

Best Practice #45
Energy Management Program
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Facility: Sandia National Laboratories

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Brief Description of Best Practice: Energy Management at Sandia National Laboratories includes integration of sustainable design principles into design specifications for implementation in all new design projects, establishment of a funding mechanism to allow for future planning, utilization of retro-commissioning and fully automated building control system for over 80% of space, lighting retrofit program, remote controlled centralized irrigation system for landscaped acreage, and an active communications campaign.

Why the best practice was used: Development and implementation of the Energy Management Program at Sandia was vitally important, not only to meet DOE Orders and Presidential Directives, but due to cost of utilities, the desire to be energy efficient, and the fact that Sandia Laboratories in New Mexico are located in a desert climate where water resources are scarce.

What are the benefits of the best practice: Results of the program include an estimated \$2.2 million of avoided energy costs from efforts over the FY85 to FY01 period, an estimated \$452k per year savings on lighting costs, and a 23% reduction in water usage since 1994.

What problems/issues were associated with the Best Practice: Problems encountered in implementing energy efficiency and establishing a lasting energy management program were twofold. There was a mindset that inclusion of sustainable design principles in designs would escalate the cost of projects and there was a lack of any funding mechanism with which to modify existing facilities for energy savings. Getting management to understand that inclusion of sustainable design features as part of facility designs is not a costly alternative when considering initial cost. Even though most understand the life cycle savings of energy projects most do not understand that initial cost escalation of a project can be kept well within 1% and making value added alternatives a part of the bid process brings out some good ideas from A/E firms. Convincing management that establishment of a funding mechanism dedicated to energy projects can be difficult since competition for investment funds across any site is fierce. However, utilizing the same engineering life-cycle analysis that energy savings contract providers use one can easily show payback on utility cost savings for proposed projects.

How the success of the Best Practice was measured: Utilizing LEEDs criteria during new facility design and retrofitting older facility lighting, variable speed drives, high efficiency chilled water loops, and building automation systems Sandia has been able to reduce energy utilization for office-type facilities since 1985 by 39% in 2004. This has been achieved even though office loads have significantly increased due to high computer usage and other electronics. On new type office buildings built in the last three years utilizing sustainable design criteria, energy usage has been measured at 76,000 Btu/gsf/yr, down from over 200,000 Btu/hr for similar older facilities.

Description:

Energy Management has been in existence for over 20 years at Sandia National Laboratories and has benefited from active support by the DOE and Sandia management. The program is supported by three part-time staff and sustainable design requirements imbedded in engineering standards, design specifications and the design manual. An annual plan is developed containing short and long-term plans and goals of the program. Attachments to this plan also include a Water Management Plan and Energy Curtailment Plan. A financial mechanism for funding of energy savings projects was established by devising a plan to use half of the savings from utility bills to fund these projects. Lighting retrofits were one of the first projects initiated and savings results were immediate. Currently the energy program at the Sandia New Mexico site is funded at \$700,000 per year.

The Facility Control System, the Electrical monitoring system, centralized irrigation control system, and metering of >90% of electrical and gas systems at the building level has enabled the energy program staff to trend energy usage and recommend appropriate projects to reduce utility usage. Meters have also been installed on >90% of the water distribution system to enable tracking of usage.

In order to focus occupants on energy usage, the space chargeback system allows direct charges of actual energy usage to tenants of facilities. In this way, the user can see an immediate benefit to controlling energy usage. An energy nag contest was also invented where an occupant of a facility will leave notes on someone's monitor or desk 'reminding' them of practices that conserve energy. The facility with the largest reduction in energy use for the year wins the contest. Other communication mechanisms used by the program include a monthly 'Porcelain Press' and weekly reminders in the Sandia Weekly News paper.

Actions that have led to energy efficiency are: equipment standardization, sustainable design requirements imbedded in design specifications and design manual, CFC phase-out and chiller replacements, lighting retrofits, centralized irrigation control, building automation, use of energy modeling, retro-commissioning, chilled water system optimization, variable speed drive usage, thermal energy storage tank installation on a major chilled water system, once through HVAC cooling reduction, cooling tower optimization, high efficiency reverse osmosis system, water recycling, waterless urinals, motion sensing lights, leak detection surveys, and metering and trending.

Sandia's energy management program has been recognized at many levels through awards and reports since 1999.