

OCCC Energy Management Programs

Background

Driven by projected budget deficits late in 2004, energy management was given a higher priority at the Orange County Convention Center (OCCC). Rapidly increasing energy prices and climate-change concerns, during the same timeframe, provided additional incentives to review and improve energy management efforts.

2005 Energy Management Plan

In early 2005, the outline of an energy management plan was developed, and an energy savings goal was established. A three-tiered approach to implementation was used: 1) Increase energy awareness / get employees involved, 2) Identify and implement no-cost and low-cost projects, and 3) Prioritize and implement capital projects. All projects that required funding were scheduled and managed by the OCCC Facility Operations Division. Most projects during the first two years involved energy conservation or efficiency improvements. A large renewable energy project (solar PV) was conceived in 2006, and ultimately implemented in 2009, as discussed later.

The kick-off for the employee-involvement phase consisted of a PowerPoint presentation by Facility Operations managers to all OCCC departments in the summer of 2005. The overall budget was discussed, and it was explained that the energy budget had been cut by 5% and that this figure was now an energy savings goal. It was clearly stated that all employees were expected to help achieve this goal. It was politely, but firmly, stated that the 5% savings equated to \$575,000 and that this figure was equivalent to 15 jobs, which would likely be the next target for budget cuts if energy costs were not successfully reduced. A listing of OCCC energy management activities is included in the two Status Reports in the Appendix below.

2005 – 2007 Energy Management Results

Routine budget monitoring indicated that the energy savings goal was achieved in 2006. In order to more accurately quantify savings, an independent third-party energy analysis was commissioned in late in 2007 to compare that year's energy use to the 2005 baseline year. The documented energy cost savings for 2007 was \$2.2M, or 18%, when compared to 2005.

2007 – 2009 Energy Management Results

Routine budget monitoring in 2008 indicated continued satisfactory energy savings. Early in 2010, an in-house analysis compared 2009 energy use to 2007. The combined energy use for electricity and purchased chilled water in 2009 was 427,890 MBtu . This was 127,683 MBtu, or 23%, less than 2007, but a portion of the energy savings (approximately 6% out of the 23%) is attributed to the impact of the economic recession on OCCC's business activity. After adjusting for the impact of the bad economy, the savings attributed to energy management efforts is 94,447 MBtu (17%, less than 2007). At an average cost of \$23.88 per MBtu, the adjusted 2009 cost savings was \$2.3M (this was over and above the 2005 - 2007 savings of \$2.2M).

Notable Energy Projects

While successful, the energy projects listed in the Appendix are typical of any good energy management program. The three following OCCC projects are considered "leading edge".

The previously mentioned Solar PV Project features a one-megawatt array which is the largest rooftop PV system in the southeast U.S. This project also includes four small PV demonstration systems and a Climate Change Education Center. It was implemented in partnership with other local organizations, and it was partially financed with a \$2.5M state grant. The PV systems became operational in 2009. For more information on this project, [click here](#).

Also noteworthy is the LED (light emitting diode) Project, which is in the procurement phase as of this writing. The OCCC has been awarded approximately \$1M in "stimulus funds" in the form of an EEC block grant. This project is the successor to a pilot project that experimented with various pre-market LED products. The LED Project will use on-market products to replace various light bulbs and lamps throughout the OCCC. This project is expected to have a combined savings of \$1.2M per year which includes lighting, air conditioning, and maintenance cost savings.

Another project of note is the EIS (energy information system) Project. The scope of this project was recently divided into phases due to budget reductions, but the ultimate goal remains the same: to collect and analyze "real time" energy data and use it to continually improve energy management practices. The first phase, in progress as of this writing, will download existing online electrical utility-meter data and merge it with an existing chilled water database. The next phase will tie into existing meters in electrical switchboards, followed by the installation of new CTs (current transformers) on branch circuits, followed by the use of portable monitoring devices on targeted equipment.

APPENDIX

Two one-page status reports, written in 2007 and 2008, are included below to provide examples of the energy management activities which resulted in the savings discussed above.

Status Report #1 - OCCC Energy Management Program

4/27/07

Background

Driven by budget constraints in 2004, energy management was given a higher priority and was more aggressively pursued. We initially focused on operational improvements and low-cost energy conservation and efficiency projects to help reduce our \$12M annual energy bills.

Administrative Activities (to increase awareness and create a sense of urgency)

1. Trained all employees on the need to reduce energy consumption: highlighted the financial and environmental benefits and asked for conservation suggestions
2. Formed an energy conservation team to review conservation suggestions and implement projects
3. Reviewed electric and chilled water bills for consumption and demand profiles
4. Set a general goal of reducing annual energy consumption by 5%

Operations Projects (little to no investment required; partial list only)

1. Reduced lighting levels in service corridors, storage areas, and walkways
2. Reduced emergency/minimum lighting in N/S Bldg meeting rooms
3. Programmed daylight harvesting and large-group "codes" in lighting computer
4. Manually shutdown floor box transformers when not needed for several days
5. Staggered large equipment start-up to minimize demand charges
6. Scheduled shutdown of A/C in non-perimeter rooms when unoccupied
7. Raised AC temp settings in perimeter spaces for nighttime/unoccupied periods
8. Fine tuned A/C systems in N/S Bldg to increase energy efficiency
 - a. Reduced outside air intake for meeting rooms
 - b. Calibrated all valves and controls
 - c. Rewired and recalibrated dehumidification systems
9. Minimizing open doors when AC is on (especially West Concourse to halls)
10. Continuing with infrared thermography to find and eliminate electric panel hot spots and chilled water coil blockage

Capital and Expense Projects (investment required; projects currently being designed or implemented)

1. Installed chilled water by-pass valves in West Bldg to improve efficiency
2. Replaced pond water fountains (w/ high eff. motors) and scheduled their use
3. Installing VFD's on West Bldg Phase 1, 2 and 2A pumps and motors
4. Assuming operation of OUC chilled water supply and return valves
5. Upgrading West Building BAS (building automation system)
6. Reconfiguring bollard lighting to low wattage devices
7. Implementing an Energy Information System (metering and monitoring equip.)
8. Re-applying for a grant to install a large scale photovoltaic system (800 KW min.)

Status Report #2 - OCCC Energy Management Program

4/30/08

Background

Since the last status report, on 4/27/07, several steps have been taken to improve energy management. A brief summary of accomplishments in the last 12 months, a status of ongoing projects, and plans for future projects are included below.

Administrative Activities

1. Energy Conservation Team received 112 suggestions by employees and implemented 44 projects to date.
2. Hired a consultant to review electric and chilled water bills and evaluate energy use from 2005 through 2007 and to review operational procedures and make recommendations on additional energy savings opportunities
3. From the consultant's report: Comparing 2007 to the 2005 baseline year and normalizing for weather (occupancy was similar), the OCCC used 18% less energy in 2007. This resulted in an annual cost savings of \$2.2 million.
4. Along with selected community partners, the OCCC applied for and was awarded a \$2.5M state grant to help install a 1-megawatt solar photovoltaic system and construct a Climate Change Education Center (this project is expected to be completed in early 2009).
5. Due to the increased energy requirements of increased building occupancy levels in 2008, only a 2% reduction in energy use (from 2007) has been set as a goal.

New or Ongoing Operations Projects (little to no investment required)

1. Programming daylight harvesting and large-group "codes" in lighting computer
2. Refining lighting schedules to minimize energy consumption in back-of-house
3. Minimizing open doors when AC is on (especially West Concourse to halls)
4. Continuing with infrared thermography to find and eliminate electric panel hot spots and chilled water coil blockage
5. Cycling most fan coil units to reduce run time
6. Installed conservation-reminder decals, or motion sensors, in mechanical rooms
7. Initiated re-commissioning of older HVAC systems to achieve design intent

Capital and Expense Projects (significant investment required; most projects are in the planning or early implementation stage)

1. Installed chilled water by-pass valves in West Bldg to improve efficiency
2. Installing VFD's on West Bldg pumps, motors, and exhaust fans
3. Assuming operation of OUC chilled water supply and return valves
4. Upgrading West Building BAS (building automation system)
5. Planning lighting control system upgrade for West Bldg
6. Reconfigured Kinkos AC system to isolate it from lobby system
7. Soliciting proposals to install a one-megawatt solar PV system
8. Planning an Energy Information System (metering and monitoring equip.)
9. Investigating LED applications for bollard, landscape, and exhibit hall lighting
10. Investigating solar hot water system for main kitchen