



Business Case Study:
Boston Properties, L.P.

Background

- Type of Business: Class A office space manager
- Location: San Francisco and South San Francisco
- Size: 56 employees in the San Francisco Region, more than 5 million square feet.
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Summary

Boston Properties San Francisco staff manages more than 5 million square feet of Class A office and retail property, including the Embarcadero Center. Throughout the years, Boston Properties has been concerned with energy efficiency to reduce load and realize energy savings. Due to the risk of incurring high energy expenses in 2000/2001, Boston Properties, on behalf of its tenants, implemented a fully integrated energy cost management strategy, developed energy conservation and load management programs, instituted a competitive energy supply acquisition policies and implemented a real-time enterprise energy information/decision support infrastructure. The efficiency or conservation projects included: lighting retrofits, chiller replacements and retrofits, utilizing variable speed drives (VFD), photocell-controlled lighting for daytime reduction when ambient light is sufficient, and creative tenant awareness programs. As a result, Boston Properties realized a 13 percent reduction in energy consumption (more than 12 million kWh) over a 12-month period. Boston Properties anticipated an additional 4 million kWh reduction annually and 1,000 kW reduction during peak hours.

Referenced in Business Guides:

- #1, "Reduce Energy Use in Commercial Facilities Through Conservation Measures and Efficiency Improvements"

Plan

Boston Properties' goals for an energy-reduction plan were to reduce operating expenses for the tenants; improve

building operating efficiencies; and reduce demand load profile on the buildings. The target audience was company clients, owners and the public.

To prepare for an energy reduction strategy, Boston Properties building staff reviewed the energy usage of its various properties. Through surveys and audits and third-party and vendor audits, the staff reviewed the total number of fixtures, pieces and types of equipment and their respective nameplate load ratings and actual usage along with hours of operation. The staff then verified the data with a third-party consultant and/or vendors and analyzed the data concurrently with an external consultant.

The senior management, building engineering staff and property management staff carried out the programs. The team identified the highest payback and return on investment items to attend to first: lighting retrofits, chiller retrofit and/or replacements using VFD technology, along with fan and pump system VFD retrofits.

Boston Properties budgeted projects for completion within the calendar year of implementation. The projects were staged over several years, but compartmented to be substantially complete within their area each calendar year.

Programs: Efficiency

✓ **HVAC:** Strong history of HVAC retrofits and upgrades and installed new chillers and made system upgrades to several different properties between 1983 and 2001.

- In 2001, Replaced a 400-ton 8kW/ton chiller with a.4kW/ton chiller utilizing R-123 HCFC refrigerant.
- In 2002, Boston Properties began replacing chillers – two 1,000-ton chillers with 800-ton chillers equipped with VFDs – in two buildings as part of a two-year project.
- Boston Properties began installing VFDs on larger air systems at three buildings on more than 1,500 horsepower of fans. The drives will convert the current mechanical systems to electronic drive systems in order to operate the motors with more efficiency and save money.

✓ **Lighting:** Boston Properties installed T8 lamps and electronic ballasts and TI technology in exit signs at eight

buildings, including Retrofits on buildings Embarcadero 1-4, totaling nearly 4.5 million square feet of space completed in 2002.

✓ **Lighting controls:** Boston Properties implemented photocell controlled lighting reduction system in large retail and public area mall – covers four city blocks of tri-level retail space. The system was fully automated on the Building Automation System (BAS) and can achieve multi-level lighting scenarios. Projected reduction in overall utility billing was 5 percent. Boston Properties will add night lighting to the photocell system in 2002. The system enabled Boston Properties to:

- Expand after-hour shutdown programs with enhanced tenant override capabilities.
- Expand lighting control coverage.
- Utilize more daylight input into lighting strategies.
- Reduce lighting at peak times.
- Profile and monitor energy use.
- Boston Properties will add night lighting to the photocell system in 2002.

Programs: Public Outreach

✓ **Tenant participation:** Boston Properties worked with tenants to design the efficiency and conservation programs. Boston Properties communicated the projects to the tenants through the quarterly bulletins and newsletters. One significant tenant-led program was voluntary load shedding. Overall the response was quite positive. The incentives for tenants were the lower operating costs and a positive public contribution to an energy crisis that has a direct effect on business. Boston Properties does not have an estimate of the savings realized through voluntary tenant curtailment at this time.

Budget and Finance

The funds came from the capital improvement approval process and were allocated to the best projects and opportunities based on cost effectiveness and feasibility.

Boston Properties received \$1.3 million from PG&E through the 20/20 rebate program: Four buildings in August and five in September qualified. Boston Properties also received a rebates from the CEC totaling approximately \$150,000.

Rebate amounts for some of the HVAC retrofits were not confirmed as of this printing. For the .4kW/ton chiller utilizing R-123 HCFC refrigerant, Boston Properties received an energy rebate of \$40,000. Gateway Center lighting retrofit offset by a \$52,000 rebate.

Results

Four properties received the ENERGY STAR® label for operating efficiency in 2000 and 2001. Four buildings of the Boston Properties San Francisco region reduced energy by more than 20 percent and qualified for PG&E's 20/20 program. The savings of the retrofits will be realized in two to four years. Reducing costs of operation meant that tenants realized savings.

Winner: Flex Your Power Energy Conservation Award (2002)

Specific HVAC retrofit results included:

- 0.4kW/ton chiller utilizing R-123 HCFC refrigerant cost \$285,000. Estimated energy savings for this project was 53,921 kWh.
- 800-ton chillers equipped with VFDs: Total estimated savings: 1,750,000 kWh and 925 peak kW.
- VFDs on larger air systems: Total cost was \$450,000 and the annual energy cost savings were \$150,000.

Specific lighting retrofit results included:

- Gateway Center (two buildings totaling 506,000 square feet) retrofit cost \$454,000. Annual energy savings estimated at \$139,000.
- West Tower retrofits cost \$234,400. Estimated monthly savings was 115.60 kW and annual energy savings was 722,104 kWh.
- Old Fed Reserve Building retrofits cost \$107,383. Monthly savings was 54 kW and annual energy savings was 250,727 kWh.
- Embarcadero Building 1 cost \$261,000, with monthly energy savings of 158.09 kW and annual energy savings of 780,117.14 kWh.
- Embarcadero Building 2 cost \$230,897, with monthly energy savings of 139.67 kW and annual energy savings of 711,779.52 kWh.
- Embarcadero Building 3 cost \$381,652, with monthly energy savings of 205.80 kW and annual energy savings of 1,078,367 kWh.
- Embarcadero Building 4 cost \$105,677, with monthly energy savings of 64.15 kW and annual energy savings of 403,773 kWh. (Building 4 previously underwent a T8 lighting retrofit and reflector project on more than 5,500 fixtures in 1994, which is largely still in service today. This explains the smaller reduction in kW on this current retrofit.)

Lessons Learned

Boston Properties found that financing energy reducing projects was a challenge. Key advice:

- Keep bringing the opportunities to the forefront of discussions.
 - Be your first consultant. You can easily save time and money if you know the components of your facility and how they operate.
 - Be involved in the equipment-specification process for your facility: Product matching and mis-application are two areas that may cause you trouble.
 - Not every opportunity will work for you; Select projects that fit your needs and are cost effective.
 - Stick with proven technology and name branding. You must be able to maintain the project and support it for the life cycle intended, or you will not see the return.
 - Be aware of code changes that may require modifications to your facility, and thus may change project costs and ROI. For example, ASHRAE 15 (a standard for refrigeration and machinery rooms) may require that additional monitoring, ventilation and controls be installed for refrigeration room safety. Management should be presented with the cost of the project alone and the cost of the code-required upgrades.
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