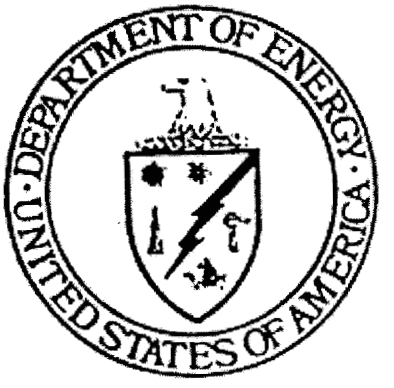

U.S. Department of Energy

Office of Energy Efficiency and Renewable Energy
Building Energy Tools
Drury B. Crawley
Program Manager

Commercial High Performance Buildings Project
(Agreement DE-FG01-99EE27578)

PROJECT MATERIALS

Prepared by:

Steven Winter Associates, Inc.
50 Washington Street
Norwalk, CT 06854
www.swinter.com

January, 2001

DISCLAIMER

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

Consortium for High Performance Buildings

The Consortium for High Performance Buildings (ChiPB) is an outgrowth of DOE's Commercial Whole Buildings Roadmapping initiatives. It is a team-driven public/private partnership that seeks to enable and demonstrate the benefit of buildings that are designed, built and operated to be energy efficient, environmentally sustainable, superior quality, and cost effective.

Consortium Configuration

It is anticipated that ChiPB will provide and orchestrate technical and marketing support for a number of commercial buildings nationwide. A separate consortium or expert team will be formed for each building or group of buildings, where the team will include building design, construction, management, financing, and other expertise pertinent to that building type and market segment. For example, if ChiPB were to provide support for 4 Times Square (prior to its start-up), a consortium would be formed to include the architect (Fox & Fowle), the developer (Durst Organization), the builder (Tishman), the HVAC supplier (Carrier) and others (including the ChiPB management firm, SWA). Other support would be available from local financing and marketing organizations, state energy offices, university research facilities and the like.

If the DOE-funded work encompasses support for six to eight commercial building projects nationwide, then six to eight such consortia would be formed. While some organizations might be represented in two or more of these consortia, most will participate only in the one established in its own market area. For example, Carrier may participate in several teams due to its nationwide purview, but Durst would not be involved outside New York.

Core Advisory Group

The activities of these regional consortia would be overseen and advised by a core consortium, or advisory group, consisting of individuals with cross-cutting expertise and a national perspective. This core group will have an "inner circle" acting like a "ChiPB Executive Committee" and including representation by building owners, developers and managers; builders or construction managers; building designers; and suppliers of building systems, products and materials.

An "outer circle" would assume the role of a planning group, which when combined with the foregoing, would constitute a "ChiPB Board of Directors" and would add representation from utilities, lenders, insurance companies, national labs, trade associations, media, and others.

This multi-level array of advisory groups is being cast as one "large consortium" for the purposes of the DOE supported effort, and is illustrated below.

CONTENTS

CONCEPT PAPERS

TO: Dru Crawley, DOE

FROM: Steven Winter, SWA

DATE: September 3, 1999

RE: **Consortium for High Performance Buildings**

Further to our August 12th meeting, we have documented a draft description of how we expect the consortium to be structured, hopefully in a way that clarifies and defines anticipated relationships.

Also included are draft lists of consortium candidates and demonstration/outreach candidates.

Finally, I have included some possible descriptors for the project title.

Please review and comment at your convenience.

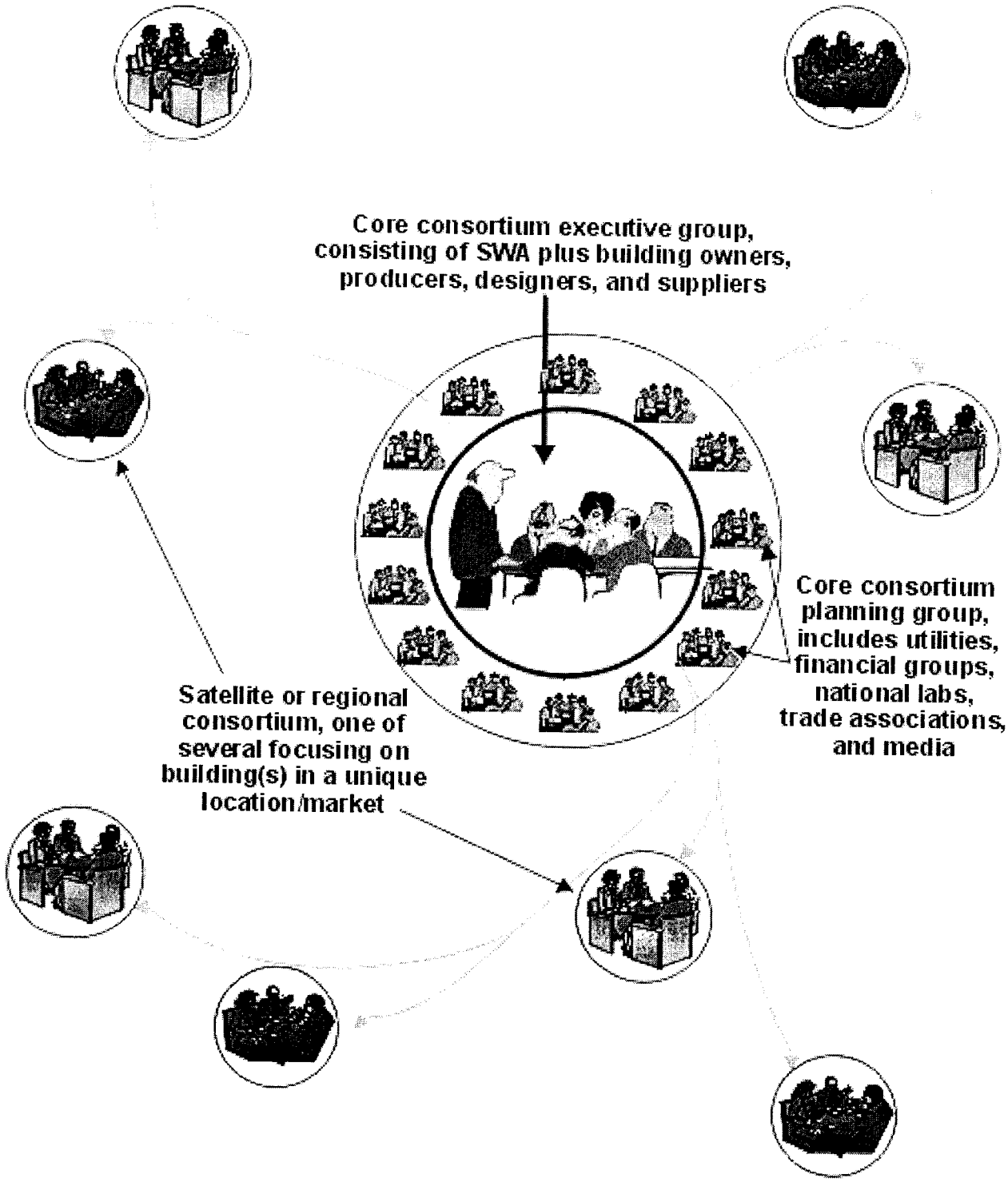

Figure 1. Graphic portrayal of the Consortium for High Performance Buildings (CHiPB)

The following is a draft list of candidate members of the core consortium.

ChiPB CORE CONSORTIUM, EXECUTIVE GROUP Candidate Members	
Industry Category	**Individual and/or Organization**
○ Building owners, developers, managers	Timon Malloy, Fred F. French Co. Jonathan Rose, Affordable Dev. Corp. Lou Maldovaniyi, CIGNA Tina Facus-Casolo, IBM
○ Builders, construction managers	Andy Bachman, Tishman Beth Heider, Hanscomb Associates
○ Architects, engineers, designers	Don Prowler, Prowler Associates Malcolm Wells, CTG Hayden McKay, lighting designer
○ HVAC systems, control, equipment	Rick Fedrizzi, Carrier Paul Von Paumgarten, Solomon Controls
○ Lighting , communications	Donnlee Drohen, Lutron Jacqueline Totten, Lucent Technologies
○ Walls, insulation	Tim Grether, Owens Corning, Viracon
○ Interior environments	Keith Winn, Herman Miller

ChiPB CORE CONSORTIUM, PLANNING GROUP Candidate Members	
Indicating Category	**Individual and/or Organization**
1. Lenders, investors	Karla Schikore, Bank America
2. Utilities, power producers	Tom Farkas, Edison Electric Inst. Tom Moskitis, American Gas Association ? , ERC (fuel cells) Jerry Paner, Atlantis (PV)
3. National Labs	Ren Anderson, NREL Jeff Christian, ORNL Phil Hanes, LBL
4. Media	Norbert Young, McGraw Hill Ed Sullivan, *Building Operating Management* John Sailer, *Environmental Design & Construction*
5. Trade associations	Chris Gribbs, AIA ?, ULI; ?, ACEC; ?, NASEO Charlie Clare, IFMA
6. Standards organizations	Tom Phoenix, ASHRAE TC 4.12, Integrated Building Design

Consortium for High Performance Buildings

The Consortium for High Performance Buildings (CHiPB) is an outgrowth of DOE's Commercial Whole Buildings Roadmapping initiative. It is a team-driven public/private partnership that seeks to enable and demonstrate the benefits of buildings that are designed, built and operated to be energy efficient, environmentally sustainable, superior quality, and cost effective.

Objectives:

CHiPB objectives are to materially improve the energy efficiency of commercial buildings, while reducing their impacts on the environment. At the same time, CHiPB aims to improve the utility, comfort, quality, and cost-effectiveness of these buildings.

These performance improvements in commercial buildings will be sought through "whole-building" approaches, in which global multi-faceted changes will yield desired results. For example, improved HVAC efficiency, in combination with higher-performance glazing, could result in smaller and lower-cost equipment and may yield cost benefits and performance benefits in addition to benefits of added comfort through reduced glare and noise. Such combinations or global arrays of improvements, when combined for optimal impacts on an entire building, constitute whole-building strategies and are central to CHiPB objectives and to DOE's roadmapping interests.

Participants:

Prior DOE initiatives, such as the residential Building America program, have demonstrated that multi-disciplinary teams or consortia, combining federal and private-sector skills and resources, are particularly effective in addressing objectives like the ones above. For this reason the Consortium for High Performance Buildings is being established as a voluntary organization whose combined talents will contribute to the implementation and demonstration of highly efficient commercial buildings.

Consortium Configuration

It is anticipated that CHiPB will provide and orchestrate technical and marketing support for a number of commercial buildings nationwide. A separate consortium or expert team will be formed for each building or group of buildings, where the team will include building design, construction, management, financing, and other

expertise pertinent to that building type and market segment. For example, if CHiPB were to provide support for 4 Times Square (prior to its start-up), a consortium would be formed to include the architect (Fox & Fowle), the developer (Durst Organization), the builder (Tishman), the HVAC supplier (Carrier) and others (including the CHiPB management firm, SWA). Other support would be available from local financing and marketing organizations, state energy offices, university research facilities and the like.

If the DOE-funded work encompasses support for six to eight commercial building projects nationwide, then six to eight such consortia would be formed. While some organizations might be represented in two or more of these consortia, most will participate only in the one established in its own market area. For example, Carrier may participate in several teams due to its nationwide purview, but Durst would not be involved outside New York.

Core Advisory Group

The activities of these regional consortia would be overseen and advised by a core consortium, or advisory group, consisting of individuals with cross-cutting expertise and a national perspective. This core group will have an "inner circle" acting like a "CHiPB Executive Committee". An "outer circle" would assume the role of a planning group, which when combined with the foregoing, would constitute a "CHiPB Board of Directors".

This multi-level array of advisory groups is being cast as one "large consortium" for the purposes of the DOE supported effort.

CHiPB core participation will include individuals from the industry sectors that have the greatest impacts on commercial building design, construction and operation:

- Building owners, developers and managers
- Builders and construction managers
- Architects, engineers, and other design professionals
- HVAC systems, controls, and equipment producers
- Lighting and communications specialists
- Wall and insulation material producers
- Interior environments producers and specialists

CHiPB second-tier participants will provide added strategic planning, technical, outreach and other skills, and will include:

- Lenders and investors
- Utilities and power producers
- National laboratories
- Media
- Trade associations
- Standards organizations
- Other appropriate sectors

Planned Activities:

CHiPB's long term intention is to positively impact the entire process whereby commercial building are designed, built and operated. This would include the provision or enhancement of services in the following phases of building development.

- Pre-design: assist with research that sets building programs and design parameters
- Design: assist with building design, detailing and specification, including energy analysis and modeling
- Benchtop testing: assist with pre-construction proof-of-concept testing and verification
- Construction: assist during construction phases
- Commissioning: assist with commissioning and shakedown procedures
- Post-occupancy: assist with building operation and post-occupancy assessments
- Outreach: Lessons learned are disseminated throughout the commercial building industry for widespread benefits

For the 1999-2000 time period CHiPB resources are limited. For this reason the first series of activities will focus on the final phase of the foregoing list: Outreach. CHiPB will identify exemplary commercial buildings around the country that exhibit desired attributes of energy efficiency, environmental sustainability, superior quality and cost effectiveness; and CHiPB will launch an outreach program to highlight the buildings' attributes and impacts. This outreach will be through media, live presentations and a website.

Schedule:

The schedule for the first phase of CHiPB activities, from August 1999 to July 2000, will be as follows:

Activity	Time Frame
1. Form consortium	August - October, 1999
2. Select exemplary buildings	September - December, 1999
3. Develop outreach plan	October, 1999 - December, 1999
4. Prepare outreach materials	November, 1999 - January, 2000
5. Implement outreach tasks	December, 1999 - June, 2000
6. Measure results and plan next steps	July 2000

Organization and Costs:

Steven Winter Associates, Inc. will manage CHiPB and its activities with significant funding being provided by the US Department of Energy. In-kind support for such elements as time spent on CHiPB issues will be provided by Consortium members. Additional CHiPB co-funding, both cash and in-kind, is anticipated from other sources but is not a prerequisite to initiation of the 1999-2000 activities outlined above.

PROJECT REPORTS

Steven Winter Associates, Inc.
Building Systems Consultants

50 Washington Street
Norwalk, CT 06854

Telephone (203) 852-0110
Telefax (203) 852-0741
E-mail: cbruncati@swinter.com

TO: Drury Crawley

FROM: Christine Bruncati

DATE: January 3, 2000

RE: CHiPB Monthly Status report, December 1999

CHiPB activities for the months of August through November included an initial CHiPB strategizing meeting in August attended by Dru Crawley, Steven Winter, Christine Bruncati and Deane Evans. This meeting laid out the scope of the CHiPB effort, refined a list of potential advisory group members, laid out potential candidate buildings for outreach, and planned other CHiPB activities for the year. Upcoming tasks were to include:

- Coordination of consortium communication and regularly scheduled meetings or conference calls
- Development of performance metrics for selected buildings drawing on experience of DOE Roadmapping groups and CHiPB Advisory group members
- Selection of additional demonstration buildings
- Various outreach activities

A kick off Conference Call Meeting for CHiPB took place on December 9, 1999. The meeting covered a general introduction to the program and to the individuals on the Advisory Group, an update on the program mission statement, a discussion of candidate buildings, an outline of outreach activities, and a summing up of next steps for CHiPB. Meeting minutes were compiled by SWA and distributed to all Advisory Group members.

Following the conference call SWA has continued to add to the list of candidate buildings to be featured by CHiPB and to develop write ups on selected buildings from that list.

The CHiPB web site has been developed to dovetail into the DOE Office of Building Technology , State and Community Programs web site. SWA would like the web site to be www.chipb.com for ease of access. SWA continues to create content for the site, primarily including the CHiPB mission statement, member information, hot links to member web sites, and candidate building write ups. Preliminary layouts will be posted for DOE approval this month. In addition to working as an outreach tool to the public, SWA is planning to use a members only section of the site to get Advisory Group feedback on candidate building write ups, building selection criteria, and other program

issues.

The CHiPB bi-monthly newsletter was briefly discussed during the conference call and is still under discussion. SWA is interested in going ahead with the newsletter, recognizing that it can be an important vehicle for publicizing the program. SWA would like to send out a January/February newsletter.

SWA has also gotten feedback on the CHiPB press release from Advisory Group Members and has submitted the revised document to James Freemont at DOE for approval. SWA is hoping to get approval on the document and send it out in January.

SWA is also in the process of developing presentation materials on the CHiPB program to be used at upcoming conferences. To date the program will be presented at GreenPrints 2000: Sustainable Communities by Design, in Atlanta GA, and Building Energy 2000, the Annual Conference of NESEA (Northeast Sustainable Energy Association), in New Haven CT.

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: March 3, 2000

RE: CHiPB Monthly Status report, January 2000

The CHiPB building database grew to include 55 entries during the month of January. Four of the one-page case studies are completed and six more are in progress. Along with the building write ups, a release form has been sent out to the architects and or owners of the buildings to be included in the database and the web site. If recipients do not respond CHiPB assumes the write content has their approval, if the recipient wants anything changed or has additional content, they e mail, fax, or mail a response.

A preliminary web page layout was posted for DOE approval. Content for the first page of the site included the program description and overview. Review of the content led to a shortening of the text with hot links to the complete text and the addition of building pictures.

The CHiPB press release was sent to DOE for approval by Jim Freemont. The CHiPB newsletter was reviewed by advisory board member Ed Sullivan and is planned to be distributed once the press release gains approval.

The CHiPB slide presentation was reviewed by the SWA CHiPB team. Changes were made to more clearly explain the goals of the program. Steven Winter is planning to give the presentation at the Green Prints Conference in Atlanta in February. A list of 23 potential conferences has been developed and an abstract of the CHiPB presentation has been submitted for approval. In addition to Green Prints, CHiPB will be presented during a green building rating system session at the Northeast Sustainable Energy Association conference in March.

Upcoming activities include

- Continued expansion of the building database
- Securing presentations at upcoming conferences
- Gaining approval for the press release and newsletter for distribution
- Putting more information on the web site, including the building database and hot links to project member web sites

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: March 3, 2000

RE: CHiPB Monthly Status report, February 2000

The Commercial High Performance Buildings project database has grown to 65 buildings with an ultimate goal of 500 buildings. Seven of the one-page write ups from the database have been approved by the building owner or architect.

The CHiPB newsletter and press release have not yet been launched as they are still waiting approval from DOE. CHiPB will no longer be used as the acronym for the project, as the project name has changed. The web site, newsletter and press release will be changed accordingly.

An introductory paragraph about the project and the web site address were posted on the Big Green commercial buildings chat room (oikos.com/resources/maillist.html).

Green Clips, which goes to 3500 subscribers, will run a small piece on the project in the coming months. *Building Design and Construction* will run an article on the program in the coming months. The February issue of *Consulting-Specifying Engineer* has an article titled "Green Gestalt" that mentions the program. The March issue of *The Construction Specifier* contains an article titled "Promoting High Performance Buildings" that mentions the project. A more exhaustive article on the project will be in the July issue of the magazine *Environmental Design and Construction* will mention the project in their April issue.

Steven Winter gave the project presentation at Green Prints in Atlanta and directed people to the web site for further information. He also provided a sign up sheet for those who wanted to be kept up to date on the project. Those who signed up will be added to the distribution list for the newsletter. Steven Winter is scheduled to present the project at the AIA regional meeting in Charlotte, NC for their Facility Management PIA (professional interest area) group at the beginning of March. Jose Higgins will be presenting the project at the ABST conference in Washington, D.C. on June 6, 2000. The project presentation is in electronic format and will be posted on the web site.

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: April 27, 2000

RE: Commercial High Performance Buildings project, March 2000

The Commercial High Performance Buildings project database now has 87 buildings, with a goal of 100 being done by the end of April. Ten one-page write ups have been completed from database entries. The "Building Inventory" included on the web site gives the project name, location by region of the country, building type, and a brief description of the high performance aspects of the building, as well as a contact name number and (where available) an e-mail address or web site for more information on each project.

As the database grows, the project team within SWA has been discussing the selection standards for buildings to be included. LEED (Leadership in Energy and Environmental Design) ratings on buildings would be an appropriate gage for candidates. Most of the buildings being selected from have not gone through the LEED rating system at this point. Early on in the project there was discussion of proposing candidate buildings to the Advisory Committee for review and selection, but that has not been settled upon at this point. This issue will continue to be discussed as the program matures.

The Commercial High Performance Buildings project press release is awaiting approval for release to the media.

Jose Higgins presented the Commercial High Performance Buildings project at the Northeast Sustainable Energy Association (NESEA) conference in New Haven on March 17.

The slide presentation presented at the conferences will be posted on the project web site in order to cut down on the amount of text on the site and show more illustrations of project buildings. The site will also include hot links to the Core Advisory Group members web sites.

A project conference call is in the early planning stages and will take place in May. Key issues to be discussed during the call will include:

- Building Database
- Outreach Activities Update
- Groundwork for Phase II

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: April 4, 2000

RE: Commercial High Performance Buildings project, April 2000

The Commercial High Performance Buildings project database now has 87 buildings, with a goal of 100 being done by the end of April. The entire database is anticipated to contain approximately 500 buildings. Ten one-page write ups have been completed from database entries.

The latest write ups include:

- National Public Radio's 152,000 square foot headquarters building in Washington, D.C.
- The Federal Reserve Bank of Minneapolis's 625,000 square foot Headquarters and Operations Center in Minneapolis Minnesota
- Owens Corning's three-story, 400,000 square feet headquarters in Toledo Ohio

The Commercial High Performance Buildings project press release was approved on April 6th.

The next project conference call has been scheduled for May 17th from 12:00 - 2:00 pm. An informational packet and agenda will be sent to all advisory group members in the third week of April to allow participants to review the materials before the call.

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: June 13, 2000

RE: Commercial High Performance Buildings project, May 2000

On May 17th 16 advisory group members participated in the second project conference call. This call helped to clarify the role of the advisory group through the project's first and second phase. During the outreach phase the group will provide feedback on outreach materials and input for building write ups. During Phase II, when actual buildings will be designed, the group would be asked for design and technical analysis support.

Discussion moved on to the criteria to be used for selected project buildings. Although LEED would be an ideal criteria, the group recognized that there were not enough LEED rated buildings to choose from. A general three point criteria was described that could be used in the interim. Selected buildings should demonstrate that a team approach was used during the design process, where many experts were brought to the table as early in the process as possible; the design should show a consideration for the interaction of the whole building structure, systems and context; and the building should be designed for high performance over the long term.

Outreach activities were also discussed and included the following:

- The Commercial High Performance Buildings project database now has 114 buildings
- The DOE press release on the project went out on April 6, 2000 to several thousand recipients
- The SWA project press release went out May 5, 2000 to 450 recipients in the media
- *Construction Specifier* will contain an article about the project in its July, 2000 issue
- SWA's *WinterGreen* April/May 2000 issue announced the launching of the project
- *Energy and Housing Report* announced the creation of the project in its May 2000 issue

Following the conference call SWA received requests from two advisory group members to provide hot links to their web sites. A report from NREL showed that 1030 visitors went to the High Performance Buildings web site, of which the Commercial High Performance Buildings project is a part.

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: September 29, 2000

RE: Commercial High Performance Buildings project
June, July 2000

Phase II of the program was scheduled to begin on July 1st. In preparation for this next implementation phase, candidate buildings were being sought out by SWA. Potential projects included Legget McCall's prototypical office building that is to be reproducible at different sites; various projects suggested by Greg Ander of Southern California Edison, and the McStain Enterprises Office building proposed for the Boulder, CO area. Other potential projects will be pursued.

Other developments during June and July included:

- The Commercial High Performance Buildings project website has 95 buildings in the database and 13 full write ups.

- The program has been invited to speak at the NAHB Builder Show in February of 2001. Dennis Creech of Southface Energy Institute has been asked to participate in the presentation and speak about the experience of building the new Southface building, which is in the Commercial High Performance Buildings project database.

- The following conferences are being applied to for presentations:
  EnvironDesign 5
  AIA Convention
  CSI Convention
  Forum 2001 Solar Energy, the Power to Choose

- SWA is planning to schedule a conference call for the Advisory group in early September to launch Phase II.

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: September 29, 2000

RE: Commercial High Performance Buildings project
August, September 2000

The SWA Commercial High Performance Buildings project team continued to add to the building database and write ups during the month of August, and developed a candidate buildings form for Phase II projects. This form was sent to Advisory Group members, for suggestions to be taken during the conference call on September 12. The conference call officially launched the beginning of Phase II

Other developments during August and September included:

- The Commercial High Performance Buildings project database has 148 buildings in the database and 14 full write ups.
- Access to the website has been simplified, and visitors to the site are nearly 3,000 per month. During the conference call it was noted that the site's database would become searchable in the future.
- The program has been presented at 5 conferences in 2000 and has been approved for 2 in 2001 with 4 others pending, including the AIA convention in May 2001. Paul von Paumgartten will look into whether the program can be presented at the Johnson Controls building summit.
- The program may get involved in a competition that will be judged in time for Earth Day 2001. It was suggested that SWA could support the technical screening of submittals to the competition.
- There have been 16 articles on the program, and there should be more than 20 by the end of the year
- A subcommittee has been formed that will decide on criteria for the selection of candidate buildings for Phase II. Members include Dru Crawley, Paul Torcellini, Herb Sloane and Jose Higgins.
- SWA will be developing a targeted mailing seeking candidate buildings for Phase II.

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TO: Drury Crawley

FROM: Christine Bruncati

DATE: December 5, 2000

RE: Commercial High Performance Buildings project
October, November 2000

On October 3 Mike Crosbie and Christine Bruncati represented SWA's project team at the High-Performance Buildings projects coordination meeting at DOE. At the meeting the functioning of the project was discussed as well as its beginnings in the High Performance Commercial Buildings Technology Roadmap. The degree of effort and funding that could be dedicated to different activities was laid out. These activities ranged from basic outreach to in-depth technical assistance for the creation of high performance buildings.

While the SWA team had developed over 14 case studies and over 148 buildings in its database, the joint meeting focused on standardizing the information being collected by the individual teams. In addition to case studies, the development of appropriate marketing materials that could be viewed on line or as printed material as well as a listing of top resources for the design of high performance buildings was discussed.

A team meeting conference call on November 6 revisited the different levels of commitment project participants may have, and how best to address their needs. The group also discussed the review of the draft documents for the High Performance Buildings Project summary and the High Performance Buildings Application. Following the draft documents, the group discussed potential phase II projects and the need for coordination of the online resources being offered by the project.

The November 27 Commercial High Performance Buildings project conference call the group was asked to review Pam Lippe's HPB Recommendations for Different Phases of Design and Construction CHART. Dan Sze requested input for his RebBuild America newsletter that would introduce the Commercial High Performance Buildings project to his readers. (Mike Crosbie responded by sending in a short article on the project to Dan). The team was told there would be an updated form on line that would allow teams to post the status of potential phase II projects. The project website was reviewed and an attempt to coordinate web efforts by different teams was revisited. The overall vision for the site was outlined to :

Define criteria for high performance buildings

Provide examples of such buildings

Explain the technologies in those buildings

Provide information and contacts for further information

Other suggested items to be included on the site were : what is a high performance building?; How is the DOE involved?; a list of frequently asked questions; top ten resources to achieving a high performance building, contacts for energy consultants, charette coordinators, etc. An overview of the project is also to be included on the site. Jose Higgins e mailed the SWA project PowerPoint presentation as a possible introduction to the project for the website.

On a parallel track to the coordination of the teams, SWA continued to receive inquiries from individuals that want their buildings to be included as part of the buildings database. SWA also continues to pursue candidate buildings for phase II assistance from the project. The three leading contenders are listed below:

Headquarters, Connecticut Innovations

Rocky Hill, CT

The client has provided SWA with photos of the site, and existing conditions. He has also provided preliminary schematic drawings for the building's design, with the understanding that the design will change. Connecticut Innovations is now in the process of releasing an invited RFP for the project (as they need to do given that they are a quasi-state organization).

Speculative Office Building, Leggat McCall

This project is moving ahead, with SWA providing some preliminary consultation on the project's parameters and high-performance features.

Mixed Use Building, Sierra Vista Center

Sierra Vista, AZ

A three story 55,000 square foot building combining ground floor commercial second floor offices and lofts, and third floor apartments. SWA negotiating with the project team.

The Commercial High Performance Buildings web site developed by SWA had 2,787 page views in October and 2.932 in November.

The site along with articles by SWA regarding the project has resulted in 24 inquiries about getting buildings included in the database and or new buildings that are seeking design assistance. A log of those inquiries is attached (Attachment A). An updated list of conference presentations is also attached (Attachment B).

Attachment A

INQUIRIES
COMMERCIAL HIGH PERFORMANCE BUILDINGS PROJECT

1.
Fred Peacock
Precision Lighting, Inc.
15245 Shady Grove Road
Suite 160
Rockville, MD 20850
Date of Inquiry: 7/25/00
Via: email from Dru Crawley
Nature of Inquiry: Unknown
Response: MJC sent a letter 7/26 inviting him to contact us with more information.

2.
Frank L. Veninga, Architect, PC
216 1st Avenue S, Suite 415
Seattle, WA 98104-3440
206-224-4914
Date of Inquiry: 7/25/00
Via: e-mail from Dru Crawley
Nature of Inquiry: Unknown
Response: MJC sent a letter 7/26 inviting him to contact us with more information.

3.
Jamey Evans
Million Solar Roofs Coordinator/
Green Buildings Specialist
U.S. Dept. of Energy, Denver Regional Office
1617 Cole Blvd., Golden, CO 80401
(303) 275-4813 jamey_evans@nrel.gov
Date of Inquiry: 6/29/00
Via: e-mail to C. Bruncati
Nature of Inquiry: Can McStain office building be in the program?
Response: Christine Bruncati responded that the building is a great candidate and will be pursued.

4.
Carmine Vasile
Dr. Carmine Vasile, CEO
WaterFilm Energy Inc.,
P.O. Box 128
Medford, NY 11763
Voice: 631-758-6271 [Fax: 631-758-0438]

Email: gfx-ch@msn.com
Date of Inquiry: 6/11/00
Via: e-mail to C. Bruncati
Nature of Inquiry: Can his drainwater heat recovery product be included in the project?
Response: Christine Bruncati told Mr. Vasile that the project was not focused on products, but that if they are featured in the future, his would be considered.

5.
Michelle Crozier <mcrozier@worldbuild.com>
Date of Inquiry: 2/22/00
Via: e-mail to C. Bruncati
Nature of Inquiry: Wants more information about the project.
Response: Christine Bruncati forwarded request to Jose Higgins

6.
Frank Cunningham
Engineer
State of Missouri
Division of Design and Construction
301 West High Street, PO Box 809
Jefferson City, MO 65102
(573) 751-7164
(573) 751-7277
Date of Inquiry: 8/2/00
Via: e-mail to C. Bruncati
Nature of Inquiry: He would like the State of Missouri's new Green office building for the Department of Natural Resources to be included in phase II.
Response: Christine Bruncati responded that the building will be considered for phase II.

7.
Tom Sayre
Principal
Sizemore Floyd Architects
Date of Inquiry: 8/8/00
Via: e-mail to C. Bruncati
Nature of Inquiry: He would like a presentation on the project at his local AIA chapter or COTE or Sustainability round table.
Response: Christine Bruncati forwarded the message to Dru Crawley to inquire as to how to respond.

8.
Doug Smith
Energy Savers, Inc.
3334 Willow Street
Santa Ynez, CA 93460

805-693-8265
805-693-8275
Date of Inquiry: 8/15/00
Via: e-mail to C. Bruncati
Nature of Inquiry: He provided two buildings he would like included in the building inventory.
Response: Christine Bruncati forwarded the message to Jose Higgins for inclusion in the matrix. She e-mailed Doug Smith to say that he would be contacted for further information by Jose. Jose has requested further info on the buildings.

9.
Walter Pazik
Viron Energy Services
1330 Broadway, Suite 515
Oakland, CA 94612
510-464-2973
510-464-2974
Date of Inquiry: 8/2/00
Via: e-mail to C. Bruncati
Nature of Inquiry: He asked whether there are incentive programs for building owners to reduce energy use.
Response: Christine Bruncati responded that the project does not have particular monetary incentives. She encouraged him to check with DOE to see if other programs might.

10.
Gary Gardner, AIA
jgg@gpaarch,com
Date of Inquiry: 5/1/00
Via: e-mail to W. J. Higgins
Nature of Inquiry: Will send info on high performance commercial buildings.
Response: Acknowledged e-mail.

11.
Kevin Hinton
Environmental Techniques Corporation
A Blue Dot Service Company
2916 National Drive
Garland, Texas 75041
Phone 972-278-0301
Fax 972-864-1944
Date of Inquiry: 8/22/00
Via: e-mail to W. J. Higgins
Nature of Inquiry: Offered his services of fully licensed commercial and residential HVAC service provider that operates in the Dallas/Fort Worth metroplex areas.

Response: Acknowledged e-mail, thanked him for info and requested if he is involved in any buildings that could be candidates for Phase II.

12.
Dr. Hillel Arkin
amatan@zahav.net.il (arkin)
Date of Inquiry: 9/2/00
Via: e-mail to: MJC
Nature of Inquiry: Wanted information on how to access the website.
Response: E-mailed website address

13.
Art Ludwig
Oasis Design
Ecological Design publishing & consulting
5 San Marcos Trout Club, Santa Barbara, CA 93105-9726, Fax805 967-3229
Phone 967-9956 <http//www.oasisdesign.net/>
<odesign@sprynet.com>
Date of Inquiry: 9/21/00
Via: e-mail to W. J. Higgins
Nature of Inquiry: Said "Nice job on Inventory."
Response: Thank You.

14.
Eddy Schultz
Office and Industrial Properties Magazine
301 Oxford Valley Road, Suite 804
Yardley, PA 19067
Date of Inquiry: 9/25/00
Via: phone call to M.J.C.
Nature of Inquiry: Wanted information on program for article.
Response: Sent copy of past article and images

15.
Bryan Garcia
Connecticut Clean Energy Fund
Connecticut Innovations
Rocky Hill, CT
Date of Inquiry: 10/11/00
Via: phone call to M.J.C.
Nature of Inquiry: Found out about the program on the website; wanted information on program for building they plan to construct.
Response: Faxed copy of past articles, information on program.

16.
Bryan Garcia
Connecticut Clean Energy Fund
Connecticut Innovations

Rocky Hill, CT
Date of Inquiry: 10/20/00
Via: phone call to M.J.C.
Nature of Inquiry: Wanted to meet to discuss project and its use in program.
Response: Set date to meet on project.

17.
Bill Johnson
H.L. Turner Company
Concord, NH
Date of Inquiry: 10/23/00
Via: e-mail to C. Bruncati
Nature of Inquiry: Wanted to know if their building could be considered for the DOE website database.
Response: Encouraged him to send information on the building.

18.
Ernie Hooks
Providence, RI
Date of Inquiry: 10/27/00
Via: Voice mail message to M.J.C.
Nature of Inquiry: Was interested in program.
Response: Returned call, left message to call.

19.
Matthew Tendler, Architect
Wisconsin
Date of Inquiry: 10/31/00
Via: Voice message to M.J.C.
Nature of Inquiry: Wanted information on program.
Response: Returned call, left message to call.

20.
Roger Chang
Building Technology Program
School of Architecture
Massachusetts Institute of Technology
Date of Inquiry: 11/02/00
Via: email to C. Bruncati
Nature of Inquiry: Looking for naturally ventilated buildings for monitoring purposes
Response: Forwarded copy of email to Dru Crawley to respond.

21.
Frank Cunningham
Engineer

State of Missouri
Division of Design and Construction
301 West High Street, PO Box 809
Jefferson City, MO 65102
(573) 751-7164
(573) 751-7277
Date of Inquiry: 11/07/00
Via: e-mail to C. Bruncati
Nature of Inquiry: Reported that the State of Missouri's new Green office building for the Department of Natural Resources, which he wanted to be considered for Phase II, is on hold until a site decision can be made.
Response: Bruncati acknowledged

22.
Conrad Ober
Technor Company, RI
Date of Inquiry: 11/06/00
Via: phone call to M.J.C.
Nature of Inquiry: Saw article on program in Energy Decisions Magazine, wanted information on program regarding products that might be promoted.
Response: Returned call, said that building products are not promoted in program

23.
Brian Lockhart, Architect
41B Country Road, Suite 250
Vallecitos, NM 87581
505-582-4241
Date of Inquiry: 11/27/00
Via: phone call to M.J.C.
Nature of Inquiry: Saw article on program; wanted information on program regarding a new commercial building he is designing.
Response: Gave information on the program. He called back and was interested in filling out a project application form. Faxed application form to him and Lockhart returned completed form on 12/01/00. Discussed Commercial High Performance Buildings Phase II project with client. Would like to be involved in the project.

24.
Bill Johnson
H.L. Turner Company
Concord, NH
Date of Inquiry: 11/28/00
Via: e-mail to C. Bruncati
Nature of Inquiry: Sent information on building for consideration for inclusion on website.

Response: Thanked him for information, said it would be considered.

Attachment B

CONSORTIUM FOR HIGH PERFORMANCE BUILDINGS

CONFERENCE STATUS

1. NAME: AIA Committee on the Environment
LOCATION: 200 Lexington Ave., N.Y., N.Y.
ORGANIZATION: AIA
DATE:
CONTACT: Joyce Lee, Chairman, 212-788-6156, e-mail: ndogan@aol.com
STATUS: Discussing local chapter programs

2. NAME: Green Village Expo
LOCATION: North Charleston, SC
ORGANIZATION: The Sustainability Institute & Coastal Living Magazine @ Dewees Island
DATE: January 14 & 15, 2000
CONTACT: 843-886-8783
STATUS: Too late for 2000

3. NAME: Greenprints 2000: Sustainable Communities by Design
LOCATION: Atlanta, GA
ORGANIZATION: Southface Energy Institute
DATE: February 6-8, 2000
CONTACT: 404-872-3549, www.southface.org
* STATUS: **ChiPB presentation has been given.**

4. NAME: International Air-Conditioning, Heating, Refrigerating Exposition (AHR Expo)
LOCATION: Dallas, TX
ORGANIZATION: ASHRAE
DATE: February 7th-9th, 2000
CONTACT: 203-221-9232, ahrexpo@aol.com, www.ashrae.org
STATUS:

5. NAME: Your Facility Management Future: Value Profit and the Green Revolution
LOCATION: Charlotte, NC
ORGANIZATION: AIA, PIA Facility Management Workshop
DATE: March 3-4, 2000
CONTACT: AIA, 202-626-7300
* STATUS: **ChiPB presentation has been given**

6. NAME: Building Energy 2000
LOCATION: New Haven, CT
ORGANIZATION: Annual Conference of NESEA
DATE: March 15-18, 2000
CONTACT: 413-774-6051, www.nesea.org
* STATUS: **ChiPB presentation was part of SWA Green Building Rating Systems presentation.**

7. NAME: The Construction and Facilities Management Conference & Exposition 2000
LOCATION: Cromwell, CT

ORGANIZATION: Construction Institute
DATE: April 13, 2000
CONTACT: Debbie Lavera, 860-768-5027
STATUS: Call in on 4/5/00

8. NAME: Soltech 2000, The Annual Solar Energy Conference
LOCATION: Washington, DC
ORGANIZATION: SEIA, Solar Energy Industries Association
DATE: April 19-22, 2000 (22 is Earth Day)
CONTACT: www.seia,org/main.htm
STATUS:

9. NAME: InLCA - International Conference and Exhibition on Life Cycle Assessment
LOCATION: Arlington, Virginia
ORGANIZATION: InLCA
DATE: April 25-27, 2000
CONTACT: 703/736-0826 (fax), InLCA.CI@epamail.epa.gov (e-mail)
STATUS:

10. NAME: 8th National Conference on Building Commissioning
LOCATION: Kansas City, Missouri
ORGANIZATION: PECI
DATE: May 3-5, 2000
CONTACT: Carolyn Dasher, PECI, 921 SW Washington, Ste 312, Portland, OR 97205; 503/248-4636 x204, 503/295-0820 (fax), cdasher@peci.org (e-mail), Web site: www.peci.org/ncbc
STATUS:

11. NAME: ABST 2000
LOCATION: Washington, D.C.
ORGANIZATION: Mechanical Systems / Construction Group
DATE: June 6-8, 2000
CONTACT: Richard Sweetser, EXERGY Partners Corp, 703-707-0293, Mike Ivanovich 800-366-1901 ext 9192
* STATUS: **ChiPB presentation has been given** (approximately 45p)

12. NAME: Midwest Renewable Energy Fair
LOCATION: Madison, Wisconsin
ORGANIZATION: Midwest Renewable Energy Fair
DATE: June 16-18, 2000
CONTACT: Midwest Renewable Energy Association, 7558 Deer Rd., Custer, WI 54423; 715/592-6595, mreainfo@wi-net.com (e-mail)
STATUS:

13. NAME: Solar 2000 Annual conference of the American Solar Energy Society.
LOCATION: Madison, Wisconsin
ORGANIZATION: ASES
DATE: June 17-21, 2000
CONTACT: ASES, 2400 Central Ave., Unit G-1, Boulder, CO 80301; 303/443-3130, 303/443-3212 (fax), ases@ases.org (e-mail), Web site: www.ases.org/solar
STATUS:

14. NAME: 23RD Annual Convention and the Office Building Show.
LOCATION: San Diego, CA

ORGANIZATION: BOMA, Building Owners and Managers Association International
DATE: June 18-20, 2000
CONTACT: 202-326-6331, registrar@boma.org
STATUS: Filled out online application 10/29/99, awaiting reply, left message with Laura 202-326-6331 on 12/28/99 - **application denied 1-25-00**

15. NAME: ASHRAE Annual Meeting
LOCATION: Minneapolis, MN
ORGANIZATION: ASHRAE
DATE: June 24-28, 2000
CONTACT: 404-636-8400, ashrae.org
STATUS:

16. NAME: Energy Forum
LOCATION:
ORGANIZATION:
DATE: June, 2000
CONTACT: Paul von Paumgartten of Johnson Controls 414-274-4546
STATUS: Sent in abstract letter, 12/17/99, left phone message 12/28/99, 1-10-00 Paul said he doesn't know status yet

17. NAME: National Summit on Building Performance
LOCATION: Washington, D.C.
ORGANIZATION:
DATE: June, 2000
CONTACT: Paul von Paumgartten of Johnson Controls 414-274-4546
STATUS: Sent in abstract letter, 12/17/99, left phone message 12/28/99, 1-10-00 Paul said he doesn't know status yet

18. NAME: Globex 2000
LOCATION: Las Vegas, NV
ORGANIZATION: PGI?
DATE: July 23-28, 2000
CONTACT: "kmoon@pgi.com"- e-mail
STATUS:

19. NAME: 35th Intersociety Energy Conversion Engineering Conference "Energy & Power in Transition"
LOCATION: Las Vegas, NV
ORGANIZATION: IECEC
DATE: July 24-28, 2000
CONTACT: www.aiaa.org/calender/lecec00cfp.html
STATUS: Abstracts due November 15, 1999, Too late now

20. NAME: International symposium & Innovative Technology Tradeshow 2000
LOCATION: Washington, DC
DATE: August 14-17, 2000
ORGANIZATION: CERF
CONTACT: Bill Carr, 202-842-0555, e-mail 2000@cerf.org
STATUS: Left message by telephone & e-mail on 4-27-00

21. NAME: Achieving High Performance Buildings Through a Whole Building Systems Design Approach
LOCATION: Harvard University
ORGANIZATION: Harvard University
DATE: August 17-18, 2000
CONTACT:
*STATUS: **Incorporated in course taught by Ian & Adrian**

22. NAME: 2000 ACEEE Summer Study on Energy Efficiency in Buildings
LOCATION: Pacific Grove, CA
ORGANIZATION: American Coalition for an Energy Efficient Economy
DATE: August 20-25, 2000
CONTACT: www.aceee.org
STATUS: ?

23. NAME: Energy 2000
LOCATION: Pittsburgh, PA
ORGANIZATION: US DOE, FEMP, US GSA, US DEPT. OF DEFENSE
DATE: August 21-23, 2000
CONTACT: Megan Mosser at Green Building Alliance, 412-431-0713
STATUS: Left message 4-2-00

24. NAME: World WorkPlace 2000
LOCATION: New Orleans, LA
ORGANIZATION: IFMA, International Facilities Management Association
DATE: September 17-19, 2000
CONTACT: Angelique Vesey 713-623-4352 ext 112, angelique.vesey@ifma.org
STATUS: Sent in application to present 11/10/99, awaiting reply, sent e-mail status inquiry 12/28/99, Angelique Vesey on 12/28/99 e-mailed that we will be notified in February of 2000, I e-mailed again 2-24-00, Vesey e-mailed back that I will receive a letter by 3-2-00, **Abstract denied dated 2-21-00**

25. NAME: NACORE International's 27th Annual Symposium & Exposition
LOCATION: Las Vegas, Nevada
ORGANIZATION: National Association of Corporate Real estate
DATE: September 24-27, 2000
CONTACT: 877-877-6588, 303-443-6588, Becky Hallden 800-726-8111
STATUS: Sent in Abstract letter 9/29/99, awaiting reply, spoke with Becky on 12/28/99, need to call back in February 2000, spoke with Becky on 2-22-00 need to call back in mid-march 800-726-8111, called 3-14-00 left message, 3-21-00

26. NAME: BENCHMARK
LOCATION: Pasadena, CA
ORGANIZATION: Cahners Publishing
DATE: October 22-25, 2000
CONTACT: Roy Diez, 847-635-8800, 800-647-2937, e-mail sbeck@cahners.com
*STATUS: **Steven Winter will be presenting CHIPB**

27. NAME: International Mechanical Engineering Congress & Exposition
LOCATION: Walt Disney World, Orlando, Florida
ORGANIZATION: ASME, American Society of Mechanical Engineers
DATE: November 5-10, 2000
CONTACT: "leach@asme.org"

STATUS:

28. NAME: International Air-Conditioning, Heating, Refrigerating Exposition (AHR Expo)
LOCATION: Atlanta, GA
ORGANIZATION: ASHRAE
DATE: January 29th-31st, 2001
CONTACT: 203-221-9232, ahrexpo@aol.com
STATUS:

29. NAME: GBC 2000
LOCATION: Maastricht the Netherlands
ORGANIZATION: Green Building Council
DATE: October 22-25, 2000
CONTACT: Cheil Boonstra, Conference Secretariat SB2000, 6501 NG Nijmegen, The Netherlands, Fax +31 24 360 11 59
STATUS: Faxed abstract letter 12/17/99, they requested a resubmittal on 1-11-99 but it would miss 12-12-99 deadline because an extension was not given.

30. NAME: Forum 2001
LOCATION: Washington, DC
ORGANIZATION: American Solar Energy Society, 303-443-3130
DATE: April 21-25, 2001
CONTACT: Helen English, 202-628-6100, ext 205
*STATUS: **11/28/00 Steven & Jose' has been accepted to speak and write paper on 4/23/01.**

31. NAME: Environ Design 5
LOCATION: Atlanta, GA
ORGANIZATION: Interiors & Sources magazine, USGBC
DATE: April 26-28, 2001
CONTACT: Peggy Thorsen, 231-755-9672, e-mail: pegclark@gte.net
*STATUS: **Mike C. & Steven will present on April 27 from 10:30am to 11:30am**

32. NAME: AIA 2001 National Convention and Exposition
LOCATION: Denver, CO
ORGANIZATION: AIA
DATE: May 17-19, 2001
CONTACT: Emily Cole, 202-626-7445, E-mail: Ecole@aia.org
*STATUS: **9/26/00 received approval letter, Steven & Jose' to Present 4pm May 19, 2001**

33. NAME: BOMA International's 94th Annual Convention and The Office Building Show.
LOCATION: Baltimore, MD
ORGANIZATION: BOMA
DATE: June 17-19, 2001
CONTACT: Janine Pesci, 202-326-6321, jpesci@boma.org
STATUS: Sent in abstract & application on 8-18-00, 8-24-00 left message, 8-24-00 Ruth Messenger said they received application.

34. NAME: CSI 45th Annual Convention
LOCATION: Dallas, TX
ORGANIZATION: CSI

	DATE:	June 21-24, 2001
	CONTACT:	Marie Delucia, 800-689-2900, ext 4745
	✳STATUS:	Filled out web form on 7-12-00, called 7-25-00, 7-27-00, 8-3-00 left message, reply from Vicky Torrence ext 4746, will notify in November, **have been accepted,** left message Vicky for submission deadlines.
35.	NAME:	World Workplace 2001
	LOCATION:	Kansas City, MO
	ORGANIZATION:	IFMA, International Facilities Management Association
	DATE:	September 23-25, 2001
	CONTACT:	Angelique Vesey 713-623-4352 ext 112, angelique.vesey@ifma.org
	STATUS:	9-12-00 phone number disconnected, 9-29-00 filled out application on line www.ifma.org

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ADVISORY GROUP

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Consortium for High Performance Buildings (ChiPB)

Conference Call Meeting
Thursday, December 9, 1999
1:30-3:30 p.m. EST

Agenda

- INTRODUCTION
- MISSION UPDATE
- CONSORTIUM ROLE
- CANDIDATE BUILDINGS
  - Benchmarks
  - Selected for Outreach
  - Filed in Database
  - Candidates for Phase II
- OUTREACH ACTIVITIES
  - Conferences
  - CHiPBWebsite
  - CHiPB Newsletter
  - Media
  - Books
- NEXT STEPS

Steven Winter Associates, Inc.
Building Systems Consultants

50 Washington Street
Norwalk, CT 06854

Telephone (203) 852-0110
Telefax (203) 852-0741
E-mail: swinter@swinter.com

TO: CHiPB Advisory Group

FROM: SWA

DATE: December 17, 1999

RE: Minutes from CHIPB Conference Call Meeting
Thursday, December 9, 1999
1:30-3:30 p.m. EST

Meeting participants
Gregg Ander, Southern California Edison
Ren Anderson, NREL
Jeff Christian, ORNL
Dru Crawley, DOE
Richard Fedrizzi, Carrier Corp.
Beth Heider, Hanscomb, Inc.
Malcolm Lewis, Constructive Technologies Group, Inc.
Timon Malloy, Fred F. French, LLC
Sandra Mendler, HOK
Steven Piguet, Armstrong World Industries, Inc.
Don Prowler, Donald Prowler & Associates
Ed Sullivan, Building Operating Management
Steven Winter, SWA
Michael Crosbie, SWA
Christine Bruncati, SWA
Jose Higgins, SWA
Deane Evans, Consultant

INTRODUCTION
Following self introductions Dru Crawley described the DOE Roadmapping initiative as being a precursor to the CHiPB program noting that CHiPB will focus primarily on educational and commercial high performance buildings.

MISSION UPDATE AND CONSORTIUM ROLE
Steven Winter outlined the objectives of the program, to enable and demonstrate the benefit of buildings that are designed, built, and operated to be energy-efficient, environmentally sustainable, superior quality, and cost effective. Discussion of drawing on the expertise of each advisory group member to achieve the program objective followed.

Jeff Christian stated that ORNL has a Commercial Buildings Systems Integrator program that would dovetail well with CHiPB.

Beth Heider suggested that CHiPB develop a database of costs for buildings to be "green". Discussion continued regarding the usefulness of knowing the cost

of certain technologies and materials and the associated benefits they offer.

CANDIDATE BUILDINGS

Steven Winter and Jose Higgins discussed the list of candidate buildings that was developed for the CHIPB program. The relative merit of some of the buildings was discussed and it became clear that criteria for building selection would need continued consideration.

Although the buildings for CHiPB were originally planned to be commercial, it was suggested that high-rise residential buildings might be useful to include. Dru Crawley agreed that high-rise residential could be included. It was noted that ASHRAE considers any building 4 stories or higher as commercial.

It was suggested that conventionally built baseline buildings of a comparable size or program would be helpful with which to compare the selected CHiPB buildings. Post office buildings were suggested as valuable candidates because standard versus energy efficient and "green" post offices could serve as side-by-side comparisons. It was also noted that candidate buildings should include different budget levels, the idea being that green buildings are not exclusively high end.

It was stated that Craig Kneeland of NYSERDA may have some information available on the comparison of costs between standard and high performance buildings. SWA will pursue this.

Ren Anderson noted that looking at cost and performance trade offs has been helpful in the Building America program and could be applicable for CHiPB.

The question was raised as to whether renovated buildings could be part of the CHiPB program. Steven Winter noted that a LEED rating is as easy to achieve with a renovated as a new building. The consensus seemed to be that the real criterion was the impact of the renovation on overall energy use. This raised the general issue of whether the program should promote whole buildings or specific technologies. The intent to some was to publicize things that work and influence other projects. The degree to which featured high performance strategies are replicable may be a criteria for project selection. A suggested strategy was to select certain technologies or approaches that CHiPB wants to promote and then find projects that include them.

Ren Anderson noted that the CHiPB effort should strive to help reduce the perceived risk of using certain high performance technologies in new projects.

While criteria for building selection continued to be discussed, it was suggested that operating history data on existing buildings would be helpful to establish life cycle costs for certain technologies. In general it was felt that this type of information is useful, but difficult to get. It was also suggested that post occupancy evaluations of existing buildings would be helpful to evaluate certain technologies and strategies over time.

Qualitative benefits of high performance buildings were discussed, such as more aesthetically pleasing settings and increased worker productivity. It was noted that data on absenteeism was planned to be collected at 4 Times Square, but the building tenants ultimately decided against providing the information.

Timon Malloy suggested that the Vermont Law School be included as a candidate building. Following the conference call Jeff Christian suggested that the ORNL office building be considered as a candidate building for CHiPB. The building is approximately 8 years old and has been submitted for an ENERGY STAR rating.

Discussion resumed to the criteria for building selection. Some had a desire to emphasize the technologies and find the incremental costs for those technologies. It was suggested that hard numbers would be difficult to obtain, and that many technologies work in conjunction with other strategies in a building so certain costs could not be isolated and remain meaningful. To move away from hard numbers, it was suggested that owners and developers of candidate buildings could be asked to evaluate the technologies in their buildings and talk about how they overcame barriers to using those technologies.

The inclusion of Federal buildings was discussed, specifically the White House. SWA will discuss potential candidates with Helen English. Post offices were mentioned again as good candidates as well as border stations, and court houses, particularly the Denver Courthouse.

OUTREACH

It was noted that there should be different versions of promotional materials for three major audiences: owners and developers; designers; and occupants and operators.

Rather than a brief write up on each building, it was suggested that fewer buildings be selected and written up in a more thorough fashion. The idea was also raised to revisit the selected buildings each year or so and get an update on how the buildings are performing.

Steven Winter noted that part of the outreach effort for CHiPB includes presenting at various conferences around the country. He mentioned that CHiPB can provide a prepared presentation packet to the advisory group members if they are planning to speak at any upcoming conferences.

It was suggested that part of the outreach program could also include continuing education, possibly with NACOR.

The CHIPB website was discussed. It will be a part of the DOE Energy Efficiency and Renewable Energy Network Building Technology website. The site is currently in development and is expected to be ready for CHiPB advisory group review in January. The site will provide information on the program's

objectives and pages on the selected buildings. There will also be CHiPB member information and hot links to member websites. A portion of the site will be open to members only and used for document review and feedback to SWA.

Media outreach might include articles in Architectural Record, Business Week, and the Wall Street Journal - their "A View From" column. Deane Evans suggested that an awards program might be appropriate, such as the Secretary's Award for High Performance Buildings.

Mike Crosbie discussed the CHiPB newsletter. Ed Sullivan noted that from an editor's perspective, newsletters need to have usable content for their magazines in order to be read. Other comments included that any way of getting the CHiPB message out would be beneficial to the program.

Steven Winter mentioned the plan to document the selected buildings in a book format.

NEXT STEPS

Steven Winter suggested that advisory group members might be able to meet at one of the upcoming conferences, such as GreenPrints in Atlanta. He also noted that another conference call would be planned for March and that in the meantime advisory group members would be receiving program activity updates, including website access information. Advisory group members were encouraged to call or email SWA with suggestions for candidate buildings or feedback on any of the issues raised during the call.

Commercial High Performance Buildings project

Conference Call Meeting
Wednesday, May 17, 2000
12:00-2:00 p.m. EST

Agenda

- INTRODUCTION
- BUILDINGS DATABASE
  - Database Content to Date
  - Projects Selected for Outreach
- OUTREACH ACTIVITIES UPDATE
  - DOE Press Release
  - Conferences
  - Project Website
  - Other Media
- GROUNDWORK FOR PHASE II
  - Candidate projects for Phase II
  - Project Nominations
  - Selection Standards

Steven Winter Associates, Inc.
Building Systems Consultants

50 Washington Street
Norwalk, CT 06854

Telephone (203) 852-0110
Telefax (203) 852-0741
E-mail: cbruncati@swinter.com

TO: Commercial High Performance Buildings Project Advisory Group

FROM: Christine Bruncati, SWA

DATE: May 30, 2000

RE: Minutes from Advisory Group Conference Call Meeting
Wednesday May 17, 2000
12:00 p.m. to 2:00 p.m. EST

Meeting participants:
Gregg Ander, Southern California Edison
Dru Crawley, DOE
Kristin Ralff Douglas, *Environmental Design & Construction*
Tim Grether, Owens Corning
Beth Heider, Hanscomb, Inc.
Steven Piguet, Armstrong World Industries, Inc.
Don Prowler, Donald Prowler & Associates
Ed Sullivan, *Building Operating Management*
John Vogel, Affordable Housing Development Corp.
Paul von Paumgartten, Johnson Controls, Inc.
Steven Winter, SWA
Michael J. Crosbie, SWA
Christine Bruncati, SWA
Dianne Griffiths, SWA
Jose Higgins, SWA
Deane Evans, Consultant

Following self introductions and a recap of the programs goals by Steven Winter, Dru Crawley gave the group an update on the Commercial High Performance Buildings project website. He noted the DOE Office of Building Technology, State and Community Programs website would soon incorporate the efforts of three of DOE's projects: NREL's high performance buildings work; the Green Buildings Challenge 98/2000 effort; and the Commercial High Performance Buildings project. He went on to say that the project would likely receive funding for another year.

Dru was asked what role the advisory group should play for the project. Dru and Steven Winter explained that the advisory group's main role was to act as a resource of knowledge for the project's activities. In Phase I that has included feedback on the outreach materials being generated as well as providing input to the buildings selected for the database, among other things. In Phase II, the contribution might be more in the way of actually bringing projects forward to be considered for the project and offering expertise to those buildings that

would ultimately receive design/technical analysis support.

Jose Higgins reported that the project building database was up to 114 buildings, with an ultimate goal of 500 to be included. Discussion turned to the criteria for the buildings to be included in the project. The general consensus seemed to be that a LEED rating was a good place to start. Jose noted that LEED can only be used as a guideline because there are very few LEED rated buildings at present. Jose went on to discuss the 3-point criteria being used to select buildings: the design of the building should incorporate a team approach bringing as much expertise to the process as early as possible; the design should take into consideration the interaction of the whole building structure and systems and context; the building should be designed for high performance over the long term. If a building does not comply with all these points, but provides an exceptional opportunity to promote high performance because of a particularly striking feature (such as a photovoltaic array), it may also be included. The idea is to get the message out to as many as possible and for the program to be more inclusive than exclusive. Don Prowler noted that looking at lessons learned in each of the buildings would be beneficial. Metrics for cost and performance were also discussed. Beth Heider suggested that formatting the building write ups in a standard way that would include cost data would make the information much more useful. Beth volunteered to provide a format for the project to use.

It was noted that square-foot costs would vary greatly depending on when and where a building is built. GSA has a vehicle for looking at such data that the project may benefit from using. The group also concluded that operational costs would be beneficial to document. This information would be included in the more extensive building write ups. Jose noted that the building write ups had used the same criteria as the database. Paul von Paumgartten suggested that the Brengel building included in the database be expanded to a write up. He will provide Jose with additional information for the write up.

In discussion of the outreach activities, Mike Crosbie asked Dru what kind of feedback the DOE press release on the project generated. Dru was not aware of any particular reaction, but did note that the release went to several thousand recipients. Steven Winter noted that the significance of the press release was that it did come from DOE and could be used elsewhere for project promotion. Mike Crosbie went on to say that the SWA press release on the project was launched about 5 weeks following the DOE release. Don Prowler suggested that the press release be written as a drop-in item for any editor, including high resolution photographs and possibly black and white line images that would reproduce well in any format.

Construction Specifier will be including an extended article about the project in its July 2000 issue. Deane Evans suggested that *Building Design and Construction* might be interested in running a piece on the project. Steven will pursue this while attending Cahners Publishing's Benchmark conference. The program could also be included at the USGBC Federal Summit to be held in

Washington, D.C. Dean also suggested that all the project buildings be submitted to the AIA/Business Week awards for high performance buildings. He noted that Chuck Hamlin at the AIA was the contact.

Jose Higgins reviewed the presentations completed and planned for the project (list of past and potential presentations will be distributed to the advisory group with these minutes). The group was asked for suggestions of other conferences the project might be presented at. Ed Sullivan suggested the National Facility Management and Technology Show in March of 2001. Don Prowler suggested EPA's Labs for the 21st Century in San Francisco. He also suggested that labs be added to the building inventory.

Christine Bruncati reviewed the web site and asked the advisory group to email to her permission to hot link their web sites from the project web site. (Please e mail her at cbruncati@swinter.com.) It was suggested that the web site contain a glossary of terms to make it more useful.

Mike Crosbie reviewed the publications to date, including:

- "Green Gestalt." *Consulting-Specifying Engineer*, February 2000
- "Promoting High Performance Buildings" *Construction Specifier*, March 2000
- "Integrated Design Informs Historic Building Renovation, *GreenClips,* No. 140, March 22, 2000
- "Commercial High Performance Buildings Project Launched," *WinterGreen* newsletter, April/May 2000
- "DOE to Create High Performance Commercial Buildings Program" in *Energy and Housing Report*, May 2000

Paul von Paumgartten suggested that he could include a piece on the project in his company's publication, which goes to 30,000 people. Ed Sullivan noted that BOM ran an item about the program in its *Green Building Report* in February, and promised to send Mike a copy.

Groundwork for Phase II was discussed. Phase II is slated to begin around July. Steven Winter reviewed activities for Phase II. This phase will move beyond outreach to actually advising on buildings. He reviewed candidate projects for Phase II, including involvement with Gregg Ander at Southern California Edison; Timon Malloy's planned office complex in Norwalk, Connecticut; McStain Enterprises' small office building in Boulder, Colorado; and a prototype speculative office building with Legget McCall Properties. The group was asked for additional project ideas. The best candidates would be those that are at the early planning stages.

Selection criteria for Phase II buildings was raised. LEED and ENERGY STAR for Office Buildings were both raised as useful criteria. The performance criteria over one year of the Energy Star rating system was mentioned. The merit of such a measure over time, along with the sustainable aspects if the

LEED system were discussed. Other merits of high performance buildings would be beneficial to publicize, such as increased productivity or other financial benefits. Although it is difficult to document these attributes statistically, it was suggested that anecdotal information on such benefits would be useful.

Dru Crawley provided the following web site addresses for further information on high performance buildings:

The Commercial Roadmap web site:
http://www.eren.doe.gov/buildings/technology_roadmaps/commercial_whole_buildings/

Draft documents from the Commercial Roadmap:
http://www.eren.doe.gov/buildings/technology_roadmaps/commercial_whole_buildings/draft_documents_cwb_roadmap.html

The book list from the Commercial Roadmap participants:
http://www.eren.doe.gov/buildings/technology_roadmaps/commercial_whole_buildings/book_list.html

Action Items

- SWA to distribute meeting minutes and list of potential conferences.
- SWA to continue compiling buildings for database and potential Phase II projects.
- SWA/DOE to provide a glossary of terms on the project web site.
- Advisory group to e mail permission for hot links to web sites.
- Ed Sullivan to send Mike a copy of the February 2000 *Green Building Report* from BOM.
- Beth Heider to provide format for collecting building data.
- Paul von Paumgartten to provide Jose Higgins with information on the Brengel building for a write up and a contact for his company's newsletter.

At the conclusion of the call the next meeting was planned to take place in late summer.

COMMERCIAL HIGH PERFORMANCE BUILDINGS project

CONFERENCE STATUS

May 28, 2000

CONFERENCES PRESENTED AT:

1.

NAME:	Greenprints 2000: Sustainable Communities by Design
LOCATION:	Atlanta, GA
ORGANIZATION:	Southface Energy Institute
DATE:	February 6-8, 2000
CONTACT:	404-872-3549, www.southface.org
* STATUS:	**Presentation has been given.** (120P)

2.

NAME:	Your Facility Management Future: Value Profit and the Green Revolution
LOCATION:	Charlotte, NC
ORGANIZATION:	AIA, PIA Facility Management Workshop
DATE:	March 3-4, 2000
CONTACT:	AIA, 202-626-7300
* STATUS:	**Presentation has been given**. (80P)

3.

NAME:	Building Energy 2000
LOCATION:	New Haven, CT
ORGANIZATION:	Annual Conference of NESEA
DATE:	March 15-18, 2000
CONTACT:	413-774-6051, www.nesea.org
* STATUS:	**Presentation was part of SWA Green Building Rating Systems presentation.** (40P)

FUTURE CONFERENCES: SCHEDULED TO BE PRESENTING AT:

1.

NAME:	ABST 2000
LOCATION:	Washington, D.C.
ORGANIZATION:	Mechanical Systems / Construction Group
DATE:	June 6-8, 2000
CONTACT:	Richard Sweetser, EXERGY Partners Corp, 703-707-0293
* STATUS:	Sent letter 12/17/99, spoke with Richard 12/18/99, left message 12/28/99, 2/24/00, 2/29/00 told me to call Mike Ivanovich 800-366-1901 ext 9192 **Presentation has been approved to speak on track 5**

2.

NAME:	BENCHMARK
LOCATION:	Pasadena, CA
ORGANIZATION:	Cahners Publishing
DATE:	October 22-25, 2000
CONTACT:	Roy Diez, 847-635-8800, 800-647-2937, e-mail sbeck@cahners.com
*STATUS:	**Steven Winter will be presenting**

Commercial High Performance Buildings project

Conference Call Meeting
Tuesday, September 12, 2000
12:00-2:00 p.m. EST

Agenda

1. INTRODUCTION

2. BUILDINGS DATABASE
   - Wrap-Up on Phase 1 Database Content
   - Wrap-Up on Projects Selected for Outreach

3. OUTREACH ACTIVITIES
   - Conferences
   - Project Website
   - Other Media
   - Submission form for Phase 2 projects

4. PHASE II WORK AND PROJECTS
   - Status of Candidate projects for Phase 2
   - Project Nominations from Advisory Group
   - Advisory Group Member participation
   - Selection Standards
   - Next Steps on Phase 2 Projects
   - October meeting with DOE

Steven Winter Associates, Inc.
Building Systems Consultants

50 Washington Street
Norwalk, CT 06854

Telephone (203) 852-0110
Telefax (203) 852-0741
E-mail: cbruncati@swinter.com

TO: Commercial High Performance Buildings Project Advisory Group

FROM: Christine Bruncati, SWA

DATE: September 29, 2000

RE: Minutes from Advisory Group Conference Call Meeting
Tuesday September 12, 2000
12:00 p.m. to 2:00 p.m. EST

Meeting participants:
Ren Anderson, NREL
Dru Crawley, DOE
Deane Evans, Consultant
Beth Heider, Hanscomb, Inc.
Sandra Mendler, CUH2A
Paul von Paumgartten, Johnson Controls, Inc.
Herb Sloan, Owens Corning
Ed Sullivan, Building Operating Management
Paul Torcellini, NREL
Steven Winter, SWA
Michael J. Crosbie, SWA
Christine Bruncati, SWA
Dianne Griffiths, SWA
Jose Higgins, SWA

The meeting was introduced as a transition from Phase I to Phase II in the program. Dru Crawley noted that the funding has been increased for the High Performance Commercial Buildings efforts at the Department of Energy. There will be a High Performance Commercial Buildings Roadmapping reception and meeting in Washington, DC on October 3-4 that all advisory group members have been invited to.

Jose Higgins reported on the status of the building database. There are currently 148 buildings in the database with a total of 165 to be completed by the end of September. Of those 148, there are 14 in-depth building write-ups.

Christine Bruncati reported on the status of the website noting that access to the site has been simplified. Visitors to the site have increased to nearly 3,000 per month. Sandra Mendler suggested that the buildings on the website database be searchable by different criteria. Dru replied that the site will have that capability in the future.

Jose Higgins reported that the program has been presented at 5 conferences in 2000 and has been approved for 2 in 2001 with 4 others pending, including the AIA convention in May 2001. Paul von Paumgartten will look into whether the program can be presented at the Johnson Controls building summit. As another form of outreach Sandy Mendler suggested the program get involved in a competition that will be judged in time for Earth Day 2001. It was suggested that SWA could support the technical screening of submittals to the competition.

Mike Crosbie reported on the coverage that the program is receiving in printed media. Articles on the program, collected by SWA, number at 16, with a few more on the way. There should be more than 20 by year's end.

Mike also reviewed the submission form for Phase II projects and asked for suggested changes. Changes will include a more precise definition of square footage and the inclusion of a building vision statement or design intent.

Moving on to Phase II, Mike listed the suggested candidate projects and asked for other suggestions. Discussion followed regarding how to find projects that were at the very early stages of planning. It was noted that typically projects at the beginning stages are learned of by word of mouth. Ed Sullivan suggested that a targeted campaign to key organizations might be worthwhile. Deane Evans suggested talking to utilities, the Design Build Institute, and tolook at NACOR's list. Paul von Paumgartten suggested that the list of attendees to the Johnson Controls Summit would be a good resource.

When discussing the criteria for candidate buildings, it was decided that a subcommittee should be formed to discuss the issue. Dru Crawley, Paul Torcellini, Herb Sloane will serve on the subcommittee, which will be overseen by SWA's Jose Higgins.

Action Items:

1. Criteria subcommittee to meet, Jose Higgins to initiate contacts and to confer with subcommittee members on goals.

2. SWA to revise Phase II candidate building submission form based on criteria subcommittee input

3. SWA to develop targeted mailing seeking candidate buildings for Phase II.

Advisory members will be notified of the next conference call.

VOLUNTARY PARTICIPATION IN THE CONSORTIUM FOR HIGH PERFORMANCE BUILDINGS

This document serves as a memorandum of understanding for participation in the Consortium for High Performance Buildings (CHiPB) by _____ (The Company).

Participation by the Company is voluntary and does not imply any contractual obligation. CHiPB is a project name established by Steven Winter Associates, Inc. (SWA) to define research and demonstration activities funded in part by the U.S. Department of Energy. Company participation in CHiPB can be terminated at any time by mutual notification.

As presently planned, the following activities will be undertaken by SWA and other CHiPB participants:

- Systems engineering research, design and other efforts for commercial buildings aimed at improved quality, affordability, energy efficiency, environmental sustainability, durability and other benefits.

- Value and systems engineering studies, design, research and analysis to improve the cost/benefits, performance, market appeal, sales opportunities, and other aspects of the Company's products and/or services and their potential integration into commercial buildings.

- Testing, monitoring, and other evaluations of Commercial Buildings to determine performance characteristics.

- Publication and promotion of noteworthy commercial buildings nationwide.

The Company's participation will consist of the following:

- Company personnel will attend CHiPB meetings, and review CHiPB designs, reports, research results and other documents in conjunction with CHiPB's research.

- The Company may, at its option, contribute labor and/or materials to the construction of prototypes or actual buildings developed in conjunction with CHIPB research to evaluate cost and performance improvements.

- The Company will collaborate with CHiPB in promotional efforts to publicize non-proprietary aspects of this program.

Company Name	For Steven Winter Associates, Inc. representing CHiPB
Title	Title
Date	Date

Company Information:

Address: _____

_____

Phone: _____ Fax: _____

Email: _____

Website: _____

Description of Company products/services:

_____

_____

_____

_____

_____

_____

_____

CHiPB Team Member
In-Kind Contribution Form

Organization:_____ Period:_____

During this time period, personnel in our organization spent the following on work in support of CHiPB activities.

LABOR

Tasks	Dates	Hours	Rate	Value

Subtotal Labor _____

TRAVEL

Location/Date	Transportation	Food & Lodging	$ Cost

Subtotal Travel _____

OTHER EXPENSES

Date	Item	$ Cost

Subtotal Expenses _____

Certification: I certify that the data represented on this form are true and correct.

Name_____ Title_____
Signature_____ Date_____

DATA-BASE PROJECTS AND DOCUMENTATION

4 Times Square - The Durst Building

Architect: **Fox & Fowle Architects**

Geotechnical Engineer: **Mueser Rutledge Consulting Engineers**

Structural Engineer: **Cantor Seinuk**

Lighting Consultants: **Fischer Marantz Renfro Stone**

Energy Analysis: **Charles Eley & Associates, Steven Winter Associates**

Photovoltaic Consultant: **Kiss + Cathcart**

Consulting Engineer: **Cosentini Associates**

Interior Designers: **Conte Nast - Mancini Duffy, Skadden Arps - Gensler Assoc.**

General Contractor: **Tishman Construction Company**

Environmental Consultants: **Rocky Mountain Institute/ William Browning, Earth Day New York/Pamela Lippe, Green October/Asher Derman, NRDC/Ashok Gupta**

Owners/Developers: **Durst Organization**

Contact: **Todd Coulard of Durst Organization** 212-789-1134

Location: The building is located at the northeast corner of Broadway and 42nd Street in Manhattan, N.Y. The site is adjacent to Times Square and within the midtown business district.

Occupancy/Use: The facility was designed as speculative office building. Conde Nast and Scadden Arps are the two major tenants.

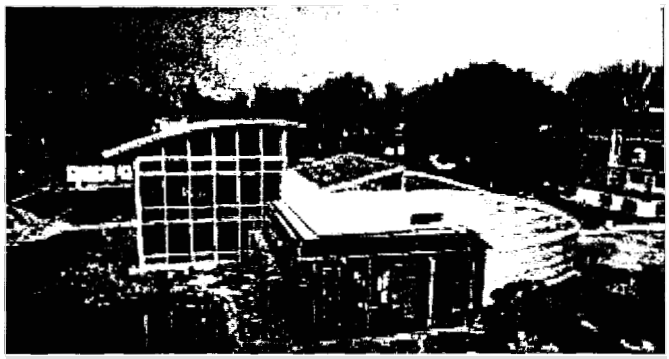
Building Construction & Type: The building is 48 stories and 1.6 million square feet. The facade is a glass, metal and granite curtain wall.

Energy Efficiency Features: Two fuel cells were installed in the building to provide 100% of the night time electric demand. Photovoltaic panels were installed in the curtain wall, on the southern and eastern sides, as a supplemental energy source. Gas-fired absorption chiller/heaters were used. variable speed drives were installed on pumps/fans & motors. Two fan units were installed on each floor. A high performance low-e glass curtain wall, with oversize windows was chosen to enhance energy efficiency, ultra violet ray reduction and daylighting. Extra insulation was placed on all opaque horizontal & vertical external assemblies. Exit signs with L.E.D. bulbs were installed throughout. Energy efficient lighting was integrated with occupancy sensors and central controls. An energy analysis indicated a 30% savings over typical good design and even more over N.Y. State code minimum.

Environmental Features: The indoor air quality measures are as follows: use of environmentally friendly building materials, floor-by-floor air quality monitoring/control & purge system, 50% more than code required fresh air provided, an 85% filtration system for air pollutants, additional exhaust shaft for smoking/fumes & heat, and environmentally friendly building maintenance. Recycling and resource conservation attributes are as follows: part of an existing building footing was re-used, hat truss & concrete core structures reduced the amount of structural steel needed, recycled content & recyclable materials used throughout, sustainably harvested wood, low water use equipment, waste chutes were installed for tenant produced recyclables, waste management & recycling plan for construction & demolition, and recyclables storage areas were provided. Non-ozone depleting non-CFC & HCFC absorption equipment were installed. On the management side, the building has a centralized, automated building management system, and all the building's systems underwent a commissioning protocol to achieve the maximum in comfort & efficiency. The tenants receive written guidelines to encourage them to choose finishes & furnishings with low VOCs/other toxins & high recycled content, acquire energy efficient lighting & equipment, use space planning for natural light penetration & flexibility, effectively interface with the building HVAC systems for better comfort/indoor air quality & energy use, set up recycling programs & utilize the recycling chutes, recycle alteration waste, and re-commission building services after alterations. During design & construction, electronic document transfer was used.

Adam Joseph Lewis Center for Environmental Studies

Oberlin College



Architect: **William McDonough + Partners**
HVAC Engineer: **Lev Zetlin Associates**
Energy Analysis: **Steven Winter Associates**
General Contractor: **Mosser Construction**
Living Machine Consultant: **Living Technologies**
Owners/Developers: **Oberlin College**
Contact: **Marci Janas, Oberlin, 440-775-8474**
Photo Credit: **Frank Wiewandt for Oberlin**
Web Site: **www.oberlin.edu/newserv/esc/**

Location: The building is located 122 Elm Street, to the west of Baldwin Cottage, on the campus of Oberlin College, Oberlin, Ohio.

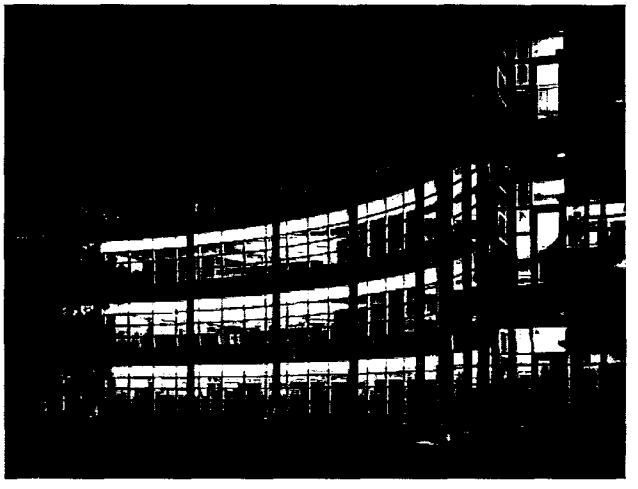
Occupancy/Use: The academic facility contains an atrium, an auditorium, classrooms, a conference room, a resource center, mechanical spaces, offices and a preparation kitchen.

Building Construction & Type: The 13,600 sq ft building's basic structure is made up of laminated douglas fir joists, glass, masonry, metal deck, precast stone, poured concrete, and structural steel.

Energy Efficiency Features: It has been estimated that a typical new college classroom building in Northern Ohio would use approximately 75,000 Btu/sf/yr. The projected energy usage for this building is 16,499 Btu/sf/yr. Heating and cooling are derived from closed-loop geothermal wells. The geothermal wells serve distributed water source heat pumps located in each space along with two larger heat pumps serving the main building and the auditorium. The heat pumps are controlled separately so they can respond to individual space needs. A small electric boiler supplements the heat pumps. The atrium has radiant coils in the concrete slab. The exhaust air passes through a heat recovery unit. Occupancy sensors open fresh air supply dampers. The first floor work spaces and all of the second floor have a raised floor system that contains the air delivery and return system, and electrical/communication/data wiring. The south facing curved roof supports 3,700 sq ft of photovoltaic panels. The building has its long axis going east to west to best respond to the sun's path. Natural light is provided in all interior spaces. The energy efficient lighting design has occupancy sensors and a connected load of 0.9 watts/sf. The lighting for the classrooms and the Resource Center has daylight dimming capability. The atrium and the work spaces have been designed to store direct solar heat during the heating season. Thermal mass has been provided to retain and re-radiate heat. A south facing, vine-covered trellis provides seasonal solar control. Operable windows are provided in all occupied spaces. The glazing has an advanced thermal design and is seasonally shaded with overhangs. The atrium has natural convection assisted ventilation. There are R-30 to R-40 insulation levels on the roofs and R-21 insulation levels in the walls. Part of the north wall has an earth berm. The masonry cavity walls feature pressure-equalized rain-screen assemblies with air barriers. The building has integrated, advanced, central controls for mechanical, security, fire and Living Machine systems. Full HVAC commissioning was specified to be done before occupancy.

Environmental Features: A gnomon in the sun plaza marks the solar year. Low V.O.C. materials, paints and adhesives were specified. Inaccessible ceiling plenums are avoided. Ventilation during construction and construction scheduling where done to mitigate material off-gassing. 100% fresh ventilation air is supplied to all the occupied spaces. A cleaning products and practices protocol was produced. Durable, low-maintenance materials are used throughout. The steel framing, aluminum (flashing, windows, curtain wall), ceramic tiles and toilet partitions have recycled content. All wood was specified to be from certified sustainable managed forests. The raised floor and carpeting are being leased from Interface Flooring Systems, Inc. Indigenous and edible plants are being used on the site. Storm water run-off is treated by an on site pond and wetland. 2,000 gallons per day of waste water will be treated for non-potable use by a Living Machine. The Living Machine, which is housed in the building, uses accelerated natural processes of ponds and marshes to purify waste water.

Armstrong World Industries Corporate Center



Architect: **Gensler**

HVAC & Electrical Engineer: **Bala Consulting Engineers**

Consultants: **Flack and Kurtz,**

Steven Winter Associates

Owner: **Armstrong World Industries, Inc.**

Photo Credit: **Scott Frances**

Contact: **James Camp of Gensler, 410-539-8786, jim_camp@gensler.com**

Charles Kensky of Bala, 610-649-8000, cbk@bala.com

Location: Lancaster, PA

Occupancy/Use: International headquarters office building.

Building Construction & Type: 120,000 sf steel and glass building.

Energy Efficiency and Environmental Features: Since Armstrong World Industries is a participating member of the US Green Building Council, The LEED™ Green Building Rating System was used on a pilot basis. An environmental peer review was done with Steven Winter Associates, building technology consultants, and another was undergone with Flack and Kurtz, building engineers. Natural light and glass was used extensively in the facility. Exterior sun-screens, interior light shelves, and the highly reflective ceiling controlled and directed the natural light. The direct-indirect lighting system limits lighting power usage to 1 to 1.5 watts per square foot. Occupancy sensors are used to reduce energy related to HVAC and lighting controls. The CO2 sensors and the variable air volume chilled-water system allows the use of 100% outside air for free cooling and building flushing when conditions are right. High-efficiency motors and variable-frequency drives are used throughout. A Direct-Digital Control System utilizes smart logic and integration with sensors to operate the HVAC system in the most efficient and effective way. The insulating properties of the earth aid in maintaining the low temperature of the buried chilled water loop. Limiting the development of the 625 acre site to the currently developed 100 acres permitted preservation of some of the natural landscape and maintenance of the natural migratory habitats for some birds. New landscaping included native plants which require little or no irrigation.

The completion of the new corporate center was only the first step of a major relocation project in Lancaster, PA, which consolidated Armstrong operations from three different sites. In addition to the new facility, several existing facilities were renovated. All the existing CFC refrigerant equipment was phased out, CO2 sensors were installed and recycled air-handling units were used. All the single glazed windows were replaced with argon-filled double-glazed units. Indirect lighting combined with highly reflective ceilings reduced energy use and provided a higher quality light. Herman Miller's Ethospace workstations where used in the open office spaces. Separate disposal containers were available during construction for metal, glass, carpet, and wood to assist in recycling. Local contractors were hired thereby reducing energy consumed for commuting. Even a tenant recycling program was implemented.

Throughout the projects, where economically feasible, recycled content materials, low-VOC adhesives, and low-VOC paints were installed. The projects complied with ASHRAE 55 and 62, and isolated, contained, and vented chemical storage areas. Grilles were installed at all entryways to contain particulates.

One may wonder what happened to the old headquarters building. Was it abandoned? In this case the old building was renovated, while maintaining 100% of the building's shell, for start up businesses within the community.

CCI Center

Architect:	**TAI + LEE Architects**
HVAC/Lighting Engineer:	**Lyle Rawlings, PE**
Owners/Developers:	**Conservation Consultants, Inc.**
Contact:	**Robert J. Kobet of Green Building Services Consultants Inc. 412-431-4449 ext 225**
Photo Credit:	**Mark Mondor**

Location: South Side neighborhood in Pittsburgh, Pennsylvania, on an urban site.
Occupancy/Use: Headquarters office for Conservation Consultants, Inc., and various local resource conservation organizations.

Building Construction/Type: Adaptive reuse of a three-story 1910 brick building, recycling as much of the original materials as possible, and construction of a new steel-frame and masonry-clad two-story structure, for a total of 10,000 square feet.

Selected Energy Efficiency Features: The client, architect, engineer, and builder worked together from the beginning of design through construction to ensure that every opportunity for recycling, energy conservation, and waste reduction was identified and could be incorporated into the design. 2.2 kW of photovoltaic cells installed on the terrace roof and roof-top garden provide enough power to run the CCI Center's computer system and shade southern windows to minimize heat gain. Energy generated from the photovoltaic array is being tracked and used in a Solar Energy Education program for Western Pennsylvania. Energy-efficiency strategies used throughout the building have resulted in an estimated annual savings of $12,000. Energy usage is estimated to be 40% of that of a typical office building of comparable size. Insulation levels were increased using environmentally benign Airkrete and dense-packed cellulose, resulting in R-24 walls, and ceilings and roofs of R-38 and R-70. Exposed interior brick walls provide thermal storage mass. Light-colored roofing tiles reflect sunlight and reduce cooling loads. Extensive daylighting, provided through R-6 double-pane, argon-gas-filled, operable windows reduce heat loss and heat gain while reducing ambient lighting requirements. Task lighting decreases the needed ambient light level, which is provided by T-8 fluorescent lamps with electronic ballasts. York Triathlon engine-driven heat pumps and Robur absorption chillers are used to provide gas-fired air conditioning. Exposed duct-work throughout the building eliminates heating and cooling losses to the plenum, as conditioned air leaks into conditioned spaces.

Selected Environmental Features: Heat recovery ventilation provides fresh air without significantly increasing heating and cooling loads. Recycled, salvaged, and non-toxic materials are used throughout the project. A construction waste demolition and salvage program ensured that the waste stream from the building and associated construction activity was minimized. Brick left from construction is used to pave the first floor garden and a walkway at the building entrance; the remainder was given to a salvaged materials warehouse and resale center. Wood and brick from the demolished section of the existing building was used in the renovation. Interior windows were salvaged from other demolished buildings and installed with recycled wood frames. Original pressed metal ceilings and hardwood floors were retained and refinished. Carpets were salvaged from a job over-run and applied with non-toxic adhesives. Agriboard, a structural panel made from agricultural waste straw and oriented strand board, was used for some ceilings. Forbo Marmoleum, a non-toxic linoleum made from linseed oil, limestone, cork flour, pine rosin, wood flour, jute, and organic pigment (all natural and renewable materials) was used throughout the first floor. Forbo flooring waste was given to the Western Pennsylvania Conservancy to be ground and used as mulch for community gardens. Finish for wood floors is citrus-based and non-toxic. Low-VOC paint was used throughout. Low-flush toilets and efficient faucets are used for water conservation. The building has a recycling program for glass, plastic, office paper, paperboard, and corrugated cardboard.

Federal Reserve Bank of Minneapolis

Architect:	**HOK Architects, Inc.**
Structural Engineer:	**Siebold, Sydow & Elfanbaum**
HVAC/Electrical Eng:	**Michaud Cooley Erickson Consulting Engineers**
Interior Designers:	**HOK, Walsh Bishop**
General Contractor:	**McGough Construction Co.**
Owners/Developers:	**Federal Reserve Bank**
Contact/Photo Credit:	**HOK, 202-339-8700**

Location: An 8.2-acre urban site in downtown Minneapolis, Minnesota, next to the Mississippi River, known as the Bridgehead site.

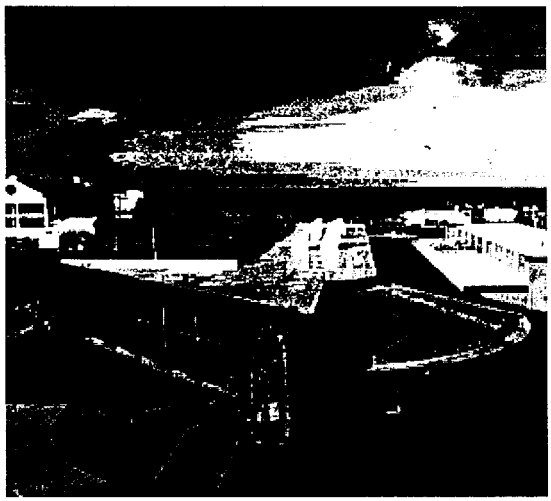
Occupancy/Use: Headquarters for the Federal Reserve Bank of Minneapolis.

Building Construction/Type: Eight-story office tower of curtain-wall construction, a four-story operations center, and a 152,000-square-foot parking structure, for a total of 777,000 square feet. Stone, precast concrete, glass, and steel are the predominant materials.

Selected Energy-Efficiency Features: Windows are triple-glazed units with two low-e films and argon gas in both cavities, delivering an R-7.6 value. The additional cost of the glass was offset by the lack of need for most of the perimeter radiation units, which resulted in a net reduction in the building's overall capital cost and reduced its long-term energy use. Most light fixtures are high-efficiency units controlled by occupancy sensors. Many common-area lights are on "time of day" controls to supplement natural light at the beginning and end of the day. Most lighting is controlled and monitored by a central control system. When outside temperatures are less than 55°F, cooling is provided by outside air economizers for a "free" cooling system. This reduces chilled water demand on the Minneapolis Energy Center (MEC), which supplies chilled water for cooling. To minimize outside air intake leakage, low-leak, minimum outside air dampers are provided at air-handling units. Steam provided by MEC is converted to hot water at the building entry and then distributed to air-handling units and other heating systems. Steam condensate return is routed through a water-to-water heat exchanger, extracting and transferring heat to preheat the building heating hot water loop, before returning the condensate return water to MEC. Variable frequency drives (VFDs) are used on most air-handling units and pumping systems, and all systems have high-efficiency motors. Temperature control and building energy management is performed through a computer-based system, which maximizes efficiency. The parking garage has a carbon monoxide monitoring system to provide ventilation as required, reducing overall energy consumption. Water heaters for the kitchen and fitness center are high-efficiency gas-fired units. Restrooms and galleys on typical office floors use small, self-contained electric water heaters to minimize thermal losses.

Selected Environmental Features: Materials for all site paving, structures, and interpretive displays were selected based on an analysis of whether the original source was sustainable, the material's embodied energy, whether the material was available locally, and whether the materials were recycled or recyclable. Plumbing fixtures are low-flow; water closet flush valves have automatic on-off controls. Showerheads have water restrictors to reduce consumption. Building materials were selected that have reduced chemical emissions, such as low-VOC paint, adhesives and finishes, and formaldehyde-free wood products. Building materials were chosen based on the sustainability of the original source, the product's recycled content, the recyclability of the product at the end of its life, and the product's effect on indoor air quality. The materials selected enhance durability, require less maintenance, and come primarily from local sources. All wood in the building comes from certified sustainable sources. Construction waste was subcontracted to a local recycling company that used the local recycling industry. The majority of refuse was separated off-site and recycled to produce a recycling rate of approximately 70%, with a decrease of over-all construction costs.

Florida Solar Energy Center



Architect: **Architects Design Group**

Consultant: **Ralph Hahn and Associates**

Energy Analysis: **Tim Merrigan, Ross McCluney and Don Shirey**

P.V. Consultant: **Jim Dunlop**

Owner / Developer: **Florida Solar Energy Center**

Photo Credit/Contact: **Architects Design Group, 407-647-1706**

Web Site: **www.fsec.ucf.edu**

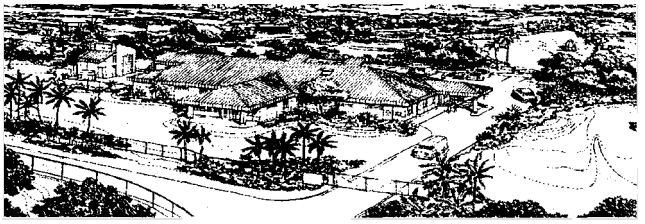
Location: The Florida Solar Energy Center is located on a 20-acre research complex on Florida's Space Coast at the University of Florida/Brevard Community College's Cocoa Campus, 35 miles east of Orlando.

Occupancy/Use: Offices, visiting center and testing labs.

Building Construction & Type: The $7.1 million facility consists of a 21,000 sf office structure, a 41,000 sf laboratory building and a 7,600 sf visitor center.

Energy Efficiency Features: The long axes of the building runs east to west to reduce the difficult to control east and west solar exposures. The floor plan is narrow to allow for maximum daylight penetration. The north and south building areas have the HVAC systems zoned separately to be able to better respond to the different cooling needs do to solar exposure. The south facing window wall assembly is made up of a spectrally selective metallic film located between two panes of glass. This window assembly lets in almost 70% of the sun's visible light while blocking 98% of the sun's infrared energy. Most of the offices in the building are efficiently lighted through the interaction of spectrally selective windows, light level sensors, occupancy sensors and super energy efficient lamps. North facing roof monitors help to light the building's core areas. The roof's white color reflects 80% of the Florida's sun's heat. The building's opaque exterior walls have an aluminum radiant barrier in its air space to reflect the sun's heat away from the sides of the structure. The amount of fresh air fed to the building is controlled by carbon dioxide sensors. The incoming fresh air is pre-cooled by a heat pipe system to enhance the dehumidification capability of the chiller. Two helical-rotary screw chillers are used in tandem for part-load high efficiency and better reliability. The energy efficiency features save $46,000 per year in energy costs. The$220,000 energy efficiency construction cost premium has a cost payback period of approximately five years. A future PV system is planned.

Guam Weather Forecast Office



Architect / Project Managers:
Design Partners Inc., Pacific Division Naval Facilities Engineering Command

Energy & Lighting Consultant:
Steven Winter Associates

Contractor:
Black Construction Corporation

Owners / users:
National Weather Service, National Oceanic and Atmospheric Agency, U.S. Department of Commerce

Contact:
John Porter, 301-713-0025, john.porter@noaa.gov

Location: The building is located at 3232 Hueneme Road in Barrigada, Guam.

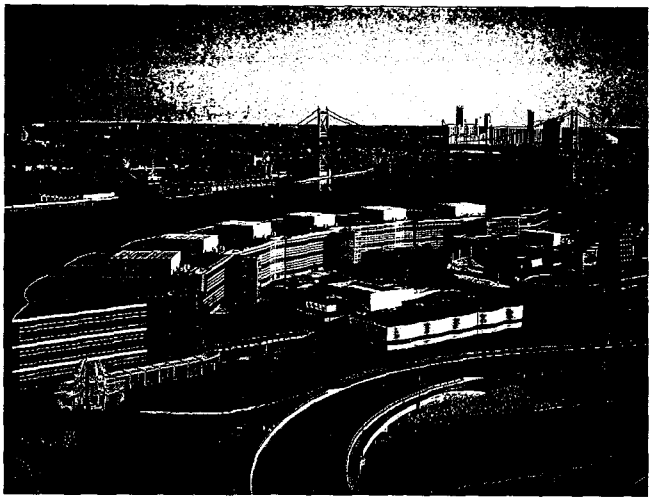
Occupancy/Use: The facility was designed as a self-sufficient, 24 hour-a-day, 365 day-a-year, weather forecast office.

Building Construction & Type: The building's structure includes cast-in-place concrete, concrete masonry, and pre-cast concrete coated with a durable acrylic plaster. The roof has a corrosion/mildew/impact resistant urethane coating. Walls and roofs have air cavity type construction with rigid and blanket insulation.

Energy Efficiency Features: The facility was designed to save approximately 22% in annual energy costs over an ASHRAE-compliant building. The main structure is orientated to minimize southwest solar gain. Daylight is enhanced and controlled by the use of glass block clerestories, curved ceiling surfaces, deep overhangs, light- colored roof/exterior walls, minimal east/west glazing, and window blinds. Air lock vestibules are located at the two main entrances to minimize infiltration. A direct digital control building management system is utilized. The non-CFC air conditioning system has low face-velocity coils & filters, variable-air-volume distribution, and high-efficiency motors with variable-speed drives all to reduce fan energy requirements. The high-efficiency lighting system consists of high-pressure sodium exterior fixtures, electronic ballasted T-8 and compact fluorescent lamps, parabolic and indirect light fixtures, dual-level switching, zoned switching, and task lighting. Select office equipment, kitchen appliances, and HVAC equipment are Energy Star certified. A thermo-siphoning solar hot water heater is located on the roof. A future photovoltaic system is planned to power the photon exchange membrane hydrogen generator which supplies hydrogen for the weather balloons and a future fuel cell.

Environmental Features: The indoor air quality issues drove decisions to use externally insulated air conditioning ductwork, anti-microbial and low-VOC Interface Boucle Grid carpet, mold and mildew retardant Armstrong Cirrus ceiling panels which also has 69% recycled-content, low-VOC Burke Rubber wall bases with low-VOC adhesive, low-VOC Crossville Porcelain floor and wall tiles, microorganism resistant and anti-static Forbo Marmoleum linoleum flooring with solvent-free adhesives, and low odor and solvent-free Benjamin Moore Pristine paint. Other environmentally benign materials include Herman Miller systems furniture, recycled foam insulation used for block-outs in precast concrete panel forms, recycled plywood & lumber concrete forms, 95% recycled rubber Tirex entrance mat by Tennessee Mat Company, recycled carpet backing on the Interface carpet tiles, and 95% post-industrial waste in the Crossville Ecocycle floor tile. The building location and elevation minimizes excavation and earthwork. A rainwater retention basin is integrated into the landscape design. The site layout minimizes amount of paving. Native landscaping with low maintenance requirements are used. A formal recycling program was followed during construction. The facility includes receptacles for recycling paper, plastic, glass, cardboard, and oil.

Owens Corning Headquarters



Design Architect:	**Cesar Pelli & Associates Architects**
Architect-of-Record:	**Kendall/Heaton Associates**
Structural Engineers:	**CBM Engineers**
MEP Engineers:	**Cosentini Associates**
Civil Engineers:	**Avea Corporation**
Interior Design:	**Harley Ellington Design**
Landscape Designer:	**Balmori Associates, Inc.**
General Contractor:	**The Lathrop Company**
Owners/Developers:	**Owens Corning**
Contact:	**Justin Shigemi, Cesar Pelli & Associates, 203-777-2515**
Photo Credit:	**Timothy Hurfley**

Location: Toledo, Ohio, on a peninsula bounded by Swan Creek and the Maumee River, directly adjacent to the heart of Toledo's business Center.

Occupancy/Use: Corporate headquarters office building.

Building Construction/Type: Three-story, 400,000 square feet. The facade is a glass and metal curtain wall.

Selected Energy-Efficiency Features: High-performance low-e and light reflective glazing with a ceramic frit reduces heat gain on the interior, helps maintain high visible daylight transmittance into the space, while the frit provides integrated shading into the glass assembly. Optimized use of glass in skylights, clerestories, and three-story atrium provides generous amounts of natural light, contributing to lower lighting demand, and bright, productive atmosphere. Raised underfloor HVAC reduces cooling costs through efficient air distribution; each workstation has an adjustable floor supply vent for individual comfort modulation; efficient diffuser layouts are modular and flexible; the system also has the added bonus of flexible wire management. An outside air economizer is installed with compact rooftop high-efficiency air-conditioning units that improve indoor air quality through a filtration system. Efficient lighting sources include dimming availability for high-efficiency fixtures, which reduce energy consumption and operating costs. A building automation system contributes to energy conservation as well. Variable speed fans allow fan speed to respond to actual loads, which reduces energy consumption and related costs.

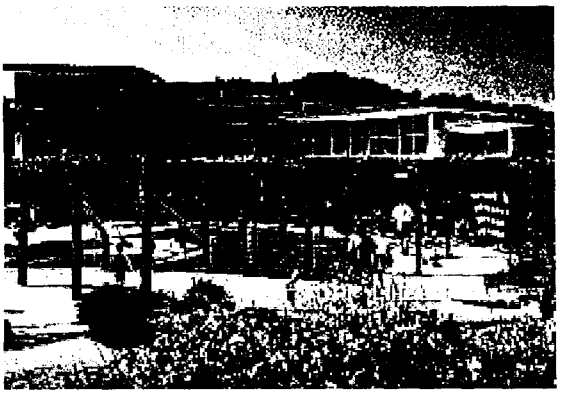
Selected Environmental Features: Low-scale building allows the elimination of elevators, with emphasis on stairways for internal building circulation. Reusable office furnishing systems virtually eliminate tear-down and disposal of building materials when office configurations change. Native plants used for easy maintenance, with minimal irrigation and pesticides required. Paperless office design reduces paper use by 60%. Outdoor courtyard spaces include a running track, with a wildlife refuge on-site. Recycling programs and close proximity to urban mass transit systems.

Pennsylvania's D.E.P. Southcentral Regional Headquarters

Architect:	**Kulp Boecker Architects, P.C.**
Energy/Green Consultants:	**Carnegie Mellon University, Conservation Consultants Inc, Energy Opportunities, Penn Energy Project, Stephen Lee Architect**
Developers:	**Tiger Development, Inc.**
Owner:	**909 Partners**
Contact:	**James Toothaker, 717-787-4190**
Website:	**www.gggc.state.pa.us**

Location: The facility is located in a suburban area of Harrisburg, Pennsylvania.
Occupancy/Use: The structure was built as an office building.
Building Construction Type and Costs: The three story steel frame building has a floor area of 73,000 square feet. The structural steel contains 90% scrap steel. The cost for construction was $5,700,000.
Energy Efficiency Features: It was calculated that the conventional energy cost for this building would have been $1.54 per square foot per year; the building as designed costs $0.74 per square foot per year. A raised floor system was installed over an air supply plenum for better indoor air quality and comfort, to provide increased energy efficiency, to create a nine foot ceiling height, to provide for Krantz floor diffusers at individual workstations, and to make office layout changes easier. Low-e one-inch thick insulated glass windows were used throughout the facade. The Carrier gas-fired absorption chillers use water as the refrigerant. The desiccant wheel dehumidifier system displaced twenty-five tons of latent cooling capacity. The efficiency of the lighting system was enhanced by indirect ambient light fixtures by Ledalite, 90% reflective Armstrong ceiling tiles, light shelves on the south facade, occupancy sensors in the conference & toilet rooms, and Watt Stopper occupancy sensor power strips for the task lighting. This high efficiency lighting design resulted in a 50% reduction in the cooling load associated with lighting.
Environmental Features: The site was a municipal dump which was designated as a brownfield site. Remediation efforts included leachate and methane collection systems. A methane barrier was installed underneath the lowest floor slab. Modular work stations with modular service wiring (Amp Inc.) are used to make layout changes easier, quicker, less costly, and less wasteful of materials. Environmentally friendly materials included low-VOC Safecoat concrete seal, Interface recyclable carpet tiles, 79% recycled content ceiling tiles, 100% recycled P.E.T.E. plastic fabric by Inteck on the Knoll furniture partitions, low-VOC water based wall coating by Polomyx, low-VOC adhesives, bio-fiber tile from Phenix Biocomposits, and recycled glass tile from Terra Green. Indigenous plants and xeriscaping techniques were used for the exterior landscaping.

The Real Goods Solar Living Center



Architect:	**Van der Ryn Architects**
Civil Engineer:	**Mendocino Engineering**
Climate/Site Analysis:	**Adam Jackaway**
Landscape Design:	**Land & Place**
Structural Engineer:	**Bruce King, P.E.**
General Contractor:	**TDM Construction**
Owners/Developers:	**Real Goods Trading Corporation**
Contact/Photo Credit:	**Van der Ryn Architects, 415-332-5806**
Web Site:	**www.vanderryn.com**

Location: The center is located in Sanel Valley near Hopland, California off of Route 101, on a site that was once a landfill dump.

Occupancy/Use: Retail and a small area of business offices.

Building Construction, Type, Constraints and Cost: The structural system consists of reinforced poured concrete columns supporting sustainably and locally harvested glulam wood trusses and engineered wood roof joists. The north and west ventilated walls are constructed of waste rice-straw bales coated with locally gathered pneumatically impacted stabilized earth (R-65). The cost for the land, site development, buildings, support systems, landscaping, and furnishings was $1.86 million. The retail/show room building was constructed for approximately $150/sf.

Energy Efficiency Features: Building orientation, a glazed south wall of low-e insulating glass, limited windows facing east and west, trellises, roll-up hemp awnings, and overhangs all mitigate solar gain and glare. Daylighting is enhanced with light shelves, light colored surfaces, a shallow floor plan, a curved building section, and clerestory windows. The light shelves are hinged to act as night-time insulating window panels. Dimmable, pendant T-8 and compact fluorescent fixtures are used throughout. Thermal mass is provided by an insulated concrete slab floor, straw bale/earthen walls, and concrete columns while supplemental heat is gained with several efficient wood stoves. Cooling and ventilation is assisted by a white Hypalon™ roof; a ventilated roof assembly; the building shape; operable clerestory windows working with low air intakes; thermal mass floors, walls and columns; grape arbors with a fountain and a drip/misting ring at the entrance; and solar powered evaporative coolers (12V recreational vehicle type swamp coolers). A foil and paper radiant barrier is installed at the perimeter surfaces. The on-site renewable energy system consists of 10kw of Siemans PV panels; four Trace sine wave Inverters; five Array Tech active trackers; a power center and two controllers by Anada Power Tech; a World Power Whisper wind generator; and 16 Interstate 6v deep cycle batteries. The nearby Feliz Creek canyon provides a natural wind venturi for the wind generator. Of the average 100 kwh/day the facility uses, 70-80% is supplied by the on-site renewable energy system.

Environmental Features:. The cellulose insulation in the roof (R-60) is made from 100% post consumer waste paper. Re-used and recycled materials in the facility include locally quarried crushed rock for paving, a culvert pipe for a play tunnel, scrap pipes for PV tracker mounts, material from old beer barrels for fencing, recycled plastic and redwood picnic tables and benches, fly-ash concrete, certified douglas fir for framing lumber, salvaged wine barrel material for casework, Hardipanel recycled paper and cement panels, Meadowood wheat straw interior trim bands, 100% post consumer glass and cement countertops in restrooms, reused corrugated steel roofing for the office/storage building, 3-D Panel recycled EPS/steel/concrete wall panels for the office/storage building, pressed wheat straw panels in the office/storage building, organic ferrous oxide concrete floor stain, near-zero VOC paints, 100% post consumer recycled paper towels and toilet paper, reused and recycled products for wall hangings and fixtures, and recycled toilet lids as wainscoting in the restrooms. The water for the fountain and the pond is circulated by a solar well pump. The graywater from the restroom sinks is filtered and used to water the plants in the courtyard. Waterless urinals are used in the men's toilet. During construction, sheet rock waste was ground up for the compost pile; wood scraps were saved for wood stove fuel; and metal, plastic, and cardboard was recycled. The 2"x8" concrete form boards were used at the top of the straw bale walls and in the roof overhangs. Most of the plantings are edible. Old car bodies have been used for tree planter boxes.

Southface Energy and Environmental Resource Center

Architect:	**Pimsler Hoss Architects**
HVAC Engineer:	**Sun Belt Engineering**
Green Consultants:	**U.S. Department of Energy, Southface Energy Institute Lawrence Berkeley Laboratory, National Renewable Energy Laboratory, Oak Ridge National Laboratory**
General Contractor:	**Southface Energy Institute**
Lighting Consultant:	**Lawrence Berkeley labs**
Developer/Owner:	**Southface Energy Institute**
Contact:	**Walter Brown, Southface, 404-872-3549**
Web Site:	**www.southface.org**

Location: 241 Pine Street, Atlanta, Georgia.
Occupancy/Use: Offices, visiting center and meeting facility.

Building Construction & Cost: The 6,300 sf center is constructed of AFM Corp. Diamond Snap-Form™ insulating concrete forms (R-16+) at the basement level, 6"-thick R-Control™ structural insulated panels (R-25) for above grade walls, and R-30 structural insulated panels for some of the roof/ceilings. The building's sustainably designed shell reduced the amount of natural resources that would have been mined, harvested, or processed for its construction by 25%. Laminated veneer lumber is used for the flooring, floor joists and structural framing. The cost was approximately $150/sf or $945,000 total.

Energy Efficiency Features: Southface uses only 7 kWh/sf per year compared to the national average of 15.6 kWh/sf per year for commercial buildings. A trial run of the *Energy Star* benchmarking program rated the facility in the top 10% of all commercial buildings nationally. Daylighting is assisted by cathedral ceilings, R-2.96 Pella® argon filled low-e windows, and a light harvesting cupola. Solar gain and glare are controlled by window placement, shade screens, deep overhangs, porches, and deciduous trees. The passive solar sun space, great room, kitchen, and laundry have thermal mass floors. The upper two floors are heated/cooled by Addison geothermal heat pumps utilizing eight 200' deep vertical wells. The great room is heated by a Heat-N-Glow® sealed combustion, direct vent fireplace. The first floor training facility is heated/cooled by a York Triathlon™ natural gas heat pump (126% AFUE, 20+ SEER). A Honeywell Perfect Climate Comfort Center™ controls the HVAC systems. The meeting and office areas have occupant sensing lighting controls by Novitas®. The artificial lighting consists of high CRI compact and T-8 fluorescent lamps powered by dimmable electronic ballasts, a light shelf, and LED exit signs. The toilet and copy rooms have Panasonic® ultra quiet and efficient exhaust fans. Appliances throughout are *Energy Star*. Seventy Percent of the hot water needs are provided by a solar hot water system. Hot water is also conserved by an ACT Metlund's® D-Mand® hot water re-circulating pump. United Solar™ photovoltaic roofing shingles produce 2,700 kWh per year, enough to power most of the lighting in the structure. The exterior parking lights and pond pump are photovoltaic powered. Two electric car charging stations are provided. There are bicycle racks, showers, and the center is convenient to mass transit.

Environmental Features: The building has a natural air change per hour of 0.15. Fresh air is admitted, filtered, and dehumidified by a Therma-Stor Ultra Aire APD unit. The windows are operable to provide more natural ventilation when desired. The building has a radon mitigation system. Some of the air handlers have pleated media filtration and Honeywell electronic air cleaners. Environmentally friendly materials include reclaimed pine flooring in the front entryway, certified birch shelving in the library, Summitville® recycled feldspar floor tiles in the sun space, 10% fly ash content concrete, Benjamin Moore Pristine® zero-VOC paints, Shaw wool fiber carpets, Interface recyclable carpet, recycled content carpet pad, a future straw bale garden cottage, and mulch from construction wood scraps. The kitchen has an adjoining recycling area. Water is conserved by Kolher® pressure-assisted toilets, low-flow faucets, and gray-water irrigation. Storm water management and water conservation is assisted by the site's use of porous pavement, a rooftop rain water harvesting system, water conserving plants, and storm water infiltration basins around the building. An endangered, native, wetland, species bog and future constructed wetlands will further manage storm water. The landscape walls and stepping stones are made from recycled concrete rubble. The exterior deck is constructed of ChoiceDek™ recycled plastic lumber. An urban wildlife habitat, permaculture gardens, native planting and extensive tree-preserve areas have been provided.

Thoreau Center for Sustainability

Architect:	**Tanner Leddy Maytum Stacy Architects, 415-394-5400**
Structural Engineer:	**Steven Tipping & Associates**
MEP Engineer:	**Flack + Kurtz**
Lighting Design:	**Architectural Lighting Design**
Landscape Architect:	**The Office of Cheryl Barton**
Civil Engineer:	**GL&A**
General Contractor:	**Plant Construction**
Owners/Developers:	**Thoreau center Partners, National Park Service**
Photo Credit:	**Richard Barnes, 415-550-1023**

Location: The facility is in the former Letterman Hospital, built between 1899 and 1933, located in the Presidio National Park of San Francisco, California, a former U.S. military base.

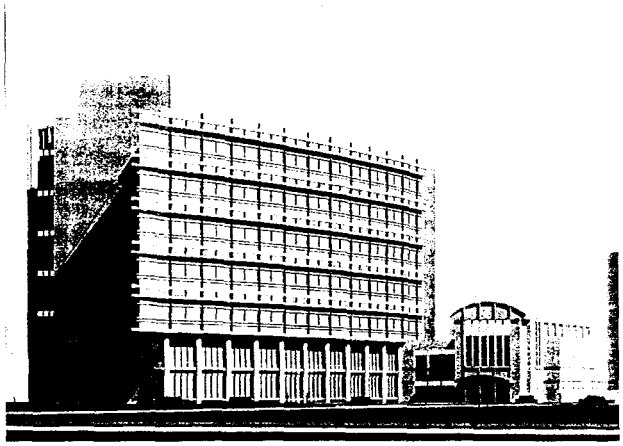
Occupancy/Use: Office space for the Tides Foundation, the Energy Foundation, the Institute for Global Communications, and sixteen other tenants having connections with sustainable and/or environmental activities.

Building Construction, Type, Constraints and Cost: The existing low-rise structures consist of a three-story wood frame building (pictured above) and three two-story concrete structures. The approximate renovation cost was $56 per square foot not including site work. The construction also complied with the National Park Service's historic buildings rehabilitation requirements.

Energy Efficiency Features: The mechanical and electrical systems of the building were kept simple and were designed to take advantage of the local benign climate and the narrow width shapes of the building. The new renovations attempted to maximize the existing daylighting attributes of the existing structures. The perimeter offices were enclosed by seven foot high aluminum and glass partitions that allowed natural light penetration. Natural ventilation was enhanced by these same low partitions, existing operable windows, ceiling vents and attic vents. Low-E insulating glass was installed in the entrance windows. Photovoltaic panels are used as a sun screen above the entrance skylight. The heating system performance was increased through the use of high efficiency/low temperature radiators with local thermostat controls, high efficiency motors, variable speed pumps & drives, and resetting of hot water heating temperatures depending on outdoor air temperatures. The new .59 to .9 watts/sf lighting design was enhanced with energy efficient fluorescent up-lighting, compact fluorescent pendant lights, electronic ballasts, and occupancy sensors. Energy use was calculated to be one-third of a standard non-energy efficient building. The non-energy efficient base building was assumed to have no additional insulation, full height opaque partitions, closed perimeter offices, standard mechanical and electrical systems, 1.5 watts/sf lighting level, the same internal loads, and the same occupancy schedules.

Environmental Features: The facility re-used existing buildings. Recycled content cellulose thermal insulation and cotton batt acoustical insulation was used. Low-flow plumbing fixtures were used to conserve water and hot water energy. Utility connected electric car charging outlets along with a nearby photovoltaic charging station were provided. Recycled content ceiling tiles, recycled content & low formaldehyde MDF substrate board, recycled content Homasote fiber board, sustainable source wood veneer panels, recycled content aluminum doors/windows & wall systems, low-VOC adhesives & paints, recyclable carpet fibers, linoleum flooring, and recycled content ceramic tiles were installed. Landscape design consisted of plant rehabilitation, earthwork minimization, organic soil amendments, water conservation & harvesting techniques, minimization of runoff, tree location for solar control, reduction in asphalt paving, and low maintenance ground covers. More than seventy-three percent of the construction debris was recycled.

U.S. Federal Courthouse Expansion
Denver, Colorado



Design Architect: Hellmuth, Obata + Kassabaum, Inc.

Architect of record: Anderson Mason Dale, P.C.

Cost Consultant: Hanscomb, Inc.

Energy/Green Consultants: Architectural Energy Consultants, RMH Group, Steven Winter Associates

Owners/Developers: U.S. General Service Administration

Credit: *HOK Guidebook to Sustainable Design* by Sandy Mendler, AIA, 2000, printed with permission of publisher John Wiley & Son, Inc., contact HOK @ 202-339-8852

Location: Downtown Denver, Colorado, Federal district.

Occupancy/Use: District Courts, Magistrate Courts, special proceedings courtroom, and offices for the United States Marshal occupy the building.

Building Construction, Type, Constraints and Cost: The 370,000 gross sf structure is eleven stories tall. The cost is approximately $180/sf for building and site development. The construction is scheduled to be completed 2002.

Energy Efficiency Features: The building design achieved a LEED™ gold rating. This facility is designed to consume 50% less energy than a building designed to comply with the minimum requirements of ASHRAE 90.1-1989. The energy-efficient HVAC system utilizes displacement air distribution supplied from the raised floor plenum, direct/indirect evaporative cooling, district steam for space heating and hot water, variable frequency drive air handler and pump motors, variable air volume air distribution, outside air economizers, premium efficiency motors, and a digital building automation system. The ventilation system complies with ASHRAE Standard 62-1989 for indoor air quality. Building insulation values average R-16 for the walls, and R-30 for the roof. Most of the glass on the tower portion of the courthouse is one-inch, insulated, high-performance, low-E glass in non-operable aluminum frames. The public corridor from levels four through eleven have a high-performance, triple-glazed curtain wall system. Exterior glazing panels immediately below the light shelf, in the public corridor, reduce visible light transmission by incorporating photovoltaic cells. Additional photovoltaic panels occur at the top of the tower and in the skylight above the secure lobby. Estimated energy production from the photovoltaic system is 71,000 kWh per year or about four percent of the total electrical consumption. The daylighting design works with photocell light fixture dimming, energy efficient exterior glazing, low office partitions, light shelves in the high-rise portion of the building, a sky dome in a courtroom, and shading devices. Energy efficient T-5 fluorescent lamps are used throughout. Private offices have low ambient light supplemented by task lighting and controlled by occupant sensors. Plumbing fixtures are low and ultra low flow type and lavatory faucets have infrared on-off sensors.

Environmental Features: All paints, adhesives and finishes are water based and low VOC. Local concrete and native stone was used. Acoustical ceiling tile, aluminum ceiling panels and grid, steel framing, carpeting, and wood substrates all have high recycled content. Cork flooring is specified throughout the courtroom floors. The raised floor system and the flexible planning makes future changes less costly and wasteful. The site improvements included indigenous and xeriscape plants, drip irrigation system, pavers in sand setting beds, grass-block paving, and gravel surfaces. Well lighted paths to nearby public transportation are provided. A construction indoor air quality management plan was mandated to reduce contamination of the HVAC system and absorbent materials from toxins during construction. A construction waste recycling program was specified.

COMMERCIAL BUILDING INVENTORY SUITABLE FOR DEMONSTRATION AND OUTREACH Candidates 9-6-00			
Building & Location	**Representative Region**	**Building Configuration**	**Notes**
4 Times Square New York, NY	Northeast Urban	High-rise office building	High efficiency HVAC, improved indoor air quality strategies (source control, ventilation), sustainable materials, photovoltaics, fuel cells, responsible construction practices, high performance tenant guidelines. Contact: Jodi Durst of Durst Organization, 212-789-1155, Bob Fox of Fox & Fowle Architects, 212-627-1700
502 Colorado, Santa Monica, CA	Southwest Urban	Mid-rise 44-unit, low income, single room occupancy residential with ground floor public spaces	The building design is expected to reduce energy by 50% in comparison to the California Energy Code (Title 24), increased exterior wall insulation, high thermal performance windows, light and reflective wall and roof colors, efficient electric lighting, efficient refrigerators, and a solar (photovoltaic) power generation system. The PV system is integrated into the exterior stair wells. Contact: Tony Pierce, P.E. at Southern California Edison, 626-633-7186

Building & Location	Representative Region	Building Configuration	Notes
ACS New Children's Center NYC	Northeast Urban	Mid-rise children's center & office building	Renovation of an existing building on the National Register of Historic Places; low-VOC paints, finishes & floor coverings; CO2 sensors; AirKrete; CFC-free insulation; daylighting; upgrade of insulation & windows; energy efficient HVAC, central steam plant condensate heat recovery; annual energy costs 33% below code compliance; 7.6 year simple payback. Contact: Bill Bobenhausen, Dave Lahiri of Steven Winter Associates, 203-857-0200
Adam Joseph Lewis Center for Environmental Studies Oberlin College Oberlin, OH	Midwest Rural	Low-rise education building	Solar electricity, biological waste treatment, sustainable site treatment, solar shading, geothermal heat pumps, environmentally friendly materials, NIST is monitoring the IAQ. Contact: Kevin Burke @ William McDonough 804-979-1111
Admissions Cottage Bryn Mawr School Baltimore, MD	East Central Rural	Low-rise school admissions building	Site harvested trees, environmentally preferred materials, rain water cistern for garden, passive solar heating & cooling, thermal mass. Contact: Cho Benn Holback & Associates, 410-576-0440, www.chowilksbenn.com
Alcoa Headquarters Pittsburgh, PA	East Urban	Low-rise office building	Sun control, daylighting, raised floor supply air, sustainable wood products, flexible open plan with movable workstations. Contact: The Design Alliance Architects, 412-261-0660

Building & Location	Representative Region	Building Configuration	Notes
Amtrak Station Normal, IL	Midwest	Low-rise train station	75% less energy than typical station; daylighting, fluorescent, HPS, electronic load mgmt cut lighting energy 70%; passive solar, 2.4kW PV
Antelope Valley Community College Library Lancaster, CA	West Coast	Low-rise library	1994, daylighting, VAV distribution systems, indirect evaporative cooling, high efficiency lighting, optimized building envelope. Contact: Spencer-Hoskins Associates (Architect), 626-398-3576
Ariel Apartments Fort Myers, FL	Southeast	Mid-rise apartment building	Passive solar cooling central atrium, energy conserving materials, shading, energy-minded building orientation. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Armstrong World Industries Headquarters, Innovations Center Lancaster, PA	Northeast Ex-urban	Low-rise office Building	Daylighting, indirect lighting, HVAC & lighting occupancy sensors, argon filled windows, CO_2 monitors, more than 50% of site left as natural, low water usage plants, alteration of existing building, no CFC's, recycling program, recycled content materials, low VOC paints & adhesives. Contact: Jim Camp of Gensler 410-539-8786

Building & Location	Representative Region	Building Configuration	Notes
Audubon at Beachwood Pittsburgh, PA	Northeast Rural	Low-rise classroom, office & learning center	Passive solar, daylighting, R24 walls, R30 ceilings, thermal mass, heat recovery ventilation in place of AC, composting toilet, water saving plumbing fixtures, solar hot water, 1.5kw PV, 5kw wind generator, shading/bird habitat trellis, non-toxic finishes & cleaning regimen, edible/herb/native landscaping. Contact: Robert J. Kobet of Green Building Services Consultants Inc. 412-431-4449 ext 225
Audubon House New York, NY	Northeast Urban	Mid-rise office building	1991, renovation of existing building, energy efficient HVAC, 5-year max payback on energy systems, 10% max premium on green materials, low-VOC materials, demolition recycling, in-house recycling system. Contact: Croxton Collaborative, Architects, 212-683-1998

Building & Location	Representative Region	Building Configuration	Notes
Bachelor Enlisted Quarters (MCPON Plackett Manor) Great Lakes Naval Training Center Great Lakes, IL	North Central Suburban	Low-rise apartment building	1999, LEED™ certification, 6% energy savings over navy energy design budget, highly insulated envelope, high-performance operable windows, daylighting, dual setting high efficiency lighting, DDC remote controls, variable speed drives, low-flow plumbing fixtures, environmentally preferred materials, reflective roof, construction waste management, indigenous landscaping, bicycle lockers, building commissioning, occupant recycling program. Contact: Terry Wade, Basewide Energy Manager, 847-688-2795, ext 107, Wight & Co. (project architect), 630-969-7000
Barney Memorial Hall Denison University Granville, OH	Lower Great Lakes Region Urban	Low-rise classroom, library & computer lab facility	Reuse of existing building, high efficiency natural gas boilers, provision for future photovoltaics, existing tall windows were renovated & light shelves added for daylighting, ultra-efficient lighting with continuous dimming & occupancy sensors, recycled materials, reused materials, low-VOC materials, demolition & construction waste recycled & reused. Contact: Carl Jahnes, 614-349-8203

Building & Location	Representative Region	Building Configuration	Notes
Bateson Building Sacramento, CA	West Urban	Mid-rise office building	1977, 70% of building's heating & cooling needs are met without fossil fuel use; one of first office buildings to use a combination of passive solar storage, night air cooling, adjustable shading, and efficient lighting. Contact:Van der Ryn Architects, 415-332-5806
Bellevue Community College Instructional Building S.E Bellevue, WA	Northwest	Classroom, student commons & office building	Energy life cycle analysis, structural bay layout for future flexibility, fixed & movable sun shading devices, operable windows, daylighting, light shelves, geothermal heat pump, economizer cycle. Contact: Kristy Kimaura, Mark Reddington of LMN Architects, 206-682-3460
Big Horn Home Improvement Center Silverthorne, CO	Mountain	Retail	Don & Betsy Sather developers? Daylighting, radiant heat, extra insulation, low-e windows, Unisolar standing seam PV roof, Solar Wall product, stepped dimming, light sensors, well water snow melt, Novar energy management system. Contact: Don Sather 970-668-3350

Building & Location	Representative Region	Building Configuration	Notes
Black Rock Forest Center for Science & Education Cornwall, NY	Norheast College Campus	Low-rise science & education center	Oblong east/west shape, mostly south facing windows, low-e/argon glazing, daylighting, highly insulated walls, SIP roof, geothermal heat pumps, variable speed fans & pumps, heat recovery, 20 cfm/ person ventilation rate, CO2 sensors, natural ventilation, efficient lighting with occupancy sensors, 43 to 49% energy savings over a code complying building. Contact: Adrian Tuluca of Steven Winter Associates, 203-857-0200
Boston Nature Center Mattapan, MA	Northeast Suburban	Low-rise education & office building	Recyclable/compostable building materials, energy efficient systems, water conservation. Contact: David Queeley of Boston Nature Center, 617-983-8500 ext 222
BP Solarex Corporate Headquarters Baltimore, MD	Northeast	Low-rise office building	23 kW PV array powers all but HVAC & lighting, PV powers UPS also, building management system, high-efficient lighting. Contact: Sarah Howell of BP Solarex, 410-981-0256, howellsc@bpsolarex.com/, www.bpsolarex.com/
Brainbridge Island City Hall Brainbridge Island, WA	Northwest Rural	Low-rise city hall	Daylighting, optimized natural ventilation, non-toxic & non-ozone depleting materials, certified wood, recycled & reused materials, non-toxic finishes, porous asphalt paving. Contact: Claudine Manio of Miller/Hull Partnership, 206-682-6837 ext 244, Cmanio@MillerHull.com

Building & Location	Representative Region	Building Configuration	Notes
Buchart Horn York, PA	Northeast Urban	Low-rise office building	Adaptive re-use of existing building on brownfield site, demolition debris reused on site, efficient VAV four pipe heating/cooling system uses a 93% efficient water heater & air-cooled chiller, heat recovery, high efficiency filtration, high efficiency task & ambient lighting, daylighting atrium, low-flow plumbing fixtures, operable windows. Contact: Gene Schenck of Buchart-Horn, Inc./BASCO Associates, 800-274-2224 ext 323
Building 33 Complex Washington Navy Yard Washington, DC	East Central	Low-rise office building	Historic Building Reuse, building within a building, high efficiency variable speed motors, triple glazed windows, indirect/direct pendant light fixtures with automatically controlled dimmers, skylight daylighting, recycled materials, low water consuming fixtures. Contact: Ewing Cole Cherry Brott (architect), 215-923-2020 http://www.ewingcole.com

Building & Location	Representative Region	Building Configuration	Notes
Building 850 Naval Construction Battalion Center, Port Hueneme, CA	West coast	Low-rise office and computer facility	1998, 45% energy & water savings compared to existing building, major renovation & addition to existing building, daylighting, shading, photovoltaics, solar space & domestic hot water heating, high efficiency lighting with dimming/ photo sensors/ occupancy sensors, natural ventilation, natural gas heat pump air conditioning, underfloor air distribution, heat recovery from air conditioning system, high efficiency pulse boilers, gray water reuse, rainwater harvesting, water conserving irrigation, IAQ monitoring, recycled & reused building materials, low toxic materials. Contact: Scott Ellinwood Associates (architect), www.ctg-net.com/Projects/Navy
Burke Building Pittsburgh, PA	Northeast Urban	Low-rise office building	Adaptive re-use of existing building, thermal envelope & building systems optimized using DOE2.1e, 1st stage enthalpy economizer cooling with 2nd stage gas fired chiller, energy efficient lighting, open plan, daylighting improved, non-CFC foam & cellulose insulation. Contact: Robert J. Kobet of Green Building Services Consultants Inc. 412-431-4449 ext 225

Building & Location	Representative Region	Building Configuration	Notes
Cape Charles Sustainable Technology Park (Building 1) Cape Charles, VA	East Central Suburban	Low-rise industrial building for lease	2000, largest roof-integrated thin-film solar electric system in North America, 42 kw PowerGuard roofing tile photovoltaic array, IAQ monitoring, energy efficient skylights for daylighting, porous pavers. Contact Greg Manter, Eastern Shore of Virginia Economic Development Commission, phone toll-free 888-200-1778 e-mail esvedc@esva.net, Tim Hayes, Director, Industrial Development Authority, 757-331-1998, e-mail ecopark@esva.net
Cape Coral High School Cape Coral, FL	Southeast	Low-rise high school	Thermal mass walls, earth berming, high level of roof insulation for area, heat recovery system that eliminates furnace, parabolic light fixtures. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711

Building & Location	Representative Region	Building Configuration	Notes
Carl Hayden Visitor Center Glen Canyon, AZ	Midwest Rural	Low-rise visitor center	Major energy upgrade; FEMP project; 33% reduction in lighting energy use=13K/yr; 3.3 month payback for lighting and zone controls, 5 yrs payback for all measures; energy-efficient lighting, lighting occupancy sensors, lighting & fan timers in bathrooms; night set-back thermostats; refurbished solar hot water; R4.75 heat mirror windows; low-flow plumbing fixtures; occupancy-sensing faucets. Contact: Karen Thomas, NREL, 202-651-7536, FEMP, www.eren.doe.gov/femp
CCI Center Pittsburgh, PA	Northeast Urban	Low-rise office building	Adaptive re-use of existing building; salvaged kitchen, wood, and brick; carpet from job overrun; retrofit cellulose; new R24 walls; R6 windows; AirKrete; air sealing; organic roof garden; heat recovery ventilation; gas powered a/c; cabling in accessible channels; BIPV saves $12K/yr; nontoxic finishes; Agriboard; rainwater harvesting; expect 4yr payback; construction waste management. Contact: Robert J. Kobet of Green Building Services Consultants Inc. 412-431-4449 ext 225
Centex Building Dallas, TX	South West Urban	Mid-rise office building	Energy efficient thermal envelope and HVAC, Energy Star ranking of 99. Contact: John Boone of Harwood Management Services 214-871-0871

Building & Location	Representative Region	Building Configuration	Notes
Center for Environmental Sciences and Technology Management SUNY at Albany	Northeast Urban	Low-rise office building	One of largest PV systems in US; BIPV shading; continuous loads; Kawneer's hi-yield Slope Glazed PV system located on the south facade above clerestory office windows; high-flexibility, low-maintenance, modular HVAC; heat recovery loop, variable-frequency drives, economizers; all services in ceiling. Architect: Cannon & Associates, N.Y. City. Contact: Millard Berry of Cannon Design 212-972-9800
Center for Renewable Energy and Sustainable Technology (CREST) Washington, D.C. 7-24-00	East Central	Museum & education center	Active & passive solar energy, energy conservation. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Chattanooga City & Building Department Chattanooga, TN	Midwest Urban	Low-rise office and retail building	Construction phase, energy efficiency, environmentally preferred materials, photovoltaics, biofuels, daylighting, fresh air, bioremediation of storm water. Contact: Croxton Collaborative, Architects, 212-683-1998

Building & Location	Representative Region	Building Configuration	Notes
Chesapeake Bay Foundation Headquarters, Phillip Merill Environmental Center Annapolis, Maryland	Northeast Rural	Low-rise office building and conference facility	Fall 2000, LEED™ Certified, energy use is 50% less than ASHRAE 90.1-1989, existing footprint, geothermal, photovoltaics, natural ventilation, daylighting, solar hot water, passive solar, dessicant dehumidification, composting toilets, non-CFC/HCFC SIPs, recycled content/ recyclable/ local/ low-VOC/low embodied energy materials, rainwater catchment, native plantings, porous paving, bicycle storage. Contact: Will Zachmann of Steven Winter Associates, 202-628-6100
Columbia University's Lamont-Doherty Earth Observatory Palisades, NY	Northeast Rural	Low-rise office building and conference facility	Natural ventilation, daylighting, temperature sensor operated clerestory windows, large overhangs, deciduous tree shading, operable windows, open offices, occupancy sensor lights, building management system. Contact: Charles Blomberg of Rafael Vinoly Architects, 212-924-5060, www.rvapc.com
Columbus Centre New York, N.Y.	Northeast Urban	High-rise office, hotel, TV studios, condo, & retail building	Design phase, energy efficient, green materials, pursuing LEED bronze rating, pursuing N.Y. State green building tax credit. Contact: John Amatruda, Adrian Tuluca of Steven Winter Associates, 203-857-0200

Building & Location	Representative Region	Building Configuration	Notes
Commander Headquarters & Navy Band Facility Bangor, WA	Northwest Rural	Low-rise office and band facility	1996, daylighting, louvered south wall, energy efficiency, storm water retention, fluorescent general lighting with incandescent task lighting & stepped switching, photo cell & clock controlled exterior lighting, VAV air handling, outside air economizers, air monitoring, minimal site disturbance, native landscaping, preserved existing vegetation and stream. Contact: Kristy Kimaura, Mark Reddington of LMN Architects, 206-682-3460
Comstock Center Pittsburgh, PA	Northeast Urban	Office building	75% less energy consumption than typical, energy efficient HVAC, energy efficient envelope, daylighting, National ASHRAE energy efficient design award. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711

Building & Location	Representative Region	Building Configuration	Notes
Coral World St. Thomas U.S. Virgin Islands	Virgin Islands Rural	Low-rise aquarium, office, retail, restaurant, and underwater observation tower	Major renovation, over 40% energy savings over existing facility, heat recovery on air conditioning condenser lines for domestic hot water, high efficiency pumps, high efficiency lighting, solar parking lights, mini hydroelectric system at display tank outfall, 896 W PV array, solar hot water, entrance air locks, increased roof insulation, white roof, mitigation of construction run-off, landscape sediment control. Contact: Onaje Jackson, Caribbean Infra-Tech Inc, 340-778-4711, e-mail citstx@viaccess.net
Dana Building University of Michigan Ann Arbor, MI	North Central Urban	Low-rise office and education building	1999 phase I, 2000-2001 phase II, 50% energy use vs conventional building, SCS certified sustainable forest wood, recycled content materials, occupancy & daylight sensor lighting controls, skylights, water-based paint stripper, traction elevator (30% less energy than hydraulic) construction recycling / salvaging / re-use, contractors responsible for own energy, occupant recycling program. Contact: William McDonough + Partners, 804-979-1111, www.mcdonough.com

Building & Location	Representative Region	Building Configuration	Notes
David L. Lawrence Convention Center expansion Pittsburgh, PA	Northeast Urban	Low-rise convention center and offices	Partially reuse existing structure, urban infill, natural ventilation, low temperature air delivery, displacement ventilation, raised floor air supply plenum in meeting rooms, daylighting, spraying water evaporative cooling of roof, environmentally preferred materials, ice storage, geothermal cooling, grey water recycling. Contact: Rebecca Flora of Green Building Alliance 412-431-0709, Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Delridge Community Center Seattle, WA	Northwest Suburban	Low-rise community center	1995, energy efficiency, low-flow plumbing fixtures, energy management control system, natural ventilation, operable windows, energy efficient building orientation, daylighting, recycled content materials. Contact: Boyle-Wagner Architects, 206-382-9651
Denver Courthouse Denver, CO	Rocky Mountains, Urban	Mid-rise courtroom & office building	LEED Gold Rating, native plants & drip irrigation; energy efficient envelope, daylighting, lighting, HVAC; displacement ventilation; evaporative cooling; automated building system; low-flow plumbing fixtures; building integrated P.V.; environmentally friendly materials. Contact: HOK, 202-339-8852

Building & Location	Representative Region	Building Configuration	Notes
Denver Dry Goods Building Denver, CO	Mountain Urban	Low-rise mixed use office, retail & residential	Existing building renovation, thermal mass, computerized HVAC system, daylighting, 60% savings in energy use compared to its previous department store use. Contact: Jonathan Rose, Affordable Housing Development Corp. 914-232-1396
Department of Environmental Conservation Headquarters Albany, NY	Northeast Urban	Mid-rise government office building	Energy efficient thermal envelope and HVAC, environmentally preferred materials, improved indoor air quality strategies (source control, ventilation). Contact: Ian Graham of Steven Winter Associates, 203-857-0200
DGI Headquarters Columbus, OH	Mideast Urban	Mid-rise office building	September 2000, downtown district, one of most efficient new buildings in central Ohio, passive solar heating/cooling, daylighting. Contact: Margaret Wazuka of Design Group Inc., 614-888-6390, margaret@designarchitecture.com

Building & Location	Representative Region	Building Configuration	Notes
Disney Conservation Learning Center, Disney Wilderness Preserve, Kissimmee, FL	Southeast Rural	Low-rise learning, administrative & laboratory facility	Natural ventilation, operable windows, east/west long axis, oak tree shading, 5' overhangs, low-e/double glazed windows, integrated photovoltaics, geothermal heat pump, zoned HVAC, high efficiency lights, daylighting, environmentally preferred materials, low-VOC paints & stains, wood from sustainably managed forest, rainwater harvesting, construction waste recycling. Contact: Geoff Meyer at Cooper Johnson Smith Architects, Inc, 813-273-0034
Donald Bren School of Environmental Science & Management University of California Santa Barbara, CA	West coast	Low-rise office, laboratory, & conference building	2002 completion, LEED certified, daylighting, passive solar heating/cooling, operable windows, natural ventilation, energy efficient lighting w/ motion&photo sensor controls, most energy efficient laboratory ventilation available, multi-building virtual chilled water loop, toilets use reclaimed water, recycled materials, certified wood, construction waste management, native landscaping, reclaimed water irrigation, permeable grass paving. Contact: Zimmer Gunsul Frasca Partnership, 503-224-3860

Building & Location	Representative Region	Building Configuration	Notes
Duracell Headquarters Bethel, CT	Northeast Rural	Low-rise office building	Minimized building impact on site, storm water management, native vegetation, environmentally friendly materials, energy efficient envelope and HVAC, water conservation, daylighting, material recycling chutes, recycled construction waste. Contact: Herbert S. Newman and Partners, PC, 203-772-1990
Eberly Family Environmetal Learning Center Bruceton Mills, WV	East Central Rural	Low-rise learning center	Geothermal heat pump with propane boiler, radiant floor heating, roof overhangs, R30 walls, R40 roof, insulated concrete forms, R50 straw bale gable walls, recycled materials, compressed straw wall panels, environmentally preferred materials, low-VOC finishes, SIPs, engineered trusses, long east/west building orientation. Contact: Thomas Gray of Design Alliance Architects, 412-261-0660
Ecovillage Common House Loudoun County, VA	East Central Rural	Low-rise community activity center	Design Phase, passive solar heating/cooling, geothermal energy, energy efficient windows, alternate waste water management, spatially efficient, environmentally preferred materials, reclaimed distressed oak, low-VOC finishes/ sealants adhesives, SIPs, Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711

Building & Location	Representative Region	Building Configuration	Notes
Eighth Avenue Post Office Fort Worth, TX **9-6-00**	Southwest Suburban	Low-rise post office	**1999,** high efficiency digital HVAC, occupancy & daylight sensor lighting, exterior heat-reflective ceramic coating, compressed straw S.I.P.s exterior walls, rainwater irrigation, environmentally responsible materials, **certified** wood from well managed forests, natural gas powered fleet, native landscaping, construction recycling & I.A.Q. plan. Contact: www.usps.gov/environ, Quorum Architects, 817-738-8095
Energy Resource Center Downey, CA	West Urban	Low-rise exhibition & office building	LEED™ certified, adaptive re-use of existing building, re-used demolition materials, environmentally friendly materials, 38% more energy efficient than California's Title 24, energy efficient envelope and HVAC, daylighting, ultra-low flush toilets, drought-resistant plants, drip irrigation. Contact: Wolff/Lang/Chistopher Architects, 909-682-2560
Environmental Education Center Falmouth, ME 9-6-00	**Northeast Rural**	**Low-rise meeting rooms, exhibition, office, & retail building**	**Ground source heat pump, in-floor radiant heating, passive solar heating & cooling, argon filled low-e windows, recycled content steel framing, low-VOC paints. Contact: Van Dam & Renner/ Carol A. Wilson Architects, 207-773-3399**

Building & Location	Representative Region	Building Configuration	Notes
Environmental Living & Learning Center, (McLean) Northland College Ashland, WI	North Central Suburban	Low-rise student residence hall	50% energy saving over code, 3.2 kW PV, 20 kW wind generator, solar hot water, passive solar heating/cooling, composting toilets, low-flow plumbing fixtures, high-efficiency lighting, heat recovery ventilation, highly insulated envelope, environmentally preferable materials. Contact: James S. Brew, AIA, 218-727-8446, Joe Danes at jdanes@ecw.org, LHB Engineers & Architects, 612-752-6935, Joel.Schurke@LHBcorp.com
Environmental Sciences and Engineering Building Michigan Technological University Houghton, MI	North Central Urban	Mid-rise education, research & office building	HVAC heat recovery, improved indoor air quality strategies (source control, ventilation), daylighting, supplementary passive ventilation, material recycling chutes, recycled content materials, modular size offices and labs, building materials recycled during construction. Contact: SHG, Inc., 313-983-3600, info@smithgroup.com

Building & Location	Representative Region	Building Configuration	Notes
Environmental Technology Center Sonoma State Univ. Rohnert Park, CA	West Coast Suburban	Low-rise education, research & office building	Fall of 2000, "smart building" control technologies, environmentally-sensitive materials, reused/sustainably harvested wood, natural ventilation, passive solar heating/cooling, thermal mass, heavily insulated envelope, advanced window systems, daylighting, PV, digital communication systems, water-efficient landscaping. Contact: Sonoma State Univ., 707-664-2306
EPA Regional Headquarters Kansas City, KS	Central Urban	Mid-rise office building	1999, energy-efficient HVAC, daylighting, recycled aluminum light shelves, 4-story east/west atrium, recycled content ceramic tile & carpet, low-VOC adhesives & paint, low-toxic materials. Contact: Langdon Wilson, 949-833-9193, www.lw-oc.com

Building & Location	Representative Region	Building Configuration	Notes
EPA's Federal Triangle Headquarters Washington, DC	East Urban	Low-rise office complex	Renovation to 3 existing buildings and construction of 1 new building, operable windows, low-VOC/ toxic paints/ adhesives/ finishes/ substrates, low-flow plumbing fixtures, concrete w/ fly ash content, energy-efficient "Green Lights" lighting, modular workstations, recycled content ceiling tiles & other finishes, direct exhaust of problem areas, CO2 & NO2 detectors, HVAC management system, system commissioning, modular chillers, HCFC 123 refrigerant, construction IAQ plan, convenient to mass transit. Contact: RTKL Associates, 202-833-4400, www.rtkl.com
EPA's Green Campus Research Triangle Park, NC	East		$282 million, 1.1 million sf, 40% reduction in energy use compared to typical, low VOC paint/ sealants/ carpets/ furniture, emphasis on indoor air quality, daylighting, energy efficient HVAC, task & energy efficient lighting, storm water bioretention, construction waste recycling, tenant recycling facilities. Contact: Ann Brown of EPA, 919-541-7818, brown.ann@epa.gov, HOK, 202-339-8852

Building & Location	Representative Region	Building Configuration	Notes
EPA Region 10 Seattle, WA	Northwest Urban	High-rise office building	Building renovation of leased space, $9 more a sf than typical, re-used materials, recycled content materials, high-efficiency lighting, occupancy sensors, modular wall units, low VOC/toxic materials, certified wood, re-used/salvaged/ recycled over 95% of construction waste. Contact: Judith Leckrone of EPA, 206-553-6911, www.epa.gov/r10earth/innovation.htm
EPICenter Montana State University Bozeman, MT	North Semi-rural	Low-rise education, research & office building	2000, still in design, Passive ventilation, passive heating and cooling, daylighting, fuel cells, photovoltaic panels, rainwater harvesting, solar aquatic wastewater treatment, sustainable materials, advanced glazing, intelligent building system controls, going for platium LEED. Contact: Kath Williams of MSU, 406-994-7713, **www.montana.edu/epicenter**
Epson America, Inc. Corporate Headquarters Torrance, CA	West coast Suburban	Low-rise office building	1990, energy-conserving design, raised floor system, thermal ice storage, light shelves, daylighting, earth berms, Contact: Gensler, San Francisco, 415-433-3700

Building & Location	Representative Region	Building Configuration	Notes
EPUD Headquarters Eugene, OR	Northwest Rural	Low-rise utility district headquarters	50% energy of typical building, daylighting, lightshelves, passive solar heating/cooling, deciduous vine shading, stepped dimming, thermal mass, hollow-core roof & floor slab, heat recovery ventilation air, preserves small creek & wetlands. Contact: WE Group PC, 541-344-3249, John S. Reynolds (architect), 541-344-9440
Erie Community College Urban Campus Buffalo, NY	Northeast Urban	Low-rise urban college building	Renovation of existing structure, reduced energy consumption 80% of existing. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Federal Campus Oklahoma City, OK	Midwest Urban	Mid-rise office building	Design phase; energy efficient, green materials; pursuing LEED bronze or higher rating and Energy Star rating, complying with Planet GSA, Executive Order 13123, and Facility Standard GSA PBS PQ-100.1. Contact: Donald Prowler, FAIA, 215-546-8511
Fire Station No. 9 Arlington, VA	East Central	Low-rise fire station	Renovation of existing building, incorporation of sustainable design utilizing LEED/ Energy Star/ Green Lights standards/ ISO 14000. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711

Building & Location	Representative Region	Building Configuration	Notes
Florida Solar Energy Center University of Florida Cocoa, FL	Southeast Urban	Low-rise office & lab buildings	Energy efficient envelope and HVAC, daylighting, light colored roof for reduced heat gain, radiant barriers, improved indoor air quality strategies (source control, ventilation). Contact: Keith Reeves of Architects Design Group, 407-647-1706
Fox Gas & Oil Company Pittsburgh, PA	Northeast	Low-rise office building	Passive solar heating/ cooling, earth-sheltered, energy efficient envelope, daylighting, light shelf. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Frye Art Museum Seattle, WA	Northwest Urban	Low-rise art museum	Major renovation, daylighting, overhangs/ recesses/ baffles/ vertical fin sun shading, natural ventilation, operable windows. Contact: Olson Sunberg Architects, 206-264-3730
Gap Inc office complex (901 Cherry) San Bruno, CA	West Coast	Low-rise office building	1997, 30% more energy efficient than code complying, 8 year simple payback, raised floor supply plenum, fan-assisted natural ventilation, operable high-performance windows, energy-efficient lighting, manual sun shades, living roof, sustainably harvested wood, daylighting, low toxicity paints & adhesives. Contact: William McDonough 804-979-1111

Building & Location	Representative Region	Building Configuration	Notes
Georgia Tech Aquatic Center Atlanta, GA	Southeast Urban	Low-rise sports complex	1996, 345 peak kW ventilated solar electric array on an existing structure, 4.5 kW building integrate AC electric panels over new entry pavilion. Contact: Solarex, 301-698-4200, www.solarex.com
Greater Pittsburgh Community Food Bank Duquesne, PA	Northeast Urban	Low-rise distribution, warehouse, processing facility	1999, LEED certified, reclamation of brownfield site, passive cooling, operable windows, daylighting, used recycled & reclaimed materials, structural building pad made from industrial by-products, low water & native landscaping, storm water bio-retention. Contact: Gardner + Pope Architects, 412-381-1184
Guam Weather Forecasting Office Agana Military Base Guam, USA	South Pacific Military Base	Low-rise research facility	20% annual energy costs less than a minimum ASHRAE compliant building, daylighting, sun control with glazing and shading, solar hot water. Contact: Ian Graham of Steven Winter Associates, 203-857-0200
Harmony Library Fort Collins, CO	Mountain Urban	Low-rise library	½ the energy of conventional structure, daylighting. Contact: Davis Partnership, 303-861-8555
Hawaii Convention Center Honolulu, Hawaii	Pacific Islands Urban	Low-rise Convention Center	1996, daylighting, natural ventilation, native landscaping. Contact: Kristy Kimaura, Mark Reddington of LMN Architects, 206-682-3460

Building & Location	Representative Region	Building Configuration	Notes
HDR Headquarters Omaha, NE	Midwest Suburban	Low-rise office building	HFC refrigerant, energy monitoring, DDC HVAC controls, high efficiency ambient & task lighting, occupancy sensored switching, daylighting dimming at perimeter, environmentally preferable materials. Contact: HDR Architecture, Inc, 402-399-1000, www.hdrinc.com/hdr_arch.htm
Herman Miller SQA Building Holland, MI	North Central Rural	Low-rise furniture factory, warehouse & headquarters building	1997, re-use of old industrial site, 65% less water costs, 18% less electricity costs, 7% less natural gas use, worker productivity increase vs former building, daylighting, energy-efficient glazing/ ventilating, photo & motion sensor dimming lighting, passive heating & cooling environmentally preferred materials, construction waste management plan. Contact: William McDonough + Partners, 804-979-1112
Hoffman Corp. Appleton, WI	Great Lake Region	Low-rise office building	40% of lighting is from daylighting, occupancy sensor controlled lighting, solar orientation of building, solar shading panels, monitoring systems, recycled materials, sustainable landscaping practices. Contact: Hoffman Corp
Illinois Museum West Union, Illinois	Midwest Urban	Low-rise museum & offices	Renewable Energy, will be completed July 4, 2000. Contact: Cindy Conner of Illinois Museum, 217-279-3463

Building & Location	Representative Region	Building Configuration	Notes
Intercultural Center Georgetown University Washington, DC	East central	Mid-rise education & office building	335 kWp PV array installed in 1984, supplies 30 to 50% of power needs, DOE sponsored. Contact:?
International Design Center for the Environment Research Triangle Park, NC	East	Conference center, hotel, showroom	To be completed in the fall of 2001, 400,000 sf, sustainable materials, products, technologies Contact: Gail Lindsey, Design Harmony, Inc., c/o IDCE, 919-549-8855
International Institute for Energy Conservation (IIEC) Washington, DC 7-24-00	East Central	Office Building	Renovation of existing building, 50% less energy costs than typical, daylighting, environmentally preferred materials, IAQ. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Iowa Association of Municipal Utilities Training & Office Complex Ankeny, IA	Midwest Rural	Low-rise office & training facility	2000, 45% less energy use than typical code compliant building, geothermal heating & cooling, heat recovery, on-demand water heating, energy efficient lighting controlled/ dimmed by photo & occupancy sensors, daylighting, east/west long building dimension, airtight building shell, timer & motion controlled light pollution minimized sight lighting, wetland waste water treatment, minimized site disruption, construction erosion & sediment control, native landscaping. Contact: Patti Cale of IAMU, 515-289-1999, patti.cole@iamu.org

Building & Location	Representative Region	Building Configuration	Notes
Johnson Controls, Inc. Brengel Technology Center Milwaukee, WI	Midwest Urban	Mid-rise office building	2000, LEED certified, individual control of temperature/ air flow/ lighting/ acoustics, raised access floor, waste heat recovery, advanced dimming lighting system, daylighting, building automation system, recycled materials, non-irrigated landscaping, construction IAQ & recycling management, near mass transit, cycling facilities. Contact: Paul von Paumgartten 414-274-4546, Zimmerman Design Group, 414-476-9500
Kansas City Zoo Deramus Education Pavilion		Low-rise education/ display building	Recycled copper roof, passive solar design, natural ventilation. Contact: Berkebile Nelson Immenschuh McDowell Architects, 816-474-6910
King Street Center Seattle, WA	Northwest	Office, retail, parking facility	2000, sensor controlled lighting is one of most energy efficient in Seattle, high efficiency air filtration, C02 sensors, exhaust for copy rooms, largest installation of renewable carpet in North America, low-VOC paints/ carpet/ system furnishings/ adhesives/ cleaning supplies, panels, recycled content paints & tiles, rainwater harvesting supplies 60% to 80% of water for flushing toilets. Contact: Carolyn Duncan, King County DNR, 206-296-8304

Building & Location	Representative Region	Building Configuration	Notes
KSBA Architects Offices Pittsburgh, PA	Northeast Urban	Low-rise office building	1998, LEED certified, 60% energy savings over ASHRAE minimum model, raised access floor, convection ventilation, daylighting, re-used existing building, recycled demo steel, re-used 90% millwork & furniture, local materials, construction IAQ management, close to mass transit, shower & indoor parking for cyclists. Contact: KSBA Architects, 888-231-5722, www.ksba.com
Lady Bird Johnson Wildflower Center Austin, TX	Southwest Rural	Low-rise galleries, auditorium, classrooms, gift shop, library, & research labs building	Passive solar heating/cooling, pragmatic building orientation, recycled / reclaimed / excavated materials, rain water harvesting. Contact: Laurie Zapalac of Overland Partners, Inc., 210-829-7003, laz@overlandpartners.com
Lambeau Field Stadium (Green Bay Packers) Green Bay, Wisconsin	Midwest	Sports Stadium	Going for Energy Star® rating. Contact: www.wifocusonenergy.com
Lawrence Marx Resource Center Hood College Fredirick, MD	East Central	Low-rise apartment, laboratory, office, computer center building	Active solar water heating, passive solar heating/ cooling, daylighting, natural ventilation. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711

Building & Location	Representative Region	Building Configuration	Notes
Lovell Place Erie, PA	Northeast Urban	Mixed use office, retail and residential building	Reuse of an existing structure, daylighting, efficient artificial lighting, recyclable & low-VOC Interface carpet, re-use of salvaged materials, energy efficient HVAC, use of geothermal energy. Contact: Crowner/King Architects, 814-452-4522, e-mail bojocrown@aol.com
McKinney Sustainable Elementary School Project (Roy Walker Elementary School) McKinney, Texas	Southwest Suburban	Low-rise school	In construction phase, rainwater collection, daylighting, wind energy, solar energy, geothermal heating & cooling, recycled materials, water habitat, reduced reliance on motorized vehicles, recycling systems, landscaping sensitivity, indoor air quality. Contact: SHW Group, Inc., Mike Elmore, 972-701-0700
Meritt Col Tower IV Rolling Meadows, IL	Midwest Suburban	Mid-rise office building	Advanced glazing, daylighting, improved indoor air quality strategies (source control, ventilation), energy efficient envelope and HVAC. Contact: ?????
Minneapolis Federal Reserve Bank Headquarters and Operations Center Minneapolis, MN	North Central Urban	Mid-rise office building	1998; energy efficient exterior envelope, triple glazed windows, light fixtures, HVAC; automated building system; low-flow plumbing fixtures; daylighting, environmentally friendly materials; construction waste recycling, low-maintenance landscaping. Contact: HOK, 202-339-8700

Building & Location	Representative Region	Building Configuration	Notes
Missouri Historical Society Museum St. Louis, MO **9-6-00**	Midwest Suburban	Low-rise museum & offfice building	**2000**, less than 50% of the energy of ASHRAE 90.1, high performance low-E glass, improved insulation, automated interior sunscreens, exterior sunshades, high efficiency chillers with water-side economizers, reduced fan power for the VAV system, efficient cooling towers/ motors/ boilers, displacement ventilation, dimmable electronic ballasts, low-VOC materials, crushed permeable stone paving, construction waste recycling, construction IAQ plan. Contact: HOK, 202-339-8852
Moon Junior High School Coraopolis, PA	Northeast	Low-rise junior high school	Renovations & addition to circa-1953 building, energy conserving features and systems resulted in utility bill savings above $17,000 annually and a 77% reduction in space heating. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Nalanda Hall Naropa University Boulder, CO	Central Mountain Suburban	Low-rise education building	2000, passive solar heating & cooling, hollow core floor thermal storage, air to air heat exchanger, operable windows, exhaust wind towers, daylighting, light shelves & reflectors, tubular & conventional skylights, high-efficient task lighting, environmentally preferred materials. Contact: Naropa University (303) 444-0202 www.naropa.edu/nalanda.htm

Building & Location	Representative Region	Building Configuration	Notes
National Public Radio Headquarters Washington, DC	East Central Urban	Mid-rise radio studio and office building	Existing building renovation, modular air-handlers/ chillers/ heat pumps, DDC control system, use-specific HVAC zoning, high-efficiency fluorescent lighting fixtures with multi-level switching, improved air-filtering, low-VOC paints/ carpets/ adhesives, minimized formaldehyde use, recycled content synthetic gypsum GWB, recycling chutes, close to mass transit, construction IAQ plan. Contact: Burt Hill Kosar Rittelmann Associates, 202-333-2711
Natural Resources Defense Council Los Angeles, CA	West Coast Urban		Energy efficient systems, water conserving fixtures, green materials, low VOC materials. Contact: NRDC, 213-934-6900
Natural Resources Defense Council New York, N.Y.	Northeast Urban	Mid-rise office building	1989, Renovation of existing building, Daylighting, orientation-tuned heat mirrored triple-glazed windows, heat reflecting film on skylights, high efficient & CRI lighting (0.5W/sf), occupancy sensors, photo sensors, extra insulation, green materials, low VOC materials, efficient HVAC, 50% reduction in energy use over typical. Contact: Croxton Collaborative, 212-794-2285
Natural Resources Defense Council San Francisco, CA	West Coast Urban		Energy efficient systems, 80% savings over typical office space. Contact: NRDC, 415-777-0220

Building & Location	Representative Region	Building Configuration	Notes
Natural Resources Defense Council, Santa Monica, CA	Southwest Urban	Low-rise office building	LEED Platinum rating targeted, 40-50% reduction in energy use below Title 24. renovation and addition, daylighting, natural ventilation, high efficiency HVAC, under floor air distribution, high efficiency lighting with occupancy sensors and daylight sensors, optimized building envelope with spectrally selective glazing, operable windows, low-energy office equipment, improved interior air quality via source control. Contact: Gregg Ander, AIA at Southern California Edison, 626-6337160.
Natural Resources Defense Council Washington, DC	Mideast Urban	Mid-rise office building	Non-CFC, non- HCFC, highly efficient HVAC; green materials; low VOC materials; 50% reduction in energy use over typical; energy efficient lighting & office equipment (70% less energy than typical office lighting & equipment); .5W/sf lighting load; occupancy sensors; daylighting; operable low-e windows; extra insulation; drinking water purification; water conserving fixtures; fuzzy logic elevators. Contact: Shiela Kaplan of Interplan, Inc., 301-231-9770
Neil Kelly Co.'s West-side Showroom Portland, OR	Northwest Suburban	Low-rise office building	Portland General Electric's Earth Smart designation, energy conservation, resource efficient building products. Contact: Thompson Vaivoda & Associates, 503-220-0668, e-mail tva@tvapdx.xom

Building & Location	Representative Region	Building Configuration	Notes
Newport Coast Elementary School Newport Beach, CA	Southwest Suburban	Single story school	Projected energy reduction: 43% below a minimally compliant building as measured by the California Energy Code (Title 24) daylighting, increased wall and roof insulation, direct/indirect high-efficiency fluorescent lighting w/ stepped switching & occupancy sensors, efficient heat pumps, fan-assisted natural ventilation, solar thermal domestic hot water system. Contact: Deborah Weintraub, AIA of Southern California Edison, 626-633-7191
New York Life Building Kansas City, MO **9-6-00**	Midwest Urban	Mid-rise office building	LEED™ certified, **a**daptive re-use of existing building, high efficiency envelope and HVAC, environmentally friendly materials, waste recycling, improved indoor air quality strategies (source control, ventilation), water conservation, daylighting, **light shelves,** ice storage, **natural ventilation,** operable windows, Region 7 Pollution Prevention Award from EPA. Contact: Gastinger Walker Harden Architects 816-421-8200

Building & Location	Representative Region	Building Configuration	Notes
Nidus Center for Scientific Enterprise (by Monsanto) Creve Coeur, MO	Midwest Suburban	Low-rise office & lab building	Fall 1999, LEED™ certified, 30% better than ASHRAE 90.1-1989, energy efficient envelope and HVAC, waste heat recovery, daylighting, local/low-VOC/recycled materials, "living" air filtering wall, rainwater harvesting, efficient plumbing fixtures, low water use landscaping, bicycle facilities. Contact: HOK, 800-788-5518, ext 2610 , www.hok.com
Norm Thompson Outfitters Headquarters Hillsboro, OR	Northwest Rural	Low-rise office building	1996, 40% less energy use than typical, 4 year payback on efficiency features, oriented for sun control, daylighting, computer controlled/ dimmable ballasted/ compact fluorescent/ occupancy sensored/ lighting, light shelves, multi-zone heating/cooling system with heat retention coils, low-flow plumbing fixtures, highly efficient windows, environmentally preferable/ recycled/ salvaged/ low-toxic/ low-VOC materials, native landscaping, bioswale storm water control, construction waste recycled. Contact: Jan Hogue of Norm Thompson, 503-614-4572

Building & Location	Representative Region	Building Configuration	Notes
NW Federal Credit Union Corporate Headquarters Seattle, WA	Northwest Suburban	Low-rise office building	Daylighting, healthy indoor spaces, resource efficient building materials, building section tuned to the sun, heat mirror glass, low-toxic finishes, linoleum, efficient lighting fixtures. Contact: Miller/Hull Architects, 206-682-6837 ext 244, Cmanio@MillerHull.com
Oakes Hall Vermont Law School South Royalton, VT	Northeast	Low-rise Classrooms & student lounge	Fall 1998, 57% less fuel / 35% less water / 25% less electricity use than typical, 1 watt/sf lighting system, photoelectric & occupancy sensored lighting controls, independent occupancy sensored controlled ventilation, enthalpic/desiccant energy recovery & dehumidification wheel, composting toilets, environmentally preferred materials, sustainable managed forest wood, operable fiberglass super windows, highly insulated stress skin panel exterior building envelope. Contact: Truex Cullins & Partners Architects, 802-658-2775, 800-227-1076, Timon Malloy of Fred F. French Investing 203-353-5326
Oak Ridge National Laboratory Oak Ridge, TN	Midwest	Low-rise office & lab building	Contact: Jeff Christian of ORNL 423-574-5207

Building & Location	Representative Region	Building Configuration	Notes
Occidental Chemical Center Niagara Falls, NY	Northeast Suburban	Mid-rise office building	Energy Star Label, double skin envelope, daylighting, active shielding/insulating louvers, VAV air-handling, air-to-air heat exchanger, heat recovery centrifugal chillers, light sensor controlled high efficient lighting, building automation system. Contact: Cannon Design 212-972-9800
Ogden Nature Center Ogden, UT	Central Mountain Rural	Low-rise visitor & administration center	1995, passive solar heating/cooling, under-floor hot water heating, daylighting with shading & light shelves, energy efficient light fixtures controlled with occupancy sensors & timers, natural ventilation, resource efficient/ recycled/ salvaged materials, low-VOC/toxic materials, building sited to minimize natural habitat disruption. Contact: Carl Palmer of Ogden Nature Center, 801-621-7595, Sanders Herman Architects
Oquirrh Park Speed Skating Oval Salt Lake City, UT	Midwest	Speed skating oval stadium	Fall 2000, LEED certified, material efficient suspension structure saves 1,200 tons of material compared to typical, white roof membrane, left 150,000 sf undisturbed on site. Contact: Gillies Stransky Brems Smith (Architect), 801-521-8600
Owens Corning Headquarters Toledo, OH	Midwest Urban		High efficiency HVAC, under floor HVAC distribution, daylighting, high performance glazing, sustainable landscaping. Contact: Justin Shigemi, Cesar Pelli & Associates, 203-777-2515

Building & Location	Representative Region	Building Configuration	Notes
"P" Building Grand Rapids, MI	Great Lakes Region Prototype	Low-rise office building	A misted-air cooling system, raised floor HVAC plenum, modular wiring, individual temperature controls, daylighting, environmentally prefered paints & carpets. Contact: Thomas Phifer, 212-337-0334, t.phifer@tphifer.com
Patagonia Distribution Center Reno, NV	Midwest Rural	Low-rise office & distribution center	60% energy savings over typical, daylighting, light shelves, tracking skylights, high-efficiency lighting, passive ventilation, nighttime flush cycle, highly insulated building envelope, passive heating/cooling, water-efficient plumbing fixtures & irrigation, environmentally preferred materials, restoration of site ecosystems, xeriscaping, biofiltration swales & detention ponds. Contact: The Miller/Hull Partnership, 206-682-6837
PCTA Headquarters Harrisburg, PA	Northeast Urban	Low-rise office building	Re-use of an existing structure, re-use of salvaged materials, recycled materials, energy efficient lighting, increased insulation, high performance windows, zoned HVAC/ambient AC, non-toxic materials, high performance air filtration, water based paints & adhesives, water saving plumbing fixtures. Contact: Robert J. kobet of Conservation Consultants Inc. 412-431-4449 ext 225

Building & Location	Representative Region	Building Configuration	Notes
Penn Center West Building Six Pittsburgh, PA	Northeast Suburban	Low-rise office building	Split task/ambient lighting system, raised floor air plenum, ecologically sound materials, green tenant guidelines, high performance window glazing. Contact: Gary Gardner 412-381-1148
Pennsylvania's Department of Environmental Protection Ebensburg District Office Ebensburg, PA	Northeast Suburban	Low-rise office & garage building	2000, going for a LEED™ platinum rating, exceeds ASHRAE/IES 90.1 by 30%, geothermal energy, raised access floor air plenum, 16 KW PV array, heat recovery air-handling units, highly insulated envelope, 0.75 w/sf high efficiency lighting, Occupancy sensored switching, daylighting, light shelves, building commissioning, energy monitoring, no CFC & HCFC refrigerants, IAQ monitoring, environmentally preferred materials, waterless urinals & low flow plumbing fixtures reduce water usage to 20% less than Energy Policy Act of 1992, pervious paving, minimized site disturbance, cycling facilities, natural gas vehicle fueling station, construction waste management & IAQ plan. Contact: Kulp Boecker Architects, 717-221-0770, Boeckj@lrkimball.com

Building & Location	Representative Region	Building Configuration	Notes
Pennsylvania's Department of Environmental Protection Southcentral Office Building Harrisburg, PA,	Northeast Suburban	Low-rise office building	Re-use of a brownfield site, DOE2, passive orientation, silver LEED™ certified, leachate & methane collection, ICFs, recycled structural steel, modular work stations, extensive recycled content materials, low-VOC materials, natural composite materials, raised floor system, low-e windows, no CFC & HCFC HVAC, desiccant dehumidifier, individual climate control, indirect lighting, daylighting, occupancy sensors, indigenous & xeriscaping, 50% energy savings=$500K. Contact: James Toothaker, 717-787-4190, Kulp Boecker Architects, 717-221-0770, Boeckj@lrkimball.com
Pentagon Remote Delivery Facility	East Suburban	Low-rise delivery, maintenance, & post office building	LEED™ pilot project, energy management system, IAQ monitoring, earth-sheltered, environmentally preferred materials, no CFC/HCFC's, low use plumbing fixtures, xeriscaping, construction waste management, IAQ construction management. Contact: 800-366-4411, www.hdrinc.com
Phillips Eco-Enterprise Center Minneapolis, MN	North Central Urban	Low-rise office building	Inner-city brownfield site, geo-exchange heating & cooling, sun-tracking daylighting, air-to-air energy recovery, salvaged steel joists / wood / and brick. Contact: Joel Schurke of LHB Engineers & Architects, 612-752-6935, Joel.Schurke@LHBcorp.com

Building & Location	Representative Region	Building Configuration	Notes
Phoenix Central Library Phoenix, AZ	Midwest Urban	Mid-rise public library	Opened May, 1995, computer controlled shading devices, daylighting, gas fired chiller w/ bromide lithium refrigerant, computer controlled VAV air handlers, 12" thick concrete east & west exterior walls. Contact: DWL Architects, 602-264-9731, www.dwlarchitects.com
Portable Classroom, Irwindale, CA	Southwest Suburban & Urban	Single story portable building	Projected energy reduction: 60% annual energy reduction below a typical portable, daylighting, natural ventilation, operable windows, high efficiency HVAC, direct/indirect lighting with daylight sensors, improved indoor air quality with source control, low VOC paints, spectrally selective glazing, and improved insulation levels. Contact: Deborah Weintraub, AIA at Southern California Edison, 626-633-7191
Real Goods Solar living Center Hopland, CA	West coast Exurban	Low-rise office, retail & education complex	1996, Energy efficient envelope, passive ventilation and cooling, natural materials, daylighting, passive solar heating, photovoltaics, wind power generation, sustainable landscaping. Contact: Andrea Traber of Van der Ryn Architects 415-332-5806

Building & Location	Representative Region	Building Configuration	Notes
REI Seattle Flagship Store Seattle, WA **9-6-00**	Northwest Urban	Retail store	Recycled materials, energy efficient, **fly-ash content concrete,** storm water waterfall, native landscaping. Contact: Thomas D. Emrich of Mithun Partners, Inc., 206-623-3344
Ridgehaven Building San Diego, CA **9-6-00**	West Coast Urban	Low-rise office building	67% reduction in energy consumption, 42% drop in water use, 4 year payback, adaptive re-use of existing building, energy efficient envelope and HVAC, water conservation, **film applied to existing windows, adjustable speed pumps, daylight & occupancy sensors for lighting, energy management system, occupancy sensors for computer outlets,** improved indoor air quality strategies (source control, ventilation), construction waste recycling, recycled & environmentally friendly materials, reused materials, participant in carpet lease program. Contact: Richard Hays, San Diego Gas & Electric, 800-336-7343, **Platt/ Whitelaw Architects, 619-260-1818**
Rio Grande Conservatory Albuquerque, NM	Southwest Rural	Low-rise enclosed botanical gardens	90% less energy, than comparable facility, selective glazing as per orientation & need, thermal mass, natural ventilation, passive solar heating/cooling, daylighting. Contact: Mazrea Riskin Odems, Inc., 505-988-5309

Building & Location	Representative Region	Building Configuration	Notes
Riverside South New York, NY	Northeast Urban	High-rise Residential, Mid to high cost plus HUD housing	20% estimated savings in energy cost compared typical, 2-year payback for improvements that benefit tenants, 3-year payback for improvements that benefit owner, energy efficient envelope & systems, environmentally preferred materials. Contact: Ashok Gupta of NRDC, 212, Mary Musca of Riverside South Planning Corporation 212-896-3876, Adrian Tuluca of Steven Winter Associates 203-857-0200
Robert L. Preger Intelligent Workplace Carnegie Mellon Univ. Pittsburgh, PA	Northeast Urban	Low-rise Office & Laboratory	High performance glazing, exterior louvers, operable windows, raised floor system, desiccant air handling unit, water flow radiant enclosure, building energy management system, individual workstation HVAC & lighting controls, modular furniture partition system, low & non-VOC adhesives/sealants/coatings/ equipment. Contact: Steve Lee of Carnegie Mellon Univ., 412-268-2354, www.arc.cmu.edu/cbpd/lw.html

Building & Location	Representative Region	Building Configuration	Notes
Saint Benedict's Center Louisville, KY	Mid East Urban	Low-rise childcare facility	1997, 46% less energy cost compared to compliance with ASHRAE 90.1-1989, "Airfloor" in-slab forced air system, daylighting, passive solar heating & cooling, thermal mass, high efficient lighting with timers, super insulated building envelope, insulated floor slab, solar building orientation, R-3/ low-e hardcoat/ argon filled windows, clerestory windows, window overhangs. Contact: Gary Watrous Associates Architects PSC, 502-776-7007
Saint Francis College Residence Hall Loretto, PA	Northeast Urban	Low-rise student housing and conference building	Geothermal energy, 40% less annual energy use than conventional fan-coil HVAC, daylighting in core spaces, low-e insulated windows. Contact: David Hatton, 412-321-0550
SC Johnson Worldwide Professional Building Racine, WI	Midwest Suburban	Low-rise office building	60% less energy than similar building, 10% less construction cost than U.S. average for office/ lab building, energy efficient envelope heat recovery HVAC, raised floor supply plenum, daylighting, light shelves, central atrium, durable materials, energy management system, personal environmental controls, wetland restoration on site, native & drought tolerant plants, construction waste management. Contact: HOK, 202-339-8852

Building & Location	Representative Region	Building Configuration	Notes
Shaklee Corporate Headquarters Pleasanton, CA **9-6-00**	West Coast **Suburban**	Low-rise office building	Raised floor air plenum with individual user control, ceiling exhaust, concrete floor used as thermal mass, daylight responsive sensors for dimming perimeter lighting, east/ west long building dimension, light shelves on south facade, certified wood, environmentally preferred materials, native grasses, oak trees moved. Contact: Gensler & Associates, **415-433-3700** Lev_Weisbach@gensler.com
Sheraton Rittenhouse Square Hotel Philadelphia, PA	Northeast Urban	High-rise hotel	Fresh filtered air in rooms & common areas, organic sleep system, certified/recycled furnishings, non-toxic cleaners, recycled marble flooring, recycled glass floor tile, Bengamin Moore's Ecospec paint, 100% organic cotton draperies & soft seating, non-toxic wallpaper, daylighted atrium, energy efficient lighting, 40 foot high air filtering bamboo plants. Contact: Ecosmart Healthy Properties, LLC, 877-ECOSMART, www.ecosmart.com

Building & Location	Representative Region	Building Configuration	Notes
Shippen Hall Renovation & Elementary School Teachers Training Addition Shippensburg Univ. Shippensburg, PA	Northeast	Low-rise education & lab building	30% less energy use than ASHRAE/IES 90.1 at addition, heat recovery air-handlers, separate ventilation & conditioned air, underground duct system, passive solar heating/cooling, operable windows, thermal mass, triple glazed/low-e/argon-filled/U=0.29 windows, highly insulated building envelope, daylighting, 0.9 W/sf average high efficiency lighting, occupancy & light-level lighting controls, high-albedo roofing, environmentally preferred materials, waterless urinals, pervious parking, building commissioning, construction waste management & IAQ plan. Contact: Design 7, 717-540-5106 or 717-233-6320
SMUD Customer Service Center Sacramento, CA	West Coast	Low-rise office building	Under floor air distribution, indirect evaporative cooling, rotary screw chillers, thermal energy storate, primary-secondary chilled water distribution, VAV air distribution, high efficiency lighting with advanced controls, daylighting. Contact: Constructive Technologies Group Inc., 949-790-0010

Building & Location	Representative Region	Building Configuration	Notes
Solar Laboratory Fayetteville Campus Pennsylvania State University Uniontown, PA	Northeast	Low-rise laboratory building	Solar assisted heat pump, solar absorption cooling system, semi-concentrating solar collectors, air-circulating collector system, rock thermal storage, passive solar greenhouse with water storage tubes. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711
Southface Energy and Environmental Resource Center Atlanta, GA	South Urban	Low-rise office building	Energy efficient envelope and HVAC, reclaimed & recycled materials, daylighting, passive solar heating, water conservation, electric car charging station, full spectrum lighting, ground source heat pump, photovoltaics, storm water management, native landscaping. Contact: Walter Brown of Southface, 404-872-3549
South Jamaica Library Queens, NY	Northeast Urban	Low-rise library	Completed 1999, daylighting, solar heating, thermal storage, shading, efficient structural system, local materials, high-efficiency motors, microprocessor controls for shades/lights/ventilation dampers, high-performance glazing, recycled materials. Contact: Stein White Architects, 212-675-0500, swarch@erols.com

Building & Location	Representative Region	Building Configuration	Notes
Spire Solar Chicago Chicago, IL	Midwest Urban	Low-rise manufacturing plant	Design Development phase, major renovation of existing brown-field site, used LEED™ as guide, planned to provide 30% of energy with photovoltaics, solar parking lot lighting. Contact: Michelle Halle Stern, fax 312-332-9601
Staples Warehouse, Rialto, CA	Southwest Suburban	500,000 sq. ft fully automated, regional warehouse and distribution center	Expected to reduce energy usage by 55% from the California energy code, Title 24, optimized daylighting according to light level requirements, occupancy sensors, photosensors, efficient fluorescent lighting, and night time venting in conjunction with thermal mass. Contact: Deborah Weintraub, AIA at Southern California Edison, 626-633-7191.
Success Center Ohio State University Columbus, OH	Midwest		Vision Wall glazing system (R-6), 1 W/ft2 lighting system, building envelope air infiltration retarder, high efficiency screw chillers, variable speed fans & pumps, high efficiency boilers. Contact: Susan Maxman, Architects, 215-985-4410, Donald Prowler & Associates, 215-546-8511, Adrian Tuluca of Steven Winter Associates 203-857-0200

Building & Location	Representative Region	Building Configuration	Notes
Sundeck Restaurant Aspen Skiing Company Aspen, CO	Mountain Rural	Low-rise restaurant building	February 2000, LEED certified, exceeds California's Title 24 Energy Code, super-insulated, energy efficient windows, existing building was deconstructed, environmentally preferred materials, low-toxic paints & adhesives, restored habitat, native & low water use landscaping, bicycle racks & lockers, low-flow faucets/toilets/urinals, no increase in storm water runoff. Contact: Cottle Graybeal Yaw Architects, 970-927-4925, cgyarchitect@compuserve.com
Sustainable Technology Center Friday Harbor, WA	Northwest Rural	Low-rise office complex	Completed 1995, photovoltaic array, solar hot water, radiant heat, highly insulated envelope, Hydroxyl waste water treatment, drip irrigation, recycled-content materials, rain water collection, bicycle parking & showers, electric vehicle charging station. Contact: Jim Sackett, Seventh Generation Stategies Inc., 360-378-8588 www.sevengensys.com

Building & Location	Representative Region	Building Configuration	Notes
Swindells Hall University of Portland, OR	Northwest Suburban	Low-rise laboratory, teaching, and office facility	1999, 50% less than Oregon Energy Code, 4 year simple payback, indirect evaporative cooling system, control valves & heat recovery on fume hoods, high efficiency exhaust fans, high efficiency condensing boilers, occupancy sensor controlled T-5 indirect lighting, recycled content materials, fly ash & denatured industrial wastes in foundation, local materials, low-VOC paint, sustainably harvested wood, native landscaping. Contact: Soberstrom Architects, 503-228-5617
Thermal Test Facility NREL Golden, CO	Central Mountain	Low-rise office & light laboratory building	1996, costs 63% less to operate than ASHRAE 90.1, two-stage cooling, short duct runs, ceiling fans, passive solar heating & cooling, thermal mass, air-to-air heat exchangers, VAV units, energy management system, 0.80 W/ft^2 lighting power, reduced lighting energy by 75%, high-efficient lighting controlled by occupancy & daylight sensors, daylighting, highly insulated envelope, stepped roof design for clerestories, location specific low-e & low U-value windows, long east/west axis, xeriscaping. Contact: Jim Copeland of Abo-Copeland Architects, 303-830-0575

Building & Location	Representative Region	Building Configuration	Notes
Thoreau Center for Sustainability Presidio San Francisco, CA **9-6-00**	Pacific West Urban	Low-rise office building	Adaptive re-use of existing building, improved thermal envelope, high efficiency HVAC, daylighting, passive ventilation, environmentally friendly & recycled materials, water conservation, photovoltaics, electric car charging station, incorporation of sustainable landscaping, construction waste recycling. Contact: **Tanner Leddy Maytum Stacy Architects, 415-394-5400**
ThorpeWood Conference Center Catactin Mountains, MD	East Central Rural	Low-rise conference center	Daylighting, dual fuel (oil or wood) boiler, convective flow of warm air out cupolas, reclaimed timber framing/ roof deck/ flooring/ siding, stress skin roof panels, Air-Krete wall insulation, composting toilets, gray water irrigation, reuse of site stone & topsoil, preservation of 100 year old oak trees, native landscaping, surrounding trees shade building Contact: Archeus Studio, 301-654-8831
Tommy Boy Music Offices N.Y., N.Y.	Northeast Urban	Office building	Medex MDF board, Homasote, Recycled Carpet. Contact: ?????????

Building & Location	Representative Region	Building Configuration	Notes
Turner Feature Animation Glendale, CA	Pacific West	Low-rise office & production facility	Completed 1998, HVAC and electrical systems designed to use less energy than permitted by California's Title 24 code, renewable/non-endangered /non-toxic/recycled/low-VOC content materials, ASHRAE 62-1989 as IAQ standard, high efficient lighting w/ stepped switching. Contact: HOK, 202-339-8852
University of Washington Computer Science and Engineering Building Seattle, WA	Northwest Urban	Mid-rise office and laboratory building	Planned completion 2003, daylighting, exterior sun shades, translucent panels, sun controlled skylights, natural ventilation, computer energy modeling utilized. Contact: Kristy Kimaura, Mark Reddington of LMN Architects, 206-682-3460
University of Wisconsin Academic Building Green Bay, WI	North Central Suburban	Low-rise classroom & office building	Designed to obtain LEED™ Gold rating, 60% less energy use than code required, controlled ventilation, highly insulated building envelope, window transmission characteristics tuned as per orientation, economizer cycle, daylighting, light monitors, high-efficient lighting w/ occupancy sensors & photocell dimming, 31,500 kWh BIPV, transpired air solar collector, Contact: Bill Odell of St. Louis office of HOK, 314-421-2000

Building & Location	Representative Region	Building Configuration	Notes
Utah Department of Natural Resources	west	low-rise office building	DOE2, passive orientation and ventilation, R28 walls, low-e, daylighting, dimmable T8s and sensors, 4-stage HVAC with evaporative cooling, recycled lumber, xeriscaping, 43% savings vs typical, cost premium of 3% for a 6 yr payback. Contact: Burke Miller, Environmental Educator; David Brems (architect), 801-521-8600
Van Atta **Design Studios** Santa Barbara, CA **9-6-00**	Southwest Urban	Low-rise office building	Average energy consumption is 30% lower than a conventional energy code (Title 24) compliant design, urban infill site, passive design elements to optimize daylighting and natural ventilation, thermal mass and enhanced stack ventilation, high-efficiency heat pumps with two speed compressors, air filtration, indirect fluorescent lighting with zoned controls in relationship to daylighting elements, and a palette of resource efficient materials. . Contact: Gregg D. Ander, AIA. of Southern California Edison, 626-633-7160, **Blackbird Architects, 916-446-6227**
Verner Elementary School Oakmont, PA	Northeast	Low-rise elementary school	Energy efficient renovation of 1930's building saves 75% energy use. Contact: Dori Landry, Burt Hill Kosar Rittelmann Associates, 202-333-2711

Building & Location	Representative Region	Building Configuration	Notes
Victor Valley Community College Learning Center Near Victoryville, CA	Pacific West Rural	Low-rise reading, study book stacks, conference rooms & office building	42% less energy than Title-24 compliant building, daylighting, roof monitors, light shelves, high-efficient lighting, continuous dimming lighting controls, open loop geothermal cooling, cooling water used for irrigation of athletic fields, variable-frequency drives, high-efficiency motors, high performance windows, xeriscape landscaping. Contact: www.energydesignresources.com/publications/case_studies/
Victor Valley Water District Administrative Facility, CA	Pacific West Rural	Low-rise office building	60% less energy than code compliant building, daylighting, high-efficient lighting w/ daylight dimming & occupancy sensors, 12" thick exterior solid masonry walls for temperature damping, low-emissivity insulated glazing w/ exterior shading, evaporative cooling, drought-resistant landscaping. Contact: www.energydesignresources.com/publications/case_studies/pdfs/vvwdcs.pdf

Building & Location	Representative Region	Building Configuration	Notes
Wal Mart, City of Industry, CA	Southwest Suburban	Single story big box store	Projected energy reduction: 49% below the California energy code, advanced natural/electric lighting system with continuous dimming, an evaporatively cooled HVAC system, a building integrated photovoltaic system, an enhanced energy management system, electric vehicle charging stations, fly ash in the concrete block, an entry floor covering made from recycled tires, counters made from recycled newspapers and soy, recycled asphalt in the parking lot, and more. In addition, an education center (Eco Room) is devoted to showcasing the store and its technologies. Contact: Carlos Haiad, P.E. of Southern California Edison, 626-633-7173
Wampanoag Tribal Building	Northeast Rural	Low-rise office building	Design/build, passive heating and cooling, daylighting, dimmers and sensors, orientation tuning, composting toilets, greywater irrigatyion, low-flow fixtures, solar hot water, future PV, heat recovery ventilation, recycled materials, recycling system, blower door, post-occupancy remediation and maintenance manual, save 50% electricity. Contact: Bruce Coldham (architect), 413-549-3616, www.ColdhamArchitects.com

Building & Location	Representative Region	Building Configuration	Notes
Way Station Club House Frederick, MD	East Suburban	Low-rise mental health clinic	Completed 1991, 66% less energy use than reference case, VAV heating, continuous ventilation system, energy management system, daylighting, light shelves, roof monitors, daylight trackers, thermal mass, highly insulated building envelope, planted greenhouse & atrium, low-tox fabrics/paints/ cleaning/maintenance. Contact: ENSAR Group, Inc., 303-449-5226
Weiden & Kennedy's Headquarters Northwest Davis, OR	Pacific Northwest	Midrise warehouse renovation for ad agency, art institute, and leased space	Move-in Dec., will save 35%/$21,000/yr energy, 8-yr payback; bldg commisioning; daylighting +fluor./HID task lighting+occ. sensors cut lighting bills 16%; raised floors, underfloor air cuts bills 40%; variable speed drives; operable windows Contact: Madeleine Kokes, W&K, 503-299-6000
West Bend Mutual Insurance Headquarters West Ben, WI	Great Lake Region	Low-rise office building	1991, 40% reduction in electricity use & 16% increase in productivity compared to former building, 72% lower construction cost than market average, occupant thermal condition complaints dropped 100%, energy efficient lighting, high performance windows, highly insulated envelope, individual control of temperature/ air flow/ lighting/ acoustics. Contact: Paul von Paumgartten 414-274-4546

Building & Location	Representative Region	Building Configuration	Notes
Women's Humane Society Bensalem, PA	Northeast Rural	Low-rise office, veterinary clinic, kennel building	1994, 40% less energy use per square foot than previous facility, low VOC/ recycled/ ecological materials, desiccant heat recovery wheel ventilation, VAV HVAC, CFC-free chiller, radiant floors in kennel, 40 to 80% of lighting is by daylight, dimmable fluorescent lighting controlled by daylight sensors, building commissioning, wetland/ wildlife preservation. Contact: Susan Maxman Architects, 215-985-4410
World Resources Institute Washington, DC	East Urban	Mid-rise office building	1999, renovation of 2 floors in existing building, 70% less lighting energy use than typical, high efficiency lighting at 0.4 w/sf energy use, Energy Star office equipment and appliances, open spaces on perimeter, environmentally preferable/ low-toxic/low-VOC/recycled content/salvaged materials. Contact: Nancy Kiefer of World Resources Institute, 202-729-7600, www.wri.org/office/, HOK, 202-333-2310
Zion Canyon Visitor Center and Transportation Center Zion National Park, UT	Southwest rural	Low-rise visitor center	Trombe walls/overhangs; daylighting; photosensors and thermosensors inform energy management computer; passive downdraft cooling towers, evaporative cooling; PV; electrical savings 10kW; energy savings $14K/yr. James Crokett, AIA, 303-969-2386
166 buildings			

CWM	construction waste management
BIPV	building-integrated photovoltaics
HRV	heat recovery ventilation
ICFs	insulated concrete forms
Continuous loads	using PV to power lighting or appliances directly, reducing the need for battery arrays
Xeriscaping	landscaping adapted to regional rainfall without additional water
Trombe wall	a passive solar technique that traps the sun's heat between a pane of glass and a black coating for circulation through the space
Photosensors	switch on or adjust electric lighting according to available daylight

PRESS RELEASES

DRAFT NEWS RELEASE 2-28-00
From Jim Fremont, EE-42, 6-5735

NEWS MEDIA CONTACT
John B. Townsend II, 202-586-5806

FOR IMMEDIATE RELEASE
xxxxxxxxxx, 2000

U.S. Department of Energy Launches Project to Improve the Energy Efficiency of Commercial Buildings

CHiPB to Improve Building Quality, Performance, Asset Value, & Affordability

U.S. Energy Secretary Bill Richardson today announced that the Department of Energy is creating the Commercial High Performance Buildings project, a government/private sector venture formed to increase the energy efficiency of commercial buildings. The project will also focus on improving the utility, comfort, quality, and cost-effectiveness of commercial buildings while reducing their impact on the environment.

"The Department is very pleased to be leading this effort to reduce commercial building energy use," said Secretary Richardson. "Thirty-two percent of the electricity generated in the United States goes to heat, cool, ventilate and light commercial buildings. Actions we take to decrease building energy use will also save money and reduce the impact of energy generation on global climate change."

The project's first phase will identify and publicize innovative "whole building" approaches that increase the quality and efficiency of commercial buildings. Architects using the whole building approach consider a building as one complete system, instead of a collection of independent components, which can have significant effects on the outcome. For instance, efficiency improvements that might be hard to justify on their own accord are seen in a different light when they result in a smaller, more efficient, and less costly heating and cooling system.

The Commercial High Performance Buildings project intends to exert a positive, lasting influence on all aspects of commercial building design, construction, and operation. Project partners will conduct demonstration projects that embody high-performance qualities in site assessment and design, programming, building design, commissioning, and post-occupancy evaluation of new buildings around the country. The project will also consult directly with architects and developers to design and construct high-performance buildings.

This venture is part of DOE's Commercial Whole Buildings Roadmap initiative, which is bringing together diverse groups involved in the design and construction of commercial buildings to help accelerate the adoption of new efficient building technologies. The initiative is one of several roadmapping projects which are aligning government resources with the needs of industry to improve building quality, performance, asset value, affordability, and energy efficiency.

DOE and its partners are inviting participation by building industry representatives and allied groups nationally, including:

- Building owners, developers, and managers;
- Builders and construction managers;
- Architects, engineers, and allied design professionals;
- Heating, ventilating and air conditioning systems, controls, and equipment manufacturers;
- Lighting and communication systems producers and specialists;
- Wall and insulation material producers; and
- Interior environments producers and specialists.

Project staff is also seeking information on commercial buildings to include in its outreach program–buildings completed within the past few years, in design or under construction. Submissions should be sent to Jose Higgins, Steven Winter Associates, Inc., 50 Washington Street, Norwalk, CT 06854-2721 (JHiggins@swinter.com), and should include a brief description of building type and location, square footage, material specifications, and energy efficiency and sustainability features. Steven Winter Associates, an architectural research and consulting firm, is managing the project on behalf of DOE.

The project will feature information on high performance commercial buildings through presentations at professional conferences, a monthly newsletter, and on the its website: www.CHiPB.com. More information is available from Michael J. Crosbie at Steven Winter Associates, phone 203–857-0200, ext. 210 (MCrosbie@swinter.com). To learn more about the Department of Energy's roadmapping initiatives for building energy efficiency, visit: www.eren.doe.gov/buildings/technology_roadmaps/.

The Department of Energy researches, develops, and deploys clean, efficient and renewable energy technologies to help meet America's energy needs while protecting the environment and strengthening the economy. Energy technologies supported and promoted by the Department will play a key role in providing *Clean Energy for the 21st Century*.

--DOE--

NEWS MEDIA CONTACT:
John B. Townsend II, 202/586-5806

FOR IMMEDIATE RELEASE
April 6, 2000

U.S. Department of Energy Launches Project to Improve the Energy Efficiency of Commercial Buildings

Secretary of Energy Bill Richardson today announced that the Department of Energy (DOE) is creating a High Performance Commercial Buildings project to increase the energy efficiency of commercial buildings. The effort, a joint partnership between the private sector and the department, will also focus on improving the utility, comfort, quality and cost-effectiveness of commercial buildings.

"Thirty-two percent of the electricity generated in the United States goes to heat, cool, ventilate and light commercial buildings," said Secretary Richardson. "The actions we are taking to decrease building energy use will save businesses money and reduce the impact of energy generation on global climate change and the environment."

The project will identify and publicize innovative "whole building" approaches that increase the quality and efficiency of commercial buildings. Architects using the whole building approach consider a building as a complete system, instead of a collection of independent components. This can have significant effects in design and construction, resulting, for example, in a smaller, more efficient, and less costly heating and cooling system.

The joint venture is part of DOE's Commercial Whole Buildings Roadmap initiative, which is bringing together diverse groups involved in the design and construction of commercial buildings to help accelerate the adoption of new energy efficient building technologies.

DOE and its partners are inviting participation by building industry representatives and allied groups nationally, including:

- Building owners, developers, and managers;
- Builders and construction managers;
- Architects, engineers, and allied design professionals;

- Heating, ventilating and air conditioning systems, controls, and equipment manufacturers;
- Lighting and communication systems producers and specialists;
- Wall and insulation material producers; and
- Interior environments producers and specialists.

Information on high performance commercial buildings is available on the website: http://www.eren.doe.gov/buildings/highperformance/. More information about the Department of Energy's efficient buildings programs is also available at: http://www.eren.doe.gov/buildings or call 800-363-3732.

The Department of Energy researches, develops and deploys clean, efficient, and renewable energy technologies to help meet America's energy needs while protecting the environment and strengthening the economy. Energy technologies supported and promoted by the department will play a key role in providing *Clean Energy for the 21st Century*.

-DOE-

R-00-094

U.S. Department of Energy Launches Consortiumfor High Performance Buildings

FOR IMMEDIATE RELEASE

Contact: Michael J. Crosbie
Phone: 202-857-0200, ext. 210
E-mail: mcrosbie@swinter.com
Web: www.swinter.com

NORWALK, CT The U.S. Department of Energy (DOE) is spearheading a new project to raise awareness of innovation in commercial buildings, through formation of the Consortium for High Performance Buildings (CHiPB). The focus of the new project is to improve the energy efficiency of commercial buildings, while reducing their impact on the environment. CHiPB will also seek to improve the utility, comfort, quality, and cost-effectiveness of these buildings through an integrated, "whole building" approach to design and construction. CHiPB is part of DOE's Commercial Whole Buildings Roadmap initiative. The CHiPB project is being managed by Steven Winter Associates, a architectural research and consulting firm with offices in Norwalk, Connecticut and Washington, D.C.

[Need a quote here from Dru or other DOE official on the goals and importance of CHIPB.]

The first phase of CHiPB activities will demonstrate and publicize innovative "whole building" approaches that increase the quality and efficiency of commercial buildings while reducing their costs and impact on the environment. CHiPB will focus on raising awareness among building industry professionals and the public of noteworthy commercial buildings that save energy and are environmentally sustainable. The Consortium will identify and promote existing commercial buildings that exemplify the desired attributes of energy efficiency, sustainability, superior quality, and cost effectiveness. Candidate projects for inclusion in the outreach program should be commercial buildings completed withing the past few years or in design or under construction. Submissions may be sent to Steven Winter Associates, Inc., 50 Washington Street, Norwalk, CT 06854-2721 to the attention of Jose Higgins and should include a brief description of building type and location, square footage, material specifications, and energy efficiency and sustainability features. Firms and others interested in Consortium participation are also encouraged to contact SWA.

CHiPB will feature information on high performance commercial buildings through live presentations at professional conferences, a monthly newsletter, and on the CHiPB website: www.chipb.com.

While CHiPB's initial efforts will focus on outreach, the Consortium's long-term focus will be to exert a positive, lasting influence on all aspects of commercial building design, construction, and operation. Future activities will include CHiPB demonstration projects that possess high-performance qualities in site assessment and design, programming, building design, commissioning, and post-occupancy evaluation of new buildings around the country. The consortium will consult directly with architects and developers to design and construct high-performance buildings. Architects, engineers, developers, and others involved in the building industry who contemplate the start of design on a commercial project within the next year are invited to contact CHiPB. The project may be eligible as a CHiPB demonstration project.

CHiPB is currently inviting participation by building industry representatives and allied groups nationally. Participants will include:

- Building owners, developers, and managers;
- Builders and construction managers;
- Architects, engineers, and allied design professionals;
- HVAC systems, controls, and equipment manufacturers;
- Lighting and communication systems producers and specialists;
- Wall and insulation material producers; and
- Interior environments producers and specialists.
-

Other participants will contribute additional strategic planning, technical, outreach, and other skills, and will include participation by:

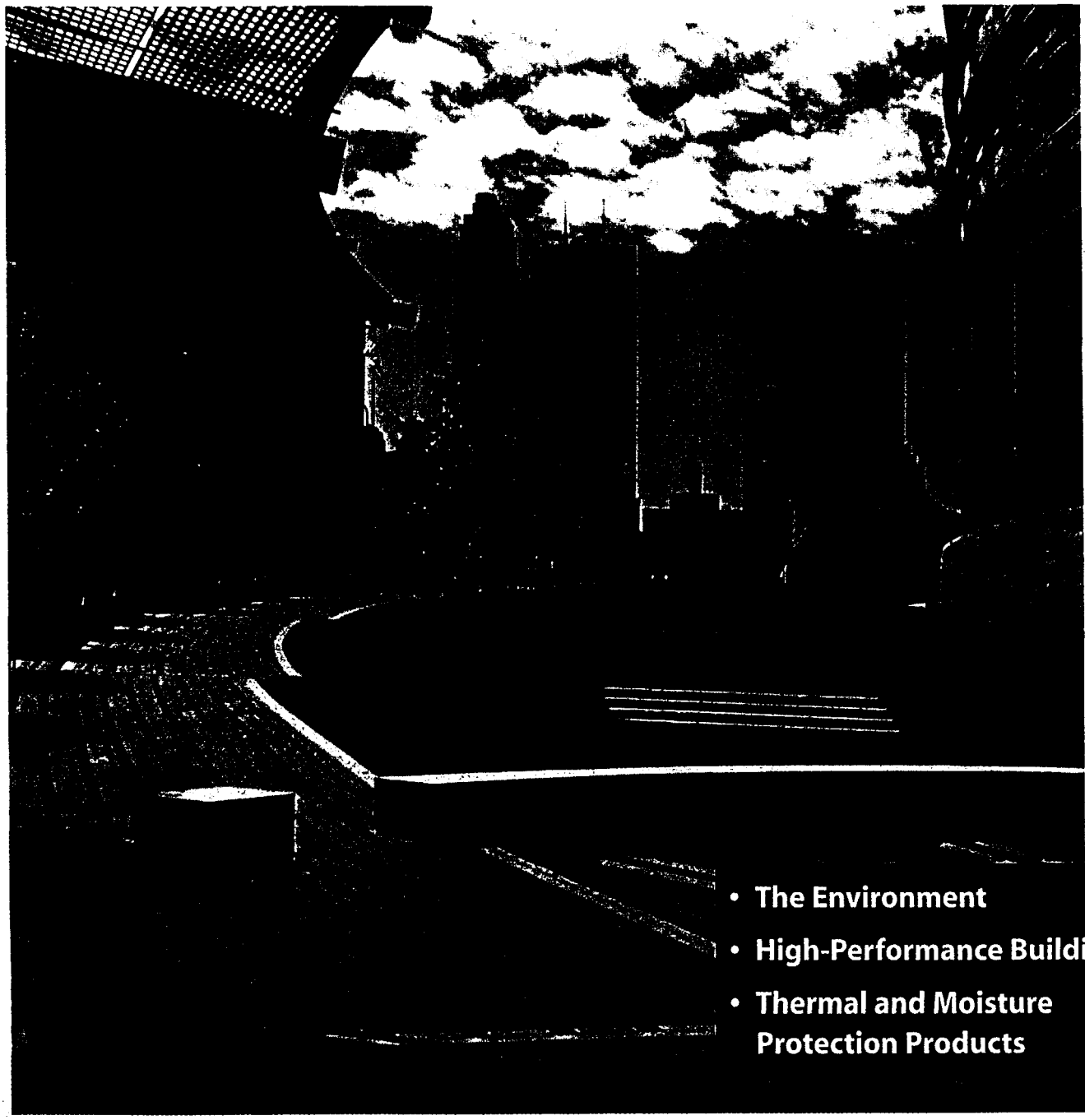
- Lenders and investors;
- Utilities and power producers;
- National laboratories;
- Media (including traditional and Web-based outlets);
- Trade associations;
- Standards organizations; and
- Other sectors, as appropriate.

More information about CHiPB can be obtained from Michael J. Crosbie at Steven Winter Associates, 50 Washington Street, Norwalk, CT 06854, 203–857-0200 ext. 210, mcrosbie@swinter.com, or through the website: www.chipb.com. To learn more about the Department of Energy's Commercial Whole-Buildings Roadmap initiative, visit: www.eren.doe.gov/buildings/technology_roadmaps/commercial_whole_buildings/.

ARTICLES AND BOOKS

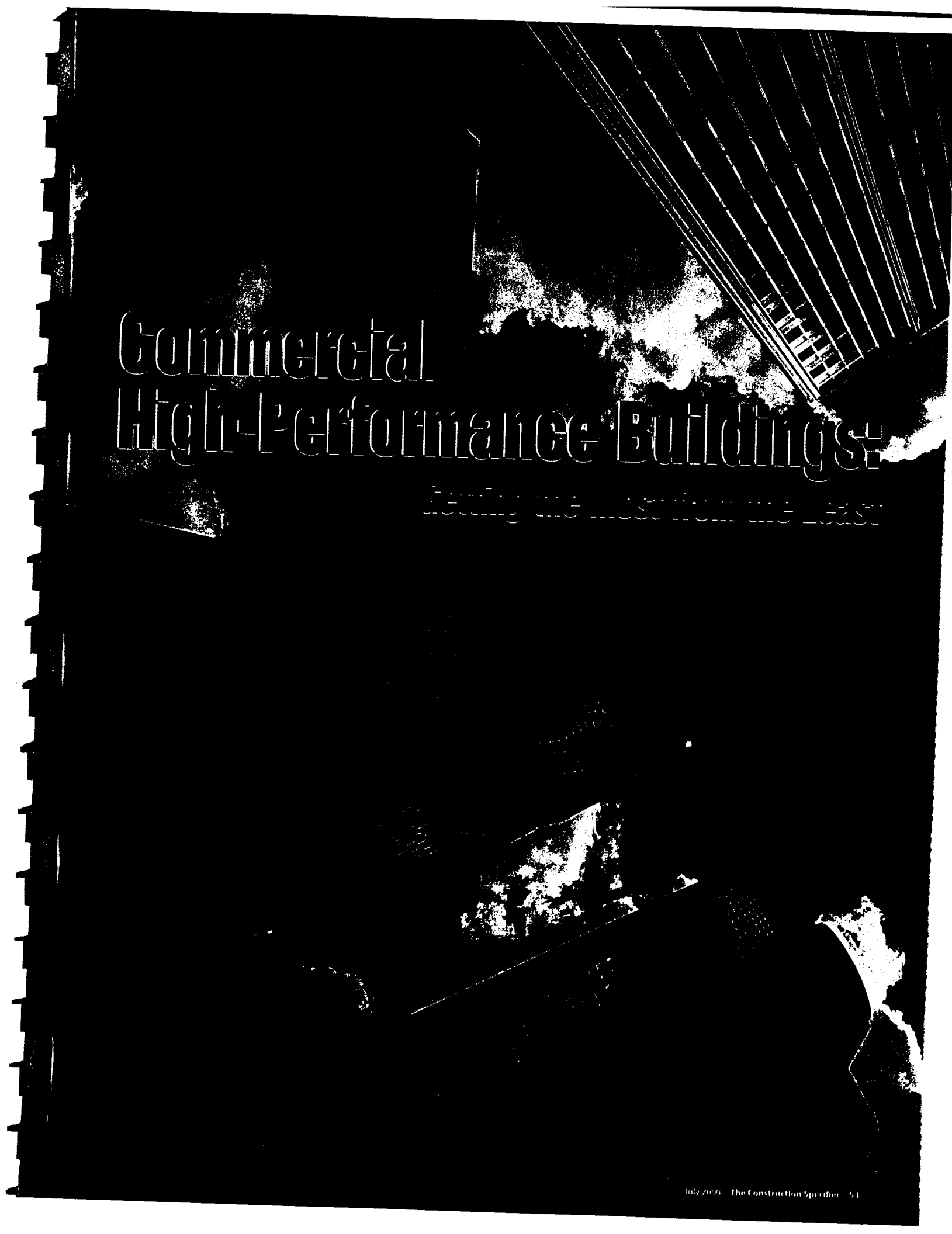
The Construction Specifier

SOLUTIONS FOR THE CONSTRUCTION INDUSTRY
July 2000



- The Environment
- High-Performance Buildings
- Thermal and Moisture Protection Products

The Magazine of the Construction Specifications Institute



Commercial High-Performance Buildings

Setting the Institution the Least

ADDITIONAL INFORMATION

Author

STEVEN WINTER, CSI, FAIA, is chairman of the U.S. Green Building Council and president of Steven Winter Associates, Inc. (SWA), an architectural research and consulting firm in Norwalk, Connecticut. WILLIAM JOSE HIGGINS, AIA, is an architect with SWA.

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Key Words

high-performance building
life-cycle costs
energy efficiency
indoor air quality

Abstract

There is a growing interest on the part of building owners, facilities managers, architects, engineers, and others in the construction industry to design and construct commercial structures to get the most from the least.

What Are High-Performance Buildings?

Unlike cars, a high-performance building doesn't go from zero to 60 mph in five seconds. A high performance commercial building is energy efficient, has low short- and long-term life-cycle costs, is healthy for its occupants, and has low impact on the environment.

High-performance building design is an all-inclusive philosophy, and such buildings are often the products of a team approach to the design of the building. Many of the design and construction team members are involved, as early as possible, in the design of the building and its various systems. This design team should not only include the architects, engineers, occupants, and owners from the project start, but should also include specialists in indoor air quality (IAQ), materials, energy, and costs. One technique for arriving at a consensus among these different building specialists is to have a peer review early in the design process in which experts and other people with interest in the project meet for a one- or two-day critique of the preliminary design.

Another aspect of high-performance buildings is that the design should take into consideration the interaction of the whole building structure and systems, and its context. The idea of looking at the "whole building" as an interrelated system grew out of past research into isolated building components that did not take into account how individual systems affect other systems. For example, a building using extensive daylighting techniques will reduce the amount of heat given off by lighting fixtures, thus allowing use of a smaller air conditioning system.

The whole building philosophy includes site characteristics, energy issues, material issues, IAQ issues, indoor environmental-quality issues, and natural resource issues, as well as how they are all interrelated. One way to balance these many issues is to use a building rating system, such as the U.S. Green Building Council's LEED™ (Leadership in Energy and Environmental Design) Green Building Rating System. LEED is a comprehensive rating system helping the designer wade through these issues. LEED focuses on sustainable sites, water efficiency, energy and atmosphere issues, materials and resources, and indoor environmental quality. The building then receives a LEED score (see related article in this issue on page 27).

The design and construction of a high-performance commercial building also considers how the facility will perform over the long term. Life cycle maintenance costs, durability, energy usage, and the effects on the occupants and the environment are analyzed.

High-Performance Benefits

High-performance buildings have many benefits for the owner, the occupants, and the environment over buildings designed and constructed according to "standard" practices. Long-term maintenance costs and annual energy costs are lower. Building occupants and visitors enjoy a healthier interior environment. Worker productivity can improve with better lighting and a more comfortable indoor atmosphere. In terms of real-estate economics, a high-performance commercial building can help attract desirable tenants and higher rent.

Identifying High Performers

In an effort to promote high-performance commercial building design and construction, the U.S. Department of Energy (DOE) recently launched the Commercial High-Performance Buildings Project as part of its Commercial Whole-Building Road-mapping initiative. The purpose of this project is to raise the awareness of owners, developers, facilities managers, architects, engineers, and contractors to innovative concepts using comprehensive systems engineering approaches that increase the quality and efficiency of commercial buildings while reducing their costs and environmental impacts.

One of the first priorities of the Commercial High-Performance Buildings project is to assemble a database of such buildings, which is now available through a project Web site, www.eren.doe.gov/buildings/highperformance. The database currently has over 100 buildings from around the country that exhibit high-performance qualities, such as energy efficiency, environmental sustainability, superior quality, and cost effectiveness. The case studies included in this article are taken from the database. In an effort to expand the database, nominations are invited including new buildings. Readers can contact the authors, or nominate buildings on the project's Web site.

Future plans for DOE's Commercial High-Performance Buildings Project include taking commercial projects in the early stages of design and development and applying high-performance design and construction principles. Clients, developers, architects, or others involved in the initial stages of a commercial building project who believe their project may be a good candidate for this program can also contact the authors for further information.

Profiles of Commercial High-Performing Buildings

The following are some examples of buildings with high-performance attributes. They cover a range of regions, construction types, materials, size, and functional demands. What they have in common is an approach to design and construction that has resulted in a building which contributes to energy efficiency and sustainability, as well as returns for the client and owner in terms of reduced life cycle costs.

Four Times Square

Location: Northeast corner of Broadway and 42nd Street in New York, New York. The site is adjacent to Times Square and within the midtown business district.

Occupancy/Use: Speculative office building.

Building Construction/Type: 48-story, 150 000 m² (1.6 million ft²). The facade is a glass, metal, and masonry curtain wall.

Selected Energy Efficiency Features: Two fuel cells were installed in the building to meet 8 percent of the building's electrical demands. Photovoltaic panels were installed in the curtain wall on the southern and western sides as a supplemental energy source. Gas-fired absorption chillers/heaters were used and variable speed drives were installed on pumps, fans, and motors. A high-performance low-e glass curtain wall with oversize windows was chosen to enhance energy efficiency, ultra-violet ray reduction, and daylighting. Boosted levels of insulation were placed on all opaque horizontal and vertical external assemblies. Exit signs with L.E.D. bulbs were installed throughout. Energy-efficient lighting was integrated with occupancy sensors and central controls. An energy analysis indicated a 30 percent savings over typical good design and even more over New York State code minimum.

Installed fuel cell in Four Times Square.

PHOTOS COURTESY RESPECTIVE ARCHITECT

Four Times Square

Selected Environmental Features: There are floor-by-floor air quality monitoring/control and purge systems, and 50 percent more fresh air than required by code is provided. There is a filtration system for air pollutants, an additional exhaust shaft for smoking/fumes and heat, and environmentally friendly building maintenance.

Recycling and resource conservation attributes are as follows:

- part of an existing building footing was reused
- hat truss and concrete core structures reduced the amount of structural steel needed
- recycled content and recyclable materials used throughout
- sustainably harvested wood
- low water-use equipment
- waste chutes were installed for tenant-produced recyclables
- waste management and recycling plan for construction and demolition
- recyclables storage areas
- nonozone depleting, non-CFC and HCFC absorption equipment.

On the management side, the building will have a centralized, automated building management system. The tenants will receive written guidelines to encourage them to

- choose finishes and furnishings with low VOCs and other toxins, and high-recycled content
- acquire energy-efficient lighting and equipment
- use space planning for natural light penetration and flexibility
- effectively use the building HVAC systems for better comfort, IAQ, and energy use.

Owens Corning World Headquarters

Owens Corning World Headquarters

Location: Toledo, Ohio, on a peninsula bounded by Swan Creek and the Maumee River, directly adjacent to the heart of Toledo's business center.

Occupancy/Use: Corporate headquarters office building.

Building Construction/Type: Three-story, 37 160 m² (400,000 ft²). The facade is a glass and metal curtain wall.

Selected Energy-Efficiency Features: High-performance low-e and light reflective glazing with a ceramic frit reduces heat gain on the interior and helps maintain high visible daylight transmittance into the space, while the frit provides integrated shading into the glass assembly. Optimized use of glass in skylights, clerestories, and three-story atrium provides generous amounts of natural light contributing to lower lighting demand and a bright productive atmosphere. Raised underfloor HVAC duct runs reduce cooling costs through efficient air distribution; each workstation has an adjustable floor supply vent for individual comfort modulation. Efficient diffuser layouts are modular and flexible; the system also has the added bonus of flexible wire management. Efficient lighting sources include dimming availability for high-efficiency fixtures, which reduces energy consumption and operating costs. A building automation system contributes to energy conservation. Variable speed fans allow fan speed and use to respond to actual loads, not just "average" calculated loads reducing energy consumption and related costs.

Selected Environmental Features: Low-scale building allows the elimination of elevators with an emphasis on stairways for internal building circulation. Reusable office furnishing systems virtually eliminate tear down and disposal of building materials when office configurations change. An outside air economizer is installed with compact rooftop high-efficiency units which improve IAQ though a filtration system. Native plants are used for easy maintenance with minimal irrigation and pesticides required. Paperless office design reduces paper use by 60 percent. Outdoor courtyard spaces include a running track with a wildlife refuge on site. Recycling programs and close proximity to urban mass transit systems also add to the building's efficiency.

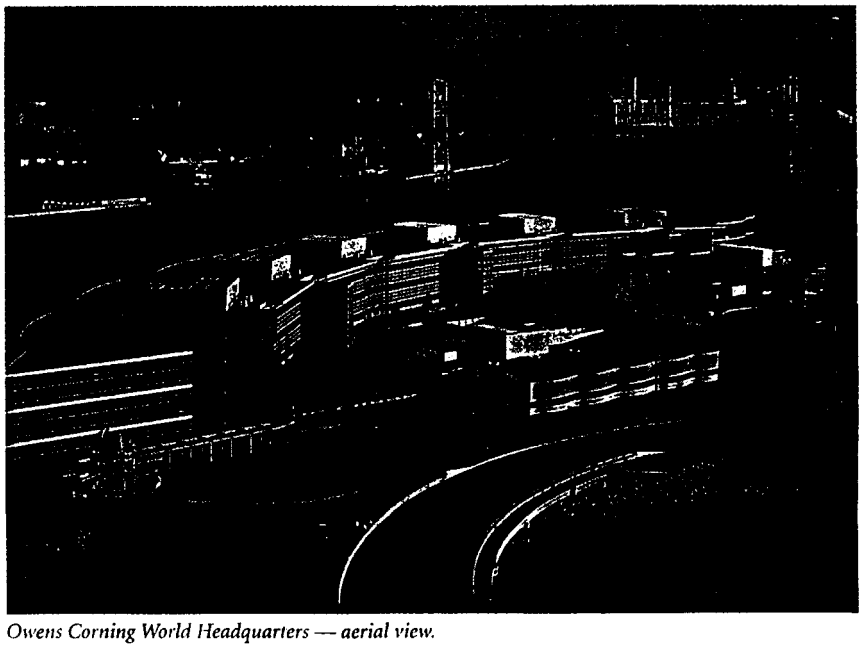
CCI Center

Location: Urban site in a South Side neighborhood in Pittsburgh, Pennsylvania.

Occupancy/Use: Headquarters office for Conservation Consultants, Inc., and various local resource conservation organizations.

Building Construction/Type: Adaptive reuse of a three-story, 1910, brick building, recycling as much of the original materials as possible, and construction of a new steel-frame and masonry-clad two-story structure, for a total of 929 m² (10,000 ft²).

Selected Energy Efficiency Features: The client, architect, engineer, and builder worked together from the



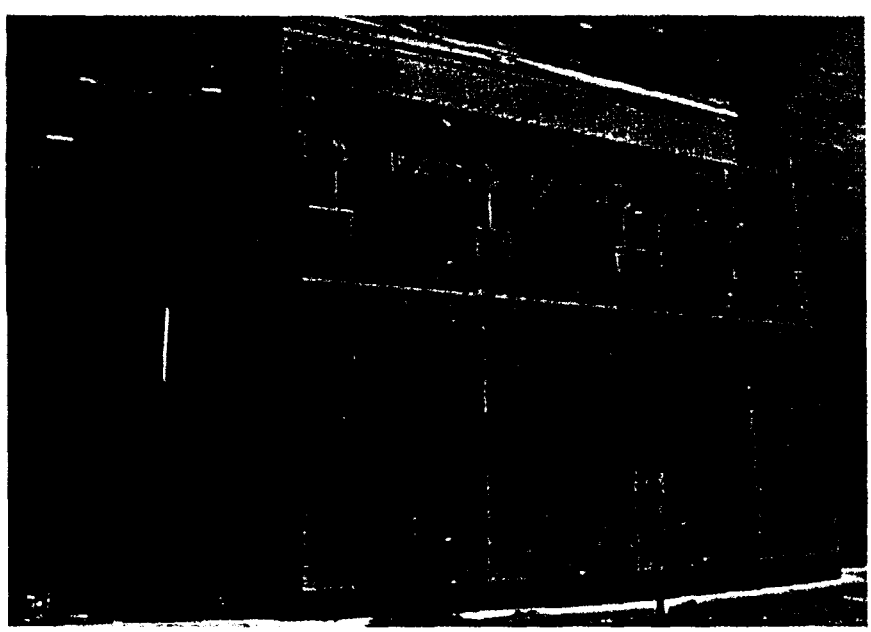
Owens Corning World Headquarters — aerial view.

beginning of design through construction to see that every opportunity for recycling, energy conservation, and waste reduction was identified and could be incorporated into the design. Photovoltaic cells installed on the terrace roof and roof-top garden provide enough power to run the CCI Center's computer system and shade southern windows to minimize heat gain. Energy generated from the photovoltaic array is being tracked and used in a Solar Energy Education program for Western Pennsylvania. Energy-efficiency strategies used throughout the building have resulted in an estimated annual savings of $12,000. Energy usage is estimated to be 40 percent of a typical office building of comparable size.

CCI Center

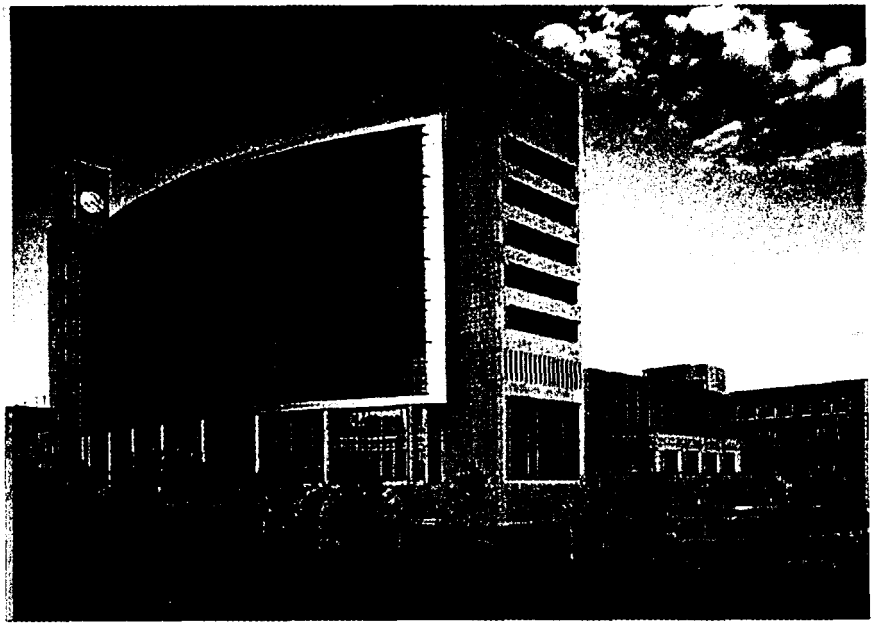
Insulation levels were increased using environmentally benign cementitous foamed insulation and dense-packed cellulose resulting in R-24 walls, and ceilings and roofs of R-38 and R-70. Exposed interior brick walls provide thermal storage mass. Light-colored roofing tiles reflect sunlight and reduce cooling loads. Extensive daylighting provided through R-6 double-pane, argon-gas-filled, operable windows reduce heat loss and heat gain while also reducing ambient lighting requirements. Task lighting decreases the needed ambient light level which is provided by T-8 fluorescent lamps with electronic ballasts. The building is heated and cooled by gas-fired units that use more efficient, cleaner, natural gas; the other half of the building is conditioned by gas-fired absorption chiller units, with similar efficiency. Exposed ductwork throughout the building eliminates heating and cooling losses to the plenum as conditioned air leaks into conditioned spaces.

Selected Environmental Features: Recycled, salvaged, and nontoxic materials are used throughout the project. A construction waste demolition and salvage program ensured the waste stream from the building and associated construction activity was minimized. Brick left from construction is used to pave the first floor garden and walkway at the building entrance; the remainder was given to a salvaged materials warehouse and resale center. Wood and brick from the demolished section of the building was used in the renovation. Interior windows were salvaged from other demolished buildings and installed with recycled wood frames.



CCI Center — balcony view.

Original pressed metal ceilings and hardwood floors were retained and refinished. Carpets were salvaged from a job over-run and applied with nontoxic adhesives. A structural panel made from agricultural waste straw and oriented strand board was used for some ceilings. A nontoxic linoleum made from linseed oil, limestone, cork flour, pine rosin, wood flour, jute, and organic pigment (all natural and renewable materials) was used throughout the first floor. Linoleum flooring waste was given to the Western Pennsylvania Conservancy to be ground and used as mulch for community gardens. Finish for wood floors is citrus-based and nontoxic. Low-VOC paint was used throughout. Low-flush toilets and efficient faucets are used for water conservation. The building has a recycling program for glass, plastic, office paper, paperboard, and corrugated cardboard.



Federal Reserve Bank of Minneapolis

Federal Reserve Bank of Minneapolis

Location: A 3.32 ha (8.2-acre) urban site in downtown Minneapolis, Minnesota, next to the Mississippi River, known as the Bridgehead site.

Occupancy/Use: Administrative and economic research center for the Federal Reserve Bank's ninth district.

Building Construction/Type: Eight-story office tower of curtain-wall construction, a four-story operations center, and a 14 121 m² (152,000 ft²) parking structure, for a total of 72 183 m² (777,000 ft²). Stone, brick, glass, and steel are the predominant materials.

Selected Energy-Efficiency Features: Windows are triple-glazed units with two low-e films and argon gas in both cavities, delivering an R-7.6 value. The additional cost of the glass was offset by the lack of need for most of the perimeter radiation units, which resulted in a net reduction in the building's overall capital cost and reduced its long-term energy use. All light fixtures are high-efficiency units, most controlled by occupancy sensors. Many common-area lights are on "time of day" controls to supplement natural light at the beginning and end of the day. All lighting is controlled and monitored by a central control system, which resulted in 0.85 watts² connected and 0.65 watts² projected actual lighting load (ASHRAE 90.1 permits up to 2.5 watts²). When outside temperatures are less than 12.8 °C (55 °F), cooling is provided by outside air economizers for a "free" cooling system. This reduces chilled water demand on the Minneapolis Energy Center (MEC), which supplies chilled water for cooling. To minimize outside air intake leakage, low-leak, minimum outside air dampers are provided at air-handling units. Steam provided by MEC is converted to hot water at the building entry and then distributed to air-handling units and other heating systems. Steam condensate return is routed through a water-to-water heat exchanger extracting and transferring heat to preheat incoming ventilation air before returning the heater water to MEC. Variable frequency drives (VFDs) are used on most air-handling units and pumping systems, and all systems have high-efficiency motors. Temperature control and building energy management is performed through a computer-based system which maximizes efficiency. The parking garage has a carbon monoxide monitoring system to provide ventilation as required reducing overall energy consumption. Water heaters for the kitchen and fitness center are high-efficiency, gas-fired units. Restrooms and galleys on typical office floors use small, self-contained electric water heaters to minimize thermal losses due to long pipe runs.

Selected Environmental Features: Materials for all site paving, structures, and interpretive displays were selected based on an analysis of whether the original source was sustainable, the material's embodied energy, and whether the materials were recyclable. Plumbing fixtures are low-flow; water closet flush values have automatic on-off controls. Showerheads have water restrictors to reduce consumption. Selected building materials have reduced chemical emissions, such as low-VOC paint, adhesives, and finishes, and formaldehyde-free wood products. Building materials were selected based on the sustainability of the original source, the product's recycled content, the recyclability of the product at the end of its life, and the product's effect on IAQ. The materials selected enhance durability, require less maintenance, and come primarily from local sources. All wood in the building comes from certified sustainable sources. Construction waste was subcontracted to a local recycling company that used the local recycling industry. The majority of refuse was separated off site and recycled to produce a recycling rate of approximately 70 percent with a decrease of overall construction costs. ●

Building materials were selected based on the sustainability of the original source, the product's recycled content, the recyclability of the product at the end of its life, and the product's effect on IAQ.

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Contracting Business

THE MAGAZINE OF HVACR MECHANICAL SYSTEMS DESIGN/BUILD/MAINTAIN CONTRACTING

the east Tennessee marketplace.

If the program is successful, Trane states that it may be expanded into other cities. Any area beyond that of Apex Supply would involve the appropriate Trane distributor and Trane Cofort Specialist Dealers for those areas.

AND THE VOTES ARE IN. . .

The "Innovations" section of the January 2000 issue of *Contracting Business* featured a wide variety of new products from leading manufacturers. Readers then voted on which products they found to be the most innovatve. The winning manufacturers are:

- First Place — Notifact, for its wireless monitoring online unit
- Second Place — Amprobe, for its KWIK-I-E® non-contact volt and current probe
- Third Place — Bryant , for its Quantum Plus ™ line.

Congratulations!

AIRE SERV LAUNCHES BRANDING EFFORT

Aire Serv Heating & Air Conditioning has introduced a national branding campaign for the HVAC services offered by its more than 60 Aire Serv franchises across the country.

Roger Goertz, Aire Serv President

The company is using commercials for their campaign, which were created by Saunders-Ream Marketing Communications Group. The first of four network cable television flights premiered the week of April 17 on The Discovery Channel, Home & Garden Television, and the Lifetime network. Commercials target-

and Refrigeration Institute (ARI), U.S. factory shipments of central air-conditioners and air-source pumps for April were down 4% from the same month last year. Although the shipments were down compared to last April, shipments from the first four months of 2000 are 14% ahead of last year.

April 2000 factory stocks are down 10,615 units from March 2000, but up 94,600 units from April 1999. April 2000 distributor inventories are up 36,589 units from March 2000, and up 164,310 units from April 1999. April 2000 distributor shipments are down 9% from April 1999, and are up 8% year-to-date.

Heat pump shipments are up 1% from last April and are 13% ahead of last year.

MURPHY COMPANY WINS SAFETY AWARD

Murphy Company Mechanical Contractors and Engineers, St. Louis, MO, received the first place 1999 safety award from the Mechanical Contractors Association of America (MCAA), in category I, more than one million work hours. All awards are based on a company's lost work days incidence rates.

637 MCAA member companies submitted information on safety performance.

OWENS ACQUIRES SERVICEONE

Owens Companies, Inc., Minneapolis, has purchased ServiceOne Companies, Inc. The acquisition will become the core of Owens Home Comfort division, which targets residential customers for heating and cooling services. Jerry Kalin will serve as vice president of the division.

John Owens, president, says, "We will offer a full range of products and services to meet the many residential needs from a comprehensive, systems perspective."

Owens Companies provides consult-

May 17-19.

Interface is a manufacturer of commercial flooring and interior furnishings, and Titus manufacturers air distribution products for HVAC systems.

Access floors originated as a solution for providing pressurized air to computer rooms and became an easy way to lay out telecommunication wiring and electrical services. The underfloor air-distribution systems use a warmer air supply, which results in higher HVAC equipment efficiency.

John Malloy, president of Carrier Commercial Systems and Service, says combining the three companies offers "a one-stop solution for building owners and managers to help meet the need for a rapidly changing work space environment."

D.O.E. LAUNCHES BUILDINGS PROJECT

The U.S. Department of Energy (DOE) is creating a Commercial High Performance Buildings project to increase the energy efficiency of commercial buildings. This joint partnership between the private sector and DOE will focus on improving the utility, comfort, quality, and cost-effectiveness of commercial buildings. Steven Winter Associates, Inc., an architectural research and consulting firm, is managing the project.

In this project, architects are to consider the whole building as a complete system, as opposed to a collection of independent components, which should make the construction more efficient and less costly.

Secretary of Energy Bill Richardson made the announcement. "The action we are taking to decrease building energy use will save businesses money and reduce the impact of energy generation on global climate change and the environment," he said

Designing sustainable buildings means adopting a whole-building philosophy

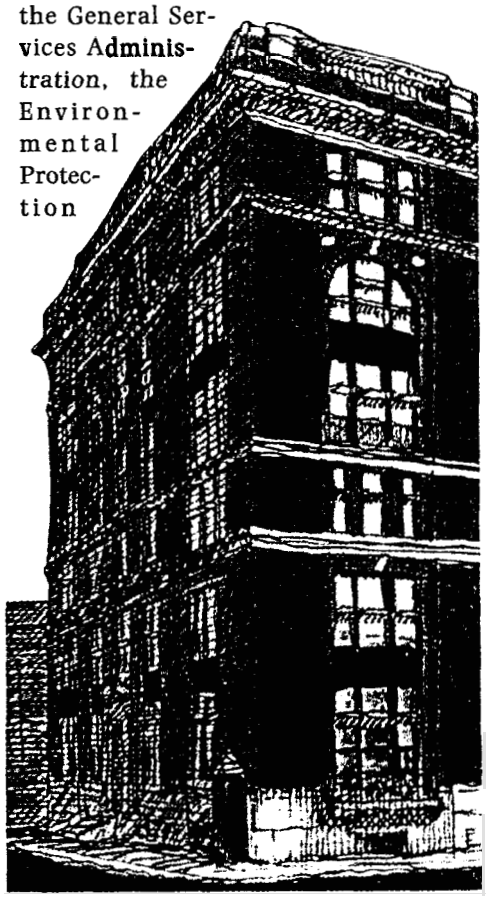
Green Gestalt

By ADRIAN TULUCA, R.A.
Principal
DEVASHISH LAHIRI, P.E.
Associate, and
IAN GRAHAM, P.E.
Associate
Steven Winter Associates, Inc.
Norwalk, Conn.

Making buildings environmentally sustainable has become a major focus for many engineers, architects and specifiers. Instead of treating a building as a collection of independent systems, sustainable design and engineering requires a synergistic, whole-building approach through which interactions between building systems are exploited to yield large energy savings at small first-cost increases. For instance, combining a highly effective thermal envelope with an efficient lighting scheme, low-emission finish materials and effective ventilation—natural and desiccant-assisted—can significantly reduce heating and cooling loads. In turn, heating, ventilation and air-conditioning (HVAC) equipment can be smaller, and money saved on smaller central plants and their associated equipment can offset the cost of installing superior envelopes and lighting systems. Furthermore, sound strategies for system control can bring further efficiency: CO2 and volatile organic compound (VOC) sensors allow for the proper intake of outside air without excessive ventilation. Occupancy sensors can control when light is needed while demand-lighting sensors can regulate electric light levels based on the availability of natural lighting at different times of the day.

Keep in mind that energy savings, while worthwhile, are not the only benefit of sustainable design. Indoor-air quality (IAQ) can improve, especially since HVAC control strategies can include the incorporation of finish materials with low VOC content. Visual and thermal comfort can also be better in green buildings and maintenance costs can be lower as well—truly a winning combination for facility owners, managers and occupants.

Additionally, sustainable design has become a key component in the construction and design policies of many federal government agencies, including the General Services Administration, the Environmental Protection



Agency and the Department of Energy (DOE). The latter, in an effort to raise awareness of innovation in commercial design and construction, has launched its Consortium for High Performance Buildings (CHPB) program—an initiative that identifies and promotes existing commercial buildings epitomizing the desired attributes of energy efficiency, sustainability, superior quality and cost effectiveness, with the long-term goal that these best practices eventually be adopted in building design and retrofits.

Three of the first CHPB projects are described below, including a renovation, a small facility and one with unusual climatic conditions.

• **Administration for Children's Services Center.** By carefully employing energy modeling, life-cycle cost analysis and sound building material selection, the design of New York City's new Administration for Children's Services Center was able to strongly adhere to the CHPB tenets of producing an energy-conserving and healthy indoor environment. Specifically, low-VOC paints, finishes and floor coverings helped make the new facility a healthier place, while upgrades to the building envelope and HVAC system make it more affordable to both operate and maintain.

The existing masonry building proved an effective template for integrating energy-efficient strategies, materials and systems. Originally completed in 1912, the 6-story, 116,740-square-foot building featured large floor-to-ceiling heights and expansive windows. Daylighting was integral to the structure's original design, and the question was not whether to continue the use of natural light, but how to maximize it.

Based on computer analysis using DOE-2.1E—a state-of-the-art energy-performance simulation program—the design team, which included architect Richard Dattner, New York, M/E/P engineers Lakhani & Jordan, New York, and lighting designer Ann Kale and Associates, New York, opted for clear, argon-filled double-pane glazing and continuous daylight dimming controls.

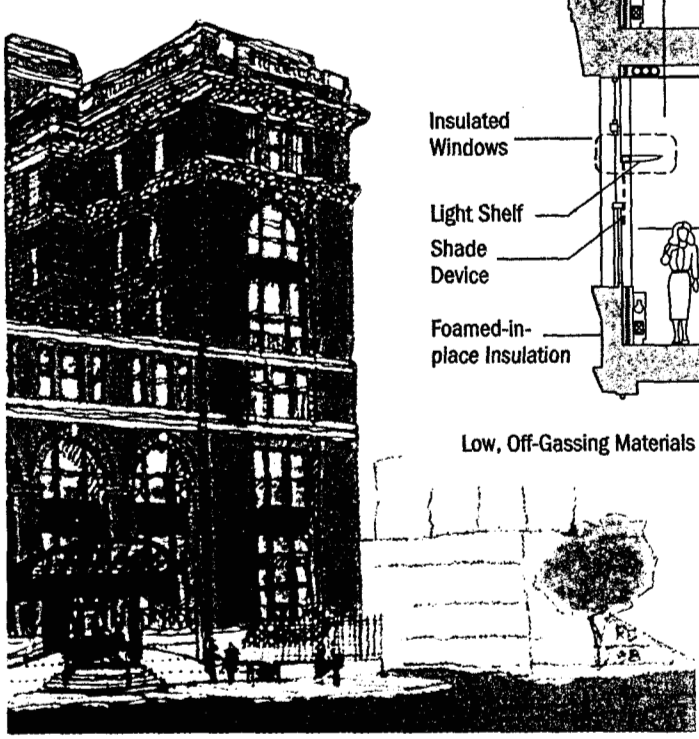
To optimize the building's daylighting potential, interior light shelves were also incorporated. These passive-solar strategies were then supplemented by a space-specific lighting configuration that concentrates artificial illumination where it would be needed most.

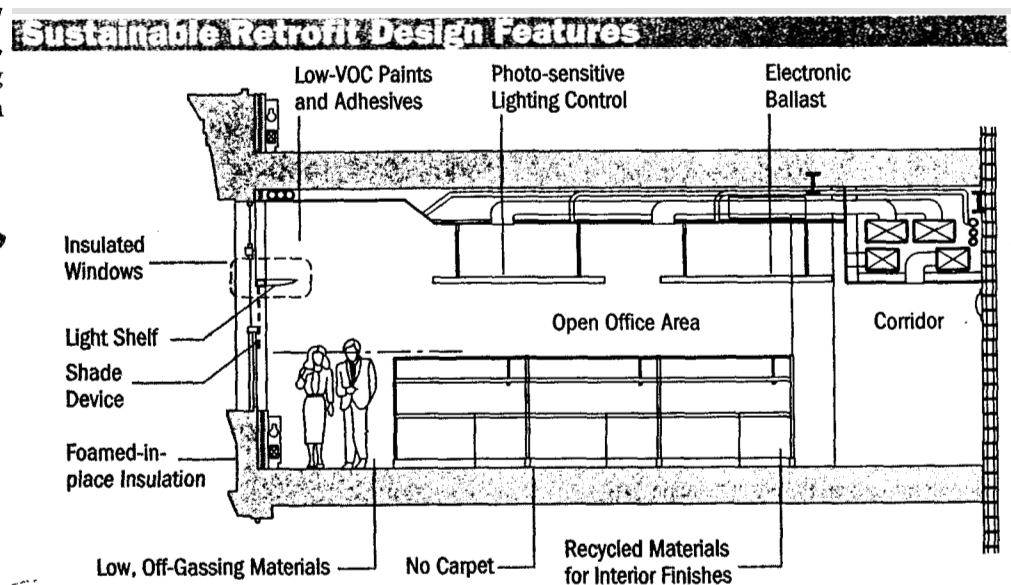
For the building envelope, foamed-in-place magnesium silicate—a lightweight, cementitious material that is fireproof and offers excellent insulation—was employed to augment the existing shell. Specifically, the cementitious insulation was used to replace the interior wythe of one of the two layers of terracotta tile that originally composed the building's interior walls.

The material yields a relatively long payback period, but produces better energy savings than glass-fiber insulation, and its more environmentally benign constitution was in tune with the project's green philosophy.

VARIABLE AIR VOLUME AND HEAT RECOVERY

On the mechanical systems side, a variable-air-volume system fitted with a variable-speed drive was installed to generate ventilation, while perimeter fan-coil units were specified for heating



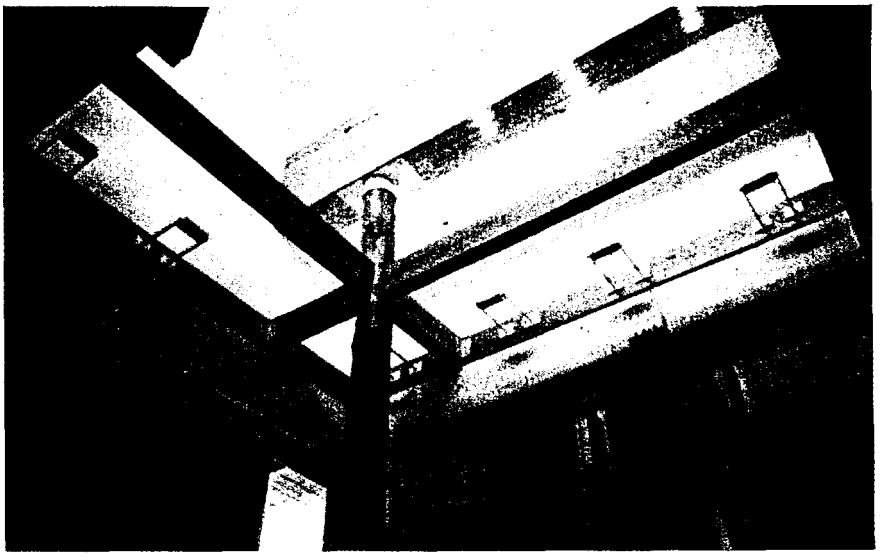


Key sustainable principles implemented within the Administration for Children's Services Center included the maximization of natural lighting by using light shelves and dimmable and photosensitive lighting controls.

and cooling. Heat-recovery devices were employed for further conservation.

Specification of the run-around loop glycol heat-recovery system was also based on the facility's structure. Since the design team had to work around the historic nature of the building and use existing shafts, the heat-recovery system became distributed in nature and needed more coils than originally planned for when a centralized ventilation shaft was envisioned.

Again, life-cycle cost considerations dictated the mechanical system choice even though its payback was also very long. In general, life-cycle costs were key in considering HVAC schemes, particularly in contemplating various types of central plants. These considerations were weighed against factors such as pollutant emissions, maintenance requirements and system footprint. For this project, it was determined that the most advantageous plant configuration would include the use of ten, 30-ton modular electric chillers for cooling. Steam from the utility is used to preheat service hot water.



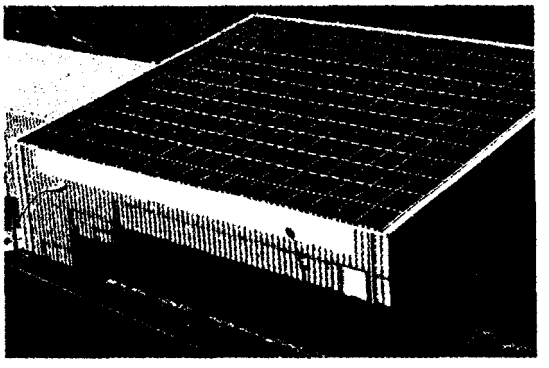
Daylighting was a key sustainable principal incorporated into the Black Rock Forest Center.

To improve IAQ and encourage informed product procurement, a detailed set of recommendations was produced. Products included resilient and hard-surface flooring, low-VOC paints, adhesives, sealers and other finishes. CO_2 sensors were also installed.

Like the majority of decisions relating to systems selection, detailed computer modeling enabled an informed approach to the integration of glazing, insulation, lighting and HVAC. These decisions were predicated on annual

Building-Integrated Photovoltaics: A Window to Solar Sustainability

Natural lighting is a key element of sustainable design. The use of windows and skylights, however, does not have to be limited to its most basic form. In fact, the implementation of integrated photovoltaics within skylights and windows offers multiple functionality for just one building system. According to Jonathan Weiss, R.A., with the Raleigh, N.C., office of Heery International, Inc., the incorporation of solar panels is becoming more prevalent. Specifically, such panels are being integrated into building façades, allowing for insulation, rain protection and energy generation. The 4 Times Square building in New York City, for example, features such technology on its upper floors, generating approximately 1 percent to 2 percent of the building's total energy needs.



Building-integrated solar panels offer multipurpose function: ambient light, shading and energy generation.

The technology, adds Weiss, has advanced so that manufacturers are now able to reduce the photovoltaic cell system to a thin layer of film that can be fritted or laser-etched into glass, yielding photovoltaic properties and providing some shading, but still allowing for visibility. "It's good for applications in atriums and skylights where they're perfectly located to absorb radiant solar energy, but the etching cuts down visible light and radiant energy coming through the glass," says Weiss.

In specifying such a technology, the consultant warns, designers have to be careful of shadows cast by tree lines. However, one of the advantages of using photovoltaics is that direct or bright sunlight is not necessary. "It can be a cloudy day and you can still be generating electricity," says Weiss.

Obviously, such panels will not generate large quantities of electricity and may sound like a hard sell initially, but Weiss says the technology's multiduty functions unquestionably offer long-term savings: "That's really to the client's advantage."

By Jim Crockett
Senior Editor

energy cost savings, simple payback periods and anticipated life-cycle cost savings. The combined energy-efficiency strategies and systems recommended have a simple payback of 7.6 years.

Compared to other state of New York facilities that merely comply with existing codes, energy costs at the Administration for Children's Services (ASC) are expected to be 33 percent lower—the equivalent of more than $99,500—and will reduce annual CO_2 emissions by more than 500 tons—the equivalent of removing 184 cars from the road.

More impressive are energy and environmental performance results, particularly in the context of a renovation with a number of constraints. In fact, representatives of the New York State Energy Research and Development Authority (NYSERDA), which cofunded the ACS effort, followed the design process with particular interest because the building is on the National Register of Historic Places. But with the backing of ACS and agencies like the New York City Department of Design and Construction, such challenges were easily met. The ACS Center warrants consideration as an exemplar for the appropriate integration of green design strategies into historical structures.

• **Black Rock Forest Center for Science and Education.** As for new construction, the 9,050-square-foot Black Rock Forest Center for Science and Education in Cornwall, N.Y., offers a model for environmentally sensitive design and engineering. This time, the project team included Fox and Fowle Architects, New York, Gerard Associates Consulting Engineers, Middletown, N.Y., and Steven Winter Associates (SWA) as the energy consultant. NYSERDA again provided financial support for the energy-efficiency analysis.

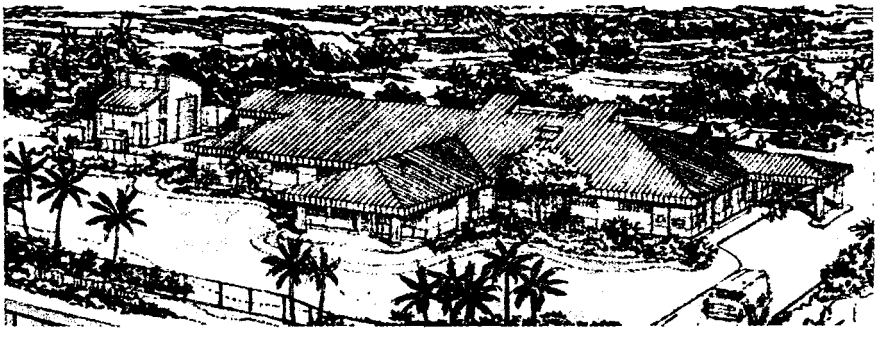
The team's strategy was to create a building whose shape and envelope were inherently efficient as well as to minimize heat gains from lighting and computers. These strategies enabled the downsizing of mechanical equipment, offsetting the cost of improved walls, windows and roofing systems.

SWA helped Fox and Fowle identify a number of specific energy-efficiency strategies that minimized energy consumption while delivering thermal comfort. Building components were chosen for their contributions to overall operating efficiency, and in some instances, for their positive effects on IAQ. Computer analyses were again conducted using DOE 2.1E, and the results were used to identify appropriate solutions. Notable sustainable features included:

- An oblong shape, with the building's longest axis running east to west.
- The placement of the majority of windows on the south facade, with minimal glazing on the east and west facades.
- Low-emissivity, argon-filled glazing.
- Daylighting in perimeter spaces.
- Highly insulated walls.
- Roofing constructed of structural insulated panels.
- Geothermal heat pumps for heating, cooling and domestic hot water.
- Variable-speed fans and pumps.
- An air-to-air heat-recovery system, operating at 75-percent efficiency.
- Ventilation rates moving at 20 cubic feet per person.
- CO_2 sensors to modulate outside-air intake based on occupancy.
- Motorized windows in the atrium for natural ventilation.
- Efficient lighting with electronic ballasts and T-8 lamps; and
- Occupancy sensors in all offices.

Mechanically, IAQ was improved through the use of a system that does not recirculate air from room to room, but instead employs an air-to-air heat exchanger to introduce a greater volume of outdoor air while recovering heat from the exhaust air. Healthy building materials and finishes also helped to improve the indoor environment.

Because energy efficiency, IAQ and sustainability were central to the design, these strategies were integrated from the outset. By working closely, the design team achieved a finished product expected to yield annual energy savings between 43 percent and 49 percent, as benchmarked against a standard code-compliant building.



Building siting and window locations were key to the sucess of the WFO project in Guam.

• **NWS weather forecasting office.** One of the benefits of green design is that it can be applied to a building of any size and any locale. This maxim held true with the National Weather Service's (NWS) weather forecasting office (WFO) project on the Southwest Pacific island of Guam. NWS wanted a low-energy-use building with minimal operating costs, as well as an indoor environment fostering increased productivity and occupant comfort. Also, NWS hoped to effectively integrate passive-solar design that would maximize daylighting, but keep glare in check and reduce excessive solar heat gain.

SWA was brought in at the project's inception under an agreement with the National Renewable Energy Laboratory and was funded by the Federal Energy Management Program, which seeks to reduce energy use and associated costs in federal facilities.

Because staffing and operations were similar in WFO facilities worldwide, the project began by establishing energy use

and assessing typical operating conditions at an existing WFO facility in Upton, N.Y. Information was gathered on hours of operation, personnel, lighting and equipment schedules and energy-consuming systems, including HVAC and electrical and peak electrical demand. The data was used to create a computer model to benchmark the facilities using DOE 2.1E software.

The model was then validated against actual energy use at the Upton facility and subsequently refined using a climate-specific Puerto Rico WFO design. Actual bid documents later aided in fine-tuning the model to accurately reflect conditions in the new WFO.

The resulting project-specific models were used to analyze various options for design and material specification. Guam's tropical climate, coupled with the facility's high concentration of electronic equipment and the nature of the work performed at the WFO, made efficient cooling and glare reduction the top priorities. These recommendations were supported by heat-flow analysis of exterior walls. As it is not uncommon for moisture to condense on the outside surfaces of air-conditioned buildings in this humid climate, insulation levels were established to minimize condensation on interior and exterior wall surfaces. Aside from identifying numerous energy-conservation opportunities, lighting modeling ensured visual comfort and glare reduction for the main forecasting area, known as the operations room.

Working closely with NWS staff, the Naval Facilities Engineering Command—the Hawaii-based assembler the design-build-bid package—and Design Partners, Inc., Honolulu—the project's design-build contractor—energy-efficiency strategies were identified that are expected to save about 20 percent in annual energy costs—roughly $15,500 per year—as compared to a building compliant with American Society of Heating, Air-Conditioning and Refrigeration Engineers standards.

Energy efficiency is actually greater if plug loads—which were particularly high in this computer-dominated building—are discounted. Without plug loads, energy savings were projected at 35 percent. One of the project's lighting recommendations alone was expected to achieve a 30-percent reduction in energy use for the facility's private offices.

For the operations room—the WFO's nerve center—a lighting strategy was established that would minimize glare, yet provide a productive and comfortable environment. Appropriate light levels were set around video-display terminals with glazing and shade-control strategies developed to ensure operator visual comfort. Indirect lighting schemes were implemented to take advantage of the room's pitched cathedral ceiling. Ceiling fixtures on the room's long axis and wall-mounted fixtures at the junctures between the ceiling and walls reflect light to occupied spaces below.

Each lighting scheme balances several important goals: adequate, task-based illumination; improved visual comfort through reduced glare; reduced "veiling reflections"; comfortable natural light; energy efficiency and enough flexibility to allow for varying workstation layouts.

Based on the positive outcomes in the project, SWA and NWS are now working together on another station in Maine, where the successful strategies identified in Guam will be adapted and refined.

BUILDING GESTALT

As these and other projects demonstrate, making buildings truly sustainable requires a knowledge of not only lighting, HVAC and other building systems, but also a firm grasp of how to make the building envelope as efficient as possible. Of equal importance is the need for a fundamental change in perception about the interaction of the building's siting, exterior design, interior design, mechanical systems, lighting and how the users will ultimately interact with it once the building is occupied.

Considering the building as an organic whole, rather than a collection of independent systems, leads designers to carefully consider how changes in one part of a building can result in energy conservation and cost savings throughout.

The future of sustainable building design and construction will yield greater benefits as designers deepen their understanding of the interconnectedness of architecture, engineering and the environment. |cse|

A Whole New Delivery Process

Green or sustainable design is certainly a concept many in the design community have heard bandied about, and perhaps even considered. But incorporating it into one's designs really requires wholesale commitment, say its proponents. "Sustainablity is a principal one adheres to," says Jonathan Weiss, with the Raliegh, N.C., office of Heery International. That means no value engineering or "cookie cutter" approaches. "If there's a tool or method for a building system that provides a better service to our client, we have to do it. It's our professional due diligence."

Such a philosophy doesn't mean one has to turn away clients, says Giuseppi Di Vanna of RTKL Associates, Balitmore: "It doesn't limit business, it makes it more challenging."

For sustainable trends visit the www.csemag.com

*Visit **csemag.com** to read more from other experts on sustainable technologies and trends, including "model" green projects such as the Chesapeake Bay Foundation's headquarters in Baltimore, featuring extensive use of natural ventilation, daylighting, rainwater collection, building-integrated photovoltaics and even composting toilets.*

More practical projects are also examined, including an energy-efficient retrofit of the ICC/Areol Rios complex in Washington, D.C., and the renovation of Baltimore's Metro West facility incorporating dessicant treatment of outdoor air.

By Jim Crockett
Senior Editor

BUILDING BLOCKS

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The Association for Preservation Technology International (APTI)

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Philadelphia, Pennsylvania

For more information, call (630) 968-6400 or visit www.apti.org.

on U. S. Labor Department and Immigration and Naturalization Service procedures for Acquiring Temporary Labor Certification for Guest Workers, generally for the acquisition of skilled labor from Canada.

For more information about the Alliance National Issues Conference, contact the SMACNA Capitol Hill office at (202) 547-8202.

High Performance Building Project

The U. S. Department of Energy (DOE) and its Secretary, Bill Richardson, announced the creation of a Commercial High Performance Building project in May. It is related to the DOE and private industry effort called the Commercial Whole Buildings Roadmap initiative meant to make commercial buildings more energy efficient and environmentally sound.

The main role of the Commercial High Performance Buildings project (the CHPB project) is to support buildings that "consume less energy while improving quality, comfort, and cost-effectiveness. High performance buildings use energy efficiency measures, renewable energy technology, recycled and sustainable materials, and site-sensitive design to minimize the burden on the environment."

The CHPB project will be managed by Steven Winter Associates, Inc., (SWA), an architectural research and consulting firm with offices in Norwalk, Connecticut, and Washington, D. C.

SWA said the project "will identify and publicize 'whole building' approaches. . . . Architects who subscribe to the whole building approach consider the structure as a complete system, rather than as a collection of independent components. This can have significant effects on design and construction, resulting, for example, in a smaller, more efficient, and less costly heating and cooling system."

Michael Crosbie of SWA said his firm will identify and catalogue completed buildings that, in its view, meet high performance characteristics. More than a hundred have been selected and most of these are listed at DOE's Web site. Along with the buildings are listings of their architects, engineers, and other professionals.

"We are trying to raise the level of consciousness of what a high performance building is," Crosbie said. "In the second phase of our effort, we will be working with architects and engineers to actually influence the buildings in the design stage."

Currently, SWA makes the selections of high performance buildings to feature on the Web site. Input comes from 15 members of an Advisory Board. Individuals may nominate buildings, too. SWA is calling for examples of high performance buildings, either built, under construction, or far along in the design process. Submissions may be sent to Steven Winter Associates, 50 Washington St., Norwalk, Connecticut 06854, to the

attention of Jose Higgins. These only need to be a brief description of the building, material specifications, energy features, and sustainable features. Designers and developers who are thinking about creating a commercial building within the next year may also make an inquiry of SWA to determine the eligibility of the project as a demonstration project.

The Roadmap effort itself is an industry-led initiative meant to develop the ideas and technology for achieving higher performance buildings. Like the CHPB project, it is run out of the DOE Office of Building Technology, State and Community Programs (BTS). The Roadmap work is generally a means of brainstorming and considering means of reaching goals. It also is meant to align the resources of the United States government with industry-identified priorities.

The Roadmap work is meant to have three phases: Visioning, Roadmap Development, and Implementation. In the first phase, participants identify their long-term technology needs, as well as their ideal future, and write a Vision Statement. This statement is not merely utopian but meant to reflect the impacts of markets, technology, and regulatory constraints.

In the Roadmap Development stage, participants discuss specific research and development activities needed in order to reach the goals of the Vision Statement, thus creating the Technology Roadmap.

For the Commercial Buildings Roadmap series (there are also six separate Roadmap efforts on each of Lighting, Windows, Building Envelope, HVAC, and Residential Buildings), workshops have already been held beginning in the summer of 1998 in New York, Washington, D. C., and California. The first working draft of the Vision Statement is available at www.eren.doe.gov/buildings/technology_roadmaps/commercial_whole_buildings.

Currently, the work is in the stage of Roadmap Development, which brings in people of a more technical expertise. The workshops for this phase have been divided into two parts: Building Delivery and Building Operation. For example, Building Delivery includes Construction and Outfitting while Building Operation includes Maintenance and Retrofit. But coordination issues involving both Delivery and Operation will be discussed, too, such as component life cycle and environmental sustainability.

Several buildings referred to as High Performance buildings on the DOE Web site are the Adam Joseph Lewis Center at Oberlin College, Westerville, Ohio; 4 Times Square, New York, N. Y., especially for saving 30 percent in energy because of its use of fuel cells and photovoltaic panels; the Thermal Test Facility at the National Renewable Energy Laboratory in Golden, Colo., especially for being 65 percent more energy efficient than called for the in the Federal Energy Code; and the Zion Visitors Center at Zion National Park in Utah, especially for its Trombe Wall, downdraft cooltower, and thermal mass flooring.

More information about the CHPB project is available from Michael J. Crosbie at SWA, 203-857-0200, extension 210, mcrosbie@swinter.com, or at the project Web site www.eren.doe.gov/buildings/highperformance/.

Steel Imports High, Duties Imposed

Specialty steel imports rose to their highest level ever in March. The U.S. Government has been considering some of this as dumping, that is, delivering steel to U.S. shores at a price below the cost of producing it. The U.S. Government has therefore been imposing anti-dumping duties on some of the imports in hopes of reducing

FORM + FUNCTION

Elevator Modernization a Must in New Millennium

Because of the building boom in the 1980s, elevator modernization is a popular topic these days. Recent industry reports state nearly 160,000 elevators are 20 years or older. By 2003, 200,000 will need to be renovated or upgraded.

Improved performance, code compliance, and enhanced aesthetics are the major reasons building managers modernize their elevators. President of Fujitec America, Kirk Feuerbach, said, "Our modernization programs are in high demand because 20-year-old elevators are now out of date...The performance benefits derived from elevator modernization are certainly dramatic. Equally critical is code compliance and safety."

CONNECTIONS

Books

HOW TO PRODUCE EFFECTIVE OPERATIONS AND MAINTENANCE MANUALS

American Society of Civil Engineers

This new step-by-step guide to creating accurate, comprehensive, and easy to understand O&M manuals should be required reading for facility operators, maintenance technicians, training coordinators, and managers. From start to finish, the process is explained by including all the elements of preparing the manuals from defining the audience to producing a hard copy or online manual. Sample manual sections are included, and topics such as overall organization, defining detail levels, standard operating procedures, developing a style guide, and more are covered. For more information, contact Betsy Shepard at (703) 295-6266 or e-mail eshepard@asce.org.

SUPERFUND RECYCLING EQUITY ACT GUIDANCE MANUAL

Institute of Scrap Recycling Industries, Inc. (ISRI)

The effect of this new law on the scrap recycling industry is described in this comprehensive volume. Practical and easy to use guidance is now available to scrap recyclers to help them take advantage of the Superfund relief. This manual makes a complex law understandable and less daunting to the average person. Key topics include Superfund guidance, a definition of "recyclable material," arrangement for recycling, and consumer compliance evaluation. To order, or for more information, call (202) 737-1770 or visit www.isri.org.

GUIDE A: ENVIRONMENTAL DESIGN

The Chartered Institution of Building Services Engineers (CIBSE)

This fully revised 336-page guide includes new recommendations and calculation procedures. It gives extensive treatment to the fabric interface between the external environment and the internal parameters that must be considered: air infiltration, plant size, internal heat loads, and moisture transfer. Changes in this new edition include new sections dealing with indoor air quality and the electromagnetic and electrostatic environment; tables of predicted irradiances and cooling loads for latitudes 0 to 60 degrees; and a selection of international heating and cooling design temperatures. For more information, contact Ken Butcher at kbutcher@cibse.org or visit www.cibse.org.

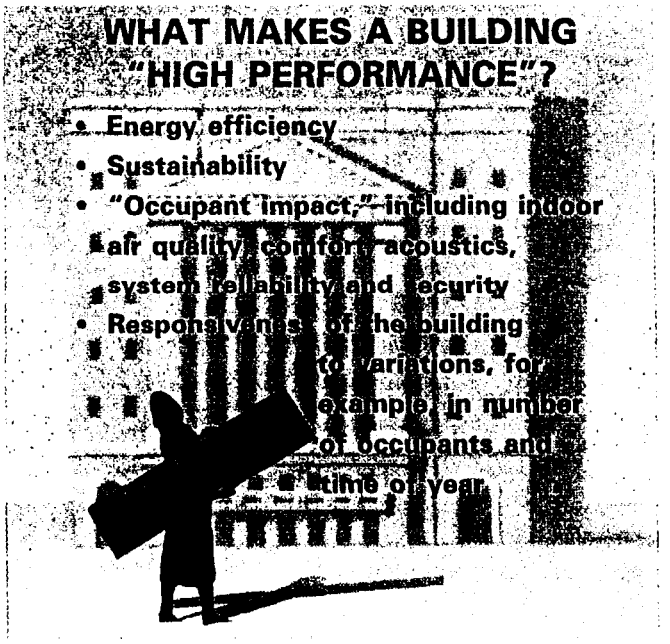
Outlook

DOE boosts high performance buildings, by word and (soon) deed

WHAT DO A LOW-RISE, 13,600-square-foot education building in rural Ohio, a 48-story, 1.6 million-square-foot office building in the heart of New York City and a Midwestern National Football League stadium that seats 60,000 have in common? Actually, much more than a cursory glance would reveal. The Adam Joseph Lewis Center for Environmental Studies at Oberlin College, 4 Times Square and Lambeau Field Stadium all appear on an inventory of exemplary commercial high performance buildings in the United States.

This inventory represents the initial phase of an ambitious U.S. Department of Energy (DOE) effort known as the Commercial High Performance Buildings project. The project, formally known as the Consortium for High Performance Buildings, which began in the fall of 1999, is an extension of the DOE's Commercial Whole-Building Roadmapping initiative to track high performance buildings.

The main focus of the project is to improve the energy efficiency of commercial buildings while minimizing the environmental impact and improving comfort, utility and cost effectiveness.



Step by Step

Step one of the project is to find high performance buildings and spread the word about them. Energy efficiency and sustainability are the main criteria, but the project also emphasizes indoor environmental quality (IEQ) focus and the responsiveness of the building to variations in its usage, such as number of people and time of year.

"We try to showcase particularly noteworthy examples, but we also try to feature different regions and different building types," says Steven Winter, president of Steven Winter Associates, the Commercial High Performance Buildings project managers. Winter invites facility executives to submit information to the project on buildings that they believe qualify as high performance buildings.

The project is expected to take its next step by the end of this year: providing cost-free assistance to project teams early in the design process on such decisions as site location, building configuration and even materials. "Often there are wrong decisions made in the very early stages, and these are very costly to fix later on," explains Michael Crosbie, associate at Steven Winter Associates. "Our first and primary role is getting everything on track at the beginning.

The next step — providing cost-free design assistance — is expected by the end of the year

A definition of high performance buildings is one of the issues that advisory group members have been discussing. "Is it an entire list of qualities or just a certain number of attributes?" asks Gregg D. Ander, chief architect of Southern California Edison and advisory group member.

Currently, high performance buildings are defined by example. "Mainly they are buildings that are energy efficient and sustainable," says Winter, adding that defining "high performance buildings" is a high priority in the next six to 12 months.

The project's inventory illustrates the fact that a wide variety of buildings may be considered high performance; however, they share common elements, mostly in the building design process. "There is a close collaboration throughout the process involving setting performance targets for areas and working closely with the owner's representative," says Drury B. Crawley, program manager of DOE's Commercial Buildings Research & Development and

program manager of the project. "This is not a traditional design process."

Green Buildings with a Twist

What's the difference between green buildings and high performance buildings? At first glance, the answer might seem to be "not much." Both share many attributes, such as superior energy efficiency and IAQ, recycled and sustainable materials, daylighting and close proximity to mass transit. However, high performance buildings have an additional emphasis: These buildings stress performance attributes such as acoustics, comfort, systems reliability and security issues. "Occupant impact is what is stressed with high performance buildings," says Malcolm Lewis, president of Constructive Technologies Group and advisory group member.

A first cost premium for high performance buildings does exist, sometimes one to two percent more for "aggressively" high performance buildings. Such costs arise from selecting higher quality technology or equipment. However, from a life cycle standpoint, these buildings are very cost effective. They have reduced operating and maintenance costs and contribute to improved employee performance and productivity. There is also a reduction in liability with respect to IAQ. From a marketing standpoint, tenant comfort equates to leasability and high occupancy rates.

As word about their benefits spreads, high performance buildings should command higher rents in the future

The project's ultimate goal is market transformation. "The building industry is very resistant to change," says Lewis. "Part of the challenge is to assuage people's fears regarding something that hasn't really been done before." The project strives to make people aware of the implications of high performance buildings and how such changes can be accomplished. "We want people to think more broadly about their decisions," says Crosbie. "The market will respond to this interest."

"The marketplace over time values the performance of buildings, so there will be a value associated with high performance," says Lewis. "Owners will be able to lease out high performance buildings at a higher rate per square foot in the future. IAQ is important to people, and they will pay for it."

To learn more about the Commercial High Performance Buildings project, visit their Web site at www.eren.doe.gov/buildings/highperformance.

E-mail comments to angela.maas@tradepress.com.

fluorescent lighting system, including the specification and supply of the programmable lighting panels, telemetry system, and sub-metering technology. Technical and management assistance for the work was provided by the county's Internal Services Department.

The 40-year-old, 324,000-square-foot facility administers general relief, medical services, and food stamps for aid-assisted programs.

System information is collected using sub-metering monitors at the lighting panels, then transmitted to an Internet server using CellNet Data Systems (of San Carlos, Calif.) radio frequency (RF) telemetry and cell phone technology. Data is accumulated every five minutes and transmitted daily via a MicroCell tower.

The Internet server, in turn, places the energy information on the Internet using Alameda, CA-based Silicon Energy Corp.'s MyBuilding.com software. This system allows for instant monitoring of energy usage buildingwide, statewide or nationwide, depending upon customer needs.

The retrofit included the installation of more than 6,000 controllable electronic ballasts connected in "control zones" to allow customized light levels in each area.

Existing T12 two-lamp fixtures equipped with magnetic ballasts were replaced with new, more energy efficient T8 lamps and ELI PowerPlus electronic dimming ballasts. Ballasts were networked together using the ELI QuickLink connection system, allowing for fast, error-free connection between ballasts and controls, ELI stated. In addition, incandescent lamps were replaced with compact fluorescents, and new energy-efficient light emitting diode exit signs were installed.

The project incorporated the ELI Envoy Lighting Load Controller (Model LS3) throughout the facility to provide total lighting control with buildingwide dimming and timer control. ELI Envoy daylight sensors (Model PS1) were located along perimeter office areas to allow automatic dimming when natural light is available.

Because most of the lighting prior to the retrofit remained on continuously, annual hours of lighting were reduced 38% following the retrofit. As a result, total annual savings per fixture of 421 kWh were realized, of which 70 kWh per fixture was attributable to a reduction in operating hours.

These savings became possible through lighting controls that turn off lights at pre-determined times with overrides allowing occupants to keep lights on independently when needed—whether operated within the building or from a remote location by computer.

While lighting costs and energy usage decreased, light output increased. Before the retrofit, light levels ranged from 30 to 115 footcandles. After the retrofit, levels at full light output ranged from 65 to 120 footcandles. By using the control, the average light output was tuned to maintain 60 footcandles.

For more information, call South Coast Media Services' Jeff Schenkel at (626) 339-8824.

DOE To Create High-Performance Commercial Buildings Program

The U.S. Department of Energy April 6 revealed that it is creating a High Performance Commercial Buildings project to increase the energy efficiency of commercial buildings.

The project will identify and publicize innovative "whole building" approaches that increase the quality and efficiency of commercial buildings. Architects using the whole building approach consider a building as a complete system instead of a collection of independent components. This can have significant effects in design and construction, resulting, for example, in a smaller, more efficient, and less costly heating and cooling system, DOE stated.

"Thirty-two percent of the electricity generated in the U.S. goes to heat, cool, ventilate, and light commercial buildings," Energy Secretary Bill Richardson lamented.

The joint venture is part of DOE's Commercial Whole Buildings Roadmap initiative, which brings together diverse groups involved in the design and construction of commercial buildings to help accelerate the adoption of new energy efficient building technologies.

DOE and its partners are inviting participation by building industry representatives and allied groups nationally, including: building owners, developers, and managers; builders and construction managers; architects, engineers, and allied design professionals; heating, ventilating and air conditioning systems, controls, and equipment manufacturers; lighting and communication systems producers and specialists; wall and insulation material

producers; and specialists; wall and insulation; material producers; and interior environments producers and specialists.

Access DOE website http://www.eren.doe.gov/buildings.

N.Y. Awards Hudson Technologies $250K To Improve Chiller Efficiency

Hudson Technologies Inc. April 13 announced it has received a commitment for a $250,000 award from the New York State Energy Research and Development Authority (NYSERDA) to develop a system to improve chiller efficiency and performance and increase system capacity. Hudson is a refrigerant-services firm specializing in emergency recovery and decontamination services for comfort and process cooling systems.

NYSERDA's commitment is the first of a two-phase project designed to develop systems that, utilizing Hudson's patented Zugibeast and proprietary RefrigerantSide decontamination services, improve and optimize chiller performance and reduce overall energy consumption. "Chiller systems are among the highest ranking energy consumers in commercial buildings. Improving the efficiency of existing systems can offer dramatic energy savings to all public, commercial, and industrial sectors," Hudson President and CEO Kevin Zugibe said.

Hudson and NYSERDA will jointly fund phase one of this project, with NYSERDA contributing $250,000 to the project.

The timeline for developing and testing the system will be 9-18 months, Hudson Executive Vice President Stephen Mandracchia told E&HR.

For additional information, call Hudson at (914) 735-6000.

Federal Government Curbs Energy Use 20% over Last 15 Years: DOE

The U.S. Department of Energy April 20 announced that the federal government has reduced energy use in its buildings by 20% since 1985.

This achievement, which saved taxpayers more than $2 billion in energy bills in fiscal 1999, is one year ahead of the schedule required by the Energy Policy Act of 1992, according to DOE. The department said it has led efforts to save about $19 billion in federal government building energy costs since 1985.

The government has saved an estimated 127.3 trillion British thermal units of energy.

According to FY'99 data from the 30 largest federal agencies, the government has reduced its energy use per square foot by more than 20% compared to 1985. About 110,716 Btus were consumed for each square foot of floor space compared to 139,271 Btu/square foot in 1985, the data indicates.

Federal energy managers reduced energy through improved heating, ventilating, and air-conditioning system maintenance, light bulb and fixture replacements, and general cleaning of facilities. Also, agencies used private funding and partnerships to increase the energy efficiency of their buildings. The government also procured energy-efficient Energy Star products and equipment.

Call DOE at (202) 586-5000.

Calls for Bids and Proposals

The Department of The Navy April 13 announced that it needs a contractor to conduct energy and water conservation audits of buildings and to conduct analyses, verification, condition assessments, inspection, testing, and evaluation of utility plants and utility distribution systems. The services are required for Department of Defense shore facilities that receive support services from the Atlantic Division of Naval Facilities Engineering Command. The facilities are located in the East Coast; Puerto Rico; Guantanamo Bay, Cuba; Iceland; the United Kingdom; Spain; Italy; Greece; and Bahrain. The contractor will develop **energy conservation** investment projects and various other duties. Refer to solicitation No. N62470-00-R-3306 when calling Bayla Mack at (757) 322-8271. Also cite No. W-102 SN443490.

The U.S. Agency for International Development (USAID) has extended the deadline for submitting applications for a contract involving an energy efficiency program that USAID and the Brazilian government is conducting. The deadline will change from April 24 to May 15. Refer to solicitation No. RFA 512-00-005-Amend01 when contacting Jose Zenteno, an acquisition specialist in USAID-Bolivia's Regional Contracting Office, at 591-2-786445. Also cite No. W-104 SN444726.

U.S. DOE Launches High Performance Building Project

Secretary of Energy Bill Richardson has announced that the Department of Energy (DOE) is creating a Commercial High Performance Buildings project to increase the energy efficiency of commercial buildings. The effort, a joint partnership between the private sector and the department, also will focus on improving the utility, comfort, quality and cost-effectiveness of commercial buildings. The project is being managed by Steven Winter Associates, Inc., an architectural research and consulting firm with offices in Norwalk, CT, and Washington, DC.

"Thirty-two percent of the electricity generated in the United States goes to heat, cool, ventilate and light commercial buildings," said Richardson. "The actions we are taking to decrease building energy use will save businesses money and reduce the impact of energy generation on global climate change and the environment."

The project will identify and publicize innovative 'whole building' approaches that increase the quality and efficiency of commercial buildings. Architects who subscribe to the whole building approach consider the structure as a complete system, rather than as a collection of independent components. This can have significant effects on design and construction, resulting, for example, in a smaller, more efficient and less costly heating and cooling system.

The joint venture is part of DOE's Commercial Whole Buildings Roadmap initiative, which is bringing together diverse groups involved in the design and construction of commercial buildings as a means of accelerating the adoption of new energy efficient building technologies. DOE and its partners are inviting participation by building industry representatives and allied groups on a national basis.

Information on high performance commercial buildings is available at www.eren.doe.gov/buildings/highperformance/.

Advance Transformer Recognized as EPA "Ally of the Year"

OAK BROOK, IL — Advance Transformer Co., Rosemont, IL, was recognized as the 2000 Energy Star Buildings Program "Ally of the Year" by the US Environmental Protection Agency in a recent ceremony held in Washington, DC. The company was selected for the award in the Large Manufacturer category based on its ongoing activities in the areas of industry support and outreach, development of exclusive marketing initiatives, successful EPA Energy Star Buildings recruitment, and comprehensive promotion of EPA ideals.

Robert Fox Wins NERO Conservation Award

NEW YORK, NY — Robert Fox, AIA, the principal of Fox & Fowle who led the "greening" of The Conde Nast Building at Four Times Square, has been awarded the highly respected Energy Conservation Award by the National Energy Resources Organization (NERO). Fox was recognized for incorporating such energy-efficient and renewable technologies as solar power, fuel cells, low-emissivity (low-e) glass, and energy-efficient lighting in the design of Four Times Square.

Collins & Aikman, Ricoh Recognized for Responsible Business Practices

NEW YORK — The Council on Economic Priorities (CEP) recently recognized the winners of the 14th Annual Corporate Conscience Awards. Collins & Aikman Floorcoverings was recognized for developing the first fully recyclable carpet and encouraging customers to bring in their old carpet (regardless of manufacturer) to be recycled. This practice has kept one million pounds of used floor covering out of landfills, and has eliminated the company's need for raw production material.

Ricoh Cop., a provider of digital imaging systems in the US, also won an award for its outstanding commitment to the environment for its development and manufacture of energy-efficient office equipment, including digital copiers, facsimile machines, printers and scanners. Ricoh's activities include ISO 14000 certification at its manufacturing facilities; office waste paper recycling; remanufacturing of copiers; and taking part in the Energy Star Buildings Program, of which it is a charter member.

DOE Launches Commercial High Performance Buildings Project

NORWALK, CT — Secretary of Energy Bill Richardson recently announced that the Department of Energy (DOE) is creating a Commercial High Performance Buildings project to increase the energy efficiency of commercial buildings. The effort, a joint partnership between the private sector and the DOE, will also focus on improving the utility, comfort, quality and cost-effectiveness of commercial buildings.

"Thirty-two percent of the electricity

generated in the United States goes to heat, cool, ventilate and light commercial buildings," said Richardson. "The actions we are taking to decrease building energy use will save businesses money and reduce the impact of energy generation on global climate change and the environment."

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The project is being managed by Steven Winter Associates, Inc., an architectural research and consulting firm with offices in Norwalk, CT, and Washington, DC. For more information, contact the firm at 203-857-0200 or visit www.swinter.com.

NYSERDA Wins Consumer Education Award

WASHINGTON, DC — In late March, the New York State Energy Research and Development Authority (NYSERDA) was named the recipient of one of the 2000 Energy Star Awards for "Excellence in Consumer Education." The award was presented by the US Department of Energy (DOE) and the US Environmental Protection Agency (EPA).

NYSERDA, with the help of Lt. Governor Donohue, has been making it possible for consumers throughout New York State to easily identify the Energy Star label and understand the benefits of using Energy Star products and appliances. The Lt. Governor, along with other state and local officials, assisted NYSERDA by kicking off a statewide public awareness campaign to educate consumers about Energy Star in four major New York cities: Buffalo, Albany, Syracuse and Binghamton.

New York is the first state to be involved in this campaign. Through this partnership with Energy Star, the state is seeking to increase household energy efficiency and promote Energy Star as a market standard for quality and performance.

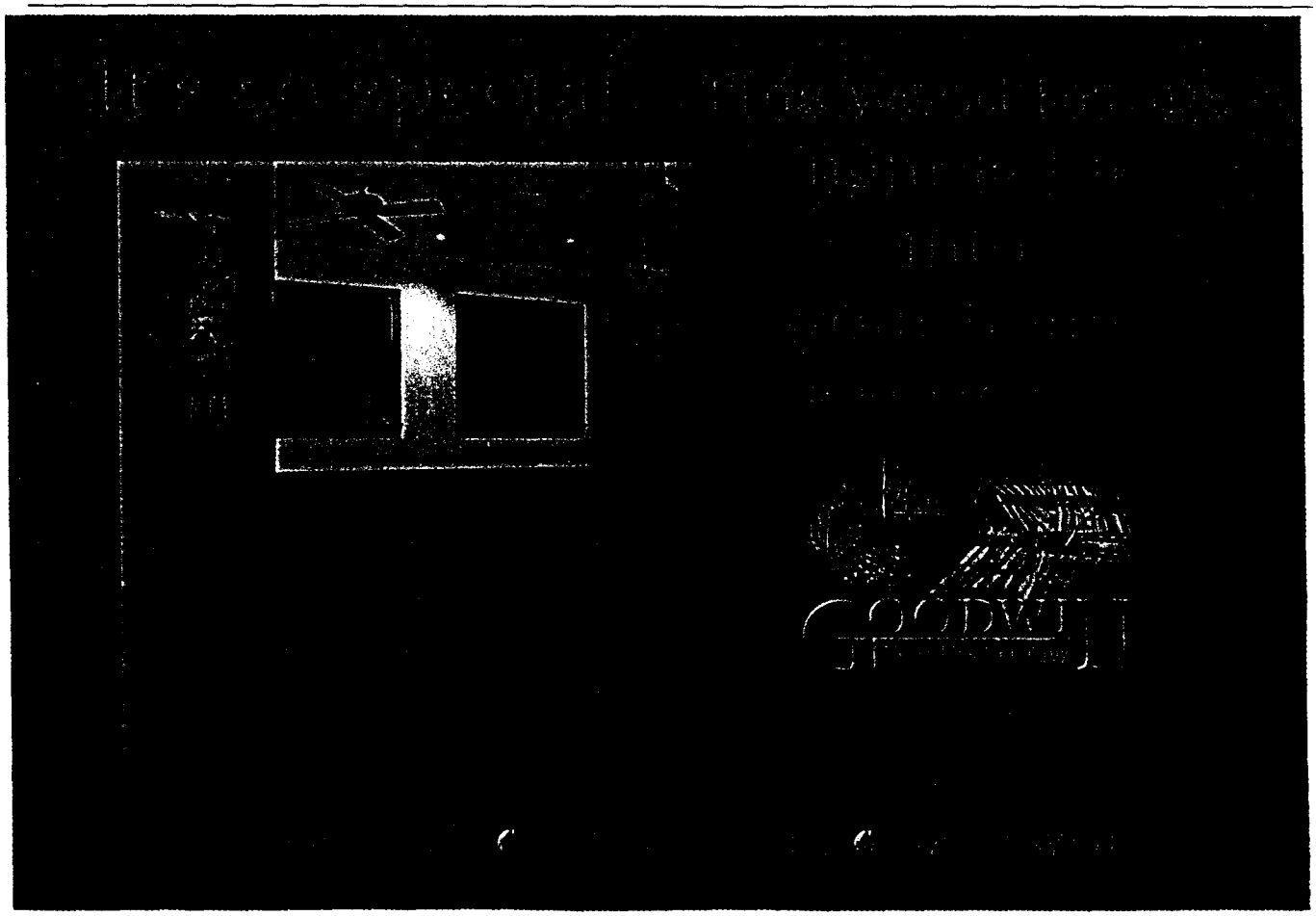
Viking Receives Energy Star Award

PORTLAND, OR — Viking Industries, a division of Pella Corp., was selected as the Energy Star® 2000 Western Region Window Manufacturer of the Year for promoting energy efficiency through the window and door products it manufactures. The company recently introduced ThermaStar, a new product line that focuses on energy performance.

Gardening Supplier Makes Commitment to Certified Wood

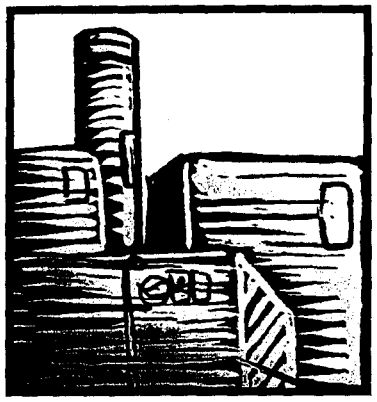
NEW YORK — Gardener's Supply, a catalog and e-commerce supplier of gardening related merchandise, is implementing a plant to transition to using certified wood in their wood products over the next 10 years.

Certified wood, such as SmartWood CM, is wood that has been harvested ac



DOE Launches Project to Improve the Energy Efficiency of Commercial Buildings

WASHINGTON, DC—Secretary of Energy Bill Richardson announced that the Department of Energy (DOE) is creating a High Performance Commercial Buildings project to increase the energy efficiency of commercial buildings. The effort, a joint partnership between the private sector and the department, will also focus on improving the utility, comfort, quality, and cost-effectiveness of commercial buildings.



The project will identify and publicize innovative "whole building" approaches that increase the quality and efficiency of commercial buildings. Architects using the whole building approach consider a building as a complete system, instead of a collection of independent components. This can have significant effects in design and construction, resulting, for example, in a smaller, more efficient, and less costly heating and cooling system, according to DOE.

The joint venture is part of DOE's Commercial Whole Buildings Roadmap initiative, which is bringing together groups involved in commercial design and construction to help accelerate the adoption of new, energy-efficient building technologies.

DOE and its partners are inviting participation by groups that include building owners, developers, and managers; builders and construction managers; architects, engineers, and allied design professionals; heating, ventilating and air conditioning systems, controls, and equipment manufacturers; lighting and communication systems producers and specialists; wall and insulation material producers; and interior environments, producers and specialists.

Information on high performance commercial buildings is available on the website http://www.eren.doe.gov/buildings/highperformance/ or by calling 800-363-3732. ***eun***

New Entrants in Energy Market Are Hot On Wall Street

BURLINGTON, MA—New energy-related stocks could start a dramatic run up, repeating the history of the telecommunications and airlines industries after restructuring, Hugh Holman, analyst for CIBC Global World Markets, told the audience of a Xenergy-sponsored forum.

"Investors recognize that the fundamentals for the energy industry, the third largest in the nation, are very strong," Holman said. "Demand is expected to increase with the Internet economy, coupled with new technologies being spawned by deregulation." In this climate, Holman cited stock prices for a group of power producers achieving increases of over 50% in 1999, with a group of new technology stocks growing 150% or more, while the Dow Jones Utility Average declined by 9%.

Against the backdrop of Wall Street enthusiasm, CEOs from four Internet energy companies faced off to discuss their business plans for deregulated markets in the Northeast and elsewhere. Two leaders in emerging retail energy markets, Utility.com CEO Chris King, and Green Mountain.com CEO Dennis Kelly, illustrated two divergent strategies—one technology-based, the other brand-based. According to King, Utility.com's recently unveiled Utility One platform "offers utilities online metering and billing services reducing transaction costs by 60 to 80%."

Kelly described the Green Mountain.com kilowatt-hour branding strategy— differentiating itself as a supplier of clean energy. According to Kelly, Green Mountain.com is working to "reach the 6-20 million customers identified through research who will buy green and pay a premium." ***eun***

What's Happening

DOE Promotes High-Performance Buildings

At an October 3 reception on Capitol Hill and an October 4 press conference, the U.S. Department of Energy (DOE) will roll out the initial results of its roadmapping initiatives for promoting high-performance commercial buildings. The series of roadmapping efforts to be featured involve broad-based private-sector and government representatives looking to the future of commercial buildings. Sponsored by industry groups and the Office of Building Technology, State and Community Programs within DOE's Office of Energy Efficiency and Renewable Energy, roadmapping workshops and strategy sessions over the past two years have studied lighting, glazing, building envelope, mechanical systems, and the integration of these technologies in high-performance commercial buildings. "On the research and development side of the building technologies group we have adjusted our budget and other materials to focus on this effort," reports Program Manager Drury Crawley.

Each roadmapping effort aims to develop a vision for that industry by the year 2020, create a "roadmap" for achieving that vision, and then implement programs to manifest the vision. Vision 2020 documents are already available on the Department of Energy Web site (see address below) for the lighting and windows initiatives. The Air-Conditioning and Refrigeration Technology Institute (ARTI) has published a vision document for the mechanical systems effort, and others will be published soon.

The high-performance commercial buildings roadmapping initiative that aims to integrate the other technologies is being coordinated by Steven Winter Associates of Norwalk, Connecticut. This project has identified key strategies in four areas:

- **Performance metrics**—Establish core definitions and metrics for high-performance commercial whole buildings. Meetings are under way to define these metrics.
- **Technology development**—Develop systems integration and monitoring technologies that enable whole buildings to achieve optimal, targeted performance over their life cycles. Several projects are funded to develop controls using wireless technologies.
- **Process change**—Create models of collaborative commercial whole-building design and development, and establish the tools and professional education programs needed to support these processes. DOE is seeking projects at the inception stage that could take advantage of free or cost-shared energy modeling and green consulting to become high-performance buildings.
- **Market transformation**—Stimulate market demand for high-performance commercial whole buildings by demonstrating and communicating compelling economic advantages. This goal will be carried out primarily by the Deployment Group in DOE's Buildings Division, through such programs as Rebuild America.

Ideally, these roadmapping efforts will help cut through the many complicated demands and constraints placed on government agencies and help focus the funding choices. Having industry groups integrally involved in setting the direction is also key, as ultimately it will be up to the private sector to manifest the vision. We look forward to the progress of these efforts! – *NM*

For more information:

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Michael Crosbie
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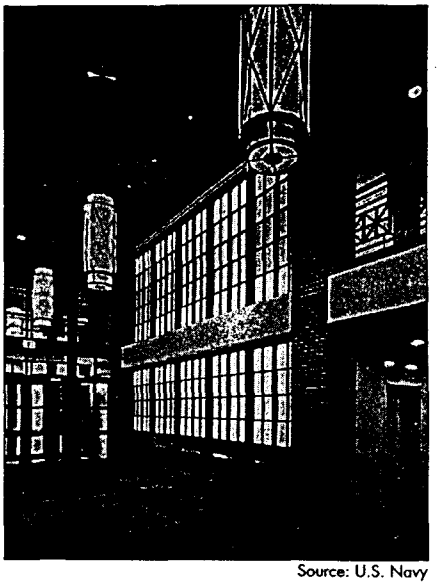
Norwalk, CT 06854
203/857-0200, 203/852-0741 (fax)



Source: U.S. Navy

DOE's High-Performance Buildings Program aims to promote technologies and strategies like those used in the U.S. Navy's Building 33 in Washington, D.C.

Regulations on Lead Paint in Salvaged Materials

A well-intentioned lead-based paint disposal rule proposed by the U.S. Environmental Protection Agency (EPA) has inadvertently caused confusion and concern in the building materials recycling and salvage industries, but the situation is improving. EPA intended to facilitate lead abatement by reducing materials disposal costs, and the agency had good science to show that lead leaches very, very slowly in the largely dry and inert matrix of C&D landfills. On this basis, in 1998 EPA proposed a rule (*Federal Register*/Vol. 63, No. 243, December 18) that basically reclassifies any lead-based paint (LBP) debris coming from residential structures as nonhazardous waste.

The effect of the proposed rule would

Commercial Builder

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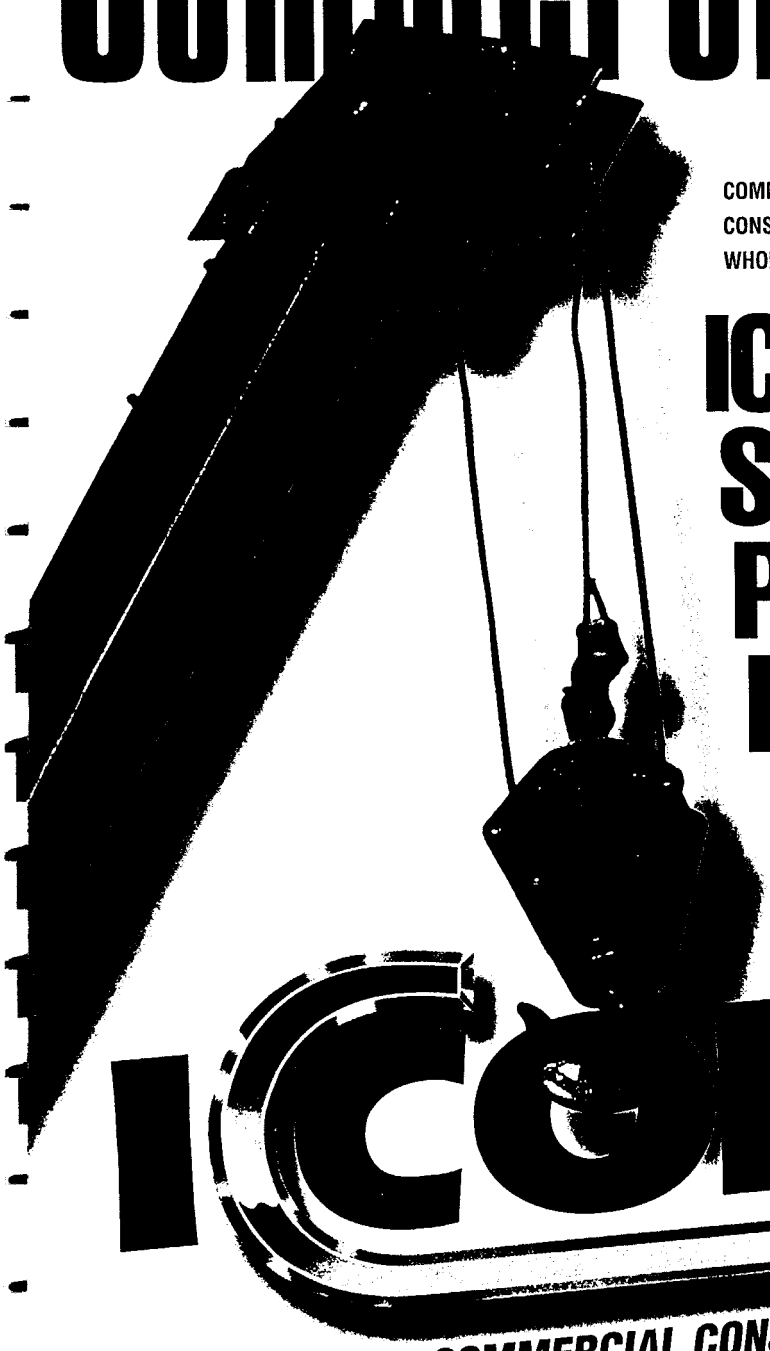

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FEATURED INSIDE: "ICCON EDUCATION PROGRAMS"

Commercial High Performance Buildings

By Michael J. Crosbie, Ph.D., RA

If you wanted to target a single building type in the U.S. to reduce energy consumption and promote sustainable design and construction, commercial buildings would be a good (if not the best) place to start. Commercial buildings today have become the preeminent workplace, and their load on our energy consumption is substantial. There is a growing interest today on the part of building owners, facilities managers, architects, engineers, and others in the construction industry to design and construct commercial structures get the most out of the least.

WHAT ARE HIGH-PERFORMANCE BUILDINGS?

Unlike cars, a high-performance building doesn't go from zero to 60 mph in five seconds. One abbreviated definition of a high-performance commercial building is one that is energy efficient, has low short-and long-term life-cycle costs, is healthy for its occupants, and has a low impact on the environment.

High-performance building design is an all-inclusive philosophy, and such buildings are often the products of a team approach to the design of the building. Many of the design and construction team members are involved, as early as possible, in the design of the building and its various systems. This design team should include not only the architects, engineers, occupants and owners, from the project start, but also specialists in indoor air quality, materials, energy, costs, etc. One technique to arrive at consensus among these different building specialists is to have a peer review early in the design process, in which experts and other people with interest in the project meet for a one- or two-day critique of the preliminary design.

Another aspect of high-performance buildings is that the design should take into consideration the interaction of the whole building structure and systems, and its context. The idea of looking at the "whole building" as an interrelated system grew out of the recognition that past research into isolated building components did not take into account how individual systems affect other systems. For example, a building that uses extensive daylighting techniques will reduce the amount of heat given off by lighting fixtures, thus allowing a smaller air conditioning system to be used. This whole building philosophy includes site characteristics, energy issues, material issues, indoor air quality issues, indoor environmental-quality issues, and natural resource issues, and how they are all interrelated. One way to balance these many issues is to use a building rating system such as the U.S. Green Building Council's LEEDTM (Leadership in Energy and Environmental Design) Green Building Rating System (the subject of another article in this issue). LEEDTM is a comprehensive rating system that helps the designer wade through the numerous whole-building issues. LEEDTM focuses on sustainable sites, water efficiency, energy and atmosphere issues, materials and resources, and indoor environmental quality. The building then receives a LEEDTM score.

The design and construction of a high-performance commercial building also takes into consideration how the facility will perform over the long term. Life-cycle maintenance costs, durability, energy usage, affect on the occupants and the environment, etc. are analyzed. Although the buildings presented in this article tend to be large, one is only 10,000 square feet. The principles of whole-building design and construction can be applied to commercial building of any size, small as well as large.

HIGH-PERFORMANCE BENEFITS

High-performance buildings have many benefits for the owner, the occupants, and the environment over buildings designed and constructed according to "standard" practices. Long-term maintenance costs and annual energy costs are lower. Building occupants and visi-

tors enjoy a healthier interior environment. Worker productivity can improve with better lighting and a more comfortable indoor atmosphere. In terms of real-estate economics, a high-performance commercial building can help attract desirable tenants.

IDENTIFYING HIGH-PERFORMERS

In an effort to promote high-performance commercial building design and construction, the U.S. Department of Energy (DOE) recently launched the Commercial High-Performance Buildings Project as part of its Commercial Whole-Building Roadmapping initiative. The purpose of this project is to raise the awareness of owners, developers, facilities managers, architects, engineers, and contractors of innovative concepts using comprehensive systems engineering approaches that increase the quality and efficiency of commercial buildings while reducing their costs and environmental impacts.

One of the first priorities of the Commercial High-Performance Buildings project is to assemble a database of such buildings, which is now available through a project website (http://www.eren.doe.gov/buildings/highperformance/chp/). The database currently has approximately 100 buildings from around the country, that exhibit high performance qualities, such as energy efficiency, environmental sustainability, superior quality, and cost effectiveness. The case studies included in this article are taken from the database. In an effort to expand the database, nominations are invited for including new buildings. Readers can contact this article's author, or nominate buildings on the project's website.

Future plans for DOE's Commercial High Performance Buildings Project include taking commercial projects in the early stages of design and development and applying high-performance design and construction principles. Clients, developers, architects, or others involved in the initial stages of a commercial building project, who believe that their project may be a good candidate for this program can contact the authors of this article for further information.

COMMERCIAL HIGH-PERFORMANCE BUILDING PROFILES

The following are some examples of buildings with high performance attributes. They cover a range of regions, construction types, materials, size, and functional demands. What they have in common is an approach to design and construction that has resulted in a building that contributes to energy efficiency, sustainability, and returns for the client and owner in terms of reduced life-cycle costs.

Four Times Square

Location:
Northeast corner of Broadway and 42nd Street in New York, New York. The site is adjacent to times square and within the midtown business district.

Occupancy/Use:
Speculative office building.

Building Construction/Type:
48-story, 1.6 million square feet. The facade is a glass, metal, and masonry curtain wall.

Selected Energy Efficiency Features:
Two fuel cells were installed in the building to meet virtually all of the night-time electrical demand. Photovoltaic panels were installed in the curtain wall, on the southern and western sides, as a supplemental energy source. Gas-fired absorption chiller/heaters were used and variable speed drives were installed on pumps, fans, and motors. A high-performance low-e glass curtain wall with oversize windows was chosen to enhance energy efficiency, ultra violet ray reduction, and daylighting. Boosted levels of insulation were placed on all opaque horizontal and vertical external assemblies. Exit signs with L.E.D. bulbs were installed throughout. Energy-efficient lighting was integrated with occupancy sensors and central controls. An

energy analysis indicated a 30% savings over typical good design and even more over New York State code minimum.

Selected Environmental Features: Environmentally friendly building materials. There is floor-by-floor air quality monitoring/control and purge systems, and 50% more fresh air than required by code is provided. There is a filtration system for air pollutants, an additional exhaust shaft for smoking/fumes & heat, and environmentally friendly building maintenance. Recycling and resource conservation attributes are as follows: part of an existing building footing was re-used; hat truss and concrete core structures reduced the amount of structural steel needed; recycled content and recyclable materials used throughout; sustainably harvested wood; low water-use equipment; waste chutes were installed for tenant produced recyclables; waste management and recycling plan for construction and demolition; and recyclables storage areas were provided. Non-ozone depleting, non-CFC & HCFC absorption equipment was installed. On the management side, the building will have a centralized, automated building management system. The tenants will receive written guidelines to encourage them to choose finishes & furnishings with low VOCs/other toxins and high recycled content, acquire energy efficient lighting and equipment, use space planning for natural light penetration and flexibility, effectively use the building HVAC systems for better comfort/indoor air quality and energy use.

Architect:
Fox & Fowle Architects

Foundation Engineer:
Mueser Rutledge Consulting Engineers

HVAC & Lighting Engineer:
Cosentini Associates

Energy Analysis:
Steven Winter Associates, Inc.

Photovoltaic Consultant
Kiss + Cathcart:

Consulting Engineer:
Flack + Kurtz Consulting Engineers, LLP

Interior Consultants:
Image & Ecology, Henderson & Associates

General Contractor:
Tishman Construction

Recycling Consultant:
Pamela Lippe

Owners/Developers:
Durst Organization

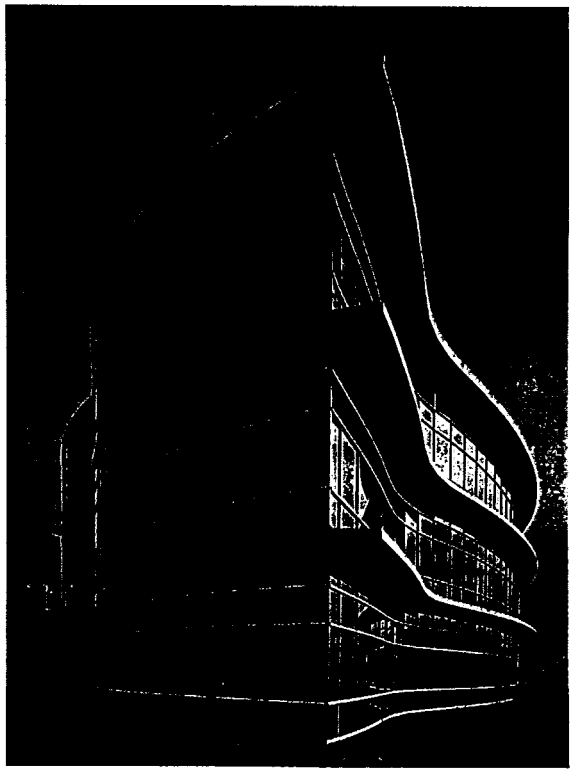
Owens Corning World Headquarters

Location:
Toledo, Ohio, on an peninsula bounded by Swan Creek and the Maumee River, directly adjacent to the heart of Toledo's business Center.

Occupancy/Use:
Corporate headquarters office building.

Building Construction/Type:
Three-story, 400,000 square feet. The facade is a glass and metal curtain wall.

Selected Energy-Efficiency Features:
High-performance low-e and light reflective glazing with a ceramic frit reduces heat gain on the interior, helps maintain high visible daylight transmittance into the space, while the frit provides integrated shading into the glass assembly. Optimized use of glass in skylights, clerestories, and three-story atrium provides generous amounts of natural light, contributing to lower lighting demand, and bright, productive atmosphere. Raised underfloor HVAC duct runs reduce cooling costs through efficient air distribution; each workstation has an adjustable floor supply vent for individual comfort modulation; efficient diffuser layouts are modular and flexible; the system also has the added bonus of flexible wire management. Efficient lighting sources include dimming availability for high-efficiency fixtures, which reduce energy consumption and operating costs. A building automation system contributes to energy conservation as well.



Variable speed fans allows fan speed and use to respond to actual loads, not just "average" calculated loads, which reduces energy consumption and related costs.

Selected Environmental Features:
Low-scale building allows the elimination of elevators, with emphasis on stairways for internal building circulation. Reusable office furnishing systems virtually eliminate tear-down and disposal of building materials when office configurations change. An outside air economizer is installed with compact rooftop high-efficiency units that improve indoor air quality though a filtration system. Native plants used for easy maintenance, with minimal irrigation and pesticides required. Yearly burn-back of ground cover eliminates the need to mow or fertilize. Paperless office design reduces paper use by 60%. Outdoor courtyard spaces include a running track, with a wildlife refuge on-site. Recycling programs and close proximity to urban mass transit systems.

Design Architect:
Cesar Pelli & Associates Architects

Architect-of-Record:
Kendall/Heaton Associates, Inc.

Structural Engineers:
CBM Engineers

MEP Engineers:
Cosentini Associates

Civil Engineers:
Avea Corporation

Interior Design:
Harley Ellington Design

Landscape Designer:
Balmori Associates, Inc.

General Contractor:
The Lathrop Company

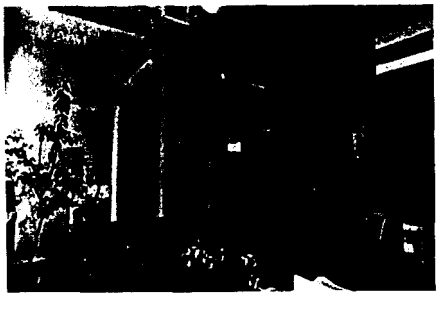
Owners/Developers:
Owens Corning

CCI Center

Location:
South Side neighborhood in Pittsburgh, Pennsylvania, on an urban site.

Occupancy/Use:
Headquarters office for Conservation Consultants, Inc., and various local resource conservation organizations.

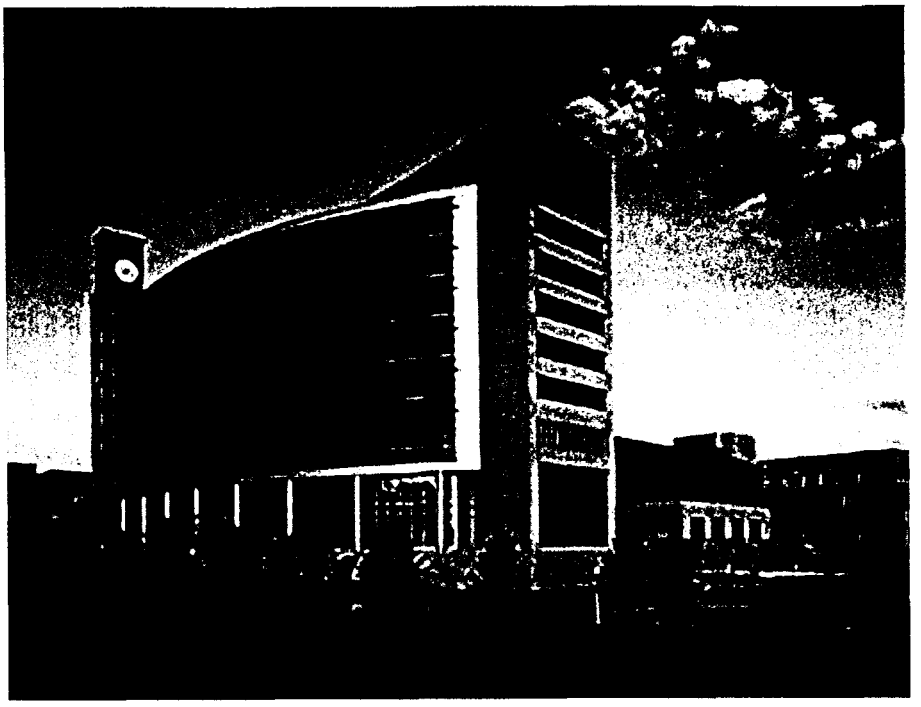
Building Construction/Type:
Adaptive reuse of a three-story 1910 brick building, recycling as much of the original materials as possible, and construction of a new steel-frame and masonry-clad two-story structure, for a total of 10,000 square feet.

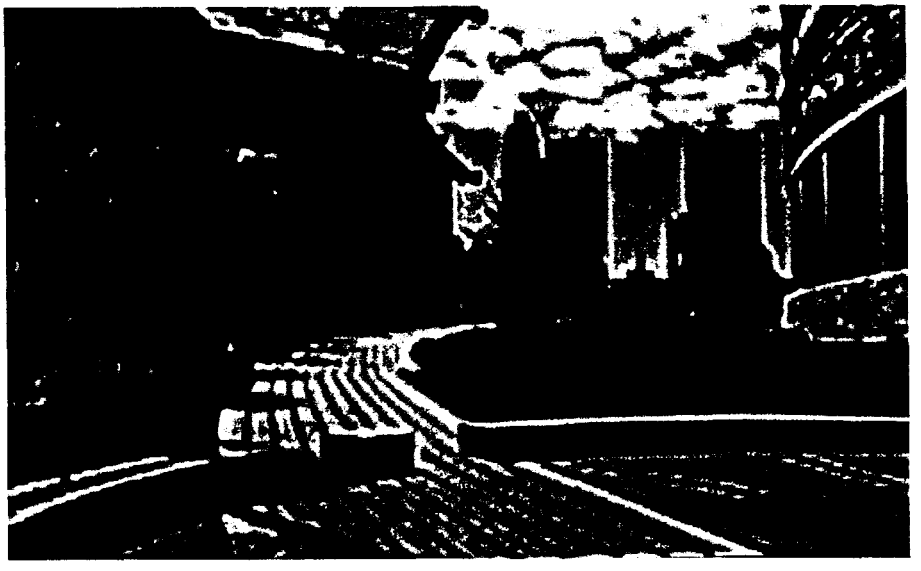


Selected Energy Efficiency Features:
The client, architect, engineer, and builder worked together from the beginning of design through construction to ensure that every opportunity for recycling, energy conservation, and waste reduction was identified and could be incorporated into the design. 2.2 KW of photovoltaic cells installed on the terrace roof and roof-top garden provide enough power run the CCI Center's computer system and shade southern windows to minimize heat gain. Energy generated from the photovoltaic array is being tracked and used in a Solar Energy Education program for Western Pennsylvania. Energy-efficiency strategies used throughout the building have resulted in an estimated annual savings of $12,000. Energy usage is estimated to be 40% of that of a typical office building of comparable size. Insulation levels were increased using environmentally benign Airkrete and dense-packed cellulose, resulting in R-24 walls, and ceilings and roofs of R-38 and R-70. Exposed interior brick walls provide thermal storage mass. Light-colored roofing tiles reflect sunlight and reduce cooling loads. Extensive daylighting, provided through R-6 double-pane, argon-gas-filled, operable windows reduce heat loss and heat gain while reducing ambient lighting requirements. Task lighting decreases the needed ambient light level, which is provided by T-8 fluorescent lamps with electronic ballasts. Half the building is heated and cooled by a gas-fired York

Triathalon units that use more efficient, environmentally cleaner natural gas; the other half of the building is conditioned by Robair units, with similar efficiency. Exposed duct work throughout the building eliminates heating and cooling losses to the plenum, as conditioned air leaks into conditioned spaces.

Selected Environmental Features:
Recycled, salvaged, and non-toxic materials are used throughout the project. A construction waste demolition and salvage program ensured that the waste stream from the building and associated construction activity was minimized. Brick left from construction is used to pave the first floor garden and a walkway at the building entrance; the remainder was given to a salvaged materials warehouse and resale center. Wood and brick from the demolished section of the existing building was used in the renovation. Interior windows were salvaged from other demolished buildings and installed with recycled wood frames. Original pressed metal ceilings and hardwood floors were retained and refinished. Carpets were salvaged from a job over-run and applied with non-toxic adhesives. Agriboard, a structural panel made from agricultural waste straw and oriented strand board, was used for some ceilings. Forbo Marmoleum, a non-toxic linoleum made from linseed oil, limestone, cork flour, pine rosin, wood flour, jute, and organic pigment (all natural and renewable materials) was used throughout the first floor. Forbo flooring waste was given to the Western Pennsylvania Conservancy to be ground and used as mulch for community gardens. Finish for wood floors is citrus- based and non-toxic. Low-VOC paint was used throughout. Low-flush toilets and efficient faucets are used for water conservation. The building has a recycling program for glass, plastic, office paper, paperboard, and corrugated cardboard.





Architect:
TAI + LEE Architects

HVAC & Lighting Engineer:
Lyle Rawlings, PE

Owners/Developers:
Conservation Consultants, Inc.

Federal Reserve Bank of Minneapolis

Location:
An 8.2-acre urban site in downtown Minneapolis, Minnesota, next to the Mississippi River, known as the Bridgehead site.

Occupancy/Use:
Administrative and economic research center for the Federal Reserve Bank's ninth district.

Building Construction/Type:
Eight-story office tower of curtain-wall construction, a four-story operations center, and a 152,000-square-foot parking structure, for a total of 777,000 square feet. Stone, brick, glass, and steel are the predominant materials.

Selected Energy-Efficiency Features:
Windows are triple- glazed units with two low-e films and argon gas in both cavities, delivering an R-7.6 value. The additional cost of the glass was offset by the lack of need for most of the perimeter radiation units, which resulted in a net reduction in the building's overall capital cost and reduced its long-term energy use. All light fixtures are high-efficiency units, most controlled by occupancy sensors. Many common-area lights are on "time of day" controls to supplement natural light at the beginning and end of the day. All lighting is controlled and monitored by a central control system, which resulted in 0.85 watts/sf connected and 0.65 watts/sf projected actual lighting load (ASHRAE 90.1 permits up to 2.5 watts/sf). When outside temperatures are less than 55°F, cooling is provided by outside air economizers for a "free" cooling system. This reduces chilled water demand on the Minneapolis Energy Center (MEC), which supplies chilled water for cooling. To minimize outside air intake leakage, low-leak, minimum outside air dampers are provided at air-handling units. Steam provided by MEC is converted to hot water at the building entry and then distributed to air-handling units and other heating systems. Steam condensate return is routed through a water-to-water heat exchanger, extracting and transferring heat to preheat incoming ventilation air, before returning the heater water to MEC. Variable frequency drives (VFDs) are used on most air-handling units and pumping systems, and all systems have high-efficiency motors. Temperature control and building energy management is performed through a computer-based system, which maximizes efficiency. The parking garage has a carbon monoxide monitoring system to provide ventilation as required, reducing overall energy consumption. Water heaters for the kitchen and fitness center are high-efficiency gas-fired units. Restrooms and galleys on typical office floors use small, self-contained electric water heaters.

Selected Environmental Features:
Materials for all site paving, structures, and interpretive displays were selected based on an analysis of whether the original source was sustainable, the material's embodied energy, and whether the materials were recyclable. Plumbing fixtures are low-flow; water closet flush values have automatic on-off controls. Showerheads have water restrictors to reduce consumption. Building materials were selected that have reduced chemical emissions, such as low-VOC paint, adhesives, and finishes, and formaldehyde-free wood products. Building materials were selected based on the sustainability of the original source, the product's recycled content, the recyclability of the product at the end of its life, and the product's effect on indoor air quality. The materials selected enhance durability, require less maintenance, and come primarily from local sources. All wood in the building comes from certified sustainable sources. Construction waste was subcontracted to a local recycling company that used the local recycling industry. The majority of refuse was separated off-site and recycled to produce a recycling rate of approximately 70%, with a decrease of over-all construction costs.

Architect:
HOK Architects, Inc.

Structural Engineer:
Siebold, Sydow & Elfanbaum

HVAC & Lighting Engineer:
Michaud Cooley Erickson Consulting Engineers

Interior Consultants:
HOK (public spaces);
Walsh Bishop (office spaces)

General Contractor:
McGough Construction Co.

Owners/Developers:
Federal Reserve Bank

Michael J. Crosbie *is an associate at Steven Winter Associates, Inc., in Norwalk, Connecticut, and SWA's project manager for the Commercial High Performance Buildings project. He can be reached at mcrosbie@swinter.com.*
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Industry News

Continued from page 49

electricity within six months of groundbreaking for the project.

Finally, the icing on the cake—wind energy also helps prevent smog and global warming. California's natural gas-fired power plants emit sizable quantities of nitrogen oxides (NO_x), a primary component of smog, and of carbon dioxide (CO_2), the most important greenhouse gas associated with global warming. Wind plants generate electricity without any emission of air pollutants or greenhouse gases.

For more information, contact Christine Real de Azua, Communications Coordinator, American Wind Energy Association, 122 C Street NW, Washington D.C. 20001, (202) 383-2508, FAX (202) 383-2505, e-mail: christine@awea.org, web site: www.awea.org.

High Performance Commercial Buildings

The U.S. Department of Energy (DOE) is creating a Commercial High Performance Buildings project to increase the energy efficiency of commercial buildings. The effort, a joint partnership between the private sector and DOE, will also focus on improving the utility, comfort, quality and cost-effectiveness of commercial buildings. Steven Winter Associates, Inc. is managing the project.

The project will identify and publicize innovative "whole building" approaches that increase the quality and efficiency of commercial buildings. Architects who subscribe to the whole buildings approach consider the structure as a complete system rather than as a collection of independent components. This can have significant effects on design and construction, resulting, for example, in a smaller, more efficient and less costly heating and cooling system. DOE and its partners are inviting participation by building industry representatives and allied groups on a national basis.

For more information, contact Michael J. Crosbie at Steven Winter Associates, 50 Washington Street, Norwalk, Connecticut 06854, (203) 857-0200, ext. 210, e-mail: mcrosbie@swinter.com, web site: www.eren.doe.gov/buildings/highperformance/. ○

BUILDING BLOCKS

Seminars/Courses

STATISTICS IN STANDARDS DEVELOPMENT—GETTING TO PRECISION AND BIAS

American Society for Testing and Materials (ASTM)

April 13-14
West Conshohocken, Pennsylvania

May 9-10,
Washington, D.C.

May 23-24
Denver, Colorado

For information, contact Eileen Finn, ASTM, (610) 832-9686, fax (610) 832-9668, e-mail efinn@astm.org, Web site www.astm.org.

COMMISSIONING OF HVAC SYSTEMS AND RELATED COMPONENTS

University of Wisconsin-Madison Department of Engineering Professional Development

April 10-14
Madison, Wisconsin

For information, contact Katie Peterson, (800) 462-0876, fax (608) 263-3160, e-mail custserv@epd.engr.wisc.edu, Web site www.epd.engr.wisc.edu/.

THE ENVIRONMENTAL COMPLIANCE BOOTCAMP

Government Institutes Division

April 3-7
New Orleans, Louisiana

For information, contact Jesus Ferro at Government Institutes Dicision, (301) 921-2345, Web site www.govinst.com.

Call for Entries/Presentations

BETEC SYMPOSIUM ON SUSTAINABLE BUILDING ENVELOPE MATERIALS

Building Environment and Thermal Envelope Council—National Institute of Building Sciences (NIBS)

June 7
Washington, D.C.

The symposium will address the environmental characteristics of available building envelope materials and examine new "green" materials. Topics will also present emerging technologies, installation techniques, economic analysis, and code enforcement. Send a 200-300 word abstract to Andre Desjarlais, Oak Ridge National Laboratory, fax (865) 574-9354, e-mail yt7@ornl.gov. Deadline is March 10.

FORM + FUNCTION

Promoting High-Performance Buildings

The U.S. Department of Energy (DOE) has formed the Consortium for High-Performance Buildings in an effort to raise awareness of technical innovation in commercial buildings and to encourage such innovation. The focus of the new project is to improve the energy efficiency of commercial buildings while reducing their impact on the environment. One strategy is to raise the utility, comfort, quality, and cost-effectiveness of commercial buildings through an integrated, "whole building" approach. Whole building design puts an emphasis on the interactions between elements such as siting, building envelope, HVAC, lighting, and glazing, which are exploited to yield large energy savings and high performance.

The new project is part of DOE's Commercial Whole Buildings Roadmapping initiative. According to DOE, the roadmap process involves three phases: visioning, roadmap development, and implementation. In the first phase, representatives from different fields in the building industry identify long-term needs and goals that reflect the impact of the market, technology, and codes/standards. In the second phase, representatives determine what specific research and development activities should be undertaken to turn the vision into reality—developing the roadmap. The third and final phase is implementing the plan.

The new consortium is part of DOE's research and development effort to identify exceptional commercial buildings and to raise awareness of their design, construction, and performance. Plans include a Web site that will present case studies of high-performance commercial buildings. An advisory group made up of industry representatives from architecture, construction, real estate, material/equipment producers, utilities, and research centers will oversee the consortium's activities. ■

Remodeling On the Upswing

Although housing starts are expected to decline somewhat from the 1999 level, remodeling is expected to be stronger than last year. The National Association of Home Builders (NAHB) said last fall that it expected residential improvements and repair to reach $128.4 billion in 2000, from $126.7 billion last year.

A later report by Randall Publishing stated that its survey of more than 2,000 contractors revealed 70 percent of them believed 2000 would be a better year than 1999, with 14 percent believing they will see business increases of more than 8 percent, and 39 percent seeing increases of 4 to 8 percent.

There are many reasons why remodeling and upgrades are hot at the moment and expected to stay strong for the foreseeable future as long as the economy stays on track. One is the

and an additional $275 million in private equity capital, all for distressed urban and rural areas. The money is meant for larger-scale businesses in inner cities and rural areas. It will go to large investment partnerships formed by private investors such as banks and pension funds that will invest in the new companies. APICs will be funds of no less than $25 million eligible for twice their sums in additional government guaranteed loans made by private lenders. For example, if $50 million is raised privately, twice that amount can be added to the fund creating a $150 million fund. Program proponents are looking to stimulate large projects to help employment and business in affected areas.

In addition, HUD secured $70 million for the second round of the Empowerment Zones (EZ) Initiative. EZs are designated zones that receive significant federal tax incentives as well as direct federal, local, and private funding for economic development. The first round of the EZ Initiative stimulated $8 billion in private-sector investment. Round II Urban EZs have already been identified in Boston, Cincinnati, El Paso, Knoxville, New Haven, Santa Ana, and other cities. The Department of Agriculture designates EZs in rural areas.

HUD is also continuing its "brownfields" efforts. The work involves recycling moderately contaminated commercial or industrial parcels in urban areas. By cleaning them, they can be used to revitalize surrounding neighborhoods. The agency recognizes 450,000 such sites.

The agency also takes pride in its work assuring that the aging population has sufficient housing. The agency budget includes $710 million for a Continuum of Care. Part of the effort includes more work on reverse mortgages that would allow seniors to stay in their homes. Another part is $660 million for the agency's Section 202 program for senior housing. This Continuum of Care strategy recently won a Harvard University Kennedy School of Government Innovations in American Government Award.

PEOPLE & FIRMS

Making changes. St. Louis-based A/E/C firm **Kennedy Associates Inc.** established a new corporation, **KAI Construction Services Division,** early this year. The firm offers construction management, program management and design/build services.

New York City-based A/E **HLW International LLP** has restructured, creating **HLW Services Group LLC** — which includes HLW Design/Build, HLW Resources and HLW Strategies — to expand their services beyond traditional A/E offerings.

San Francisco, Calif.-based **Gensler** opened an office in Seattle. Linda Moriarty, a Gensler principal, is in charge of the office.

Ghafari Associates Inc., an A/E firm based in Dearborn, Mich., has formed a manufacturing engineering team that will provide industrial engineering, material handling, logistics, plant layout and manufacturing process engineering services to automotive and manufacturing clients. James Zare will lead the team.

On the move. Robert D. Cavigli is the new president of Omaha, Neb.-based **HDR Architecture Inc.**

New York City-based **Swanke Hayden Connell Architects** named Joseph J. Aliotta principal. Howard Leist, Philip Fishel and Alex Badalamenti are associate principals. All are based in the New York City office.

Los Angeles-based A/E firm **AC Martin Partners Inc.** named Kenneth Lewis president.

Treasurer David H. Gibbs of **Owen-Ames-Kimball Co.,** a Grand Rapids, Mich.-based contracting, design/build and construction management firm, is president-elect of the Construction Financial Management Association for 2000-2001.

Madison, Wis.-based **Flad & Associates** named Dave Provencher senior associate of the firm.

Michael D. Phillips is now president of Salt Lake City-based **Union Pointe Construction Corp.**

Longwood, Fla.-based **DCC Constructors Inc.,** a construction services firm, named David W. Scott president and CEO. Former President John A. Jones becomes vice chairman. ■

High-performance buildings touted as part of "whole buildings" concept

Increasing the energy efficiency of commercial buildings is the object of the U.S. Department of Energy's (DOE) Commercial High-Performance Buildings project, a public-private initiative that also focuses on improving the utility, comfort, quality and cost-effectiveness of commercial buildings.

"Thirty-two percent of the electricity generated in the United States goes to heat, cool, ventilate and light commercial buildings," said Secretary of Energy Bill Richardson. "The actions we are taking to decrease building energy use will save businesses money and reduce the impact ... on global climate change."

The project, part of the DOE's Commercial Whole Buildings Roadmap initiative, will publicize "whole building" approaches — where the building is considered a system, rather than a collection of independent components — that are shown to increase the quality and efficiency of buildings.

Candidate projects should be commercial structures that are recently completed or under construction. Submissions may be sent to Steven Winter Associates Inc., 50 Washington St., Norwalk, Conn. 06854, attention Jose Higgins, and should include a brief description of the building and its square footage, material specifications and energy efficiency and sustainability features. ■

Corrections

U.S. Secretary of Education Richard Riley was inaccurately quoted in the June news story about the AIA convention. He said no school should have an enrollment of more than about 600 students.

The June feature article on the Precision Components International industrial project omitted the names of Dr. Yair Raz, project manager for the owner, and Macy O. Teetor III, who was retained as an independent project manager.

ARCHITECTURE

Essentially, any user can navigate through the Web site and find their community of interest at the travel analysis zone (TAZ) level, which can be nearly identical to a census tract. From there, with inputs of household income, available down payment, interest rate, and household size, the user sees how much of a home they can purchase in this neighborhood. The site also allows the user to compare maximum loan amounts between the Location Efficient Mortgage and the conventional lending formula.

The Location Efficient Mortgage Versus Other Mortgage Products

There are dozens of mortgage designs from which a lucky borrower can choose. For those borrowers who find themselves hoping to live in an urban environment but just shy of qualifying for a standard loan, this unique underwriting structure is the solution to their particular dilemma. The research partners are pleased that the mortgage is a market-based product, meaning that there are no subsidies attached, no special pools of public money involved, and no income restriction. The success of the Location Efficient Mortgage is correlated to the demand for housing in compact, transit-served neighborhoods. We hope that with this product available in the marketplace consumers will choose more livable communities over living on the urban fringe.

The Commercial High Performance Buildings Project

Michael J. Crosbie, Associate, and William José Higgins, Architect

Steven Winter Associates, Inc.
50 Washington Street
Norwalk, CT 06854
www.swinter.com

The Commercial High Performance Buildings project is part of the U.S. Department of Energy's (DOE) Commercial Whole-Building Roadmapping initiative. The purpose of the program is to demonstrate and publicize innovative concepts using comprehensive systems engineering approaches that increase the quality and efficiency of commercial buildings while reducing their costs and environmental impacts. (According to Energy Information Administration estimates, commercial buildings use approximately one-sixth of all the energy in this country.) The idea of looking at a building as

an interrelated system grew out of the recognition that past research into isolated building components did not take into account how individual systems affect other systems. For example, a building that uses extensive daylighting techniques will reduce the amount of heat given off by light fixtures, thus allowing a smaller air-conditioning system to be installed. Studies that focused on, for example, HVAC efficiency would have missed this relationship.

The High Performance Building project is made up of a core advisory group, which will be involved throughout the life of the project, as well as building-specific satellite groups. The core group is composed of a wide range of professionals in the architecture, engineering, construction, materials manufacturing, government, and publishing fields. The project's current activities focus on publicizing noteworthy commercial buildings in the media, in live presentations at conferences, and on the Internet, at www.eren.doe.gov/buildings/highperformance.

One of the program's first priorities was to assemble a database of high performance buildings that will be available through the Web site and publicized in a variety of forums. The database currently details some 100 buildings from around the country that exhibit high performance qualities such as energy efficiency, environmental sustainability, superior quality, and cost effectiveness. Later activities will include contributing to the design, construction, and

evaluation of exemplary commercial buildings through early participation in the development process.

What is a High Performance Building?

No, high performance buildings don't go from zero to 60 miles per hour in five seconds. An abbreviated definition for "high performance buildings" could be those that are energy efficient, have low short- and long-term costs, are healthy for their occupants, and have a low impact on the environment.

Achieving these goals, however, involves more than simply meeting cost and efficiency requirements. A high performance building design is an all-inclusive philosophy. First, there must be a team approach to the design. This design team should include not only the architects, engineers, and owners, but also the future building occupants and specialists in indoor air quality, materials, energy, costs, etc. With so many parties involved, reaching consensus can be difficult; one solution is to have a peer review early in the design process, during which the experts and other people involved in the project get together for a one-day or two-day critique of the preliminary design. Second, regarding design, the interaction of the whole building structure, its systems, and its context should be considered. This whole building philosophy should include site issues, energy, materials, indoor air quality, indoor environmental quality, and resources, and how they are all interrelated. Third, a

high performance building considers how the facility will perform over the long term. The life-cycle maintenance costs, durability, energy usage, and effect on the occupants and the environment must all be analyzed.

The Benefits of High Performance Buildings

High performance buildings have many potential benefits over conventional ones for the owner, occupants, and the environment. Long-term maintenance costs and annual energy costs are lower. Building occupants and visitors enjoy a healthier interior environment. Worker productivity can improve with better lighting and a more comfortable indoor atmosphere. A high performance building can help attract tenants. The building will be a better neighbor and will have fewer negative impacts on the natural environment.

Paths to High Performance Buildings

One way to help define a high performance building is to use a building rating system such as the U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating System. LEED is a comprehensive rating system that helps the designer wade through the numerous issues involved in creating a high performance whole building. LEED focuses on sustainable sites, water efficiency and energy efficiency, materials

and resources, and indoor environmental quality.

Another helpful program is EPA's Energy Star label for buildings, which covers energy consumption and some of the indoor environment. It provides a Web-based benchmarking tool that can show where a building stands in comparison to similar buildings nationwide. The user inputs the building's physical attributes, operating characteristics, and energy consumption and then receives a score of 0 to 100. A score of 75 means that the building is more efficient than 75 percent of similar buildings in the U.S. and is thus entitled to the Energy Star label.

The Federal Energy Management Program (FEMP) is a DOE program for federal buildings to reduce energy and water use, manage utility costs, and promote renewable energy. The many FEMP resources include analytical software tools, a building commissioning guide, descriptions of federal "greening" projects, renewable energy information, the SAVEnergy Program, and water conservation information.

How to Participate

The first way to participate in the Commercial High Performance Buildings program is to alert the project management team, Steven Winter Associates, about high performance buildings that you have been involved with. Another is to present proposed high performance buildings, early in the planning stage, to Steven Winters Associates in order to obtain technical

support. Finally, architects and designers can join the U.S. Green Building Council (www.usgbc.org) and become involved in the LEED Green Building Rating System, which will help clarify the whole building design approach and help create valuable tools for creating high performance buildings.

The AIA's Sustainability Resolution

Sara Malone, Editor

The American Institute of Architects
1735 New York Avenue NW
Washington, DC 20006
www.aiaonline.com

Architects are pivotal to the creation of a sustainable society, one that can extend far into the future without exhausting its key resources. The American Institute of Architects has long recognized the effect of architecture on the environment, and it reconfirmed its commitment to sustainability at its 2000 Convention in Philadelphia.

During the convention, members overwhelmingly approved a resolution to "acknowledge sustainable design as the basis of quality design and responsible practice for AIA architects and, therefore, to integrate sustainable design into AIA practices and procedures."

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LIFECYCLE ASSESSMENT MEASURE HOMES' IMPACTS
Siegel & Strain Architects may be one of the few designers of green residential buildings who have attempted to measure how much better their green homes are. For the Emeryville Resourceful Building, a three-unit residential project on a 5,500-square-foot lot in the San Francisco area, they calculated the costs and environmental impacts of building assemblies such as walls, roofs and floors, comparing conventional to green assemblies. All assembly components underwent lifecycle assessment using a computer simulation program developed by Boustead Consulting & Associates to calculate air and water emissions, solid-waste generation, and embodied energy. Using a systems engineering approach, each possible material was programmed in to determine its effect on building performance and cost. Each material's lifecycle impacts were also examined, including resource extraction, manufacture, transport, product life, and disposal. The final analysis identified measurable environmental performance differences between products and assemblies and showed which materials have environmental benefits or disadvantages. Based on this information, the architects selected an exterior wall assembly that included cement-fiber cladding, R-19 cellulose insulation, and sustainably harvested wood studs placed 24 inches on center. This assembly cost $5,000 more than a conventional assembly, but had a 36 percent lower gross energy requirement, according to the lifecycle assessment. -- Home Energy, Mar-Apr 00, p 39, by Nancy Malone.
[More: <http://www.siegelstrain.com/> and <http://www.boustead-consulting.co.uk>]

INTEGRATED DESIGN INFORMS HISTORIC BUILDING RENOVATION
A new program launched by the US Department of Energy--the Consortium for High Performance Buildings (CHPB)--identifies and promotes existing commercial buildings that are models of energy efficiency, sustainability, superior quality and cost effectiveness. One of CHPB's first buildings, a renovation project for the Administration for Children's Services Center in New York City, adhered to CHPB's tenets by employing lifecycle cost analysis, sound building material selection, and detailed computer modeling using DOE-2.1E. This energy-performance simulation program enabled an informed approach to the integration of glazing, insulation, lighting and HVAC. Constructed in 1912, the six-story, 116,740-square-foot building is listed on the National Register of Historic Places. Taking advantage of the original design's large floor-to-ceiling heights and expansive windows, the design team maximized natural light by incorporating clear, argon-filled double-pane glazing, continuous daylight dimming controls, and interior light shelves. A foamed-in-place magnesium silicate—a lightweight cementitious material that is fireproof and offers excellent insulation—augments the existing shell. The mechanical system includes a variable-air-volume system with variable-speed drive, perimeter fan-coil units and run-around loop glycol heat-recovery devices. Since the design team had to use the historic building's existing shafts, the heat-recovery system became distributed in nature and needed more coils than originally planned for when a centralized ventilation shaft was envisioned. The building's combined energy-efficiency strategies have a simple payback of 7.6 years. Annual energy costs are expected to be 33 percent lower--the equivalent of almost $100,000--than comparable state of New York facilities that merely comply with existing codes. – Consulting-Specifying Engineer, Feb 00, p 24, by Adrian Tuluca, Devashish Lahiri and Ian Graham.
[Full text: http://www.buildingteam.com/applic/articles/c00b024.asp]

RFQ ISSUED FOR RESPIRATORY-FRIENDLY BUILDING
The American Lung Association of Colorado is seeking proposals from architects for the design of an innovative office building that integrates respiratory-friendly, daylighting, energy-saving, and other green

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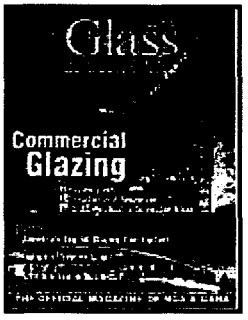

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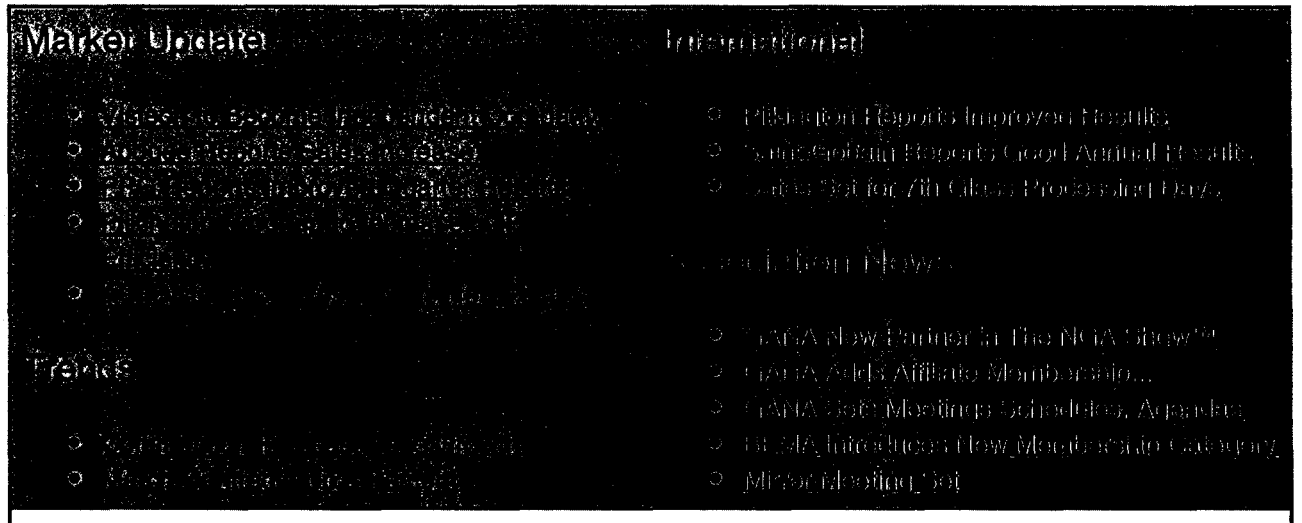

Market Briefs

• **C.R. Laurence Co., Inc.**, is opening a new distribution facility in Richmond, BC, that will serve its customers in western Canada. Current branch operations in Port Coquitlam, BC, will be moved to the Richmond location. The 30,000-square-foot facility features state-of-the-art shipping equipment and computer systems for quick UPS delivery to Canadian customers, the company reports.

• **Action Hardware**, the Charlotte, N.C., based wholesaler and distributor of door hardware and accessories, is under the new ownership of Joe DePaola and Joe Fontanella. The company's sales and stocking locations in Charlotte and Chicago, Ill., remain in place.

• **The Department of Energy** has announced plans to create a Commercial High Performance Buildings project to increase the energy efficiency of commercial buildings. The effort will focus on improving the utility, comfort, quality, and cost-effectiveness of commercial buildings by identifying and publicizing innovative 'whole building' approaches that increase the quality and efficiency of commercial buildings. Project submissions may be sent to Steven Winter Associates, Inc., 50 Washington St., Norwalk, CT 06854.

• **TruSeal Technologies, Inc.'s** Barbourville, Ky., plant has earned ISO 9000 registration, it reports. The 27-year-old facility is officially registered under the ISO 9002 standard, the current classification for product manufacturing and distribution.

• **InterEdge Technologies, LLC**, Sausalito, Calif., has signed a joint agreement with Belgian glass manufacturer Glaverbel to introduce its Pyrobel fire-rated glass product to the United States market.

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ARCHITECTUREWEEK
THE NEW MAGAZINE OF DESIGN AND BUILDING

Commercial High-Performance Buildings

by Michael J. Crosbie, Ph.D., R.A.

If you wanted to target a single building type in the United States to reduce energy consumption and promote sustainable design and construction, commercial buildings would be a good (if not the best) place to start. Commercial buildings today have become the preeminent workplace, and their load on our energy consumption is substantial. There is a growing interest today on the part of building owners, facilities managers, architects, engineers, and others in the construction industry to design and construct commercial structures to get the most out of the least.

What Are High-Performance Buildings?

In a nutshell, a high-performance commercial building is energy efficient, has low short-term and long-term life-cycle costs, is healthy for its occupants, and has a relatively low impact on the environment. In terms of real-estate economics, a high-performance commercial building can help attract desirable tenants. These principles of whole-building design and construction can be applied to commercial buildings of any size.

High-performance building design is an

all-inclusive philosophy, and such buildings are often the products of a team approach to the design of the building and its various systems. This design team should include not only the architects, engineers, occupants and owners, but also, *from the project start,* specialists in indoor air quality, materials, energy, costs, etc.

This design process also takes into consideration the interaction of the whole building structure and systems, and its context. In the past, research into isolated building components did not take into account how individual systems affect other systems. For example, a building that uses extensive daylighting techniques will reduce the amount of heat given off by lighting fixtures, thus allowing a smaller air conditioning system to be used. This whole-building philosophy considers site, energy, materials, indoor air quality, acoustics, natural resources, and how they are all interrelated.

One way to balance these many issues is to use a comprehensive building rating system such as the U.S. Green Building Council's LEED™ (Leadership in Energy and Environmental Design) Green Building Rating System. The building receives a LEED score based on these issues. (LEED was further described in ArchitectureWeek's "Greening" a Profession.)

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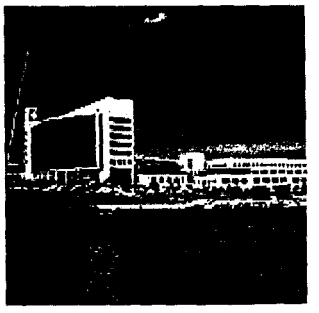
Commercial High-Performance Buildings

(continued)

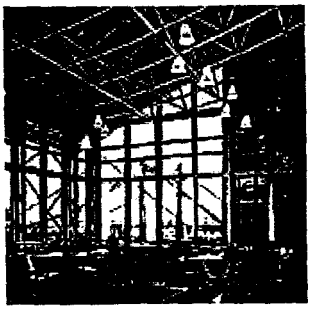
Another consideration is how the facility will perform over the long term: life-cycle maintenance costs, durability, energy usage, the effect on the occupants and the environment, etc.



The new Federal Reserve Bank consists of an eight-story office tower of curtain-wall construction, a four-story operations center, and a parking structure. Photo: Don Wong

Identifying High-Performers

To promote these design and construction practices, the U.S. Department of Energy (DOE) recently launched the Commercial High-Performance Buildings Project as part of its Commercial Whole-Building Roadmapping initiative. The purpose of this project is to raise the awareness of owners, developers, facilities managers, architects, engineers, and contractors of innovative concepts using comprehensive systems engineering approaches that increase the quality and efficiency of commercial buildings while reducing their costs and environmental impacts.



Many common-area lights in the Federal Reserve Bank are on "time of day" controls to supplement natural light at the beginning and end of the day. Photo: Steve Hall/Hedrich Blessing

One of the first priorities of the Commercial High-Performance Buildings project is to assemble a database of such buildings. It now has more than 100 U.S. buildings that exhibit energy efficiency, environmental sustainability, superior quality, and cost effectiveness.

The case studies included here are taken from the database. Readers can nominate new buildings at the project's Web site.

Future plans for DOE's project include applying high-performance design and

construction principles to commercial projects in the early stages of design and development. Clients, developers, architects, or others who believe their project may be a good candidate for this program can contact the author for further information.

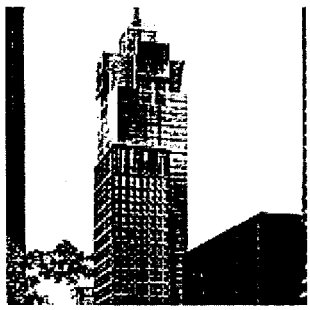
Materials for the Federal Reserve Bank of Minneapolis were selected on the basis of their embodied energy, the sustainability of their source, and their recyclability.
Photo: Don Wong

The following two examples share an approach to design and construction that has resulted in energy efficiency, sustainability, and reduced life-cycle costs.

Federal Reserve Bank of Minneapolis: HOK Architects, Inc.

Location: An 8.2-acre (33,200-square-meter) urban site in downtown Minneapolis, Minnesota, next to the Mississippi River, known as the Bridgehead site.

Occupancy/Use: Administrative and economic research center for the Federal Reserve Bank's ninth district.



Four Times Square designed by Fox & Fowle Architects in midtown New York is one of about 100 case studies in a DOE database of commercial high-performance buildings.
Photo: Steven Winter Associates, Inc.

Building Construction/Type: Eight-story office tower of curtain-wall construction, a four-story operations center, and a 152,000-square-foot (14,000-square-meter) parking structure, for a total of 777,000 square feet (72,000 square meters). Stone, brick, glass, and steel are the predominant materials.

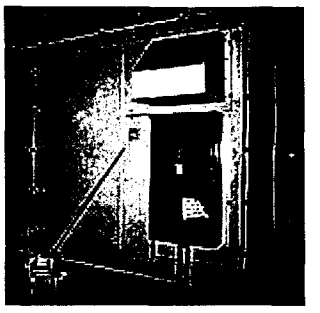
Selected Energy-Efficiency Features: Windows are triple-glazed units with two low-e films and argon gas in both cavities, delivering an R-7.6 value. The additional cost of the glass was offset by the lack of need for most of the perimeter radiation units, which resulted in a net reduction in the building's overall capital cost and reduced its long-term energy use.

The Four Times Square building's facade is a glass, metal, and masonry curtain wall. Photovoltaic panels installed in its southern and western sides serve as a supplemental energy source.
Photo: Steven Winter Associates, Inc.a

All light fixtures are high-efficiency units, most controlled by occupancy sensors. Many common-area lights are on "time of day" controls to supplement natural light at the beginning and end of the day. All lighting is controlled and monitored by a central control system, which resulted in 0.85 watts/square foot (9.15 watts/square meter) connected and 0.65 watts/square foot (7.0 watts/square meter) projected actual lighting load. ASHRAE 90.1 permits up to 2.5 watts/square foot (26.9

watts/square meter).

When outside temperatures are less than 55 degrees Fahrenheit (13 degrees Celsius), cooling is provided by outside air economizers for a "free" cooling system. This reduces chilled water demand on the Minneapolis Energy Center (MEC), which supplies chilled water for cooling. To minimize outside air intake leakage, low-leak, minimum outside air dampers are provided at air-handling units.



In the Four Times Square office building, two fuel cells were installed to meet virtually all of the nighttime electrical demand. Photo: Steven Winter Associates, Inc.

Click on thumbnail images
to view full-size pictures.

Steam provided by MEC is converted to hot water at the building entry and then distributed to air-handling units and other heating systems. Steam condensate return is routed through a water-to-water heat exchanger, extracting and transferring heat to preheat incoming ventilation air, before returning the heater water to MEC.

Variable frequency drives (VFDs) are used on most air-handling units and pumping systems, and all systems have high-efficiency motors. Temperature control and building energy management is performed through a computer-based system, which maximizes efficiency.

The parking garage has a carbon monoxide monitoring system to provide ventilation as required, reducing overall energy consumption. Water heaters for the kitchen and fitness center are high-efficiency gas-fired units. Restrooms and galleys on typical office floors use small, self-contained electric water heaters.

Selected Environmental Features: Materials for all site paving, structures, and interpretive displays were selected based on an analysis of the material's embodied energy, on whether the original source was sustainable, and on whether the materials were recyclable. Plumbing fixtures are low-flow; water closet flush values have automatic on-off controls. Showerheads have water restrictors to reduce consumption. Building materials were selected that have reduced chemical emissions, such as low-VOC paint, adhesives, and finishes, and formaldehyde-free wood products.

Building materials were selected based on the sustainability of the original source, the product's recycled content, the recyclability of the product at the end of its life, and the product's effect on indoor air quality. The materials selected enhance durability, require less maintenance, and come primarily from local sources. All wood in the building comes from certified sustainable sources.

Construction waste was subcontracted to a local recycling company that used the local recycling industry. The majority of refuse was separated off-site and recycled to produce a recycling rate of approximately 70 percent, with a decrease of overall construction costs.

Four Times Square: Fox & Fowle Architects

Location: Northeast corner of Broadway and 42nd Street in New York, New York. The site is adjacent to Times Square and within the midtown business district.

Occupancy/Use: Speculative office building.

Building Construction/Type: 48-story, 1.6 million square feet (148,600 square meters). The facade is a glass, metal, and masonry curtain wall.

Selected Energy Efficiency Features: Two fuel cells were installed in the building to meet virtually all of the nighttime electrical demand. Photovoltaic panels were installed in the curtain wall, on the southern and western sides, as a supplemental energy source. Gas-fired absorption chiller/heaters were used, and variable-speed drives were installed on pumps, fans, and motors.

A high-performance low-e glass curtain wall with oversize windows was chosen to enhance energy efficiency, ultraviolet ray reduction, and daylighting. Boosted levels of insulation were placed on all opaque horizontal and vertical external assemblies. Exit signs with L.E.D. bulbs were installed throughout.
Energy-efficient lighting was integrated with occupancy sensors and central controls. An energy analysis indicated a 30 percent savings

over typical good design and even more over New York State code minimum.

Selected Environmental Features: Environmentally friendly building materials. There is floor-by-floor air quality monitoring/control and purge systems and 50 percent more fresh air than required by code. There is a filtration system for air pollutants, an additional exhaust shaft for smoking/fumes and heat, and environmentally friendly building maintenance.

Recycling and resource conservation attributes: part of an existing building footing was re-used; hat truss and concrete core structures reduced the amount of structural steel needed; recycled content and recyclable materials used throughout; sustainably harvested wood; low-water-use equipment; waste chutes were installed for tenant-produced recyclables; waste management and recycling plan for construction and demolition; and recyclables storage areas were provided.

Non-ozone depleting, non-CFC and HCFC absorption equipment was installed. On the management side, the building will have a centralized, automated building management system.

The tenants will receive written guidelines to encourage them to choose finishes and furnishings with low volatile organic compounds or other toxins and high recycled content, to acquire energy-efficient lighting and equipment, to use space planning for natural light penetration and flexibility, and to effectively use the building HVAC systems for better comfort, indoor air quality, and energy use.

Michael J. Crosbie is a contributing editor to ArchitectureWeek and an associate at Steven Winter Associates, Inc., in Norwalk, Connecticut. He is SWA's project manager for the Commercial High Performance Buildings project.

A version of this article first appeared in the July 2000 issue of The Construction Specifier and is reprinted with permission from The Construction Specifications

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The Construction Specifier

Commercial High-Performance Buildings: Getting the Most from the Least

by Steven Winter and William Jose Higgins

If you wanted to target a single building type in the United States to reduce energy consumption and promote sustainable design and construction, commercial buildings would be a good (if not the best) place to start. Commercial buildings today have become the preeminent workplace, and their load on energy consumption is substantial. There is a growing interest on the part of building owners, facilities managers, architects, engineers, and others in the construction industry to design and build commercial structures to get the most from the least.

What Are High-Performance Buildings?

Unlike cars, a high-performance building doesn't go from zero to 60 mph in five seconds. A high performance commercial building is energy efficient, has low short- and long-term life-cycle costs, is healthy for its occupants, and has low impact on the environment.

High-performance building design is an all-inclusive philosophy, and such buildings are often the products of a team approach to the design of the building. Many of the design and construction team members are involved, as early as possible, in the design of the build-ing and its various systems. This design team should not only include the architects, engineers, occupants, and owners from the project start, but should also include specialists in indoor air quality (IAQ), materials, energy, and costs. One technique for arriving at a consensus among these different building specialists is to have a peer review early in the design process in which experts and other people with interest in the project meet for a one- or two-day critique of the preliminary design.

Another aspect of high-performance buildings is that the design should take into consideration the interaction of th

The Construction Specifier

July 2000

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design should take into consideration the interaction of the whole building structure and systems, and its context. The idea of looking at the "whole building" as an interrelated system grew out of past research into isolated building components that did not take into account how individual systems affect other systems. For example, a building using extensive daylighting techniques will reduce the amount of heat given off by lighting fixtures, thus allowing use of a smaller air conditioning system.

Photo 7

The whole building philosophy includes site characteristics, energy issues, material issues, IAQ issues, indoor environmental-quality issues, and natural resource issues, as well as how they are all interrelated. One way to balance these many issues is to use a building rating system, such as the U.S. Green Building Council's LEEDTM (Leadership in Energy and Environmental Design) Green Building Rating System. LEED is a comprehensive rating system helping the designer wade through these issues. LEED focuses on sustainable sites, water efficiency, energy and atmosphere issues, materials and resources, and indoor environmental quality. The building then receives a LEED score (see related article in this issue on page 27).

The design and construction of a high-performance commercial building also considers how the facility will perform over the long term. Life cycle maintenance costs, durability, energy usage, and the effects on the occupants and the environment are analyzed.

High-Performance Benefits

High-performance buildings have many benefits for the owner, the occupants, and the environment over buildings designed and constructed according to "standard" practices. Long-term maintenance costs and annual energy costs are lower. Building occupants and visitors enjoy a healthier interior environment. Worker productivity can improve with better lighting and a more comfortable indoor atmosphere. In terms of real-estate economics, a high-performance commercial building can help attract desirable tenants and higher rent.

Identifying High Performers

In an effort to promote high-performance commercial building design and construction, the U.S. Department of Energy (DOE) recently launched the Commer-cial High-Performance Buildings Project as part of its Commercial Whole-Building Road-mapping initiative. The purpose of this project is to raise the awareness of owners, developers, facilities managers, architects, engineers, and contractors to innovative concepts using comprehensive

systems engineering approaches that increase the quality and efficiency of commercial buildings while reducing their costs and environmental impacts.

One of the first priorities of the Commercial High-Performance Build-ings project is to assemble a database of such buildings, which is now available through a project Web site, www.erendoe.gov/buildings/highperformance. The database currently has over 100 buildings from around the country that exhibit high-performance qualities, such as energy efficiency, environmental sustainability, superior quality, and cost effectiveness. The case studies included in this article are taken from the database. In an effort to expand the database, nominations are invited including new buildings. Readers can contact the authors, or nominate buildings on the project's Web site.

Future plans for DOE's Commercial High-Performance Buildings Project include taking commercial projects in the early stages of design and development and applying high-performance design and construction principles. Clients, developers, architects, or others involved in the initial stages of a commercial building project who believe their project may be a good candidate for this program can also contact the authors for further information.

Profiles of Commercial High-Performing Buildings
The following are some examples of buildings with high-performance attributes. They cover a range of regions, construction types, materials, size, and functional demands. What they have in common is an approach to design and construction that has resulted in a building which contributes to energy efficiency and sustainability, as well as returns for the client and owner in terms of reduced life cycle costs.

Four Times Square
Location: Northeast corner of Broadway and 42nd Street in New York, New York. The site is adjacent to Times Square and within the midtown business district.

Occupancy/Use: Speculative office building.

Building Construction/Type: 48-story, 150 000 m2 (1.6 million ft2). The facade is a glass, metal, and masonry curtain wall.

Selected Energy Efficiency Features: Two fuel cells were installed in the building to meet 8 percent of the building's electrical demands. Photovoltaic panels were

installed in the curtain wall on the southern and western sides as a supplemental energy source. Gas-fired absorption chillers/heaters were used and variable speed drives were installed on pumps, fans, and motors. A high-performance low-e glass curtain wall with oversize windows was chosen to enhance energy efficiency, ultra-violet ray reduction, and daylighting. Boosted levels of insulation were placed on all opaque horizontal and vertical external assemblies. Exit signs with L.E.D. bulbs were installed throughout. Energy-efficient lighting was integrated with occupancy sensors and central controls. An energy analysis indicated a 30 percent savings over typical good design and even more over New York State code minimum.

Selected Environmental Features: There are floor-by-floor air quality monitoring/ control and purge systems, and 50 percent more fresh air than re-quired by code is provided. There is a filtration system for air pollutants, an ad- ditional exhaust shaft for smoking/fumes and heat, and environmentally friendly building maintenance. Recycling and resource conservation attributes are as follows:

- part of an existing building footing was reused
- hat truss and concrete core structures reduced the amount of structural steel needed
- --recycled content and recyclable materials used throughout
- sustainably harvested wood
- low water-use equipment
- waste chutes were installed for tenant-produced recyclables
- waste management and recycling plan for construction and demolition
- recyclables storage areas
- nonozone depleting, non-CFC and HCFC absorption equipment.

On the management side, the building will have a centralized, automated building management system. The tenants will receive written guidelines to encourage them to

- choose finishes and furnishings with low VOCs and other toxins, and high-recycled content
- acquire energy-efficient lighting and equipment
- use space planning for natural light penetration and flexibility
- effectively use the building HVAC systems for better comfort, IAQ, and energy use.

Owens Corning World Headquarters
Location: Toledo, Ohio, on a peninsula bounded by Swan Creek and the Maumee River, directly adjacent to the heart of Toledo's business center.

Occupancy/Use: Corporate headquarters office building.

Building Construction/Type: Three-story, 37 160 m2 (400,000 ft2). The facade is a glass and metal curtain wall.

Selected Energy-Efficiency Features: High-performance low-e and light reflective glazing with a ceramic frit reduces heat gain on the interior and helps maintain high visible daylight transmittance into the space, while the frit provides integrated shading into the glass assembly. Optimized use of glass in skylights, clerestories, and three-story atrium provides generous amounts of natural light contributing to lower lighting demand and a bright productive atmosphere. Raised underfloor HVAC duct runs reduce cooling costs through efficient air distribution; each workstation has an adjustable floor supply vent for individual comfort modulation. Efficient diffuser layouts are modular and flexible; the system also has the added bonus of flexible wire management. Efficient lighting sources include dimming availability for high-efficiency fixtures, which reduces energy consumption and operating costs. A building automation system contributes to energy conservation. Variable speed fans allow fan speed and use to respond to actual loads, not just "average" calculated loads reducing energy consumption and related costs.

Selected Environmental Features: Low-scale building allows the elimination of elevators with an emphasis on stairways for internal building circulation. Re-usable office furnishing systems virtually eliminate tear down and disposal of building materials when office configurations change. An outside air economizer is installed with compact rooftop high-efficiency units which improve IAQ though a filtration system. Native plants are used for easy maintenance with minimal irrigation and pesticides required. Paperless office design reduces paper use by 60 percent. Outdoor courtyard spaces include a running track with a wildlife refuge on site. Recycling programs and close proximity to urban mass transit systems also add to the building's efficiency.

CCI Center
Location: Urban site in a South Side neighborhood in Pittsburgh, Pennsylvania.

Occupancy/Use: Headquarters office for Conservation Consultants, Inc., and various local resource conserva-tion organizations.

Building Construction/Type: Adaptive reuse of a three-story, 1910, brick building, recycling as much of the original materials as possible, and construction of a new steel-frame and masonry-clad two-story structure, for a total of 929 m2 (10,000 ft2).

Selected Energy Efficiency Features: The client, architect, engineer, and builder worked together from the beginning of design through construction to see that every opportunity for recycling, energy conservation, and waste reduction was identified and could be incorporated into the design. Photovoltaic cells installed on the terrace roof and roof-top garden provide enough power to run the CCI Center's computer system and shade southern windows to minimize heat gain. Energy generated from the photovoltaic array is being tracked and used in a Solar Energy Education program for Western Pennsylvania. Energy-efficiency strategies used throughout the building have resulted in an estimated annual savings of $12,000. Energy usage is estimated to be 40 percent of a typical office building of comparable size.

Insulation levels were increased using environmentally benign cementitous foamed insulation and dense-packed cellulose resulting in R-24 walls, and ceilings and roofs of R-38 and R-70. Exposed interior brick walls provide thermal storage mass. Light-colored roofing tiles reflect sunlight and reduce cooling loads. Extensive daylighting provided through R-6 double-pane, argon-gas-filled, operable windows reduce heat loss and heat gain while also reducing ambient lighting requirements. Task lighting decreases the needed ambient light level which is provided by T-8 fluorescent lamps with electronic ballasts. The building is heated and cooled by gas-fired units that use more efficient, cleaner, natural gas; the other half of the building is conditioned by gas-fired absorption chiller units, with similar efficiency. Exposed ductwork throughout the building eliminates heating and cooling losses to the plenum as conditioned air leaks into condi-tioned spaces.

Selected Environmental Features: Recy-cled, salvaged, and nontoxic materials are used throughout the project. A construction waste demolition and salvage program ensured the waste stream from the building and associated construction activity was minimized. Brick left from construction is used to pave the first floor garden and

walkway at the building entrance; the remainder was given to a salvaged materials warehouse and resale center. Wood and brick from the demolished section of the building was used in the renovation. Interior windows were salvaged from other demolished buildings and installed with recycled wood frames.

Original pressed metal ceilings and hardwood floors were retained and refinished. Carpets were salvaged from a job over-run and applied with nontoxic adhesives. A structural panel made from agricultural waste straw and oriented strand board was used for some ceilings. A nontoxic linoleum made from linseed oil, limestone, cork flour, pine rosin, wood flour, jute, and organic pigment (all natural and renewable materials) was used throughout the first floor. Linoleum flooring waste was given to the Western Pennsylvania Conservancy to be ground and used as mulch for community gardens. Finish for wood floors is citrus-based and nontoxic. Low-VOC paint was used throughout. Low-flush toilets and efficient faucets are used for water conservation. The building has a recycling program for glass, plastic, office paper, paperboard, and corruga-ted cardboard.

Federal Reserve Bank of Minneapolis
Location: A 3.32 ha (8.2-acre) urban site in downtown Minneapolis, Minnesota, next to the Mississippi River, known as the Bridgehead site.

Occupancy/Use: Administrative and economic research center for the Federal Reserve Bank's ninth district.

Building Construction/Type: Eight-story office tower of curtain-wall construction, a four-story operations center, and a 14 121 m2 (152,000 ft2) parking structure, for a total of 72 183 m2 (777,000 ft2). Stone, brick, glass, and steel are the predominant materials.

Selected Energy-Efficiency Features: Windows are triple-glazed units with two low-e films and argon gas in both cavities, delivering an R-7.6 value. The additional cost of the glass was offset by the lack of need for most of the perimeter radiation units, which resulted in a net reduction in the building's overall capital cost and reduced its long-term energy use. All light fixtures are high-efficiency units, most controlled by occupancy sensors. Many common-area lights are on "time of day" controls to supplement natural light at the beginning and end of the day. All lighting is controlled and monitored by a central control system, which resulted in 0.85 watts2 connected and 0.65 watts2 projected actual lighting load

(ASHRAE 90.1 permits up to 2.5 watts2). When outside temperatures are less than 12.8 oC (55 oF), cooling is provided by outside air economizers for a "free" cooling system. This reduces chilled water demand on the Minneapolis Energy Center (MEC), which supplies chilled water for cooling. To minimize outside air intake leakage, low-leak, minimum outside air dampers are provided at air-handling units. Steam provided by MEC is converted to hot water at the building entry and then distributed to air-handling units and other heating systems. Steam condensate return is routed through a water-to-water heat exchanger extracting and transferring heat to preheat incoming ventilation air before returning the heater water to MEC. Variable frequency drives (VFDs) are used on most air-handling units and pumping systems, and all systems have high-efficiency motors. Temperature control and building energy management is performed through a computer-based system which maximizes efficiency. The parking garage has a carbon monoxide monitoring system to provide ventilation as required reducing overall energy consumption. Water heaters for the kitchen and fitness center are high-efficiency, gas-fired units. Restrooms and galleys on typical office floors use small, self-contained electric water heaters to minimize thermal losses due to long pipe runs.

Selected Environmental Features: Materials for all site paving, structures, and interpretive displays were selected based on an analysis of whether the original source was sustainable, the material's embodied energy, and whether the materials were recyclable. Plumbing fixtures are low-flow; water closet flush values have automatic on-off controls. Showerheads have water restrictors to reduce consumption. Selected building materials have reduced chemical emissions, such as low-VOC paint, adhesives, and finishes, and formaldehyde-free wood products. Building materials were selected based on the sustainability of the original source, the product's recycled content, the recyclability of the product at the end of its life, and the product's effect on IAQ. The materials selected enhance durability, require less maintenance, and come primarily from local sources. All wood in the building comes from certified sustainable sources. Construction waste was subcontracted to a local recycling company that used the local recycling industry. The majority of refuse was separated off site and recycled to produce a recycling rate of approximately 70 percent with a decrease of over-all construction costs.

Additional Information

Author
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Key Words
high-performance building
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Abstract
There is a growing interest on the part of building owners, facilities managers, architects, engineers, and others in the construction industry to design and construct commercial structures to get the most from the least.

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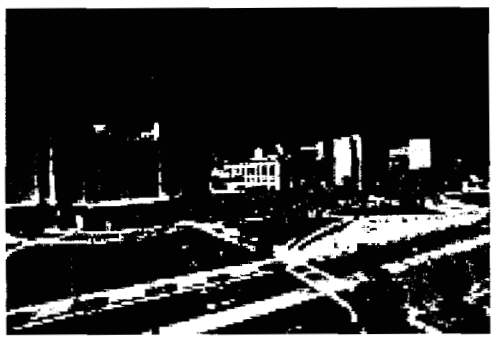

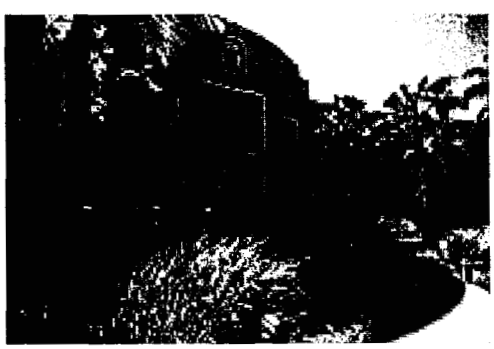

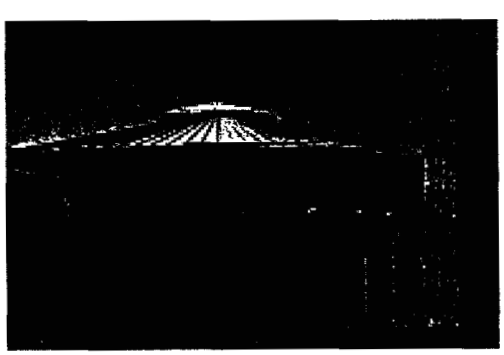

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Coming Soon from the Department of Energy: Tools and Resources for Architects and Building Designers

Welcome to a new era in national focus on high-performance building design: The U.S. Department of Energy (DOE) has established the Commercial High Performance Buildings project. It's a team-driven public/private partnership established to demonstrate and generate the benefits of buildings that are designed, built and operated to be energy efficient, environmentally sustainable, and cost effective. And it promises to be a beneficial partnership opportunity for architects and building designers.

Partnership Goals

The project exists to improve the energy efficiency of commercial buildings, while reducing their impacts on the environment—and at the same time improve the buildings' utility, comfort, quality, and cost-effectiveness.

Like Energy Design Resources, the Commercial High Performance Buildings project aims to achieve these performance improvements through "whole-building" approaches. For example, improved HVAC efficiency, in combination with higher-performance glazing, could result in smaller and lower-cost equipment, yielding cost and performance benefits in addition to added comfort through reduced glare and noise. These combinations of improvements are the kinds of whole-building strategies that are central to the project goals and to DOE's broader program interests.

Resources You Can Use

The project aims to positively affect the entire process whereby commercial buildings are designed, built and operated. To accomplish this, it will provide or enhance services to the design

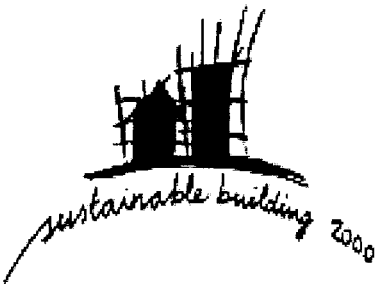
(Continued)

Coming Soon

Sustainable Building 2000 Conference in Maastricht, The Netherlands, Oct. 23-25

The conference themes will include:
- Urban sustainability actors
- Green Building Challenge 2000
- Environmental assessment tools
- Sustainable design and construction
- Sustainable building services

The event will feature the presentation of buildings entered into the International Green Building Challenge. This collaborative effort aims to develop a building environmental assessment tool that addresses controversial aspects of building performance. The tool will be available for participating countries to selectively draw ideas to either incorporate into or modify their own tools.



EDR E-News will bring you a conference update in our Nov. 10 issue. For more information about the Sustainable Building 2000 Conference, contact Ronald Rovers, Organizing Committee SB2000, Novem, PO Box 17, 6130 AA Sittard, The Netherlands or e-mail him at sb2000@novem.nl. Web site: www.novem.nl/sb2000

community in the following phases of building development:

- **Pre-design:** assist with research that sets building programs and design parameters
- **Design:** assist with building design, detailing and specification, including energy analysis and modeling
- **Commissioning:** assist with commissioning procedures
- **Benchtop testing:** assist with pre-construction proof-of-concept testing and verification
- **Construction:** assist during construction phase
- **Post-occupancy:** assist with building operation and post-occupancy assessments
- **Outreach:** Lessons learned are disseminated throughout the commercial building industry for widespread benefits

The Team Power Behind the Project

Preparation, talent, and teamwork contribute to high performance. Designing high performance, energy-saving buildings is no different. The DOE has learned from such initiatives as the residential Building America program that multi-disciplinary teams combining federal and private-sector skills and resources are very effective at achieving wide-ranging program goals. In this light, its directors have established the Commercial High Performance Buildings project as a voluntary organization of combined talents that contribute to the implementation and demonstration of highly efficient commercial buildings.

The Commercial High Performance Buildings project will provide and orchestrate technical and marketing support for a number of commercial buildings nationwide. A separate expert team will be formed for each building or group of buildings. The team will include building design, construction, management, financing, and other expertise pertinent to that building type and market segment. We encourage program participants to include their utility as part of this team. Other support will be available from local financing and marketing organizations, state energy offices and university research facilities.

A core advisory group will oversee these expert teams and support groups. Core participation includes individuals from the industry sectors that have the greatest impacts on commercial

(Continued)

building design, construction and operation:

- Building owners, developers and managers
- Builders and construction managers
- Architects, engineers, and other design professionals
- HVAC systems, controls, and equipment manufacturers
- Lighting and communications specialists
- Wall and insulation material producers
- Interior environments producers and specialists

An additional group of participants will provide further strategic planning, technical, outreach and other skills, and will include

- Lenders and investors
- National laboratories
- Media
- Trade associations
- Standards organizations
- Other appropriate sectors

What's the Project Status?

The first series of activities focus on the outreach phase. The Commercial High Performance Buildings project is identifying exemplary commercial buildings around the country that exhibit desired attributes of energy efficiency, environmental sustainability, superior quality and cost effectiveness. Several California buildings (including some Savings By Design competition award winners) are among these outstanding projects. The outreach phase highlights these buildings' attributes and impacts through media, live presentations and the project Web site at http://www.eren.doe.gov/buildings/highperformance/chp/planned_activities.html. *EDR E-News* will keep you posted about the progess of this project and how you can participate.

For more information from DOE about high performance buildings, see http://www.eren.doe.gov/buildings/highperformance/

Green Gestalt

Designing sustainable buildings means adopting a whole-building philosophy

By Adrian Tuluca, R.A., Principal, Devashish Lahiri, P.E., Associate, and Ian Graham, P.E., Associate, Steven Winter Associates, Inc., Norwalk, Conn.

Reprinted courtesy of *Consulting-Specifying Engineer*, 02/01/2000. For information on ordering a printed version of this article, with all photographs and illustrations, click here.

Also see: Building-Integrated Photovoltaics: A Window to Solar Sustainability
A Whole New Delivery Process

Making buildings environmentally sustainable has become a major focus for many engineers, architects and specifiers. Instead of treating a building as a collection of independent systems, sustainable design and engineering requires a synergistic, whole-building approach through which interactions between building systems are exploited to yield large energy savings at small first-cost increases. For instance, combining a highly effective thermal envelope with an efficient lighting scheme, low-emission finish materials and effective ventilation—natural and desiccant-assisted—can significantly reduce heating and cooling loads. In turn, heating, ventilation and air-conditioning (HVAC) equipment can be smaller, and money saved on smaller central plants and their associated equipment can offset the cost of installing superior envelopes and lighting systems. Furthermore, sound strategies for system control can bring further efficiency: CO2 and volatile organic compound (VOC) sensors allow for the proper intake of outside air without excessive ventilation. Occupancy sensors can control when light is needed while demand-lighting sensors can regulate electric light levels based on the availability of natural lighting at different times of the day.

Keep in mind that energy savings, while worthwhile, are not the only benefit of sustainable design. Indoor-air quality (IAQ) can improve, especially since HVAC control strategies can include the incorporation of finish materials with low VOC content. Visual and thermal comfort

can also be better in green buildings and maintenance costs can be lower as well—truly a winning combination for facility owners, managers and occupants.

Additionally, sustainable design has become a key component in the construction and design policies of many federal government agencies, including the General Services Administration, the Environmental Protection Agency and the Department of Energy (DOE). The latter, in an effort to raise awareness of innovation in commercial design and construction, has launched its Consortium for High Performance Buildings (CHPB) program—an initiative that identifies and promotes existing commercial buildings epitomizing the desired attributes of energy efficiency, sustainability, superior quality and cost effectiveness, with the long-term goal that these best practices eventually be adopted in building design and retrofits.

Three of the first CHPB projects are described below, including a renovation, a small facility and one with unusual climatic conditions.

•**Administration for Children's Services Center.** By carefully employing energy modeling, life-cycle cost analysis and sound building material selection, the design of New York City's new Administration for Children's Services Center was able to strongly adhere to the CHPB tenets of producing an energy-conserving and healthy indoor environment. Specifically, low-VOC paints, finishes and floor coverings helped make the new facility a healthier place, while upgrades to the building envelope and HVAC system make it more affordable to both operate and maintain.

The existing masonry building proved an effective template for integrating energy-efficient strategies, materials and systems. Originally completed in 1912, the 6-story, 116,740-square-foot building featured large floor-to-ceiling heights and expansive windows. Daylighting was integral to the structure's original design, and the question was not whether to continue the use of natural light, but how to maximize it.

Based on computer analysis using DOE-2.1E—a state-of-the-art energy-performance simulation program—the design team, which included architect Richard Dattner, New York, M/E/P engineers Lakhani & Jordan, New York, and lighting designer Ann Kale and Associates, New York, opted for clear, argon-filled double-pane glazing and continuous daylight dimming controls.

To optimize the building's daylighting potential, interior light shelves were also incorporated. These passive-solar strategies were then supplemented by a space-specific lighting configuration that concentrates artificial illumination where it would be needed most.

For the building envelope, foamed-in-place magnesium silicate—a lightweight, cementitious material that is fireproof and offers excellent insulation—was employed to augment the existing shell. Specifically,

the cementitious insulation was used to replace the interior wythe of one of the two layers of terracotta tile that originally composed the building's interior walls.

The material yields a relatively long payback period, but produces better energy savings than glass-fiber insulation, and its more environmentally benign constitution was in tune with the project's green philosophy.

Variable air volume and heat recovery

On the mechanical systems side, a variable-air-volume system fitted with a variable-speed drive was installed to generate ventilation, while perimeter fan-coil units were specified for heating and cooling. Heat-recovery devices were employed for further conservation.

Specification of the run-around loop glycol heat-recovery system was also based on the facility's structure. Since the design team had to work around the historic nature of the building and use existing shafts, the heat-recovery system became distributed in nature and needed more coils than originally planned for when a centralized ventilation shaft was envisioned.

Again, life-cycle cost considerations dictated the mechanical system choice even though its payback was also very long. In general, life-cycle costs were key in considering HVAC schemes, particularly in contemplating various types of central plants. These considerations were weighed against factors such as pollutant emissions, maintenance requirements and system footprint. For this project, it was determined that the most advantageous plant configuration would include the use of ten, 30-ton modular electric chillers for cooling. Steam from the utility is used to preheat service hot water.

To improve IAQ and encourage informed product procurement, a detailed set of recommendations was produced. Products included resilient and hard-surface flooring, low-VOC paints, adhesives, sealers and other finishes. CO2 sensors were also installed.

Like the majority of decisions relating to systems selection, detailed computer modeling enabled an informed approach to the integration of glazing, insulation, lighting and HVAC. These decisions were predicated on annual energy cost savings, simple payback periods and anticipated life-cycle cost savings. The combined energy-efficiency strategies and systems recommended have a simple payback of 7.6 years.

Compared to other state of New Yorkfacilities that merely comply with existing codes, energy costs at the Administration for Children's Services (ASC) are expected to be 33 percent lower—the equivalent of more than $99,500—and will reduce annual CO2 emissions by more than 500 tons—the equivalent of removing 184 cars from the road.

More impressive are energy and environmental performance results,

particularly in the context of a renovation with a number of constraints. In fact, representatives of the New York State Energy Research and Development Authority (NYSERDA), which cofunded the ACS effort, followed the design process with particular interest because the building is on the National Register of Historic Places. But with the backing of ACS and agencies like the New York City Department of Design and Construction, such challenges were easily met. The ACS Center warrants consideration as an exemplar for the appropriate integration of green design strategies into historical structures.

•**Black Rock Forest Center for Science and Education.** As for new construction, the 9,050-square-foot Black Rock Forest Center for Science and Education in Cornwall, N.Y., offers a model for environmentally sensitive design and engineering. This time, the project team included Fox and Fowle Architects, New York, Gerard Associates Consulting Engineers, Middletown, N.Y., and Steven Winter Associates (SWA) as the energy consultant. NYSERDA again provided financial support for the energy-efficiency analysis.

The team's strategy was to create a building whose shape and envelope were inherently efficient as well as to minimize heat gains from lighting and computers. These strategies enabled the downsizing of mechanical equipment, offsetting the cost of improved walls, windows and roofing systems.

SWA helped Fox and Fowle identify a number of specific energy-efficiency strategies that minimized energy consumption while delivering thermal comfort. Building components were chosen for their contributions to overall operating efficiency, and in some instances, for their positive effects on IAQ. Computer analyses were again conducted using DOE 2.1E, and the results were used to identify appropriate solutions. Notable sustainable features included:

- An oblong shape, with the building's longest axis running east to west.
- The placement of the majority of windows on the south facade, with minimal glazing on the east and west facades.
- Low-emissivity, argon-filled glazing.
- Daylighting in perimeter spaces.
- Highly insulated walls.
- Roofing constructed of structural insulated panels.
- Geothermal heat pumps for heating, cooling and domestic hot water.
- Variable-speed fans and pumps.
- An air-to-air heat-recovery system, operating at 75-percent efficiency.
- Ventilation rates moving at 20 cubic feet per person.
- CO2 sensors to modulate outside-air intake based on occupancy.
- Motorized windows in the atrium for natural ventilation.
- Efficient lighting with electronic ballasts and T-8 lamps; and
- Occupancy sensors in all offices.

Mechanically, IAQ was improved through the use of a system that does not recirculate air from room to room, but instead employs an air-to-air heat exchanger to introduce a greater volume of outdoor air while recovering heat from the exhaust air. Healthy building materials and finishes also helped to improve the indoor environment.

Because energy efficiency, IAQ and sustainability were central to the design, these strategies were integrated from the outset. By working closely, the design team achieved a finished product expected to yield annual energy savings between 43 percent and 49 percent, as benchmarked against a standard code-compliant building.

•**NWS weather forecasting office.** One of the benefits of green design is that it can be applied to a building of any size and any locale. This maxim held true with the National Weather Service's (NWS) weather forecasting office (WFO) project on the Southwest Pacific island of Guam. NWS wanted a low-energy-use building with minimal operating costs, as well as an indoor environment fostering increased productivity and occupant comfort. Also, NWS hoped to effectively integrate passive-solar design that would maximize daylighting, but keep glare in check and reduce excessive solar heat gain. SWA was brought in at the project's inception under an agreement with the National Renewable Energy Laboratory and was funded by the Federal Energy Management Program, which seeks to reduce energy use and associated costs in federal facilities.

Because staffing and operations were similar in WFO facilities worldwide, the project began by establishing energy use and assessing typical operating conditions at an existing WFO facility in Upton, N.Y. Information was gathered on hours of operation, personnel, lighting and equipment schedules and energy-consuming systems, including HVAC and electrical and peak electrical demand. The data was used to create a computer model to benchmark the facilities using DOE 2.1E software.

The model was then validated against actual energy use at the Upton facility and subsequently refined using a climate-specific Puerto Rico WFO design. Actual bid documents later aided in fine-tuning the model to accurately reflect conditions in the new WFO.

The resulting project-specific models were used to analyze various options for design and material specification. Guam's tropical climate, coupled with the facility's high concentration of electronic equipment and the nature of the work performed at the WFO, made efficient cooling and glare reduction the top priorities. These recommendations were supported by heat-flow analysis of exterior walls. As it is not uncommon for moisture to condense on the outside surfaces of air-conditioned buildings in this humid climate, insulation levels were established to minimize condensation on interior and exterior wall surfaces. Aside from identifying numerous energy-conservation opportunities, lighting modeling ensured visual comfort and glare

reduction for the main forecasting area, known as the operations room.

Working closely with NWS staff, the Naval Facilities Engineering Command—the Hawaii-based assembler the design-build-bid package—and Design Partners, Inc., Honolulu—the project's design-build contractor—energy-efficiency strategies were identified that are expected to save about 20 percent in annual energy costs—roughly $15,500 per year—as compared to a building compliant with American Society of Heating, Air-Conditioning and Refrigeration Engineers standards.

Energy efficiency is actually greater if plug loads—which were particularly high in this computer-dominated building—are discounted. Without plug loads, energy savings were projected at 35 percent. One of the project's lighting recommendations alone was expected to achieve a 30-percent reduction in energy use for the facility's private offices.

For the operations room—the WFO's nerve center—a lighting strategy was established that would minimize glare, yet provide a productive and comfortable environment. Appropriate light levels were set around video-display terminals with glazing and shade-control strategies developed to ensure operator visual comfort. Indirect lighting schemes were implemented to take advantage of the room's pitched cathedral ceiling. Ceiling fixtures on the room's long axis and wall-mounted fixtures at the junctures between the ceiling and walls reflect light to occupied spaces below.

Each lighting scheme balances several important goals: adequate, task-based illumination; improved visual comfort through reduced glare; reduced "veiling reflections"; comfortable natural light; energy efficiency and enough flexibility to allow for varying workstation layouts.

Based on the positive outcomes in the project, SWA and NWS are now working together on another station in Maine, where the successful strategies identified in Guam will be adapted and refined.

Building gestalt

As these and other projects demonstrate, making buildings truly sustainable requires a knowledge of not only lighting, HVAC and other building systems, but also a firm grasp of how to make the building envelope as efficient as possible. Of equal importance is the need for a fundamental change in perception about the interaction of the building's siting, exterior design, interior design, mechanical systems, lighting and how the users will ultimately interact with it once the building is occupied.

Considering the building as an organic whole, rather than a collection of independent systems, leads designers to carefully consider how changes in one part of a building can result in energy conservation and cost savings throughout.

The future of sustainable building design and construction will yield greater benefits as designers deepen their understanding of the interconnectedness of architecture, engineering and the environment.

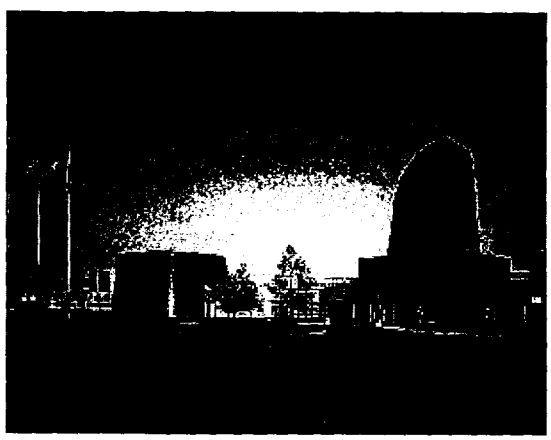
WinterGREEN

A BIMONTHLY UPDATE ON STEVEN WINTER ASSOCIATES, INC.'S WORK IN THE REALM OF ENERGY EFFICIENCY AND SUSTAINABLE BUILDINGS

Volume I, No. 6 April - May 2000

Commercial High Performance Building Project Launched

U.S. Department of Energy (DOE) Secretary Bill Richardson has announced that DOE is creating a Commercial High Performance Buildings project to increase the energy efficiency of commercial buildings. The effort, a joint partnership between the private sector and the department, will also focus on improving the utility, comfort, quality and cost-effectiveness of commercial buildings. The project is being managed by **Steven Winter Associates, Inc(SWA)**. "Thirty-two percent of the electricity generated in the United States goes to heat, cool, ventilate and light commercial buildings," said Secretary Richardson. "The actions we are taking to decrease building energy use will save businesses money and reduce the impact of energy generation on global climate change and the environment." The first phase of the Commercial High Performance Buildings project activities will demonstrate and publicize innovative "whole building" approaches that increase the quality and efficiency of commercial buildings while reducing their costs and impacts on the environment. The focus will be on raising awareness among building industry professionals and the public of noteworthy commercial buildings that save energy and are environmentally sustainable. Commercial buildings that exemplify the desired attributes of energy efficiency, sustainability, superior quality, and cost effectiveness will be identified and promoted, and a database of high performance buildings (such as the Owens Corning headquarters, designed by Cesar Pelli & Associates, pictured here) is now on the project website: www.eren.doe.gov/buildings/highperformance/. Candidate projects for inclusion in the outreach program should be commercial buildings completed withing the past few years or in design or under construction. Submissions may be sent to SWA to the attention of Jose Higgins and should include a brief description of building type and location, square footage, material specifications, and energy efficiency and sustainability features. Firms and others interested in participating are also encouraged to contact SWA.



SWA Honored on Earth Day 2000

SWA was the recipient of an award bestowed by the Connecticut State House of Representatives recognizing its "exemplary efforts that promote clean energy," on the occasion of Earth Day 2000. Connecticut state representative Robert Maddox (R-Bethlehem) drove from the state capital in Hartford to SWA's offices in Norwalk in a gas/electric powered Honda Insight (photo left) that gets up to 70 mpg to present the award. Maddox (at left in photo), who built and lives in an energy-efficient home, is pictured with SWA President Steven Winter.

CONFERENCES AND PRESENTATIONS

COMMERCIAL HIGH PERFORMANCE BUILDINGS program

CONFERENCE STATUS

January 17, 2001

CONFERENCES PRESENTED AT:

1.

NAME:	Greenprints 2000: Sustainable Communities by Design
LOCATION:	Atlanta, GA
ORGANIZATION:	Southface Energy Institute
DATE:	February 6-8, 2000
CONTACT:	404-872-3549, www.southface.org
* STATUS:	**ChiPB presentation has been given.** (120P)

2.

NAME:	Your Facility Management Future: Value Profit and the Green Revolution
LOCATION:	Charlotte, NC
ORGANIZATION:	AIA, PIA Facility Management Workshop
DATE:	March 3-4, 2000
CONTACT:	AIA, 202-626-7300
* STATUS:	**ChiPB presentation has been given.** (80P)

3.

NAME:	Building Energy 2000
LOCATION:	New Haven, CT
ORGANIZATION:	Annual Conference of NESEA
DATE:	March 15-18, 2000
CONTACT:	413-774-6051, www.nesea.org
* STATUS:	**ChiPB presentation was part of SWA Green Building Rating Systems presentation.** (40P)

4.

NAME:	ABST 2000
LOCATION:	Washington, D.C.
ORGANIZATION:	Mechanical Systems / Construction Group
DATE:	June 6-8, 2000
CONTACT:	Richard Sweetser, EXERGY Partners Corp, 703-707-0293
* STATUS:	Sent letter 12/17/99, spoke with Richard 12/18/99, left message 12/28/99, 2/24/00, 2/29/00 told me to call Mike Ivanovich 800-366-1901 ext 9192 **CHIPB has been given on track on track 5** (45p)

5.

NAME:	Achieving High Performance Buildings Through a Whole Building Systems Design Approach
LOCATION:	Harvard University
ORGANIZATION:	Harvard University
DATE:	August 17-18, 2001
CONTACT:	
*STATUS:	**Incorporated in course taught by Ian & Adrian**

FUTURE CONFERENCES: SCHEDULED TO BE PRESENTING AT:

1.

NAME:	Forum 2001
LOCATION:	Washington, DC
ORGANIZATION:	American Solar Energy Society, 303-443-3130

	DATE:	April 21-25, 2001
	CONTACT:	Helen English, 202-628-6100, ext 205
	✳STATUS:	**11/28/00 Steven & Jose' has been accepted to speak present paper on 4/23/01.**
2.	NAME:	Environ Design 5
	LOCATION:	Atlanta, GA
	ORGANIZATION:	Interiors & Sources magazine, USGBC
	DATE:	April 26-28, 2001
	CONTACT:	Peggy Thorsen, 231-755-9672, e-mail: pegclark@gte.net
	✳STATUS:	**Mike C. & Steven will present on April 27 from 10:30am to 11:30am**
3.	NAME:	AIA 2001 National Convention and Exposition
	LOCATION:	Denver, CO
	ORGANIZATION:	AIA
	DATE:	May 17-19, 2001
	CONTACT:	Emily Cole, 202-626-7445, E-mail: Ecole@aia.org
	✳STATUS:	**9/26/00 received approval letter, Steven & Jose' to Present 4pm May 19, 2001**
4.	NAME:	CSI 45th Annual Convention
	LOCATION:	Dallas, TX
	ORGANIZATION:	CSI
	DATE:	June 21-24, 2001
	CONTACT:	Marie Delucia, 800-689-2900, ext 4745
	✳STATUS:	Filled out web form on 7-12-00, called 7-25-00, 7-27-00, 8-3-00 left message, reply from Victoria Torrence, will notify in November, **have been accepted.**

FUTURE CONFERENCES BEING APPLIED FOR:

2.	NAME:	BOMA International's 94th Annual Convention and The Office Building Show.
	LOCATION:	Baltimore, MD
	ORGANIZATION:	BOMA
	DATE:	June 17-19, 2001
	CONTACT:	Janine Pesci, 202-326-6321, jpesci@boma.org
	STATUS:	Sent in abstract & application on 8-18-00, 8-24-00 left message, 8-24-00 Ruth Messenger said they received application, **1/11/01 application denied.**
3.	NAME:	World Workplace 2001
	LOCATION:	Kansas City, MO
	ORGANIZATION:	IFMA, International Facilities Management Association
	DATE:	September 23-25, 2001
	CONTACT:	Angelique Vesey 713-623-4352 ext 112, angelique.vesey@ifma.org
	STATUS:	9-12-00 phone number disconnected, 9-29-00 filled out application on line www.ifma.org

GOAL: 2 to 4

U.S. DEPARTMENT OF ENERGY

BUILDING TECHNOLOGY ROADMAPS

STEVEN WINTER
ASSOCIATES, Inc.

DRURY B. CRAWLEY,
US DOE, DC

OFFICE OF BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS

Focus of Building Technology Roadmaps

- Four buildings roadmaps underway:
  - Commercial Whole Buildings
  - Lighting
  - Windows
  - Insulation, roofs and walls
- Working closely with ARI on HVAC roadmap
- Other roadmaps for 2000:
  - Residential Whole Buildings (with PATH?)
  - Other technologies & initiatives (e.g. combined cooling heating and power)

U.S. DEPARTMENT OF ENERGY

BUILDINGS CHP

STEVEN WINTER
ASSOCIATES, Inc.

DRURY B. CRAWLEY,
US DOE, DC

OFFICE OF BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS

Focus of BCHP

- Commercial buildings
- New buildings and retrofits
- Integration of:
  - on site power production
  - building heating
  - building cooling
  - building ventilation
  - building dehumidification
  - building hot water

FOR MORE INFORMATION...

Contact: **Joel Anderson, BCHP Initiative Chair**

Mississippi Valley Gas

Address: P.O. Box 3348

Jackson, MS 39207

Phone: 601-961-6882

Fax: 601-961-6767

Email: andersoj@mvgas.com

U.S. DEPARTMENT OF ENERGY

COMMERCIAL WHOLE BUILDINGS ROADMAP

STEVEN WINTER
ASSOCIATES, Inc.

DRURY B. CRAWLEY,
US DOE, DC

OFFICE OF BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS

U.S. DEPARTMENT OF ENERGY

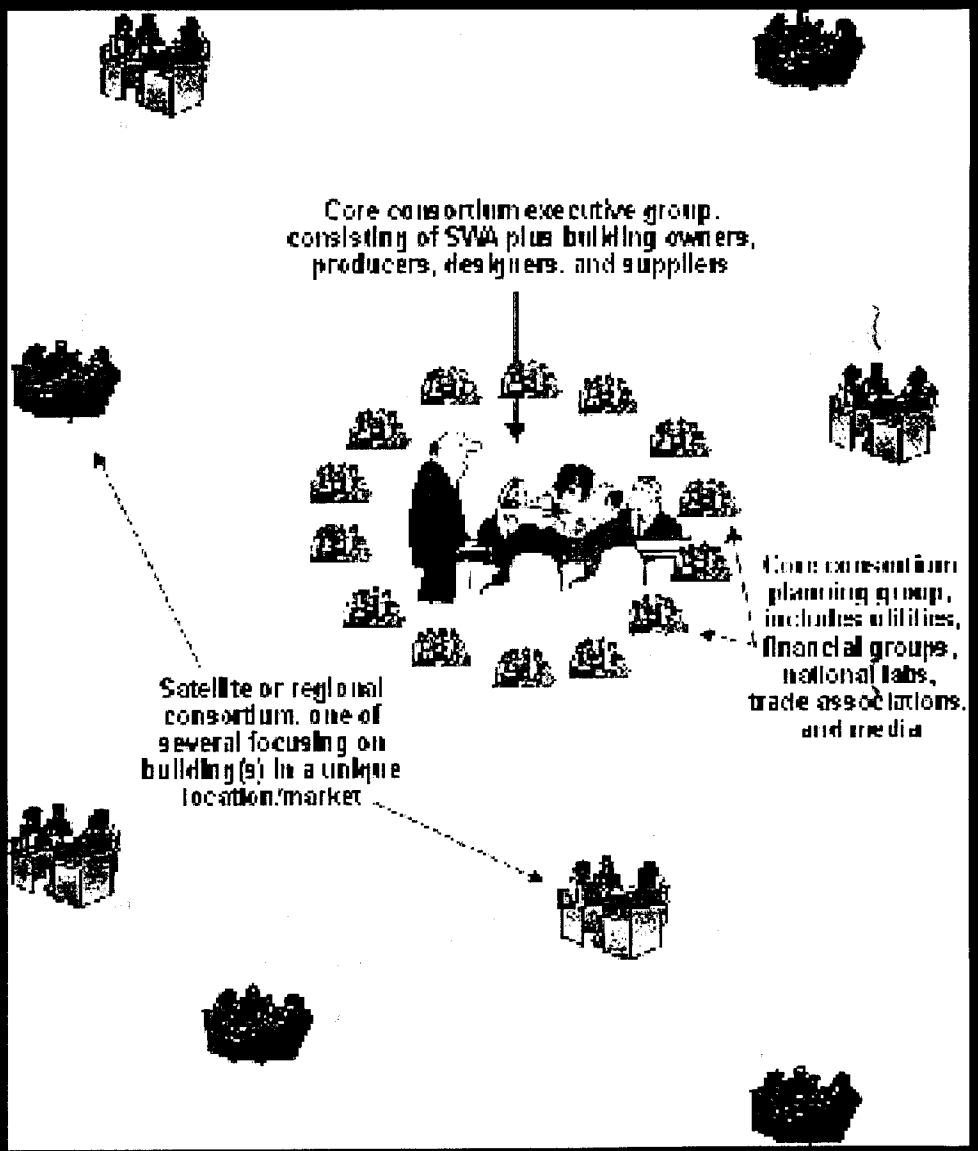
COMMERCIAL HIGH PERFORMANCE BUILDINGS project

STEVEN WINTER
ASSOCIATES, Inc.

DRURY B. CRAWLEY,
US DOE, DC

COMMERCIAL HIGH PERFORMANCE BUILDINGS project

- U.S. D.O.E. COMMERCIAL WHOLE-BUILDING ROADMAPPING
- DEMONSTRATE & PUBLICIZE HIGH PERFORMANCE BUILDINGS
- CONTRIBUTE TO THE DESIGN OF HIGH PERFORMANCE BUILDINGS



CORE ADVISORY MEMBERS

- Gregg D. Ander, Southern California Edison, CA
- Ren Anderson, National Renewable Energy Laboratory, CO
- Jeff Christian, Oak Ridge National Laboratory, TN
- Kristin Ralff Douglas, Environmental Design & Construction magazine, NJ
- S. Richard Fedrizzi, Carrier Corporation / United Technologies, NY
- Tim Grether, Owens Corning, OH
- Beth Heider, Hanscomb, Inc., VA
- Malcolm Lewis, Constructive Technologies Group, Inc., CA
- Timon Malloy, Fred F. French Investing, LLC, CT
- Sandra F. Mendler, CUH2A, Inc., DC
- Steven J. Piguet, Armstrong World Industries, Inc., PA
- Donald Prowler, Donald Prowler & Associates, PA
- Jonathan Rose, Affordable Housing Development Corp., NY
- Edward Sullivan, Building Operating Management magazine, WI

continued on next page

ADVISORY MEMBERS, continued

- Paul von Paumgartten, Johnson Controls, Inc, WI
- Rick Voelker, VIRACON, MN
- Keith Winn, Herman Miller, Inc., MI

SPONSER: Drury B. Crawley, US DOE, DC

MANAGER: Steven Winter Associates, Inc., CT

CONSULTANT: Deane Evans, VA

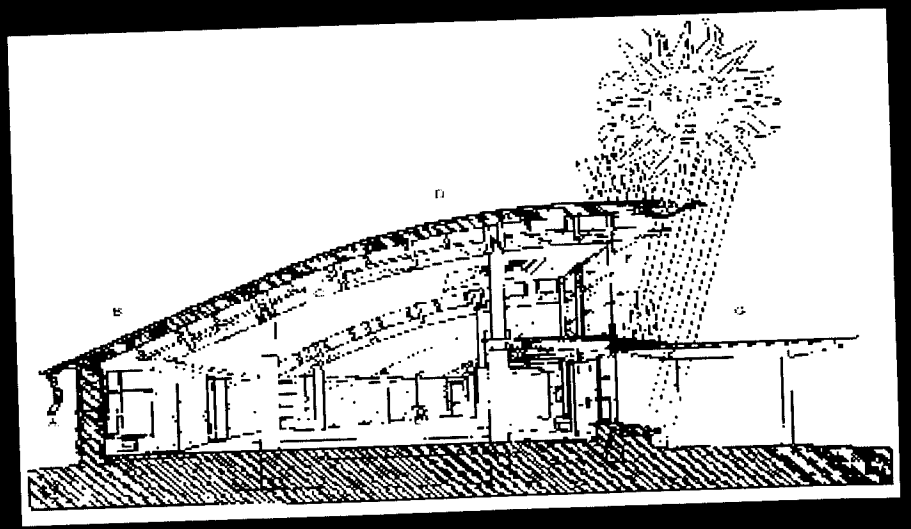
GUAM WEATHER FORECASTING OFFICE
AGANA MILITARY BASE GUAM, USA

WHAT IS A HIGH PERFORMANCE BUILDING?

- WHOLE TEAM INVOLVED FROM THE START
- WHOLE BUILDING AS A SYSTEM
- EFFICIENCY OF ENERGY USE
- EFFICIENCY OF RESOURCE AND MATERIAL USE
- AFFECT OF BUILDING ON ITS OCCUPANTS
- INTERACTION WITH SITE AND NEIGHBORHOOD CONTEXT
- INTERACTION AND IMPACT WITH THE ENVIRONMENT
- LIFE CYCLE COSTS
- DURABILITY

WHAT ARE THE BENEFITS?

- LOWER LONG TERM MAINTENANCE COSTS
- LOWER ANNUAL ENERGY COSTS
- HEATHIER WORKPLACE
- BETTER LIGHTING
- LESS NEGATIVE IMPACT ON THE ENVIRONMENT



REAL GOODS, CA

PHOTO CREDIT: Ecological Design

PATHS TO HIGH PERFORMANCE BUILDINGS

STEVEN WINTER
ASSOCIATES, Inc.

U.S. Green Building Council

LEED
Green Building Rating System™

STEVEN WINTER
ASSOCIATES, Inc.

Focus of LEED™

- Commercial and high-rise residential buildings
- New buildings and retrofits
- Covers:
  - planning sustainable sites
  - water use reduction
  - improving energy efficiency & reducing atmospheric emissions
  - conserving materials and resources
  - enhancing indoor environmental quality
  - innovation and design process

LEED™ Rating System

- Contains
  - 7 prerequisites
  - 64 core credits
  - 5 innovation and design credits
- Gives the following ratings:
  - Certified 50-60% of Core Points
  - Silver 61-70%
  - Gold 71-80%
  - Platinum 81% or better

LEED™ Application and Certification

- Form available from USGBC
- Requests basic information on projects
- Certification requires documentation
- Entry application: $350m, $500nm (includes 2 interpretations)
- Further interpretations: $90/hr
- Submittal of application $1200m, $1500nm (includes plaque)

RESOURCES AVAILABLE

- Reference Guide
- USGBC LEED™ Committee
- LEED™ Workshop
- LEED™ Training

FOR MORE INFORMATION...

Contact the **US Green Building Council**

Web site: www.usgbc.org

Address: 110 Sutter Street, Suite 906,
San Francisco, CA 94104

Phone: 415-445-9500

Fax: 415-445-9911

Email: info@usgbc.org

United States Environmental Protection Agency

ENERGY STAR®
Label for Buildings

STEVEN WINTER
ASSOCIATES, Inc.

ENERGY STAR® Program Is...

- Part of a broad based equipment, products and appliance rating program where buildings are one part
- ENERGY STAR® Label for Buildings indicate top 25 percent nationwide in energy performance
- Other ENERGY STAR programs include Homes, Small Business, Buildings and Greenlights, and Methane Outreach

Focus of ENERGY STAR® Label for Buildings

- Commercial Buildings 5,000 SF minimum
- New buildings and renovations
- Covers:
  - Energy consumption
  - Indoor environment prerequisites

ENERGY STAR® Label for Buildings Rating System

- Input into Benchmarking Tool
  - Physical attributes
  - Operating characteristics
  - Energy consumption
- Gives the following ratings:
  - 0 to 100 scale
  - 75 or better = ENERGY STAR Label

ENERGY STAR® Label for Buildings Application and Certification

- ENERGY STAR Benchmarking Tool
- Statement of Energy Performance validated by a Licensed Professional Engineer
- One-page agreement letter
- ENERGY STAR Label plaque

ENERGY STAR® RESOURCES AVAILABLE

- US Department of Energy
- Registry of ENERGY STAR Buildings
- Web based Target Finder spreadsheet
- On-line interactive software tools
- ENERGY STAR® Guide
- Lists of supporting documents and standards
- Lists of ENERGY STAR® certified equipment

FOR MORE INFORMATION...

Contact the United States E.P.A.

Web site: http://www.epa.gov/buildings/label/

Address: US EPA (6202J), 401 M Street, S.W.,
Washington, D.C. 20460

Phone: 888-782-7937

Email: energystarbuildings@epa.gov

Energy Star Homes:
http://yosemite.epa.gov/appd/eshomes/eshaware.nsf

U.S. DEPARTMENT OF ENERGY

COMMERCIAL HIGH PERFORMANCE BUILDINGS project

CASE STUDIES

STEVEN WINTER
ASSOCIATES, Inc.

DRURY B. CRAWLEY,
US DOE, DC

4 TIMES SQUARE-DURST BUILDING

- HIGH EFFICIENCY HVAC
- 30% ENERGY SAVINGS OVER TYPICAL GOOD DESIGN
- I.A.Q. STRATEGIES
- EFFICIENT LIGHTING & CONTROLS
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- BUILDING INTEGRATED PV
- RECYCLING CHUTES
- FUEL CELLS
- WASTE MANAGEMENT & RECYCLING DURING CONSTRUCTION
- HIGH PERFORMANCE TENANT GUIDELINES

ADAM JOSEPH LEWIS CENTER
OBERLIN COLLEGE

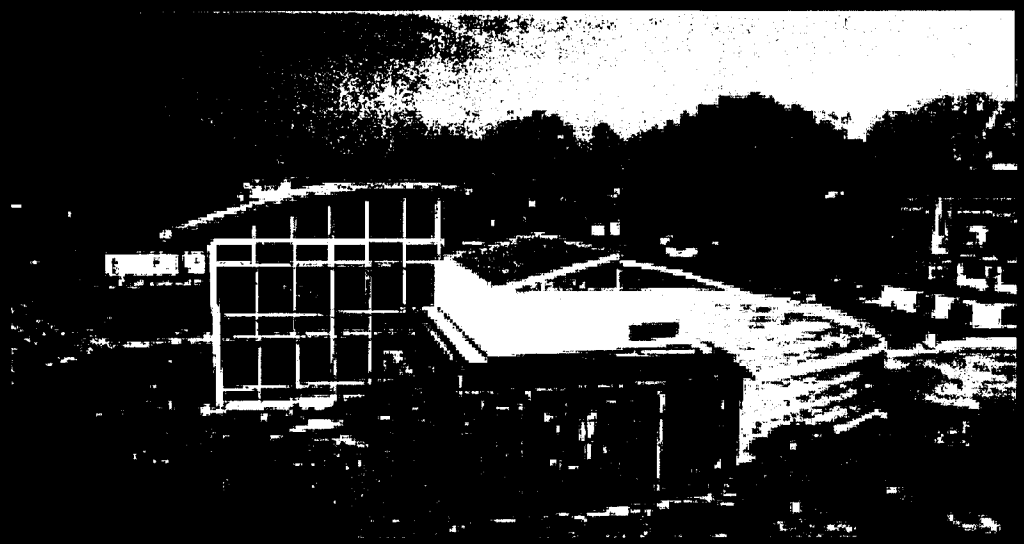


PHOTO CREDIT: Frank Wiewandt for Oberlin College

- 78% LESS ENERGY VS TYPICAL
- GEOTHERMAL ENERGY
- BIOLOGICAL WASTE TREATMENT
- PASSIVE SOLAR
- HEAT RECOVERY
- OCCUPANCY SENSORS FOR FRESH AIR DAMPERS
- FUTURE PV
- RAISED FLOOR AIR SUPPLY
- EAST-WEST BLDG ORIENTATION
- EFFICIENT LIGHTING/ CONTROLS
- DAYLIGHTING
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- CONSTRUCTION I.A.Q. PLAN
- INDIGENOUS LANDSCAPING

ARMSTRONG WORLD HEADQUARTERS
Lancaster, PA

PHOTO CREDIT: Scott Francis

- DAYLIGHTING & INDIRECT LIGHTING
- HVAC & LIGHTING OCCUPANCY SENSORS
- CO2 SENSORS
- HIGH-EFFICIENCY MOTORS & VARIABLE FREQUENCY DRIVES ON ALL PUMPS & FANS
- DIRECT-DIGITAL CONTROL SYSTEM
- ARGON FILLED WINDOWS
- MORE THAN 50% OF SITE LEFT AS NATURAL
- LOW WATER USAGE PLANTS
- REMOVED ALL EQUIPMENT USING CFC
- RECYCLED CONTENT MATERIALS
- LOW VOC PAINTS & ADHESIVES.
- RECYCLING PROGRAM

CCI CENTER

Pittsburgh, PA

PHOTO CREDIT: Marc Mondor

- ADAPTIVE RE-USE OF EXISTING BUILDING
- GAS POWERED AIR CONDITIONING
- HEAT RECOVERY VENTILATION
- AIRKRETE & CELLULOSE INSULATION
- 2.2 KW PHOTOVOLTAIC ARRAY
- R6 OPERABLE WINDOWS
- HIGH EFFICIENCY DIRECT/INDIRECT LIGHTING
- ENVIRONMENTALLY FRIENDLY MATERIALS
- EXTENSIVE USE OF SALVAGED MATERIALS
- RAIN WATER HARVESTING.
- ORGANIC GARDEN

EIGHTH AVENUE POST OFFICE
Fort Worth, TX

PHOTO CREDIT: Joseph Romeo Photography

- HIGH EFFICIENCY DIGITAL HVAC
- OCCUPANCY & DAYLIGHT SENSOR LIGHTING
- EXTERIOR HEAT-REFLECTIVE CERAMIC COATING
- COMPRESSED STRAW S.I.P.S EXTERIOR WALLS
- RAINWATER IRRIGATION
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- WOOD FROM WELL MANAGED FORESTS
- NATURAL GAS POWERED FLEET
- NATIVE LANDSCAPING
- CONSTRUCTION RECYCLING & I.A.Q. PLAN.

FLORIDA SOLAR ENERGY CENTER

PHOTO CREDIT: Architects Design Group

- SAVES $46,000 PER YEAR IN ENERGY COSTS
- EAST-WEST BLDG ORIENTATION
- EFFICIENT LIGHTING & CONTROLS
- DAYLIGHTING
- TWIN CHILLERS
- VARIABLE SPEED FANS & PUMPS
- HEAT RECOVERY DEHUMIDIFICATION
- CO2 SENSING VENTILATION
- HIGH PERFORMANCE WINDOWS
- ENERGY STAR OFFICE EQUIPMENT

MINNEAPOLIS FEDERAL RESERVE BANK

PHOTO CREDIT: HOK

- R-7.6 TRIPLE GLAZED WINDOWS
- 0.85 W/SF LIGHTING W/ OCCUPENCY SENSORS & CLOCK
- ECONOMIZER CYCLE
- MUNICIPAL CHILLED WATER & STEAM
- STEAM CONDENSATE/ VENT AIR HEAT EXCHANGER
- VARIABLE FREQUENCY DRIVES
- HIGH EFFICIENCY MOTORS
- COMPUTERIZED TEMPERATURE & ENERGY MANAGEMENT
- GARAGE CO DETECTORS
- LOW-FLOW PLUMBING FIXTURES
- ENVIRONMENTALLY PREFERRED MATERIALS
- CONSTRUCTION WASTE MANAGEMENT

OWENS CORNING HEADQUARTERS
Toledo, OH

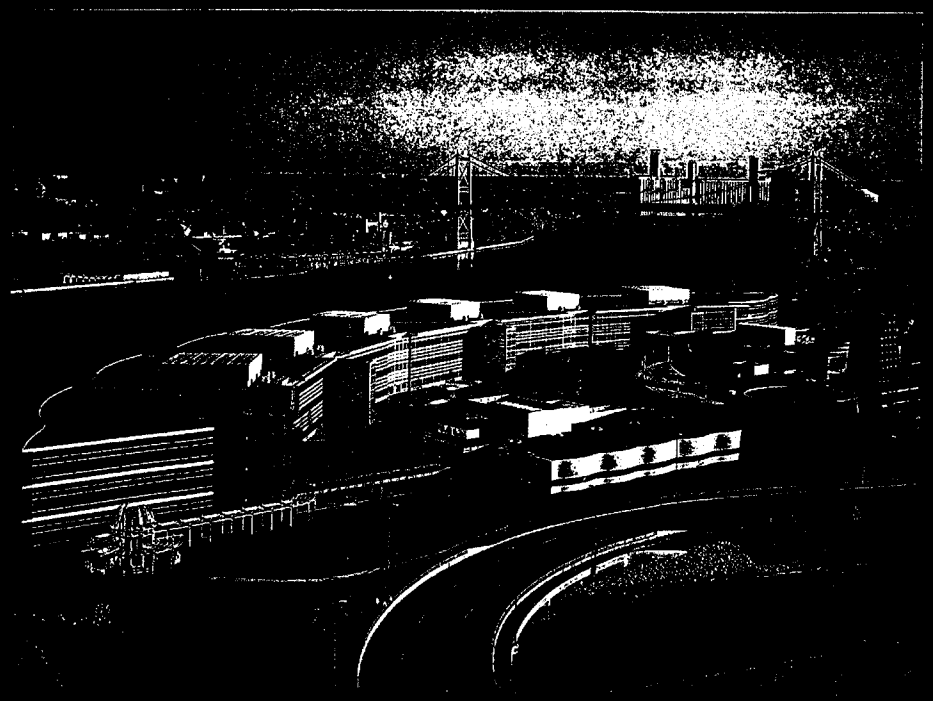


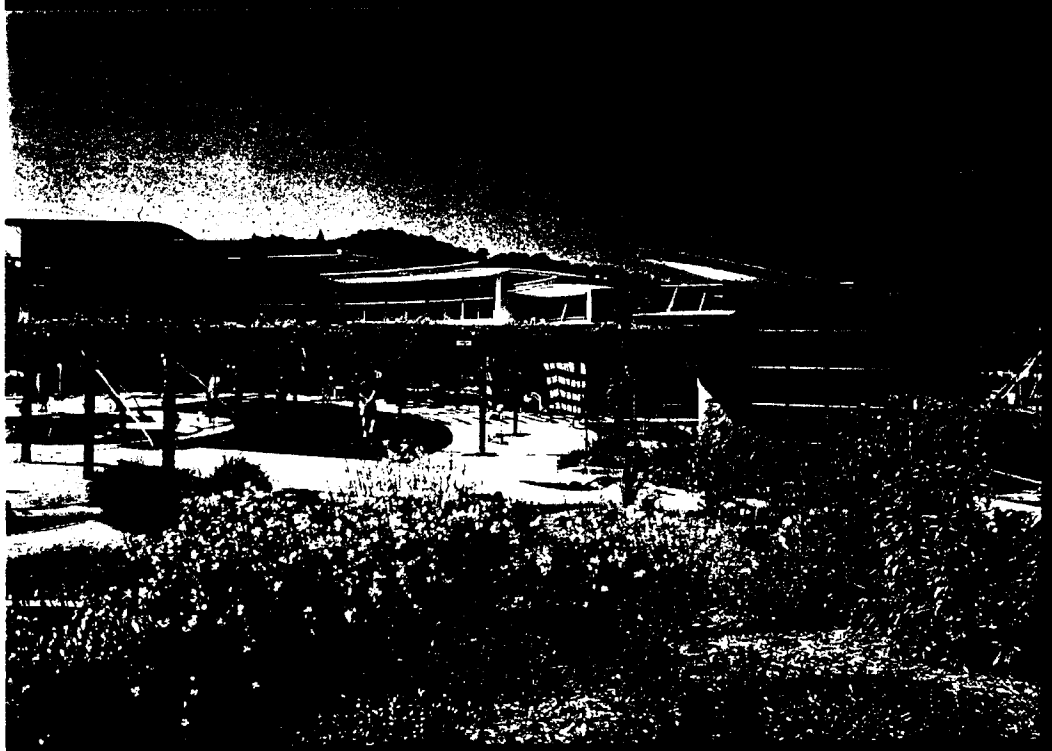
PHOTO CREDIT: Timothy Hurfley

- HIGH PERFORMANCE GLAZING
- DAYLIGHTING
- RAISED ACCESS FLOOR HVAC
- DIMMING HIGH EFFICIENT LIGHTING
- BUILDING AUTOMATION SYSTEM
- VAV FANS
- MODULAR FURNITURE PARTITIONS
- ECONOMIZER & FILTERED HVAC
- NATIVE LANDSCAPING
- PAPERLESS OFFICE PROGRAM
- CONVENIENT TO MASS TRANSIT

PA's D.E.P. SOUTHCENTRAL REGIONAL HEADQUARTERS

- LEED™ CERTIFIED
- BROWN FIELD SITE REMEDIATION
- 52% LESS ENERGY VS TYPICAL
- DESICCANT DEHUMIDIFIER
- MODULAR WORK STATIONS
- MODULAR WIRING
- RAISED FLOOR AIR SUPPLY
- EFFICIENT LIGHTING/ CONTROLS = 50% LESS COOLING LOAD
- DAYLIGHTING
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- INDIGENOUS & ZERISCAPING LANDSCAPING

REAL GOODS SOLAR LIVING CENTER



CREDIT: Ecological Design

- REMEDIATION OF A LANDFILL
- 70-80% RENEWABLE ENERGY
- PHOTOVOLTAICS
- SOLAR HOT WATER
- WIND GENERATOR
- NATURAL VENTILATION
- EFFICIENT LIGHTING/ CONTROLS
- DAYLIGHTING
- EAST-WEST BLDG ORIENTATION
- PASSIVE SOLAR
- WOOD STOVE BACK-UP HEAT
- RICE-STRAW BALE WALLS
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- WATER CONSERVATION & GRAYWATER USE
- INDIGENOUS LANDSCAPING

SOUTHFACE ENERGY & ENVIRONMENTAL RESOURCE CENTER

PHOTO CREDIT: Southface Energy Institute

- 56% LESS ENERGY VS TYPICAL
- GEOTHERMAL ENERGY
- PHOTOVOLTAICS
- SOLAR HOT WATER
- EFFICIENT LIGHTING/ CONTROLS
- FULL SPECTRUM LIGHTING
- DAYLIGHTING
- PASSIVE SOLAR
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- S.I.P.s
- WATER CONSERVATION
- SOLAR ELEC. CAR CHARGING
- RAINWATER HARVESTING
- INDIGENOUS LANDSCAPING
- 99 on ENERGY STAR®

THOREAU CENTER FOR SUSTAINABILITY

PHOTO CREDIT: Leddy Maytum Stacy Architects

- RE-USE OF EXISTING BUILDING
- 67% LESS ENERGY VS TYPICAL
- PHOTOVOLTAICS
- IMPROVED THERMAL ENVELOPE
- HIGH EFFICIENT HVAC
- NATURAL VENTILATION
- EFFICIENT LIGHTING/ CONTROLS
- DAYLIGHTING
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- WATER CONSERVATION & HARVESTING
- PV ELECTRIC CAR CHARGING
- INDIGENOUS LANDSCAPING
- CONSTRUCTION WASTE RECYCLING

U.S. FEDERAL COURTHOUSE EXPANSION
DENVER, CO

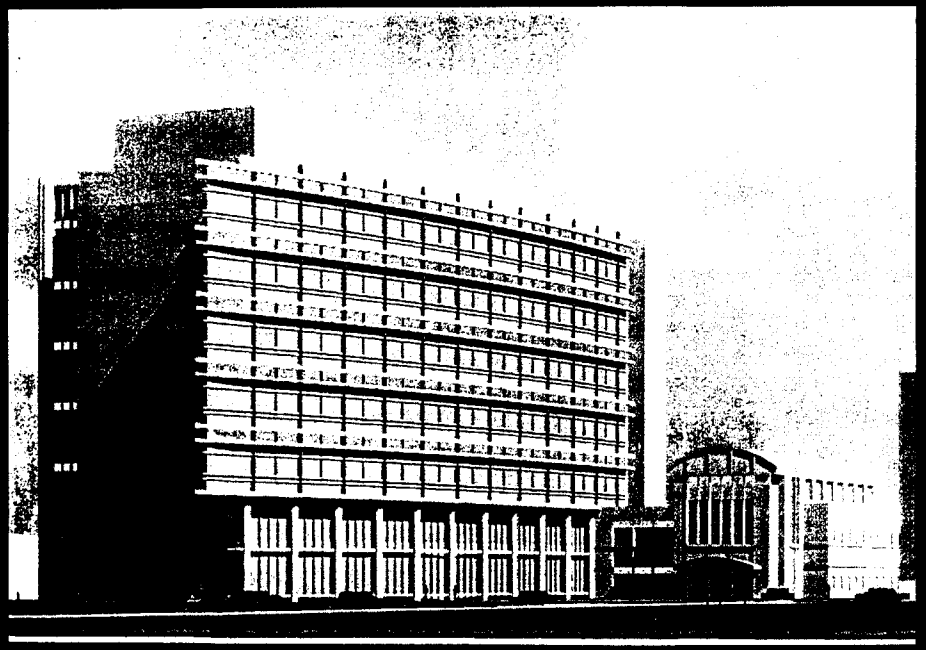


PHOTO CREDIT: HOK

- LEED GOLD RATING
- 50% LESS ENERGY VS ASHRAE 90.1-1989
- RAISED FLOOR SUPPLY PLENUM
- BUILDING INTEGRATED PV
- EVAPORATIVE COOLING
- DISPLACEMENT VENTILATION
- EFFICIENT LIGHTING/ CONTROLS
- DAYLIGHTING
- ENVIRONMENTALLY RESPONSIBLE MATERIALS
- WATER CONSERVATION
- INDIGENOUS & XERISCAPE LANDSCAPING
- CONSTRUCTION I.A.Q. PLAN
- CONSTRUCTION WASTE RECYCLING

HOW TO GET INVOLVED

- VISIT WEB SITE
- CONTACT US WITH INFORMATION ON NEW CANIDATE BUILDINGS
- PRESENT PROPOSED BUILDINGS TO THE ADVISORY GROUP
- JOIN U.S. GREEN BUILDING COUNCIL & BECOME INVOLVED WITH LEED™

http://www.eren.doe.gov/buildings/highperformance/chp

PHASE 2 CANDIDATE PROJECTS

Commercial High Performance Building
Phase 2 Suggested Candidate Projects List

1. Battery Park Housing, New York, NY (nominated by Ren Anderson)
2. CNN Headquareters (nominated by Ren Anderson)
3. New NREL Headquarters Building, Colorado (McDonough, architect; Browing, consultant; charette by GBC; nominated by SWA)
4. McStain Enterprises Headquarters, Colorado (nominated by SWA)
5. Legett-McCall Prototype Office Building, New England (nominated by SWA)
6. New National Resources Defense Council building, Santa Monica, CA (gut rehab; LEED platinum; Syska Engineers; nominated by Gregg Ander)
7. New Rand Headquarters Building, Santa Monica, CA (DMJM, architects; Flack & Kurtz, engineers; nominated by Gregg Ander)
8. Military Air Force Base conversion to homeless center, Orange County, CA (nominated by Gregg Ander)
9. School Campus (Perkins & Will, architect; nominated by Gregg Ander)
10. Department of Natural Resources building (Berkebile Nelson Immenschuh McDowell, architects; ENSAR group, energy modeling; Super Symmetry, ME; Clanton Engineers, lighting; nominated by Frank Cunningham, State of Missouri)
11. National Constitution Center, Philadelphia (Pei Cobb Freed, architect; 1 million square feet; $300 million; project start date: fall 2000; nominated by Herbert Sloan, Owens-Corning)
12. Catamount Institute, CO (campus-scaled plan for residential, dining, classroom, and research buildings; nominated by SWA; contact: Matt Duston 719-687-0929)

COMMERCIAL HIGH PERFORMANCE BUILDINGS PROJECT

Phase II Candidate Project Submission Form

Thank you for your interest in the Commercial High Performance Building project. Phase II of the project focuses on assistance with the design, construction and evaluation of commercial buildings that have the potential to exemplify the qualities of high-performance buildings. The goal is to encourage and support the design and construction of such buildings through consultation, analysis, and publicity. Candidate buildings will be chosen by the U.S. Department of Energy (DOE) and the Commercial High Performance Buildings Advisory Group. Please mail or fax this form to: Michael J. Crosbie, Steven Winter Associates, Inc., 50 Washington Street, Norwalk, CT 06854; 203-852-0741. Questions? Please contact Crosbie at: 203-857-0200, ext. 210; or at: mcrosbie@swinter.com.

1. Project name:_____ 2. Architect:_____

3. HVAC engineer:_____ 4. General Contractor:_____

5. Energy, lighting and/or green consultants:_____

6. Owner and/or developer:_____ 7. Project site: _____

8. Occupancy/use:_____ 9. Building size (gsf):_____

10. Construction type:_____ 11. Estimated cost and cost/sf (date):_____

12. Proposed or target energy-efficiency features:_____

_____

_____

13. Proposed or target sustainable/environmental features:_____

_____

_____

14. Ratings met (ENERGY STAR, LEED, etc.):_____

15. Current project phase and schedule:_____

16. Building vision statement, major goal: _____

17. Contact info: _____

COMMERCIAL HIGH PERFORMANCE BUILDINGS PROJECT

Phase II Candidate Project Submission Form

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1. Project name: Littleton Office Building
2. Architect: Gensler & Associates
3. HVAC engineer: Weidlinger Associates
4. General Contractor: Turner Construction
5. Energy, lighting and/or green consultants: Steven Winter Associates, Inc.
6. Owner and/or developer: Leggat McCall Properties LLC
7. Project site: Littleton, MA
8. Occupancy/use: Commercial Office
9. Building size (gsf): 133,000
10. Construction type: Precast Concrete -Type 2C
11. Estimated cost and cost/sf (date): $22.0 MM (Total Project Cost)
12. Proposed or target energy-efficiency features:

Raised floor environment throughout all office spaces with proprietary interior systems to enhance sustainability.

13. Proposed or target sustainable/environmental features:

Reusable/recyclable interior materials including walls, carpet and all M.E.P. systems.

14. Ratings met (ENERGY STAR, LEED, etc.): Will be using LEED criteria
15. Current project phase and schedule: Early schematic design
16. Building vision statement, major goal:
17. Contact info: Eric B. Sheffels
Executive Vice President/Director of Development
Leggat McCall Properties LLC
10 Post Office Square
Boston, MA 02109
Phone: (617) 422-7000 Fax: (617) 422-7002

COMMERCIAL HIGH PERFORMANCE BUILDINGS PROJECT

Phase II Candidate Project Submission Form

Thank you for your interest in the Commercial High Performance Building project. Phase II of the project focuses on assistance with the design, construction and evaluation of commercial buildings that have the potential to exemplify the qualities of high-performance buildings. The goal is to encourage and support the design and construction of such buildings through consultation, analysis, and publicity. Candidate buildings will be chosen by the U.S. Department of Energy (DOE) and the Commercial High Performance Buildings Advisory Group. Please mail or fax this form to: Michael J. Crosbie, Steven Winter Associates, Inc., 50 Washington Street, Norwalk, CT 06854; 203-852-0741. Questions? Please contact Crosbie at: 203-857-0200, ext. 210; or at: mcrosbie@swinter.com.

1. Project name: THE SIERRA VISTA CENTER AT COYOTE WASH 2. Architect: BRIAN LOCKHART / SASHA WICKS

3. HVAC engineer: AL NICHOLS ENG. INC. 4. General Contractor: WILLIAM BRINKS

5. Energy, lighting and/or green consultants: NICHOLS (ENERGY) GARY J. JURKIN, P.E (LIGHTING) DESIGN CENTER FOR APPROPRIATE TECHNOLOGY - DCAT (GREEN CO

6. Owner and/or developer: BRINKS DEVELOPMENT 7. Project site: SIERRA VISTA, AZ

8. Occupancy/use: PAD (RETAIL, OFFICE, RESIDENTIAL) 9. Building size (gsf): 57,000 S.F.

10. Construction type: MASONRY (INSULATED) AND STEEL FRAME 11. Estimated cost and cost/sf (date): $4,321,300 $75.77 S.F.

12. Proposed or target energy-efficiency features: HIGH INSULATED BUILDING INCLUDING WINDOWS HIGH EFFICIENT HVAC WATER SOURCE HEAT PUMP SYSTEM AND CONTROLS HIGH EFFICIENT LIGHTING SYSTEM

13. Proposed or target sustainable/environmental features: PASSIVE SOLAR HEAT GAIN (WINTER) DAY-LIGHTING INCLUDING SKYLIGHTS & LIGHT SHELVES, SOLAR WATER HTG (DOMESTIC + HVAC) WATER HARVESTING (HVAC + LANDSCAPING) PHOTOVOLTAIC - GRID CONNECTED

14. Ratings met (ENERGY STAR, LEED, etc.): LEED RATING

15. Current project phase and schedule: SCHEMATIC / PRELIM. DESIGN - CONST. START AUGUST

16. Building vision statement, major goal: AFFORDABLE MULTI-USE COMPLEX - ATTRACTIVE IN HARMONY W/ ENVIRONMENT - CELEBRATING THE ABUNDANCE & OPTIONS AVAILABLE W/O POLLUTING OR DEPLETING OUR RESOURCES

17. Contact info: BRIAN LOCKHART - BOX 222, VALLECITOS, NM 87581 (505) 582-4241 PHONE & FAX.

HPB Team Materials

Steven Winter Associates, Inc.'s response to HPB questions on program and website:

1. **What are your goals for HPB?**

- Seek out and identify candidate designers, developers, builders and projects, and accommodate for different levels of commitment to sustainability. Those that are:
  - Highly motivated to create high performance buildings
  - Interested but not knowledgeable
  - Unaware of high performance buildings as a concept or a practice – need the most aggressive campaign
- Convince and assist candidates to achieve a high performance building
- Make resources available to them:
  - High performance building strategic planning
  - Energy analysis
  - Product and system expertise
  - Green/LEED guidance expertise and certification
  - Indoor air quality expertise
  - Daylighting expertise
  - Resource conservation
  - Sustainability
  - Pollution reduction
- Evaluate and document results. Disseminate lessons learned to practitioners

2. **What strengths and weaknesses do you bring to the team?**

- Extensive industry networks and the ability to gain participation form builders and developers
- In-house technical expertise
  - Energy Analysis
    - DOE 2
    - Algor
    - Therm
    - Energy 10
  - Indoor Air Quality (industrial hygienist on staff)
  - Daylighting modeling
    - Radiance
    - Lightscape
  - LEED certified SWA staff
  - Sustainable materials and products specification
  - Mechanical Electrical and Plumbing design
  - Architectural design
  - Commissioning
- Strong outreach capability
  - Conferences
    Have presented at NESEA, Green prints and Benchmark. Will be presenting at ABST and AIA,
  - Continuing education

- Publications. SWA has recently authored and published, or has prompted the following articles on high performance buildings:

Adrian Tuluca, R.A., Devashish Lahiri, P.E., Ian Graham, P.E., "Green Gestalt," Consulting-Specifying Engineer, February, 2000.

"DOE Boost High Performance Buildings, by Word and (Soon) Deed," Outlook, October 2000, p. 12.

"DOE Launches Project to Improve the Energy Efficiency of Commercial Buildings," Energy User News, July 2000, p. 6.

U.S. DOE Launches High Performance Building Project," Interiors, June 2000.

"DOE Launches Commercial High Performance Buildings Project," Environmental Design & Construction, August 2000, pp. 14-15.

"DOE Launches Building Project," Contracting Business, July 2000, p. 13.

DOE to Create High-Performance Commercial Buildings Program," Energy and Housing Report, May 2000, pp. 55-56.

"High Performance Buildings Touted as part of 'Whole Buildings' Concept," Building Design & Construction, p. 23.

"Department of Energy has announced plans to create a Commercial High Performance Buildings Project..." Flat Glass Newsline website, www.glass.org, June 2000.

"Integrated Design Informs Historic Building Renovation," GreenClips.140, March 22, 2000.

"Promoting High Performance Buildings," Construction Specifier, March 2000, p. 14.

"Green Gestalt," Buildingteam Cast Studies, www.buildingteam.com.

Steven Winter and William Jose Higgins, "Commercial High Performance Buildings: Getting the Most from the Least," Construction Specifier, July 2000, pp. 53-58.

"High Performance Building Project," Construction Specifier, August 2000, p. 14.

"Coming Soon From the Department of Energy: Tools and Resources for Architects and Building Designers," Energy Design Resources e-News, energydesignresources.com, Issue 13, August 18, 2000.

Michael J. Crosbie, "Commercial High Performance Building," ArchitectureWeek.com, No. 16, August 30, 2000.

- Contributions to websites and other outreach media

- Leverage program impact and funding with other programs including:
  - Long Island Power Authority Commercial Buildings Program
  - New York Research and Development Authority
  - New York State Green Tax Credit program
  - US Green Building Council and Sustainable Buildings Industry Council activities
  - American Solar Energy Society (ASES)
  - GSA's criteria development programs

3. Your top 10 resources?

- Books/periodicals
  - Environmental Building News
  - AIA Environmental Resource Guide
  - GreenSpec
  - LEED Guide
  - Environmental Design and Construction

- Tools
  - **Energy** 10 with manual Designing Low Energy Buildings
  - DOE 2
  - LEED

- Web sites

Energy Efficiency and Renewable Energy Network (EREN)
http://www.eren.doe.gov

DOE's Center of Excellence for Sustainable Development (Funding, Green Building programs, Organizations, Activities)
www.sustainable.doe.gov

DOE Efficient Windows Collaborative (EWC)
http://www.efficientwindows.org/

Berkeley Green Resource Center Links (Organized by Subject)
http://www.greenresourcecenter.org/links.html

Energy Related Associations and Organizations from REED
http://www.its-canada.com/reed/refer/ref02.htm

Environmental Building News
http://www.buildingreen.com

Florida Solar Energy Center
http://www.fsec.ucf.edu/

Interstate Renewable Energy Council
(Solar Info Links)
http://irecusa.org/goingsolar/links.htm

NCAT Center for Resourceful Building Technology
www.crbt.org

PA Green Building Alliance Resource Center
(See Resource List for Publications)
http://www.gbapgh.org/resourceList.html

SOLSTICE Crest
(See discussion Groups' arvchives)
http://solstice.crest.org/

State of Massachussetts' Sustainable Design & Green Building
(Also see links)
http://www.state.ma.us/osd/enviro/products/grenbldg.htm

Sustainable Sources' List of Green Building Databases
http://www.greenbuilder.com/general/greendbs.html

USGBC LEED 2.0
http://www.usgbc.org/programs/leed.htm

Vital Signs (Case Studies , See Resources - Resource Packages)
http://www-archfp.ced.berkeley.edu/vitalsigns/res/rps.html

- Case studies
  - Case studies and database from the Commercial High Performance Buildings project web site at: http://www.eren.doe.gov/buildings/highperformance/chp/building_inventory.html
  - Green Building Advisor case studies
  - AIA COTE Top Ten

4. List of common questions (and answers) that you get.

1. What is a high performance building?
Buildings that drastically reduce energy usage, with the potential for zero energy use or net energy exporters.

Buildings that create healthful environments which incorporate daylit spaces, good indoor air quality, appropriate thermal comfort and foster increased productivity.

A building which is created through an integrated design approach incorporating the expertise of all design parties involved.

2. Does it cost more, if so how much?
Savings in other areas may offset the increased cost of certain materials or techniques used in high performance buildings. For example, high performance glazing typically costs more than standard windows, but high performance glazing may allow perimeter heating and cooling to be eliminated, reducing the cost of the distribution system, and often the capacity of the heating and cooling system. In addition, long term operating costs are typically lower, and user productivity is often increased.

3. How does a building get a LEED rating?
LEED™ (Leadership in Energy and Environmental Design) Green Building Rating System. LEED™ is a very comprehensive rating system that helps the designer wade through the numerous whole building issues. LEED™ focuses on sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. For a building to receive the lowest LEED™ certification, seven prerequisites and nineteen other points must be obtained. Silver, gold, and platinum certifications are available when more points are earned. The US Green Building Council's website, **www.usgbc.org** covers project registration, building certification, technical support, and costs.

4. What are the benefits of a high performance building?
Increased productivity
Reduced environmental impact
Good corporate citizenship
Constructive example for other businesses
Reduced life-cycle costs
Reduced maintenance costs

5. What would you like to see on the (a) web site and (b) print material
- A consistent message
- A graphic of the roadmap of the design sequence, from predesign to construction administration and commissioning for a high performance building.
- Information tailored to different audiences.
- Links to other valuable sites
-Schedules of upcoming presentations at conferences
-Downloadable Powerpoint presentation
-List of consultants
-Lists and links to HP buildings

6. **Give an example of a HP building and why you think that it is HP.**
Lewis Center at Oberlin College
This building demonstrates an elegant response to the environment for both present users and future generations. Compared to typical new college classrooms in Northern Ohio, this building will use approximately 75% less energy annually. Heating and cooling are provided closed loop geothermal wells in combination with conventional heat pumps and a radiant slab. Each heat pump is controlled separately to respond to individual space needs. Efficiency is gained by passing the exhaust air of the heating system through a heat recovery unit. Indoor air quality is assured by extensive source control and responsive ventilation. Low V.O.C. materials, paints

and adhesives were specified. Ventilation during construction and construction scheduling mitigated material off-gassing. A cleaning products and practices protocol was produced to minimize pollutants introduced in the building after completion. 100% fresh ventilation air is supplied to all the occupied spaces and occupancy sensors open fresh air supply dampers. The first floor work spaces and all of the second floor have a raised floor system that contains the air delivery and return system, and electrical/communication/data wiring.

Renewable energy is provided by 3,700 sq ft of photovoltaic panels on the south-facing curved roof. The building has its long axis going east to west to best respond to the sun's path. Natural light is provided in all interior spaces. The energy-efficient lighting design has occupancy sensors and the lighting for the classrooms and the Resource Center has daylight dimming capability. The atrium and the work spaces have been designed to store direct solar heat during the heating season. Thermal mass has been provided to retain and re-radiate heat. A south-facing, vine-covered trellis provides seasonal solar control. Operable windows are provided in all occupied spaces. The glazing has an advanced thermal design and is seasonally shaded with overhangs. The atrium has natural convection assisted ventilation. There are R-30 to R-40 insulation levels on the roofs and R-21 insulation levels in the walls. Part of the north wall has an earth berm. The masonry cavity walls feature pressure-equalized rain-screen assemblies with air barriers. The building has integrated, advanced, central controls for mechanical, security, fire and Living Machine systems. Full HVAC commissioning was specified to be completed before occupancy.

Environmental Features: A gnomon in the sun plaza marks the solar year. Low V.O.C. materials, paints and adhesives were specified. Inaccessible ceiling plenums are avoided. Ventilation during construction and construction scheduling where done to mitigate material off-gassing. 100% fresh ventilation air is supplied to all the occupied spaces. A cleaning products and practices protocol was produced. Durable, low-maintenance materials are used throughout. The steel framing, aluminum (flashing, windows, curtain wall), ceramic tiles and toilet partitions have recycled content. All wood was specified from certified sustainable managed forests. The raised floor and carpeting are being leased from Interface Flooring Systems, Inc. Indigenous and edible plants are being used on the site. Storm water run-off is treated by an on site pond and wetland. 2,000 gallons per day of waste water will be treated for non-potable use by a Living Machine. The Living Machine, which is housed in the building, uses accelerated natural processes of ponds and marshes to purify waste water.

Dru Crawley's High Performance Buildings Joint Projects meeting 10/3/00

Projects:
DOE Tech Assistance (McDonald, Kinzey) from labs.
Comm High Per Buildings/ SWA (Bruncati, Crosbie, Winter)
HPB/EDNY: Pam Lippe, Barry Donaldson - Guidelines for developers, identify projects for tech. assistance
ReBuild America Dan Sze

Info projects:
EnergySmart Schools - existing and new
ESS Guidelines - Innovative Design
LEED - GBC doing it on their own
Eco Advisor - Joe Deringer
GBA - Gail Lindsey, Nadav Malin
Green Building Challenge

IiSBE - becoming the umbrella for the GBC project
SBIC - training for low energy buildings (primarily small commercial)
Athena - DOE is a minor supporter
FEMP has been doing one-off tech assistance projects. Is the lead on Green Energy Parks. Also doing tech assistance. GFF
AIA COTE - looking at aggressive ED top ten, Gail may be leading that work.
ASHRAE: 3 pieces: Integrated building design tech committee (TC 4.12) A handbook chapter
Guideline is18 underway to go beyond Standard 90 in guidance on doing energy efficiency in buildings.

Tools:
Building Design Advisor (has DOE 2 under it)
Energy-10 EnergyPlus (flagship simulation program will be out in April 2001)
NEED: to be doing things in design/construction

High Performance Issues
Design/construction
Commissioning/start-up
Retrofit

Roadmapping
Process change – Pam's developer guidelines; Paul's process change
Performance metrics
Technology development
Market transformation

Moving forward--levels of participation:
1. Information/training/guidelines
Create a web page to focus those efforts. Other existing tools that can be used: WBDG, GBA, EcoAdvisor, Lippe's Guidelines, Case Studies - Considering working through EDNY to create a pamphlet, expanding to a number of additional buildings.

2. Tech Assistance 1st level.
1-day workshop, 1-2 day charrette
Take existing information and create something "turn-key"

3. Tech Assistance- next level, >25% beyond ASHRAE 90.1. Can spend up to $25,000 on a project

4. Truly high performance building >50% beyond ASHRAE 90.1 (e.g. Zion National Park). Can spend more to help, over time.

Dan Sze - ReBuild America:
Seeks to do market transformation, through partnerships. Initially tried to fund things directly, didn't work so well. Now funding provided to be highly leveraged. Are turning to this resource area as a potential partnership. Put people with ideas in touch with professionals who can help.
Have a group of about 50 business partners: lighting, HVAC, electronics, recycling. Don't want to set up "preferred vendors."
Have 300 partners, adding 2-3/week.
Trying to broaden their customer rep base.
They need right application of tech assistance. Dan sees the information dissemination as 80% of the job
Joe Deringer suggested that the charettes, workshops, and deeper levels of technical assistance can be documented to create the information for Level 1 participants.
Dan agrees, but sees face time as an important value to provide.
Crosbie suggests that format for material/information/guidance should depend on the audience, and that the members of that audience need to be very clearly defined.

Deringer: small businesses have little time to make decision. Information has to be very focused. What are key areas, decision points about certain technologies. Give them the information to hire a consultant, and provide different info to the consultant.

Paul Torcellini suggested that the whole notion of what "cost effective is" has to be changed. Work with people's values. Joe Deringer noted that if productivity increases a measure is more cost effective. EcoAdvisor now estimates lighting quality improvement, it assumes 1% productivity increase from worst to best lighting. Its very conservative, still swamps all other cost benefits.

Dru noted that in addition to the web, paper materials still need to be created.

Torcellini noted that often the real decision maker on the project is the people who maintain the building.
Lippe asked how to get ad hoc decision makers into the process.
Torcellini: Daylit test facility was used to convince people of the benefits of daylighting.
Barry: Decision-makers who will get the benefits of the decision are one thing. What about spec developers? Often want to be able to see it. Has it been done before? Is there a measure of cost and benefit.
1. They have to like it
2. Is has to work
3. They must be able to afford it.

It was noted that developers are not interested unless they have a project on the table, and by then they are often too busy to be influenced.

Donaldson noted that the real estate community drives many of the energy decisions in a building, usually for the worse.
Torcellini asked what information is needed to sell people on high performance?
Deringer: focal point is data structure and format of case studies for varying audiences.
Classify case studies by strategies or the process that was used to develop them.

A diagram of development team, design team, decision team and a template for a decision structure would be helpful.
Gail Lindsey noted that hard data is useful but process issues (testimonials) are also important.
Pam Lippe stated that her lessons learned was book due out in two weeks and contained a lot on process as well as more technical details than 4 time square book. The book includes 3 case studies.
Pam would welcome the opportunity to work on a book of case studies.

Dru wants to get specifics on the structure of case studies in GBA. The case study format needs to look at:
Who is the audience?
What is the technical data that's needed?
Document the project's process
How has the building performed?
What three things would you do differently next time?

A syllabus green building library was provided. Must be provided as a deliverable. Beyond the case studies there needs to be a way to find the products and bring the technologies to other projects.

It was noted that there are many good tools out there, but someone still may not know how to get started. A guide to the tools and a timeline for a project showing when those tools are appropriate would be helpful.

Dru noted that SWA's approach is described as a commercial "Building America" project, with a set consortium of players, but that model won't work for commercial buildings where players constantly change from project to project.

Tech Assistance will be provided as a suite of teams that can be sent out on a week's notice to a project.
DOE will be sending out a solicitation, based on level of detail each team wants to provide.
Commissioning was raised as an issue, but Dru noted that another group is dealing with that area.

Nadav asked about XML as format for data sharing. Dru some reservations but it may be useful.

Next Steps:

Case studies

Framework: based on the information determined to be important to sell high performance.
GBA's model can be used. What additional information do users need?

Marketing Materials

A list of questions to ask an architect or consultant as part of the selection process
Material that an architect can give to a client
Gail suggested that the State of PA had a video and guidelines that work well together, this may be a good model.

Tools

The practical application of the tools. What groups have used them, how have they used them?
Guide people through the web site to next steps
Get feedback along the way and reinsert into the tools.
Gail recommends the AIA Charrette process book as an early tool.
Dru will put up a working unlinked Web page. Send info to Dru, in the next week (by 10/10/00) he will share it more widely. Send a top ten list of resources, not exhaustive, but exclusive.

Related follow on meeting
Dan Sze asked the group to consider convening a roundtable in November