

PM8 Energy Management Control

Introduction

Businesses large and small are under increasing economic and environmental pressure to reduce their electric power consumption. The cost of power directly impacts their bottom line, driving organizations to find innovative ways to conserve energy and mitigate rising utility rates.

New programs, such as Pacific Gas & Electric's Peak Day Power program in California, offer the promise of lower rates during off-peak hours, but higher rates during afternoon hours. In some areas, PG&E has implemented tiered rates with pricing as high as \$13.00 per kWh during demand times. [Note the PG&E bill below.] To avoid higher costs and realize savings, businesses must find a way to efficiently reduce consumption during peak pricing hours.



Time of Use Detail

Season: Summer	Energy
Peak	5,334 @ \$0.15257
Partial-Peak	5,167 @ \$0.10525
Off-Peak	12,215 @ \$0.08591

Season: Summer	Demand
Max. Peak	95 @ \$13.05000
Max. Partial-Peak	82 @ \$2.99000
Max. Demand	95 @ \$8.58000

Cyber Switching's PM8 is the ideal solution, a turnkey intelligent power management system that controls power (load) and monitors energy consumption in real time on multiple circuits without the need for costly meters or timers. The device provides

scheduled or manual on/off control of eight individual circuits and can monitor the current supplied by each output using CT coils for currents from 15A to 3200A.

The PM8 enables one-touch load shedding, allowing organizations to respond instantly to brownout and demand response conditions. When power is restored, adjustable stagger start of circuits helps protect plugged-in hardware. Scalable from a small office to a large campus, the PM8 provides a detailed view of consumption from individual panels and branch circuits, data center racks, lighting segments, office space partitions, lab space, or communications closets.

Additional features include baseline usage information, remote management through the Cyber Switching Enterprise Management Console (EMC), high/low current alarms for added protection, and Cyber Breaker, the virtual circuit breaker, for supplemental circuit breaker protection on an individual outlet basis.

PM8 at work

The following four scenarios illustrate the ability of the PM8 to minimize power consumption during costly peak pricing periods to reduce overall cost for a typical commercial building. Each scenario assumes off-peak pricing of \$0.1385 per kilowatt hour, peak pricing of \$0.4400 per kilowatt hour, 21 work days per month, and 10 days when the business is closed. Power consumption by device is shown below:

System	% active	Voltage (V)	Current (A)	Power (W)
Lighting bank 1	100%	277	10	2770
Lighting bank 2	100%	277	10	2770
Lighting bank 3	100%	277	10	2770
Water heater	30%	208	24	1497.6
Appliances (coffee maker)	30%	120	12	432
Vending machine	30%	120	12	432
Accent lighting	100%	120	10	1200
Fountain pump	100%	208	10	2080
Total				13951.6 (14kWh)

Figure 1. Device usage

Scenario 1 – Business as usual

The first scenario shows the office with no power management in place (i.e., business as usual, no one turns off the lights or non-essential devices). The total annual cost would be \$24,757.23 per year.

How this cost was calculated

This annual cost is derived from the table in Figure 2 below. To calculate the off-peak cost on workdays, multiply \$0.1385 per kilowatt times 14 kilowatts consumed by all devices per hour times 17 hours per day = \$32.96. To calculate the peak cost on workdays, multiply \$0.4400 per kilowatt hour times 14 kilowatts consumed per hour times 7 hours per day = \$43.12. Add the off-peak and peak cost together for a total of \$76.08 per day. Multiply that times 21 workdays per month for a total of \$1597.74, and 12 times that for an annual total of \$19,172.91. Off-day consumption can be similarly calculated.

Work days				
Off-peak cost (7pm-Noon)	\$0.1385/kW	14 kW	17 hours	\$32.96
Peak cost (Noon-7pm)	\$0.4400/kW	14 kW	7 hours	\$43.12
Cost per workday				\$76.08
Cost over 21 work days/mo.				\$1597.74
Annual cost				\$19,172.91
Off days				
Off-peak [all weekend]cost	\$0.1385/kW	14 kW	24 hours	\$46.53
All weekend cost for 10 days per month				\$465.36
Annual cost				\$5,584.32
Total annual cost				\$24,757.23

Figure 2. Consumption Scenario 1

Scenario 2 – Manual control of lighting, appliances

In the second scenario, employees turn on the lights and appliances at 6am each work day and turn them off at 8pm. Lights and appliances are off all weekend. There is no control of the fountain, vending machines, or water heater. The results: electric cost is reduced by nearly \$7500, or 30 percent.

While the savings potential is significant, results are completely dependent upon staff to implement consistently each and every workday (i.e., last one out the door turn off the lights). Alternatively, a dedicated building engineer could be assigned to the task, but that would add labor costs, reducing the overall savings.

Work days				
Lights & appliances				
Off-peak cost	\$0.1385/kW	10 kW	7 hours	\$9.69
Peak cost	\$0.4400/kW	10 kW	7 hours	\$30.80
No control of water heater/vending machine/fountain				
Off peak cost	\$0.1385/kW	4 kW	17 hours	\$9.41
Peak cost	\$0.4400/kW	4 kW	7 hours	\$12.32
Cost per workday				\$62.23
Cost over 21 work days/mo.				\$1,306.89
Annual cost				\$15,682.71
Off days				
No control of water heater/vending machine/fountain				
Off-peak cost	\$0.1385/kW	4 kW	24 hours	\$13.29
Cost for 10 days per month				\$132.96
Annual cost				\$1,595.52
Total annual cost				\$17,278.23

Figure 3. Consumption Scenario 2

Scenario 3 – PM8 control of lighting and non-critical systems, turns off all but two banks of lights

In Scenario 3, lighting and non-critical systems are controlled by the PM8. In addition, demand response turns off systems except two banks of lights, appliances, and the water heater on work days. Equipment is turned off on off days. Savings is \$16,291.80 or 65 percent.

Work days				
Off-peak cost	\$0.1385/kW	14 kW	7 hours	\$13.57
Peak cost	\$0.4400/kW	6.5 kW	7 hours	\$20.02
Cost per workday				\$33.59
Cost over 21 work days/mo.				\$705.45
Annual cost				\$8,465.43
Off days				
Off-peak cost	\$0.1385/kW		24 hours	\$0
Cost for 10 days per month				\$0
Annual cost				\$0
Total annual cost				\$8,465.43

Figure 4. Consumption Scenario 3

Scenario 4 – PM8 control of lighting and non-critical systems, turn off all but one bank of lights

In Scenario 4, lighting and non-critical systems are again controlled by PM8. However, demand response turns off all systems except one bank of lights, appliances, and water heater on work days. Equipment is turned off on off days. Savings is \$18,232.95 or 74 percent.

Work days				
Off-peak cost	\$0.1385/kW	14 kW	7 hours	\$13.57
Peak cost	\$0.4400/kW	4 kW	7 hours	\$12.32
Cost per workday				\$25.89
Cost over 21 work days/mo.				\$543.79
Annual cost				\$6,525.03
Off days				
Off-peak cost	\$0.1385/kW	14 kW	24 hours	\$0
Cost for 10 days per month				\$0
Annual cost				\$0
Total annual cost				\$6,525.03

Figure 5. Consumption Scenario 4

Typical return on investment (ROI) for the PM8 is one year. The PM8 is offered as a turnkey solution and includes one PM8 board with eight positions in a housing can. The

housing will accept two PM8 boards. Also included are one power supply, one D-Link router, and one Dell computer with EMC software.

Summary

The PM8 unit from Cyber Switching is an intelligent, cost-effective, scalable, and highly reliable power management system for controlling and monitoring electric consumption. The PM8 can help organizations significantly reduce power costs and provide greater visibility into power usage in commercial and industrial environments.

About Cyber Switching

Cyber Switching is a leading provider and innovator of power distribution and power management products. Cyber Switching has a reputation for developing green solutions—like the PM8—that integrate rich features with unsurpassed reliability and value.

For additional information about the PM8, please contact sales@cyberswitching.com. For any purchase, RMA, installation, or support questions for the PM8, please contact our North American distributor, C.H. Reynolds Electric at 408.436.9280 or visit www.chreynolds.com.

Cyber Switching, Inc.
2050 Ringwood Avenue
San Jose, Ca. 95131
Phone: 888-311-6277