Energy Auditing Techniques for Small & Medium Commercial Facilities
Spring 2011

These links are provided as information only and are not in any way to be considered a comprehensive listing or as an endorsement by PG&E. All links were current at time of list creation. An electronic version of this list is available at www.pge.com/energyclasses/

Related Online Resources:

Auditing

Tool Lending Library at the Pacific Energy Center
The Tool Lending Library (TLL) site contains images and descriptions for its data collecting devices from over 100 vendors. Application Notes describe measurement techniques and provide step-by-step instructions for using specific tools. The TLL has a search feature to help you select the right tools for your project. A tool request form and contact information is also provided.
http://www.pge.com/pec/tll/

Building Commissioning Association (BCA)
The Building Commissioning Association is a professional organization dedicated to “promoting building commissioning practices that maintain high professional standards”. Case studies, information about commissioning-related events, membership information, the BCA newsletter and other publications can be accessed from this site.
http://www.bcxa.org

Building Life Cycle Cost Programs (BLCC)
The Building Life Cycle Cost programs were developed by the National Institute of Standards and Technology (NIST) for the comparative life-cycle costing analysis of capital investments. Registration is required to obtain this free software. Several other analysis software products can also be retrieved from this site.
http://www1.eere.energy.gov/femp/information/download_blcc.html

California Building Energy Reference Tool. CAL-ARCH
The official Web site for this California benchmarking program includes the CalArch 2.1 building energy benchmarking tool, news of upcoming workshops and project information.
http://poet.lbl.gov/cal-arch/

California Commissioning Collaborative
The California Commissioning Collaborative is a group of government, utility, and building service professionals organized to develop and promote commissioning practices in the California. The CCC site includes over 40 case studies, and has recently added a Library to its resources that contains articles, white papers, guides, and sample commissioning documents.
http://www.cacx.org
Efficiency Valuation Organization (EVO) and International Performance Measurement & Verification Protocol (IPMVP)
EVO and IPMVP have formed a joint measurement and verification tools Web site. IPMVP provides an overview of best practices for verifying results of energy efficiency. Under the products heading you will find the paper “Concepts and Options for Determining Energy and Water Savings.” The Library contains several articles on measurement and verification of energy savings.
http://www.evo-world.org/

Energy Audit Workbook. Washington State University Energy Program
WSU’s Commercial/Industrial energy publications include a comprehensive energy audit workbook that contains audit instructions, forms, and checklists.
http://www.energy.wsu.edu/Documents/audit1.pdf

Energy Design Resources. eValuator Financial Analysis Software
This software calculates life-cycle benefits of improved building design investments. It also provides financial information necessary for making sound building improvement decisions. The program can be downloaded free from this site. Over 20 building design briefs are also available from Energy Design Resources.

Energy Star® for Business Improvement. Tools and Resources
This is the Energy Star program’s gateway to documents and software for measuring, managing, and improving business energy usage and financial performance. Tools include Portfolio Manager and Automated Benchmarking for assessing your buildings efficiency. The Building Upgrade Manual is a guide to help plan and implement energy saving building upgrades. Energy Star also provides a directory for locating Energy Star labeled energy efficient products and services.
http://www.energystar.gov/index.cfm?c=tools_resources.bus_energy_management_tools_resources

Functional Testing Guide
http://www.peci.org/ftguide/index.htm

Portland Energy Conservation, Inc. (PECI)
PECI, a nonprofit energy consulting corporation, offers access to staff papers, presentations, training opportunities, a good resource list, and numerous publications on building commissioning for downloading and for purchase.
http://www.peci.org

A Practical Guide for Commissioning Existing Buildings
Prepared by the staffs of Portland Energy Conservation, Inc. and Oakridge National Laboratory, this guide covers the benefits and methodologies of retrocommissioning projects.

Procedure for Measuring and Reporting Commercial Building Energy Performance
This report, by the staff of the National Renewable Energy Laboratory, describes the process for measuring and reporting building energy performance. The report includes a glossary, definitions, lists of related references, and a detailed description of a sample energy performance project.
http://www.nrel.gov/docs/fy06osti/38601.pdf
Energy Efficiency, Building Systems, and Data Sources:

American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE)
ASHRAE is a professional organization dedicated to the creation and promotion of quality-based standard practices in the HVAC&R industry. Members have access to ASHRAE’s technical articles and conference papers. Anyone can browse abstracts of ASHRAE’s numerous books, journal articles, standards, and other technical publications that are available for purchase.
http://www.ashrae.org

Buildings Energy Data Book, 2009
The Department of Energy’s Buildings Energy Data Book is updated annually. This publication contains statistics on residential and commercial building energy consumption in the US. The Data Book also includes characteristics and efficiencies of common commercial equipment.
http://buildingsdatabook.eere.energy.gov/

California Climate Data
Heating and cooling degree days, bin data, and solar radiation data for several California locations are available in the PEC Energy Resource Center’s electronic catalog. Click on Special Titles under the Lists navigation bar.
http://207.67.203.54/P40007Staff/OPAC/index.asp

California Energy Commission. Title 24 Energy Efficiency Standards
The CEC’s web site provides access to the Title 24 Standards, the Residential and Nonresidential Manuals, compliance forms, other related documents, duct tape rulemaking, and information about energy analysis software programs.
http://www.energy.ca.gov/title24/

Commercial Buildings Energy Consumption Survey (CBECS)
CBECS is a sample survey of U.S. commercial buildings’ energy characteristics that is published every 4 years by the Energy Information Administration. The survey includes data on buildings’ energy consumption, energy expenditures, end-use equipment, and energy sources.
http://www.eia.doe.gov/emeu/cbecs/

Consortium for Energy Efficiency (CEE)
CEE promotes the manufacture and acquisition of energy efficient products and services for homes and businesses. Topics include lighting, HVAC, and refrigeration equipment. Efficiency specifications, product information, qualifying equipment lists, and FAQs on commercial equipment are available on this site.
http://www.cee1.org

DOE Building Energy Software Tools Directory
This directory contains detailed descriptions of over 200 energy-related software tools. The directory can be searched by topic or alphabetically. The Whole Building Analysis section includes software for energy simulation, load calculation, renewable energy, retrofit, and sustainability.
http://www.eere.energy.gov/buildings/tools_directory/

DOE-2 Building Performance Software
Detailed descriptions and comparisons for DOE-2, eQuest and PowerDOE building energy use software are available on this site. Information for downloading or purchasing copies of the software is also available.
www.doe2.com

Energy Design Resources (EDR)
EDR contains a good collection of resources on the energy efficient operation, design, and construction of buildings. Topics include, lighting systems, HVAC, building envelope, and daylighting. All of EDR’s publications, software, and training materials are organized by technology and building type.
http://www.energydesignresources.com/
Florida Solar Energy Center (FSEC). Solar Electricity Basics
The FSEC’s Solar Electricity section includes an illustrated primer that discusses the history of PV, how PV cells and systems work, plus a glossary of solar electricity terminology.

Food Service Technology Center (FSTC)
The FSTC promotes the use and operation of energy efficient equipment in food service. Information about proper equipment selection and how to save energy in the commercial kitchen are provided. The site includes FSTC publications and information about their energy efficiency seminars.
http://www.fishnick.com/

MotorMaster
MotorMaster+ 4.0.6 is a software tool that analyzes motors and motor system efficiency for thousands of AC motors. It can be downloaded from the Industrial Technologies Program’s software tools site.
http://www1.eere.energy.gov/industry/bestpractices/software.html

National Lighting Product Information Program (NLPIP)
NLPIP researches and tests new lighting products. It provides unbiased information about energy-efficient lighting products and technologies. A glossary, NLPIP product reports, application guides, and searchable publication database are among the sites many resources.
http://www.lrc.rpi.edu/programs/NLPIP/index.asp

New Buildings Institute
New Buildings Institute is a nonprofit corporation that promotes energy efficient building design and operations. This site includes several useful publications under their Technologies category. These include Lighting, HVAC, and other mechanical systems. A link to NBI’s Advanced Buildings suite of building design and operation resources is under the Advanced Design tab.
http://www.newbuildings.org/

PG&E Resources:

Business Tools
PG&E Business Tools include Energy Usage, Billing History and Rate Comparison Tools.
http://www.pge.com/mybusiness/myaccount/analysis/

Demand Response Incentives
Information on the various Demand Response incentives offered by PG&E can be found here.
http://www.pge.com/mybusiness/energysavingsrebates/demandresponse/

Energy Analyzer and Audits
Here are quick on-line tools for identifying and analyzing business energy use. Tools include an Online Energy Analyzer.
http://www.pge.com/mybusiness/energysavingsrebates/energyenergyanalyzeraiserver Analyzer/

Large Business Energy Management Solutions
Here you will find information about cash rebates and incentives for replacing existing equipment with new energy efficient technologies or purchasing new equipment. Design assistance for a new facility and system process is also available.
http://www.pge.com/mybusiness/energysavingsrebates/incentivesbyindustry/

Small and Medium Businesses Energy Management Solutions
Information about rebates, incentives, and resources available for your retrofit or new construction project can be found here.
http://www.pge.com/mybusiness/energysavingsrebates/smallmediumbusiness/
PG&E PowerPathway™
PowerPathway offers a Portfolio of programs aimed at building capacity within the state of California to produce the skilled workers needed by PG&E and the energy and utility industry. The PowerPathway Portfolio includes four separate but interconnected efforts: Career preparation, Industry workforce challenges, Education, and Green communities.
http://www.pge.com/about/careers/powerpathway/

Partners and Trade Professionals
PG&E program partners, local contractors and trade professionals offer special assistance in implementing energy efficiency measures for your business.
http://www.pge.com/mybusiness/energysavingsrebates/partnersandtradeprs/

Self-Generation Incentive Program at Pacific Gas and Electric
Financial incentive information, description of eligible technologies, forms, resources, and program contact information can all be accessed here.
http://www.pge.com/mybusiness/energysavingsrebates/selfgenerationincentive/

Solar Energy
PG&E provides information on how a photovoltaic system works; steps to take before installing solar in your home or business; solar schools; and requirements and applications for the California Solar Initiative Program.
http://www.pge.com/solar/

Tariff Book
This site contains all current gas and electric rate schedules.
http://www.pge.com/tariffs/

Third Party Incentive Programs
PG&E has partnered with energy efficiency specialists in order to extend the reach and effectiveness of energy efficiency, demand response, renewable energy, and self-generation programs. A fact sheet about the specialists and programs can be downloaded here.

Understanding Your Bill
Sample business class bills with explanations for each bill item.

Print Resources Available in the PEC’s Resource Center:

Procedures for Commercial Energy Audits. ASHRAE, 2004

Other Print Resources: