

Zero Net Energy Buildings – How Do We Get There?

Fall 2009

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:

Advanced Buildings

Advanced Buildings provides a suite of technical resources that design teams can use to achieve buildings that are up to 30% more efficient than the national average. Resources include case studies, *Core Performance Guide*, *Advanced Buildings Benefits Guide* and *Advanced Buildings Benchmark*.

<http://www.advancedbuildings.net/>

American Council for an Energy-Efficient Economy (ACEEE)

The ACEEE has promoted energy efficiency practices and policies for nearly 30 years. Titles of its numerous technical papers and conference proceedings, including their semi-annual *Summer Study on Energy Efficiency in Buildings* are all listed on the site along with purchasing information.

<http://www.aceee.org>

Architecture 2030 Challenge

This initiative has established performance standards for buildings to achieve by the year 2030. The standards include significant reductions in green house gases, energy consumption, and the use of fossil fuel. Guidelines for Implementation of these standards are provided on this site.

http://www.architecture2030.org/2030_challenge/index.html

ASHRAE Advanced Energy Design Guides

ASHRAE developed design guides for four building types; schools, retail, and warehouses. The goal of these guides is to provide users with the tools to achieve building energy savings that are 30% above the savings of buildings that meet the minimum requirements of ASHRAE Standard 90.1 1999.

<http://www.ashrae.org/publications/page/1604>

Assessment of the Technical Potential for Achieving Net Zero-Energy Buildings in the Commercial Sector

This National Renewable Energy Laboratory paper reports on the findings from their research to assess the potential for zero-energy building technologies and practices to reduce energy consumption in the commercial building sector.

<http://www.nrel.gov/docs/fy08osti/41957.pdf>

Athena Institute. Environmental Impact Estimator Software

Athena Institute is a nonprofit organization that researches the environmental impact of buildings and building materials. Athena developed the Impact Estimator for Buildings, which evaluates whole buildings and the EcoCalculator, an LCA calculator for environmental impact. The EcoCalculator is available at no charge. A trial version of the Impact Estimator is available. Overviews of both software products are provided. Selected Institute publications can be downloaded at no charge.

<http://www.athenasmi.ca/>

BuildingGreen

A great resource for information on environmentally friendly products and building design practices. This site provides abstracts of all articles from *Environmental Building News*, plus full text of selected articles, product reviews, GreenSpec® product information service, and resource lists on green building topics.

<http://www.buildinggreen.com>

Build It Green

Build It Green promotes the building and retrofit of homes that are healthy, and efficient in their use of energy and resources. They foster the use of green building practices throughout California. The site includes information about their services, a Green Products Directory, details about the *GreenPoint Rated System*, training opportunities, design guidelines, fact sheets, and case studies.

<http://www.builditgreen.org/>

California Building Energy Reference Tool. CAL-ARCH

This California benchmarking project includes the CalArch 2.1 building energy benchmarking tool, news of upcoming workshops, and project information.

<http://poet.lbl.gov/cal-arch/>

California Integrated Waste Management Board. Green Building

Case studies, a Sustainable Building Tool Kit, building profiles, Environmental Requirements, and other CIWMB program details and publications are available on this site.

<http://www.ciwmb.ca.gov/GreenBuilding/>

DOE Net Zero Energy Commercial Building Initiative

Learn about the DOE's Zero Energy Initiative for commercial buildings. The steps involved in building design and evaluation of a net zero building are presented along with information about software tools, case studies, and links to useful resources.

http://www1.eere.energy.gov/buildings/commercial_initiative/index.html

DOE Zero Energy Buildings Database

This database features profiles of eight zero energy commercial buildings. Each profile contains an overview and information about the process, financing, land use, site, energy use, materials, indoor environment, ratings, and lessons learned.

<http://zeb.buildinggreen.com/>

Energy Design Resources (EDR)

EDR provides a variety of useful design resources for building professionals. This site includes guidelines, case studies, over two dozen design briefs, access to design software tools and online courses covering many efficient building design techniques and technologies. Topics include Lighting, HVAC, Daylighting, Building Envelope, Building Commissioning, and Integrated Design.

<http://www.energydesignresources.com>

European Council for an Energy-Efficient Economy (ecee).

The ecee promotes energy efficiency in the EU with the dissemination of information via conferences, print, and web media. The paper, "The Lowdown on Low and Zero Energy Buildings", discusses the issues surrounding zero energy buildings in Europe.

<http://www.ecee.org/press/LowZeroEnergyBuildings>

Federal Research and Development Agenda for Net-Zero Energy, High-Performance Green Buildings. Final Report

This report by the National Science and Technology Council discusses the Federal R&D program and vision for net-zero buildings.

<http://www.bfrl.nist.gov/buildingtechnology/documents/FederalRDAGendaforNetZeroEnergyHighPerformanceGreenBuildings.pdf>

International Initiative for a Sustainable Built Environment (iiSBE)

iiSBE is an international organization dedicated to promoting sustainable buildings. Information about the organization's goals, Green/Sustainable Building Challenge archives, *Advanced Building News* archives, building conference information and case studies are available on this site.

<http://greenbuilding.ca/>

New Buildings Institute

New Buildings Institute is a nonprofit corporation that promotes energy efficient building design and operations. This site includes several useful building design guidelines. These include the *Advanced Lighting Guidelines*, various guides for the design of HVAC systems, and links to the *Advanced Buildings* suite of resources.

<http://www.newbuildings.org/guidelines.htm>

U.S. Green Building Council and LEED™

The USGBC is a coalition of building industry professionals, environmental organizations, and manufacturers organized to promote resource efficient and healthy buildings. This site includes an extensive list of resources, case studies, green building news and events. Detailed information about the LEED™ Green Building Rating System can be accessed from this site.

<http://www.usgbc.org>

Whole Building Design Guide. Sustainable Design

This is a gateway to resources and information on integrated building design practices and technologies. The Sustainable Design Guidance section provides guidelines for implementing six fundamental sustainable principles. Links to valuable related resources are provided at the end of the article.

<http://www.wbdg.org/design/sustainable.php>

Zero Peak Communities Electric Utility Benefits

This Oak Ridge National Laboratory report analyzes the energy performance of four near zero energy test houses and their impact on peak demand. The paper proposes that utility incentives be restructured to encourage the adoption of near zero energy practices by homeowners.

http://www.ornl.gov/sci/buildings/2010/Session%20PDFs/15_New.pdf

Building Rating and Certification Programs

BREEAM

The Building Research Establishment's Environmental Assessment Method rates buildings in several areas of environmental performance. Areas rated include energy use, materials, transport, and pollution. BREEAM provides assessment tools for commercial and residential buildings.

<http://www.breeam.org/>

Energy Star

Design projects that receive a rating of 75 or higher are eligible for the Designed to Earn the ENERGY STAR label and it is a requirement for participating in the ENERGY STAR Challenge for architecture firms. Program details plus a directory of successful projects are among the resources available here.

http://www.energystar.gov/index.cfm?c=new_bldg_design.new_bldg_design_benefits

Green Building Council of Australia (GBCA) Green Star

The GBCA promotes the adoption of green building practices in Australia. The council has developed a Green Star rating scheme that evaluates the environmental design and performance of buildings. Green Star guidelines and rating software tools can be downloaded from this site.

<http://www.gbca.org.au/>

Green Globes®

The Green Globes certification system provides assessment tools, a rating system, and guidance for the design and operation of green, high performance commercial buildings. The Green Globes system is used in Canada and the United States. Registration information, program and tool descriptions, free-trial information, and case studies are provided on the site.

<http://www.greenglobes.com/>

GreenPoint Rated System

Build It Green's rating system evaluates both new and existing homes in five categories of green performance. Details about the rating system, explanations of the grading categories, green building guidelines, and a directory of rated homes are included here.

<http://www.builditgreen.org/greenpoint-rated>

LEED® Green Building Rating System Version 3

This newest version of LEED launched in April 2009. Learn about this version, opportunities for LEED training, webcasts, and LEED credentials here. The *LEED Reference Guides* can be downloaded or ordered in hard copy from this USGBC site.

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1970>

SBTool 07

This software tool assesses the environmental and sustainability performance of buildings. Tool modules, features, and recent notes about the software are provided. The SBTool can be downloaded from the iiSBE site.

http://www.iisbe.org/iisbe/sbc2k8/sbc2k8-download_f.htm

Print Resources Available in the PEC's Resource Center:

- ❑ Building for Life: Designing and Understanding the Human-Nature Connection. Stephen Kellert. Island Press, 2005
- ❑ Cradle to Cradle: Rethinking the Way We Make Things. William McDonough. North Point Press, 2002
- ❑ Environmental Design: An Introduction for Architects and Engineers. Randall Thomas. E & F Spon, 1999
- ❑ Green Architecture: A Guide to Sustainable Design. Michael Crosbie. Rockport Publishers, 1994
- ❑ Green Buildings, Brian Edwards, ed. John Wiley & Sons, 2001
- ❑ Green Buildings Pay. Brian Edwards, ed. E & FN Spon, 1998
- ❑ Green Studio Handbook: Environmental Strategies for Schematic Design. Alison Kwok, Boston Architectural Press, 2006
- ❑ A Green Vitruvius: Principles and Practice of Sustainable Architectural Design. European Commission, et al. James & James, 1999
- ❑ Heating, Cooling, Lighting: Design Methods for Architects. Norbert Lechner. Wiley, 2000
- ❑ HOK Guidebook to Sustainable Design. Sandra Mendler and William Odell. Wiley, 2000
- ❑ The Philosophy of Sustainable Design. Jason McClennan. MO Ecotone, LLC, 2004
- ❑ Solar Control and Shading Devices. A. Olgay. Princeton University Press, 1957
- ❑ Sun, Wind, and Light: Architectural Design Strategies. G.Z. Brown. Wiley, 2000.
- ❑ Sustainable Building Technical Manual: Green Building Design, Construction, and Operations. Green Building Council, et al. Public Technology, Inc., 1996
- ❑ The Technology of Ecological Building. Klaus Daniels. Birkhauser Verlag, 1997
- ❑ Ten Shades of Green: Architecture and the Natural World. Peter Buchanan. Architectural League of New York, 2005
- ❑ The Twin Pillars of Sustainable Energy: Synergies between Energy Efficiency and Renewable Energy Technology and Policy. Bill Prindle, et al. ACEEE, 2007

Journals

- ❑ Building and Environment
- ❑ Environmental Building News
- ❑ Environmental Design + Construction Magazine
- ❑ Green Source
- ❑ High Performance Buildings
- ❑ Journal of Green Building

Other Print Resources:

- ❑ Ecological Design. Sim Van der Ryn and Stuart Cowan. Island Press, 1995
- ❑ Green Architecture. James Wines and Philip Jodidio, ed. Taschen, 2000
- ❑ The Integrative Design Guide to Green Building: Redefining the Practice of Sustainability. 7group, Bill Reed, S. Rick Fedrizzi. Wiley, 2009
- ❑ Sustainable Architecture White Papers, Earth Pledge Foundations, 2000

Journals

- ❑ Journal of Building Research & Information
- ❑ Journal of Renewable and Sustainable Energy
- ❑ Sustainable Buildings