.

Additional Reviewer Comments and Analysis

The purpose of the Energy Director is not to reduce energy usage, so the customer should expect no significant changes in energy consumption. It is designed to save energy costs by limiting peak demand in order to reduce the monthly demand charge. The manufacturer uses the term demand control to describe this. This can only be done when major equipment can be identified that can be shut down or unloaded for at least several minutes. Many customers find that once they begin thinking about controlling equipment and saving energy, they can use the Energy Director for scheduled startups and for turning equipment off or down when not in use, saving some energy.

The cost-effectiveness of this approach is also highly dependent on the utility rate structure. High demand charges or favorable rates and demand-response payments will make this technology more cost-effective. In the right application, it will save the customer money on demand charges or on overall rates if participating in a demand response program. However, few utilities in the Northwest are capacity-constrained, so they tend not to have high demand charges or aggressive demand response programs, making this less cost-effective in the Northwest. The benefits to the utility should be evaluated separately.

Before investing in an Energy Director or any other component of an energy management information system, evaluate the overall needs for automated information and control in the plant, and talk to your local utility about various rate schedules and incentives. If the functionality of the Energy Director fits well into the needs of the plant, then consider including it as part of the system.

Conclusion

For a large industrial plant (over 70 kW peak load) that wants to reduce peak demand or participate in a utility demand response program, the Energy Director may make a lot of sense. Powerit Solutions has focused on limiting peak demand from the beginning,

and has now expanded to include technology appropriate for effectively participating in demand response and curtailment programs, as well as submetering, monitoring and logging electrical usage and other process variables, and providing energy accounting functions. If these are your goals, you may want to consider the Energy Director.

We have every reason to believe that the Energy Director is a quality product in the sense that it should be able to reliably monitor and control equipment as described. The question is not really whether the Energy Director works, in a technical sense, but rather whether it will save the customer any money in their circumstance. This is very application-specific. Large facilities with a sharp peak in the daily or weekly load profile that are able to identify large equipment that can be cycled or shut down without detriment to occupants or production will experience greater cost savings.

The other consideration is the customer's rate structure. Most electrical utilities in the Northwest are not capacity-constrained, so demand charges are not exceptionally high, and few, if any, have demand response programs. Thus, this technology will typically be less cost-effective in the Northwest than in some other parts of the country. Bear in mind, however, that Powerit Solutions does not currently have a savings guarantee. If you are not confident in the capabilities of plant personnel to evaluate a proposal from Powerit Solutions, check with your utility, an independent engineer, or the EnergyIdeas Clearinghouse to help verify the validity of the proposal.

Additional Information

Northwest businesses and electric utilities can contact the EnergyIdeas Clearinghouse for additional information on this or other energy technologies or products. Contact:

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The EnergyIdeas Clearinghouse is a technical assistance service managed by the WSU

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Reviewer

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Note: Product & Technology Reviews are peer reviewed by objective industry professionals prior to publishing.

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