



At Yahoo!, the Possibilities Are Endless

Can managers of thoroughly modern buildings continuously find new efficiencies, reduce energy consumption, and lower peak demand while maintaining a comfortable work environment? At Yahoo!, the relentless search for energy savings is proving that they can.

Yahoo! first grabbed the world's attention with its search engine and its revolutionary means of communicating, conducting transactions, and sharing information. In a more modest way, its Silicon Valley world headquarters is now getting attention as a model of energy management.



**Pacific Gas and
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A SMART START

In 1999, as Yahoo!'s 43-acre headquarters in Sunnyvale was being planned, the company took advantage of PG&E's design assistance to incorporate energy efficiency in its new buildings. The seven-building campus was designed and built to exceed California's stringent Title 24 energy efficiency standards for new construction.

When the campus opened in the fall of 2001, these design decisions paid off in more than \$60,000 in incentives from PG&E. Electric demand was 553 kW below the 2001 Title 24 standards, and Yahoo! was saving 928,000 kWh annually that it would otherwise have consumed. And that was just the beginning.

In its first five years of operation, this Yahoo! site has continued to reduce electric demand and energy consumption through a combination of smart operational strategies and equipment upgrades—reducing demand by an additional 306 kW and saving an additional 2 million kWh annually. How has Yahoo! achieved these results?



Fitness center

management, with each level being more aggressive than the previous level. As individual buildings reach predefined demand levels, the central control system controls load by adjusting local temperature set points and lighting levels. Most adjustments take place during peak or partial-peak electricity time-of-use periods.

Yahoo! runs this control strategy every day during May through October. The result is a remarkably flat demand profile during the utility peak period (see graph). Given the higher cost of energy during peak periods, this strategy also helps “flatten” Yahoo!'s utility bills. Equally important: nearly five years of experience has shown that these temperature and lighting adjustments can be made with negligible impact on employees.

Participating in Demand Response Although Yahoo! practices aggressive time-of-use load management every day during the summer season, Senior Facility Manager Rick Cuevas still believes in the benefits of

A MODEL OF ENERGY MANAGEMENT

Just as computers are faster, better, and cheaper today than they were only a few years ago, technological change continues to create cost-effective opportunities for reducing energy consumption and managing operating costs—even in relatively new, well-designed facilities. Yahoo! adopted the practice of continuous improvement, trying and adjusting new operating strategies, taking advantage of newer technologies, and assessing costs, energy savings, and employees' satisfaction.

Managing Daily Peak Demand Campus electrical systems are controlled by a direct digital control (DDC) system, installed in 2001, that continuously monitors electric demand. The control program has three levels of load

Office window after window film application



participating in PG&E's Critical Peak Pricing (CPP) demand response program. Thus Yahoo! benefits from a discount on its summer electric usage in return for voluntarily reducing demand during critical peak hours when PG&E sends a day-ahead alert. In the summer of 2005, Yahoo!, helped to reduce load on the state's electric grid by reducing demand for two to six hours on seven CPP days. Rick Cuevas points out that "the ability to change set points across the buildings from a single location, via the control system, is a huge advantage for participating in demand response."

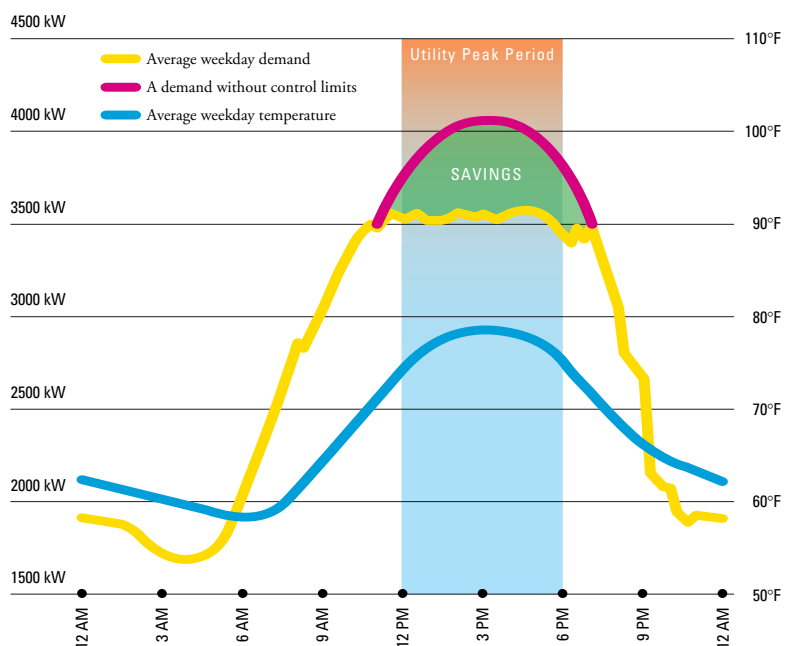
Installing Equipment Upgrades Even though wattage per square foot was below the Title 24 standard when the buildings were constructed, a few years later Yahoo! retrofitted the campus with higher efficiency fluorescent lamps, reducing the lighting load by 4 watts per lamp, and also replaced 50-watt incandescent bulbs with 4-watt fluorescents. The combined annual savings totaled more than 300,000 kWh.

Looking for Opportunities through an Energy Audit To get an independent view of its facilities and management, in 2004 Yahoo! requested an Integrated Energy Audit from PG&E. This comprehensive on-site audit identified 13 measures that could yield additional savings and, with a combination of reduced kWh and PG&E rebates, would pay for themselves in a little over one year.

A striking finding from the audit was that as the outside temperature rose each day, office temperatures spiked in building perimeters on the west, south, and east because of solar heat gains through large windows. PG&E engineers used DOE-2 building simulation modeling to estimate the effects of adding window film to the existing windows. Yahoo! then conducted a test in two rooms with the same solar exposure—one with film applied and one without—and demonstrated that adding the film would indeed have significant energy benefits, and no aesthetic drawbacks.

Savings resulting from daily peak period demand control

Source: PG&E Integrated Energy Audit, October 2004.



Building systems control room

In a project completed in mid 2006, Yahoo! installed nearly 130,000 square feet of window film. Across the six treated buildings the project is estimated to save at least 1.4 million kWh per year. Temperatures may be reduced by 2°F to 4°F in most affected areas, not only increasing employees' comfort but also enabling the facilities team to change temperature set points around the buildings, obtaining the maximum benefits of the project through an iterative process of adjusting environmental systems.

Digging Deeper The next major item on Yahoo!'s agenda is to increase automation. "This year," Rick Cuevas emphasizes, "we want to really dig into the programming." At the top of the list: fine tuning the control system that responds to demand



SITE

Location:

Sunnyvale, California

Size:

976,000 sq. ft. in six 3- to-5-story office buildings and one 2-story building housing the café and kitchen, fitness center, retail shops, and auditorium

Built and Occupied:

Spring 2001 (Buildings A-E) and
Fall 2004 (F-G)

Integrated Energy Audit:

October 2004, supplemented
January 2005

Space Functions:

Closed and open offices, computer data centers, cafe, fitness center, shops, mechanical rooms, parking garages

Energy Management:

Rick Cuevas, Senior Facilities Manager

ENERGY USAGE AND SAVINGS

Annual Energy Consumption:

18,998 MWh (at 2004 audit)

Summer Peak Demand:

4,093 kW (at 2004 audit)

PG&E Incentive Programs:

Savings by Design, 500 Plus Peak, Standard Performance Contract, Critical Peak Pricing, PG&E Energy Watch Partnerships

Annual Energy Savings:

Est. 2.9 million kWh

PG&E Rebates & Incentives:

Approximately \$240,000

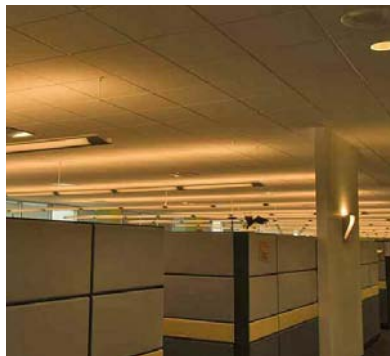
response events in order to maintain an even temperature across each building during the events.

Other changes deriving from the PG&E audit will involve further adjusting HVAC set points, reducing boiler operation on weekends, and extending active hours of daily demand controls. In addition, Yahoo! plans to re-commission its building systems through the Silicon Valley Leadership Group, a PG&E Energy Watch Partnership. Recommissioning will determine whether and where systems may not be performing to design specifications, and will help the facilities team analyze and implement enhanced control strategies.

A PASSION FOR RESULTS

Although the energy requirements of the Sunnyvale campus continue to grow through business expansion, Yahoo!'s facilities management staff continues to improve its energy utilization.

Says Senior Facilities Manager Rick Cuevas, "Do we embrace energy conservation and efficiency? Absolutely! Are we doing everything we can to



capitalize on energy savings projects? We are not there yet, but we continue to move in that direction. The pace of the company's growth is a constant challenge, but the capabilities are there. What I'm always looking for are different ways of utilizing what we already have. The possibilities are pretty much endless."

Interior lighting (Circuits are wired for separate control within three zones. Lighting is reduced in stages when electricity demand reaches predetermined set points.)

PG&E's 2006-08 Offerings for Integrated Energy Management

- Energy efficiency rebates and custom incentives
- Time-of-Use rates
- Demand response and reliability programs
- Self-generation incentives
- Local "Energy Watch" partnerships

For further information, visit www.pge.com/biz, or call the Business Customer Service Center at (800) 468-4743

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