

Case Study 27 Energy Savings from Preventative Maintenance of Small to Medium Sized Ducted Air Conditioning Units



Objective: To reduce the energy consumption of ducted air conditioners through preventive maintenance

Location: Los Angeles, USA

Website: <http://www.caddet-ee.org/infostore/details.php?id=1197>

Description:

Preventative maintenance of air-conditioning units is known to restore performance capacity, improve comfort and perhaps lower utility costs. The Orleans Parish Extension Energy Advisory Committee conducted a series of result demonstrations in five small businesses. The aim was to determine the:

- servicing potential for restoration of capacity to the air-conditioning system
- servicing potential for lowering utility costs through preventative maintenance, and
- to estimate the need for air conditioner system servicing in the small business community.

The audit and analysis revealed that units with preseason services resulted in average monthly savings of US\$36.59 and a payback period of approximately two months. As with most systems, an additional benefit of extended operating life for the equipment is expected and hence, greater savings in the longer term.

Case Study 28 Re-evaluating Energy Efficient Buildings for Continuous Savings



Objective: To reduce the energy consumption in an existing energy efficient building

Location: Manila, Philippines

Website: http://www.iaeel.org/IAEEL/NEWSL/2000/Etttva2000/Case_1-2_00.html

Description:

The Asian Development Bank (ADB) headquarters building in Manila, the Philippines, is living proof of the potential for substantial energy savings in commercial buildings. When the building was designed in the 1980s, it received an energy-efficiency design award from the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE). However, despite the fact that the building was fairly modern, actions taken over the past six years reduced its energy use by nearly 40% and generated an internal rate of return of more than 25%.

In 1993, the electricity bill of the ADB headquarter building exceeded US \$2 million per year, and the monthly bill averaged around \$180 000. The two largest components of the bill were lighting (35%) and cooling (50-60%). Some of the other major end uses of electricity - all of which consumed less than 5% each - were computers, the restaurant, refrigeration, elevators and transformer losses.

Beginning in 1993, ADB began efforts to improve the use of energy in its headquarters. As part of this effort, the Building Maintenance Section undertook housekeeping measures and several projects to optimize the existing equipment. These efforts resulted in an 11% reduction in the building's energy consumption.

In 1994, ADB commissioned a detailed energy audit by the International Institute for Energy Conservation (IIEC) and Supersymmetry (of Singapore) to evaluate the potential savings of an additional set of more aggressive energy-saving measures. The measures considered in the study ranged from no-cost and low-cost measures to more significant retrofit investments.

Based on discussions with ADB staff, it was assumed that the Bank would only consider energy-saving opportunities with a return-on-investment (ROI) of greater than 12%. The measures analyzed in the study had ROIs ranging from 19% to 137%.

ADB budgeted \$3.5 million for the retrofit project. As of December 1999, committed expenditures were approximately \$3.3 million. The overall savings generated to date through the completed project components is more than 30000000kWh, or \$3.43 million in reduced electricity costs until December 1999.

Case Study 29 PowerSaver Energy Saving Device for Computers



Objective: To reduce energy consumption from computers without compromising availability or performance

Location: Canada

Website: <http://www.caddet-ee.org/infostore/details.php?id=2627>

Description:

This Case Study provides an alternate option to that presented later in Case Study 31 and examines the effect of installing a small, mouse sized hardware controller for powering down unused computer monitors. The PowerSaver device is connected in series with a monitor's power cord and consists of a small sensor attached to the keyboard to determine user activity. One major advantage of the device is it does not require connection to a computer's input devices (mouse and keyboard) and hence does not interact with the processing unit, hard disks, modem or network connections.

The organization spent approximately US\$8000 on installing 307 devices which resulted in an energy saving of approximately US\$13 000 in the first year, representing a return on investment of 168%.

Case Study 30 Awareness Raising and Motivation



Objective: To promote staff awareness of energy management issues

Location: United Kingdom

Website: <http://www.caddet-ee.org/infostore/details.php?id=2445>

Description:

The Sears Group plc is major group of companies with more than 2,000 retail outlets and employs over 40,000 staff. Each retail company within the Sears Group has full responsibility for its own financial performance, and each store manager is responsible for day-to-day operation and profitability. Historically, some of the retail companies undertook energy management initiatives, but many of those failed to achieve their full potential. Sears therefore decided to establish a full-time central energy team to provide an in-house service to all the group's retail companies.

In July 1994 a group energy manager was appointed who created a full-time energy team comprising an energy secretary, responsible for the processing of fuel and water data, an energy analyst, responsible for regular energy monitoring, the production of high-consumption reports, and tariff analysis, and an energy engineer, responsible for providing on-site technical support and assistance to individual store managers.

The team identified two main issues to address as part of a phased energy management strategy. These issues comprised the specification and adoption of standards for new and refurbished stores and the need for store manager training. These two initiatives were delivered as part of a broader energy and environmental campaign. The programme stressed the link between energy consumption and environmental benefits and was designed to be delivered in three phases. Advance flyers addressing a range of environmental issues were sent to all stores and were followed by an information pack containing posters, 'switch off' and other stickers, and a staff suggestion pad. Lastly, follow-up bulletins were distributed to provide feedback on the programme's success stories and maintain staff interest. The central team followed up poorly performing stores identified by its monitoring procedures, and provided a swift response to enquiries from the campaign publicity. The group energy manager used the interest created by the campaign to drive forward a ten point plan for the incorporation of energy-efficient technologies into new and refurbished store designs. Commitment was obtained from all the retail companies in the Group to adopt them as part of their design and refurbishment policies.

A few months after the launch of the program, a large colour poster illustrating success stories and including the photographs and telephone numbers of energy team members was sent to each store. The programme resulted in savings of approximately 7% across all stores, with maximum savings of up to 20% in some retail outlets. The payback period for the establishment of the energy team was two and a half months and resulted in average financial savings of £600 000. The cost of the program is £120 000.

Case Study 31 Computer Users Energy Management Behaviour



Objective: To reduce energy consumption from computers without compromising availability or performance

Location: Sweden

Website: <http://www.caddet-ee.org/infostore/details.php?id=1489>

Description:

Most computers and monitors today are EnergyStar compliant, meaning that they have reduced power modes which can be automatically initiated when computers are not in use.

Although most computer operating systems now include power saving features in the display settings, many of these features are not activated at the time of installation.

This Case Study examines the behaviour of staff who were asked to switch off computer equipment when not in use, without interfering with normal operations. A memo was sent out to staff after identifying that 40% of computer equipment was left on after hours and on weekends. Following the issue of the memo, non-productive equipment energy use dropped to 20% and resulted in energy savings equivalent to approximately US\$23 000.

Case Study 32 Funding Options for High Efficiency Lighting Programmes for Public Buildings



Objective: To improve the energy efficiency of lighting systems in public buildings

Location: New York, USA

Website: <http://www.caddet-ee.org/infostore/details.php?id=1738>

Description:

The New York Power Authority implemented a scheme of economic measures to promote the installation of energy efficient lighting systems in public buildings in New York State. Under the scheme, the New York Power Authority conducted an energy audit to determine lighting needs and fund the cost of the new more efficient lighting. Schemes like these are ideal for governments and government agencies that are able to provide attractive financing options to other government agencies.

The cost of the lighting installation is partly recovered through a surcharge on the monthly energy bill, with the total cost to the public building being only 53% of the value of the lighting installation. The scheme has resulted in annual savings in excess of US \$5.6M for the participants at an installed cost of US\$1650 / kW or approximately US\$ 0.03 / kWh with a payback period of 4.3 years.

**Case Study 33 Energy Savings from Equipment Replacements:
Water Chilled Air Conditioning Systems**



Objective: To reduce energy consumption due to HVAC through the replacement of split system cooling with water chilled central cooling

Location: Thailand

Website: <http://www.egat.or.th/dsm/GreenBuilding/casestudies/case.html>

Description:

The program was rolled out on 17 June 1998 as a joint initiative between the Port Authority of Thailand (PAT) and EGAT. The goals were:

1. To install air-conditioning systems with a 1,050 ton cooling capacity at the new head office of the Port Authority of Thailand. The investment cost was 56 million baht.

2. Redesign to use energy efficient water chiller instead of spilt type air-conditioners, which can yield a reduction of energy use from 1,470 kW to 871.5 kW, or a saving of 2.72 million baht per year.

Designed by Plan Engineering Co., Ltd. the project was putted out to tender, and it was won by Siam Inter Air Supply Co., Ltd. Under close supervision of EGAT's Design and Construction Division, the project started on 28 September 1999 and was completed on 10 July 2001.

With upfront investment from the Electricity Generating Authority of Thailand (EGAT), the Port Authority of Thailand was able to install new air conditioning, which resulted in easier maintenance, longer service life and significant annual energy savings (598.5 kW), resulting in a US\$61 500 cost saving. However, the initial investment of US \$1.3 million dollars in this system, , results in a payback period longer than the life span of the new system.

Case Study 34 Motion Sensors Save 80% of Energy Costs



ECONOMIC APPROACHES



Objective: To reduce energy consumption through the use of motion sensors

Location: Sweden

Website: <http://www.caddet-ee.org/infostore/details.php?id=2808>

Description:

At the Swedish housing company Svenska Bostäder a cost of 22 million SEK (ca 2,5 million USD) was detected as a result of permanent - and, as it occurred, temporarily unnecessary - illumination in public areas like stairs and garages. Tests were made in an 11-storey building at Nybohovsbacken 65 in Liljeholmen just outside central Stockholm. The result was a fundamentally new system for illumination of public areas, based upon two different sources of light. This resulted in the development of "intelligent" luminaries that directs the level of light in relation to the physical presence of humans in the current area by means of thermal effect (IR) and motion, in combination. The PIR-system (passive infrared detection) turned out to save 80 - 90% of the electricity required for a conventional lighting system.

Especially in stairways there occurred to be a demand for a weak, basic illumination permanently being turned on. The installation of a dim, permanent light neutralises such negative experiences during the interval before the comfort light has reached its optimal level. When the installation was performed an energy analysis where made. The result of the measuring indicated a consumption of 58 kWh/year and flat, viz a decrease from 269 SEK to 48 SEK (from approx. 31 USD to 5,5 USD). The energy use in the stairways had diminished with some 84 percent, and this alteration had not affected the tenants in any way at all.

A hidden unit for detection registers movement and heat and sends a signal on to the luminaries. There are no circuits for controls or switches, which means that the installation becomes very flexible, simple and inexpensive. A PIR-luminaire located to the ceiling has an effective working area of about 6 m in diameter in a room of normal height (2,5 m) and has a detection area of 360 degrees. One single sensor can direct other luminaries up to 400 VA. The directing PIR-armature is equipped with a 11 W compact lighting tube or a 15 - 48 W standard tube.

The economic gain of these energy savings are estimated to be about 400,000 SEK/year (45,000 USD). The annual cost per flat decreased from 30 USD to 4,5 USD. The payback time is less than a year compared with installation of a conventional lighting system. The total potential of savings inside the concern Svenska Bostäder are in the magnitude of 4,5 million SEK/year (500,000 USD) by change of all luminaries located to the stairways.