

.....

Beyond Mandates:
Agencies Shape the
Future of Their
Facilities

3

Case Study: Baca
Dlo'ay azhi School

4

Snapshot of Agency-
Specific Sustainable
Building Policies

5

WaterSense Brings
Home the Need for
Water Efficiency

6

Case Study: Sofia
(Bulgarian) Embassy

6

Standardizing
Sustainability – An
Overview of U.S.
Government Policy
and Activities

7

Case Study: Midwest
Regional
Headquarters,
National Park
Service, Omaha, NB

8

Case Study: EPA
Potomac Yard
Buildings

9

The WBDG: Your
"One Stop Shop" for
Sustainable Building

10

Beyond the
Checklist: EPA Sets
the Benchmark for
Green Construction
Specifications

11

(continued next page)

Closing the Circle News

Special Edition: Sustainable Buildings Where we are... Reflecting on OFEE's 2003 Recommendations

From court houses to research institutions to embassies, Federal buildings have been icons of architectural design throughout history. Faced with the new challenges and opportunities of today, Federal buildings are also symbols of our nation's priorities and values as members of the global community. Owning approximately 445,000 buildings and leasing an additional 57,000 buildings—the largest real estate portfolio in the world—the Federal government recognizes that its facilities have tremendous impact on the natural environment, the economy, surrounding communities, and the thousands of people that work in, live in, and visit these buildings every day.

Stepping up to this responsibility, the Federal government is rethinking how it builds today to secure and enhance the future. High performance and sustainable building involves maximizing environmental and human health benefits throughout the building's entire life cycle - from siting through design, specification, construction, operation, maintenance, renovation, and eventual removal. This is but one element in meeting the President's commitment for the Federal government to lead by example and be good stewards of our environment and natural resources.

In the few short years since the 2003 Office of the Federal Environmental Executive (OFEE) Report, *The Federal Commitment to Green Building: Experiences and Expectations*, Federal agencies have made tremendous strides in meeting the challenge through momentous commitments, far-reaching policies, high performance buildings, and sophisticated technologies. These Federal efforts are also helping to transform markets toward more environmentally sustainable products, systems, and construction services—serving as powerful examples for American businesses and consumers.

I wanted to take this opportunity to look at the recommendations in that report that my office, then under the leadership of John Howard, made for overcoming real obstacles and furthering green building in the Federal sector. The recommendations were intended to address challenges and opportunities, regarding high performance buildings. The key areas included policy approaches (including life cycle costing and assessment requirements), education and awareness, research and development, and metrics.

I am happy to report that through a few key initiatives, many of the recommendations have been, or are being, addressed. Probably the single major event since 2003 regarding moving forward was the Memorandum of Understanding (MOU) entitled "Federal Leadership in High Performance and Sustainable Buildings." Signed by 19 Federal entities representing more than 80 percent of our square footage, the MOU embodied a series of guiding principles that call for enhancements in energy efficiency, use of building materials, indoor environment quality, and water conservation in the areas of design, construction, use, maintenance, and decommissioning.

The MOU served not only to demonstrate commitment to enhanced performance, but also prompted much activity in the building community, both within and outside, of the Federal government. These activities support the development of the technical guidance, including case studies, best practices, and tools needed to implement and achieve the MOU goals. In addition, the MOU has served as a focal point to bring together the various experts and stakeholders to discuss research and development needs. Finally, there is much work underway in developing relevant building performance metrics, above and beyond energy and water use, to monitor progress toward >>>



(from previous page)

Select Federal Sustainable Buildings Programs

13

Federal Green Building Research Update

15

Green Building Measurement: SF GreenPRINT Scores Results

16

Applying a Life Cycle Perspective to Federal Construction Specifications

17

Lifecycle Building Challenge

19

Using an EMS to Green Federal Construction - One Site at a Time

20

Don't Forget the "EE" in GREEN

21

Case Study: NOAA Satellite Operations Facility

22

Understanding IEQ in Buildings

23

U.S. Coast Guard ISC Kodiak Water Leak Detection and Other Water Efficiency Efforts

25

EPA's GreenScapes Program - New Tools to "Green" Beyond the Building

26

>>> the goals. The Interagency Sustainability Working Group (ISWG) and Whole Building Design Guide, both discussed at length in this newsletter, are the leaders in developing and disseminating this work.

In 2004, OFEE also created and chairs the Federal Green Building Council (FGBG) to provide a more senior policy implementation avenue for the existing ISWG. The FGBG is made up of agency middle and upper level management who can take the recommendations developed by the experts in the ISWG to higher levels in their respective agencies, further facilitating implementation.

To highlight the signing of the MOU, my office, in partnership with the Office of Management and Budget (OMB), held the White House Summit on Federal High Performance Buildings in January 2006. At the summit, the MOU was signed, and a series of presentations highlighted the state of current progress and featured case studies.

Also at the summit, OMB debuted the new Environmental Stewardship, Energy, and Transportation scorecards, intended to monitor progress and grade agencies on specific metrics, among which is one for building-related accomplishments. The scorecards fill several roles in regard to buildings, mainly serving as a senior management measurement tool, as well as a mechanism to ensure accountability and responsibility.

Even before the summit, we began recognizing agencies for their performance and commitment to high performance buildings, not only to reward them, but also to provide incentive for others to emulate their accomplishments. We added a separate buildings category to the annual White House Closing the Circle Awards to highlight this commitment to recognizing progress.

Finally, to build from these accomplishments and pave the way for future success, President

Bush signed Executive Order 13423, "Strengthening Federal Environmental, Energy and Transportation Management" on January 24, 2007. The new Executive Order consolidates and strengthens E.O.s 13101, 13123, 13148, and 13149 by establishing new and updated goals, practices, and reporting requirements for environmental, energy, and transportation performance and accountability. In the area of sustainable design and high performance buildings, the new E.O. makes mandatory the five Guiding Principles of the MOU for all new construction and major renovations and sets an aggressive goal for applying these practices to our existing capital assets over the next decade.

So what is next? In 2007 and beyond, we will see exponential growth in the development and sharing of best practices, case studies, and implementation guidance. We will increase the visibility of Federal buildings efforts in many venues through presentations and speeches, for example at the annual OFEE Environmental Symposium, GreenBuild, and the U.S. Green Building Council (USGBC) Federal Summit, among others. We will also continue to work closely with the experts in the field to catalyze research and development, especially in the areas of life cycle assessment, worker productivity, and innovations. OFEE will strive to strengthen our partnership with OMB on developing supporting budget and costing tools, and the financial flexibility needed to encourage high performance building, within the statutory and legislative funding and appropriations structure.

With these actions, I feel that we are entering a new era of widespread progress and innovation in Federal high performance buildings and setting yet another benchmark in our commitment to lead by example. I trust that the stories reflected in this newsletter will not only enlighten your understanding and awareness of what the government is doing, but will also inspire you to build smartly! ■



Beyond Mandates: Agencies Shape the Future of Their Facilities

Since the early 1990s, executive orders have directed Federal agencies to apply the principles of sustainable design to the siting, design, and construction of new facilities. These principles include energy efficiency, reduced consumption of land and other non-renewable resources, minimization of waste materials and water use, and creation of a livable, healthy, and productive work environment. Sustainable design mandates also incorporated a wide range of recycled content, energy and water efficient, biobased, and other environmentally preferable materials, helping to promote markets for these products.

While far-reaching and holistic in scope, these directives did not define key sustainable building practices with measurable performance goals. Federal agencies, therefore, took it upon themselves to respond to this need. On January 24-25, 2006, more than 150 Federal facility managers and decision makers came together at the first-ever “White House Summit on Federal

Sustainable Buildings” to witness the signing of the “Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (MOU).” The MOU was the

flagship Federal effort to define guiding principles of green building and provide leadership in the design, construction, operation, and maintenance of high performance and sustainable buildings. >>>

Signatory Agencies

- Department of Defense
- Department of Energy
- General Services Administration
- Department of Veterans Affairs
- Department of the Interior
- Department of Justice
- Department of Agriculture
- National Aeronautics and Space Administration
- Department of Homeland Security
- Department of Health and Human Services
- Department of Transportation
- Tennessee Valley Authority
- Environmental Protection Agency
- Department of State
- Department of Housing and Urban Development
- Office of Personnel Management
- Department of Commerce
- Department of Labor
- Executive Office of the President



Reporting success stories and lessons learned into the High Performance Federal Buildings Database—a project led by the Department of Energy (DOE)—is one of the commitments made by MOU signatory agencies. This will facilitate sharing lessons learned and best practices among stakeholders and should be instrumental in benchmarking facilities across the Federal government. Peruse the case studies at <http://www.eere.energy.gov/femp/highperformance/>.

>>> Today, 19 Federal agencies, controlling more than 80 percent of the total Federal facility square footage, have joined to minimize the environmental footprint of their buildings by adopting the MOU's Guiding Principles, which include:

- Employing integrated design principles.
- Optimizing energy performance.
- Protecting and conserving water.
- Enhancing indoor environmental quality.
- Reducing the environmental impact of materials.

The Interagency Sustainability Working Group provides Technical Guidance—continually updated on the Whole Building Design Guide at: www.wbdg.org/sustainablemou — to assist agencies in implementing the

MOU. Available resources include information on designing, operating, commissioning, and monitoring sustainable new buildings and renovations, as well as information on specific topics, such as moisture control, creative funding strategies, guidance for vendors, and managing construction

waste. The MOU Technical Guidance also provides clarification on a number of the MOU commitments, related mandates, and direct links to model contract and specification language. For more on this Technical Guidance, please see the related article in this newsletter. ■

MOU Commitments

- Integrated Design
- Commissioning
- Energy Efficiency
- Measurement & Verification
- Indoor Water
- Outdoor Water
- Ventilation & Thermal Comfort
- Moisture Control
- Daylighting
- Low-Emitting Materials
- Protecting Indoor Air Quality During Construction
- Recycled Content
- Biobased Content
- Ozone Depleting Compounds

Case Study: Baca Dlo'ay azhi School

The Bureau of Indian Affairs Baca Dlo'ay azhi Community School, located on the Navajo Nation reservation in Prewitt, NM, serves students in kindergarten through grade six. The building incorporates Native American cultural concepts, including an orientation that reflects the meanings associated with the four cardinal directions. The name means “little prairie dog” in Navajo. A number of sustainability strategies contribute to the project's success. Light-colored materials were used for the majority of the building site's impervious surfaces, reducing its contribution to the heat-island effect. Parking was kept to a minimum, and employees and visitors are encouraged to carpool or bicycle to the school. Using daylighting, low-emissivity windows, shading, an efficient mechanical system, and a sophisticated energy-management system, energy use at the school is expected to be 20 percent lower than in a comparable, conventional facility. The school also purchases wind power for half of its energy use. Water use is kept low through the use of low-flow faucets and native, xeric landscaping. The school is expected to use at least 30 percent less water than a comparable, conventional facility. Materials were selected for their recycled content and their proximity to the building site. More than 60 percent of the building materials, by cost, were sourced within 500 miles of the site. Several factors, including daylighting, air filtration, a track-off entryway system, and a green housekeeping plan, contribute to a healthy indoor environment. ■



Snapshot of Agency-Specific Sustainable Building Policies

In addition to being subject to government-wide mandates and the MOU, many agencies and departments have implemented their own sustainable building policies to address unique criteria and articulate their own priorities.

Within many agencies, sustainability principles serve as the foundation for planning, programming, budgeting, contracting, constructing, commissioning, operating, maintaining, and decommissioning building projects. In particular, several agency policies emphasize energy efficiency, water conservation, and life cycle costing. An increasing number of agencies and departments are turning to the USGBC's Leadership in Energy and Environmental Design (LEED™) Green Building Rating System as the basis for their sustainable design and construction activities. LEED™ is a sophisticated checklist covering five areas of environmental impact: energy and atmosphere, water efficiency, materials and resources, indoor environmental quality, and sustainable sites. A sixth category, innovation and design process, offers credit for creative approaches to

sustainable design and construction. The more credits that a building earns based on its design and construction, the higher the rating, ranging from LEED™ Certified to LEED™ Silver, Gold, or Platinum. (See the article on Standardizing Sustainability for more information on LEED™ and other standards activities.)

The USGBC estimates that registered LEED™ projects constitute 5 percent (pro-rated for the year) of all annual new commercial and institutional construction in the U.S. by floor space. In the Federal community, 320 buildings are currently registered for LEED™ certification, and 51 have been certified (representing 6.4 million square feet of building space).

The following provides a snapshot of agency policies in order to illustrate the significance of Federal sustainable building commitments:

- The General Services Administration (GSA) is the Federal government's landlord and the largest real estate organization in the country, with more than 340 million square feet of buildings and an additional

90 million square feet currently under construction. GSA requires that all building projects meet the LEED™-Certified level with a target of LEED™-Silver.

- In completing design-build contracts, the Pentagon strives to achieve the highest performance possible utilizing LEED™ as a benchmark; the Pentagon Renovation Program's long-term goal is to obtain a LEED™ rating for the entire Pentagon Reservation.
- The Air Force has committed to achieving 100 percent LEED™ certifiable facilities by FY09.
- The Army requires that all military offices construct all vertical projects to the LEED™-Silver level, beginning in FY 08.
- In an August 4, 2006 memorandum, the Assistant Secretary of Navy for Installations and Environment directed the Department of Navy to plan, program and budget to meet the requirements of the Energy Policy Act of 2005 and the Federal Leadership in High Performance and Sustainable Buildings MOU and earn a LEED™ Silver-level rating minimum, in new and replacement buildings.
- The Environmental Protection Agency (EPA) aims to have all of its new facility construction and new building acquisition projects 20,000 gsf or larger meet LEED™ Silver. EPA also aims to use LEED™ for new Commercial Interiors and Existing Building standards when space in an existing building is acquired.
- The Department of Health and Human Services (HHS) requires that facilities costing \$3 million or more obtain certification from LEED™ or the Green Building Initiative's Green Globes green building rating system. ■

Jones Federal Building and Courthouse, Youngstown, OH



WaterSense Brings Home the Need for Water Efficiency

EPA and other Federal agencies have at their disposal a range of technologies to help reduce their facilities' water use, from high-efficiency plumbing fixtures to water-minimizing landscaping. Until recently, however, consumers had no national source of information on water-efficient products. To fill this gap, EPA launched WaterSense in June 2006. WaterSense is a voluntary public-private partnership program aimed at protecting the future of our nation's water supply by raising awareness about the importance of water efficiency and helping consumers incorporate water-saving features into their homes and yards.

WaterSense is partnering with

utilities, manufacturers, retailers, and distributors, state and local governments, trade associations, and other nonprofit organizations to promote water-efficient products and practices through an easy-to-recognize label. These partners will help advocate water efficiency and promote the WaterSense label to consumers and businesses in their communities. The WaterSense label will only be allowed on products that meet EPA criteria for efficiency and performance, which will help consumers identify water-efficient products that perform well, save money, and encourage innovation in manufacturing. Beginning in 2007, WaterSense will work with manufacturers and retailers nationwide

to promote WaterSense labeled high-efficiency toilets and other water-saving plumbing fixtures.

WaterSense has also begun labeling certification programs that promote water efficiency. Landscape irrigation designers, auditors, and installation/maintenance professionals can become WaterSense partners by passing the requirements of a WaterSense labeled certification program, including demonstrating knowledge of water-efficient technologies and practices.

To learn more about WaterSense, visit the program's Web site at <http://www.epa.gov/watersense> or contact the WaterSense Helpline at (866) WTR-SENSE (866-987-7367). ■

Case Study: Sofia (Bulgarian) Embassy

The Department of State has committed to using LEED™ in the construction of new embassies worldwide over the next 10 years. The Sofia, Bulgaria, Embassy chancery building compound houses the offices of the State Department, including the Executive Office and the General Administration, the Community Liaison, the cafeteria, and the health unit. The Embassy redeveloped a former hospital site for the building. The site was selected in part for its proximity to existing bus and rail lines in order to encourage mass transit. The design also includes shade and pervious paving materials to reduce the urban heat island effect. By relying on high efficiency landscape irrigation technology, water consumption for landscaping purposes was reduced by more than 50 percent from conventional techniques. The project achieved a 40 percent energy reduction over the baseline. Almost one-third of the materials used for the Sofia Embassy project were manufactured within a 500-mile radius of the project site, far greater than the 20 percent required by LEED™. In terms of indoor air quality, the use of a carbon monoxide monitoring system was incorporated in Sofia to provide the feedback necessary to maintain proper ventilation. ■



Standardizing Sustainability – An Overview of U.S. Government Policy and Activities

The National Technology Transfer and Advancement Act requires Federal agencies to “use technical standards that are developed or adopted by voluntary consensus standards bodies” in both our procurement and rulemaking unless such use is inconsistent with applicable law or otherwise impractical. In cases where no voluntary consensus standards exist, agencies can also use other technical standards.

Green building standards are at the forefront of environmental preferability standards in many ways: taking an holistic, systems approach; pushing the science of life cycle assessment; asking the tough questions about chemicals of concern; and balancing environmental, economic, and social considerations. The leaders in green building standard development are engaging stakeholders in an open, transparent process. Their standards methodologies, rating systems, and other metrics provide a larger framework in which to organize and implement green programs at the national level. The use of green building standards fits well in the government context, considering the Federal government's massive size, hierarchical structure, and way of doing business. The use of green building standards will also facilitate implementation, reducing the duplication of background research by the many parties working on green building, and giving third party validation opportunities to justify sustainable design and construction work.



Leadership in Energy and Environmental Design

OFEE encourages the development of sustainable buildings using agreed upon criteria that are determined in a scientific and life cycle based manner, and can be verified by a process that is credible and transparent to the public. To date, the USGBC's LEED™ Green Building Rating System has been the most widely available and advanced mechanism to do that. As a result, many Federal agencies, including GSA, EPA, and the Department of Defense (DoD),

have made LEED™ a policy for their facilities (see related article on agency policies). However, the Federal government is open to, and is encouraging, other models and tools as they become available, while at the same time, applaud those who use LEED™ to enhance their buildings and have received various levels of certification.

USGBC was accredited by the American National Standards Institute (ANSI) in November of 2006. As USGBC takes LEED™ through the consensus process, Federal experts are working with USGBC to address environmental performance criteria as they move into new standards and later versions of the existing standards. We are also working with other organizations as they develop sustainable building rating systems and product standards. The following provides a brief update on some of those activities.



Green Globes

The Green Building Initiative (GBI) is a 501(c)3 organization that formed in 2005 to help bridge the gap between early adopters of green building and more mainstream building owners and practitioners. Its Green Globes™ system is a suite of building environmental assessment tools that can be used over the entire life cycle of the building. The tools are web-based, interactive, and unique in their ability to provide baselines, early assessments, design guidance, and downloadable

reports that include recommendations and hyperlinks to find supplemental information.

GBI was accredited by ANSI in September of 2005. GBI is now taking its Green Globes™-Design/New Construction (Green Globes-DNC) commercial building rating system through ANSI's consensus process. GBI released Green Globes v.1 as a Draft Standard for Trial Use in 2006. The GBI ANSI committee, which includes a number of Federal experts, is 8 months into its technical review process, which is on time for completion in January of 2008.

Concurrent to the ANSI draft standard review process, GBI completed its pilot on the use of Green Globes-DNC on various building types. GBI certified eight buildings in the United States over the last 15 months, including the >>>

Case Study: Midwest Regional Headquarters, National Park Service, Omaha, NB

Sited on a former brownfield, the Carl T. Curtis Midwest Regional Headquarters of the *National Park Service* in Omaha, NB is the first facility in Nebraska and one of about 50 buildings in the world to earn LEED™ Gold certification. The project promotes the use of alternative transportation with parking spaces for carpools, and bike racks and showers. The project uses water efficiently through the use of native, drought-tolerant plants that will not require permanent irrigation and a retention pond that naturally filters rainwater on the site. Restroom facilities also use water-conserving systems. The building's east-west axis allows simpler mechanical controls, increases daylighting, reduces solar heat gain from the west, and gives 90 percent of the occupants views of the river or surrounding area. Materials selected for the project include insulated precast concrete, aluminum, FSC-certified wood, low-emissivity insulated tinted glass, and limestone. Local materials were emphasized to reflect the Midwest region, and minimal finishes were used to support a healthy indoor environment. ■



The project uses water efficiently through the use of native, drought-tolerant plants that will not require permanent irrigation and a retention pond that naturally filters rainwater on the site. Restroom facilities also use water-conserving systems. The building's east-west axis allows simpler mechanical controls, increases daylighting, reduces solar heat gain from the west, and gives 90 percent of the occupants views of the river or surrounding area. Materials selected for the project include insulated precast concrete, aluminum, FSC-certified wood, low-emissivity insulated tinted glass, and limestone. Local materials were emphasized to reflect the Midwest region, and minimal finishes were used to support a healthy indoor environment. ■

>>> Clinton Presidential Library, Pfizer CRU building, and the Summit County MRF building—the nation's first green recycling center. Many of these buildings received dual certification from Green Globes and LEED™. Green Globes-DNC is now being piloted by the Dept. of Health and Human Services, and GBI is in discussions with several other Federal agencies to develop multi-tiered pilots.

GBI also began a pilot for its Green Globes for Continual Improvement of Existing Buildings (Green Globes-CIEB) module beginning January 2007. GBI is seeking public and private sector participants to evaluate their buildings using this web-based tool that helps users to create a baseline and provides a built-in assessment, guidance, and recommendations for improvement. If you are interested in learning more about Green Globes, please contact Vicki Worden, GBI Commercial Programs, at 202-841-2999 or vworden@thegbi.org.



ASTM is a nonprofit organization comprised of more than 30,000 individuals from 100 nations. Since 1898, ASTM has provided a global forum for the development and publication of voluntary consensus standards, which serve as the basis for manufacturing, research and development, product testing, procurement, and regulatory activities around the world. ASTM International's five-year-old Subcommittee E06.71 on Sustainability is responding to a fast-

growing market demand for "green building" and "sustainable development."

EPA chaired the task groups responsible for developing the "Standard Guide for General Principles of Sustainability Relative to Buildings" and the "Standard Practice for Data Collection for Sustainability Assessment of Building Products." EPA is active in the task groups currently working on standards on terminology and environmentally preferable products.

EPA is co-chairing the first ASTM International Symposium on Common Ground, Consensus Building & Continual Improvement: International Standards and Sustainable Building. The symposium, featuring peer-reviewed papers from the major players in sustainable building product standards and rating systems from around the world, will be held April 19-20, 2007 in Washington, DC.

USGBC held three meetings with Federal agency representatives in the fall of 2006 in order to obtain feedback on LEED™. A compilation of the Federal comments is available on OFEE's website at <http://www.ofee.gov/sb/sb.htm>. If you have additional thoughts to share with USGBC as they consider major revisions to LEED™ over the next two years, please e-mail LEEDv3@usgbc.org and put "Federal comments" in the subject line. ■



A Sustainability Standard for Furniture

The Business and Institutional Furniture Manufacturers Association (BIFMA) partnered with NSF International to develop a Sustainable Office Furniture Standard, which will apply to moveable walls, systems furniture, desk systems, casegoods, tables, seating, and accessories. Through analysis of environmental, economic, and social aspects throughout the supply chain, the BIFMA/NSF effort is establishing criteria to define what makes furniture progressively more sustainable. The standards development committee plans to incorporate the general areas of human and ecosystem health; the use of renewable energy and energy efficiency; use of materials and materials reutilization; water management; economics and cost; and social responsibility. This standard is on schedule for completion by late 2007.

For more information on sustainable building standards activities within ASTM, NSF, and BIFMA, please contact Alison Kinn Bennett at kinn.alison@epa.gov.

This photo shows the connection between One and Two Potomac Yard, where the green roof resides.



Sustainable Textile and Carpet Standards

The Association for Contract Textiles (ACT) is working with the Green Blue Institute and NSF International to develop an ANSI-accredited standard for the manufacturing of sustainable textiles, beginning with furnishing fabrics. EPA serves on the standard developing committee. Ideally, the standard will serve two purposes: (1) to provide a transparent and fair means of assessing textile products which claim to have environmentally preferable attributes; and (2) create a resource for the contract textile industry that

provides as much guidance and information as practicable to teach applicants about the elements of sustainable design and manufacturing of textiles. The goal is to create a standard with metrics that are relevant, measurable, and that are economically feasible. It is also important that the standard carries a reporting format which is easily understood by end-users so that they can make product-to-product comparisons. The textile standard is on track for completion in June 2008.

NSF also has a draft sustainable commercial carpet standard scheduled to complete the consensus process in May 2007. ■

Case Study: EPA Potomac Yard Buildings

Completed last May, EPA's 1 and 2 Potomac Yard Buildings, located in Arlington, VA, contain office and retail spaces as well as a fitness center for use by building occupants. The buildings' indoor bicycle storage and shower facilities encourage occupants and visitors to use alternative means of transportation. The roofing is Energy Star®, high-emissivity material to reduce both heat-island effect and internal heat loads. Utilizing immense daylighting and other strategies, the buildings are expected to use 20 percent less energy than comparable buildings. EPA purchased 100 percent green power for the first year of the buildings' occupancy. In order to conserve water, no permanent irrigation system was installed, and the facility contains low-flow toilets, urinals, showerheads, and faucets. When possible, materials were



selected for their recycled content, regional origin, and low chemical emissions. More than 70 percent of construction waste was kept out of the landfill. An indoor air quality management plan was effectively implemented during construction, and pre-occupancy and permanent temperature and humidity monitoring systems were installed to ensure a comfortable indoor environment. ■

The WBDG: Your 'One Stop Shop' for Sustainable Building

For those readers in the business of siting, designing, manufacturing, constructing, operating, maintaining, and/or renovating buildings—especially Federal buildings—the Whole Building Design Guide (WBDG), www.wbdg.org, is the 'holy grail' of 'how-to.'

In addition to information and resources covering project management, operations and maintenance, and the myriad of building-related policies, criteria, and mandates, the WBDG holistically and seamlessly weaves together the design objectives of building accessibility, productivity, cost-effectiveness, functionality, aesthetics, historic preservation, security, and sustainability. The WBDG is so thorough in its treatment of these complex and interrelated issues, in fact, that many Federal agencies, including all the DOD services, have essentially closed down their own construction criteria websites in favor of contributing that content, as well as other tools and resources, to the WBDG.

In particular, the Sustainable Design Objective (SDO) section of the WBDG has grown exponentially in recent years, drawing attention and accolades. The SDO begins with an overview of the key principles of sustainable design as defined by Federal agencies in response to E.O. 13123. Those principles are:

- Optimize site potential
- Optimize energy use
- Protect and conserve water
- Use environmentally preferable products
- Enhance indoor environmental quality
- Optimize operational and maintenance practices

Within each principle category, more detailed sections called resource pages educate users on specific topics, such as

daylighting, environmentally preferable products, and natural ventilation. These resource pages are written by nationally-renowned experts in their field, in the public and private sectors, as well as academia. Each resource page contains links, additional resources, and publications to explore the topic further and is updated on an 'as needed' basis.

Sustainable Building MOU Technical Guidance

Last year, in response to the commitments made by the signatory agencies to the Federal Leadership in High Performance and Sustainable Building MOU, the ISWG built on the SDO's content and created MOU Technical Guidance, www.wbdg.org/sustainablemou.

For each of the goals set forth in the MOU Guiding Principles, the Technical Guidance provides an introduction to the topic; clarification of the requirement;

related mandates; additional recommendations and considerations; and, most importantly, direct links to the most appropriate resources and tools, including model contract and specification language. In addition, the ISWG recognized that agencies needed a number of other resources to assist them in programming sustainable building projects and addressing concepts included in the MOU. These supporting guidance topics are under development and will continually be expanded and revised.

As the MOU Guiding Principles are becoming the de facto Federal sustainable buildings policy, the significance of the WBDG SDO and Technical Guidance is reaching a new level. The ISWG and the Sustainability Subcommittee of the WBDG are committed to the continual improvement of these resources. If you would like to learn more about the WBDG and/or contribute to its expansion and updates, please contact Dominique Fernandez at dfernandez@wbdg.org.

Supporting Guidance for Implementing Sustainable Building Programs

- Model Sustainable Building Program Implementation Plans
- Renewable Energy & Green Power
- Operations & Maintenance
- Chemicals*
- Interior Noise
- Sustainable Sites/Smart Growth
- Creative Funding Strategies
- Making the Environmental Case
- Life Cycle Assessment
- EMS Integration
- Selecting A/E Contractors
- Minor Alterations *
- Security and Sustainability
- Addressing Green Building in Asset Management Plans *
- Guidance for Vendors
- Utilizing Rating Systems & Standards
- Meeting Needs with Space Optimization and Alternative Workplace Arrangements
- Reporting - The New EO and the OMB Environmental Scorecard *

* Denotes that this supporting guidance is in the earliest stages of development

Beyond the Checklist: EPA Sets the Benchmark for Green Construction Specifications

While certain practices have become the norm for green projects, construction firms are increasingly finding not only new materials and methods specified, but new approaches to incorporating “green” in construction documents. A new model from the EPA may set the benchmark for construction specs—helping to level the playing field among construction firms seeking to “go green.”

The Federal Green Construction Guide for Specifiers

Despite strong mandates, the Federal government continues to face challenges in implementing green building. A key issue has been that, although a “Solicitation for Offers” may state an agency’s general environmental goals for the project, there is often little guidance defining “green,” and no means for agencies to ensure they get what they want in the end. To address this need for a comprehensive guide for procuring green construction and renovation services, EPA, in partnership with OFEE and the multi-agency-sponsored WBDG, developed the *Federal Green Construction Guide for Specifiers*

(Guide), <http://fedgreenspecs.wbdg.org>.

The Guide is a voluntary tool, including more than sixty sections, organized according to the Construction Specifications Institute’s MasterFormat™. Developed with the input of numerous Federal agencies, including GSA and DOD, as well as key private sector stakeholders, such as the Associated General Contractors of America and other professional and trade associations, the Guide assists in specifying environmental performance requirements of materials and installation methods. The sample language—intended to be inserted into project specifications as appropriate to the owner’s environmental goals—also prescribes the quality standards of construction procedures to be executed on the project. And key in building owners’ efforts to demonstrate results, the guide lays out the contractors’ submittal requirements. In addition, through a number of notes, the guide educates specifiers about life cycle impact issues, Federal environmental mandates, and helpful resources on green building.

What began as a guide for Federal agencies has grown into a practical

tool for architects and specifiers working on public and private sector construction projects of all shapes, sizes, and uses. The Guide reflects more than 100 public comments received from July 27, 2004, through January 14, 2005. The comments can be viewed at www.regulations.gov (Advanced Search: Document Search: EPAHQ-OPPT-2004-0092).

Near-term expansion plans for the guide include new sections covering: Commercial Kitchen Equipment; Stormwater Management with Compost; Rainwater Harvesting; Vegetative Roof Systems – membranes and plant selection; Constructed Wetlands; Integrated Pest Management; Structural Steel; and Indoor Air Quality Management-Moisture Control. In addition, guidance for using environmental management systems for continual improvement in building projects is being developed.

EPA intends the Guide to be a living document—expanding into new sections and raising the bar as the green building industry matures. To review and comment on the Guide, go to <http://fedgreenspecs.wbdg.org> and click on the “comments” button at the bottom of each page. ■

Sections for which model green guide spec language has been developed:

DIVISION 01	GENERAL REQUIREMENTS	DIVISION 09	FINISHES
01 10 00	Summary	09 29 00	Gypsum Board
01 30 00	Administrative Requirements	09 30 00	Tiling
01 74 19	Construction Waste Management	09 51 00	Acoustical Ceilings
01 57 19.11	Indoor Air Quality (IAQ) Management	09 65 00	Resilient Flooring
01 57 19.12	Noise And Acoustic Management	09 65 16.13	Linoleum Flooring
01 57 19.13	Environmental Management	09 68 00	Carpeting
01 40 00	Quality Requirements	09 72 00	Wall Coverings
01 41 00	Regulatory Requirements	09 90 00	Painting and Coating
01 42 00	References		
01 50 00	Temporary Facilities and Controls	DIVISION 10	SPECIALTIES
01 67 00	Environmental Product Requirements	10 21 13.19	Plastic Toilet Compartments
01 74 13	Progress Cleaning	10 14 00	Signage
01 78 53	Sustainable Design Close-Out Documentation	10 81 16.13	Bat Houses
01 91 00	Commissioning		
01 79 11	Environmental Demonstration and Training	DIVISION 11	EQUIPMENT
01 78 23	Operation and Maintenance Data	11 13 00	Loading Dock Equipment
01 81 30	Green Power Requirements	11 30 00	Residential Equipment
		11 28 00	Office Equipment
DIVISION 02	SITE CONSTRUCTION	DIVISION 12	FURNISHINGS
02 41 13	Selective Site Demolition	12 10 00	Art
DIVISION 03	CONCRETE	12 48 13	Entrance Floor Mats and Frames
03 30 00	Cast-In-Place Concrete	12 59 00	Systems Furniture
03 40 00	Precast Concrete		
DIVISION 04	MASONRY	DIVISION 14	CONVEYING EQUIPMENT
04 20 00	Unit Masonry	14 20 00	Elevators
DIVISION 05	METALS	DIVISION 22	PLUMBING
05 05 00	Common Work Results For Metals	22 40 00	Plumbing Fixtures
05 10 00	Structural Metal Framing		
DIVISION 06	WOOD, PLASTICS, AND COMPOSITES	DIVISION 23	HEATING, VENTILATING AND AIR CONDITIONING
06 05 73	Wood Treatment	23 70 00	Central HVAC Equipment
06 10 00	Rough Carpentry	23 30 00	HVAC Air Distribution
06 16 00	Sheathing		
06 20 00	Finish Carpentry	DIVISION 26	ELECTRICAL
06 60 00	Plastic Fabrications	26 50 00	Lighting
06 90 00	Alternative Agricultural Products		
DIVISION 07	THERMAL AND MOISTURE PROTECTION	DIVISIONS 31-33	EARTHWORK, EXTERIOR IMPROVEMENTS AND UTILITIES
07 10 00	Dampproofing and Waterproofing	31 10 00	Site Clearing
07 20 00	Thermal Protection	31 31 00	Soil Treatment
07 30 00	Steep Slope Roofing	31 25 73	Stormwater Management by Compost
07 33 63	Vegetated Roof Covering	32 71 00	Constructed Wetlands
07 50 00	Membrane Roofing	32 10 00	Bases, Ballasts and Paving
07 55 63	Vegetated-Protected Membrane Roofing	32 12 43	Porous Paving
07 92 00	Joint Sealants	33 16 20	Rainwater Harvesting
		32 90 00	Planting
DIVISION 08	OPENINGS	DIVISION 48	ELECTRICAL POWER GENERATION
08 14 00	Wood Doors	48 14 00	Solar Energy Electrical Power Generation Equipment
08 50 00	Windows	48 15 00	Wind Energy Electrical Power Generation Equipment
		48 30 00	Biomass Energy Electrical Power Generation Equipment

The July 2006 quarterly release of the Unified Facilities Guide Specifications (UFGS)—used by the Navy, Army, NASA and other Federal agencies to develop their project-specific construction specifications—includes updates of more than fifty specifications based on the sustainability approaches in the Federal Green Construction Guide for Specifiers. To view the new, “greener” UFGS, visit www.wbdg.org/ccb/browse_org.php?o=70.

Select Federal Sustainable Buildings Programs

Agency Program	Website	Description
Multi-agency effort	Whole Building Design Guide (WBDG) www.wbdg.org	Gateway to up-to-date information on 'whole building' design techniques and technologies, including federal mandates and criteria.
DOC	Office of Administrative Services www.osec.doc.gov/oas/energy	Energy & water management , and other related sustainability information
DOD	Air Force Civil Engineer Support Agency www.afcesa.af.mil/ces/index.asp	Standards and criteria for design, operations and maintenance of buildings and other structures
DOD	Army Construction Engineering Research Laboratory (CERL) www.cecer.army.mil/sustdesign	The US Army Corps of Engineers (USACE) sustainable design & development web site
DOD	Defense Environmental Network & Information eXchange (DENIX) www.denix.osd.mil/denix/Public/Library/Sustain/sustain.html	Sustainable Development publications, guidance, tools and working groups
DOD	Pentagon Renovation (PENREN) http://renovation.pentagon.mil/	Pentagon Renovation & Construction
DOD	The Air Force Center for Environmental Excellence www.afcee.brooks.af.mil	Many tools and resources on sustainable development
DOD	The Army Facilities and Housing Directorate www.hqda.army.mil/acsimweb/fd/linksSDD.htm	Information on Sustainable Design and Development (SDD)
DOE	Building Technologies www.eere.energy.gov/buildings	Provides resources for energy efficiency and renewable energy
DOE	DOE Sustainable Design Program www.pnl.gov/doesustainabledesign	Gateway to tools, resources, and regulations to help incorporate sustainable design into DOE facilities and operations
DOE	Federal Energy Management Program (FEMP) www.eere.energy.gov/femp	Aids Federal agencies to reduce energy and water use and build green
DOE	Smart Communities Network www.smartcommunities.ncat.org	Provides resources on sustainability
DOI	Green Buildings www.doi.gov/greening/buildings	Green building policies and issues
EPA	Brownfields www.epa.gov/brownfields www.epa.gov/swerosps/bf/sustain.htm	Provides grants and resources for safe development of polluted sites and supports sustainable brownfields redevelopment
EPA	Comprehensive Procurement Guidelines www.epa.gov/cpg	Provides information and guidelines on the Federal purchase of recycled-content products
EPA	Construction and Demolition (C&D) Debris www.epa.gov/epaoswer/non-hw/debris-new/index.htm	Provides resources to reduce, reuse and recycle C&D debris

Agency Program		Website	Description
EPA	Construction Sector Compliance Assistance	www.epa.gov/compliance/assistance/sectors/construction.html	Provides construction industry compliance assistance information.
EPA	Environmentally Preferable Purchasing	www.epa.gov/oppt/epp	Provides resources to aid Federal purchasing of green products
EPA	Green Building Workgroup	www.epa.gov/greenbuilding	Portal website to many programs
EPA	Indoor Environments	www.epa.gov/iaq	Conducts research and outreach and develops guidelines to improve indoor environments
		www.epa.gov/iaq/schools	Comprehensive guidance, tools, and activities for Indoor Air Quality (IAQ) in schools
EPA	Non-point Source Pollution	www.epa.gov/owow/nps/urban.html	Provides guidance on how to reduce stormwater runoff from the built environment
EPA	Water Efficiency Program	www.epa.gov/owm/water-efficiency	Provides resources to increase residential, commercial, institutional, and industrial water efficiency, including WAVE water management software.
EPA	WaterSense	www.epa.gov/watersense	Partnership and labeling program for water-efficient products
EPA/DOE	ENERGY STAR	www.energystar.gov	Partnership and labeling program for energy-efficient commercial and residential buildings and building products
EPA/DOE	Labs 21	www.labs21century.gov	Provides information on improving the environmental performance of labs
GSA	Sustainable Design Program	www.gsa.gov/sustainabledesign	Program documents, projects & examples
HUD	Sustainable Development/Growth Management	www.hud.gov/offices/cpd/energyenviron/environment/subjects/gm/index.cfm	Information and resources on Sustainable Development
NASA	Environmental Management Division	www.hq.nasa.gov/office/codej/codeje/je_site/sustainability/about_sustainability.html	Policies and other resources
NIST	Building for Environmental and Economic Sustainability (BEES)	www.bfrl.nist.gov/oae/software/bees.html	Measures environmental and economic performance of building products through life cycle assessment and life cycle costing.
USDA	Biobased Products and Bioenergy Coordination Council	www.ars.usda.gov/bbcc/	Provides a forum for coordinating, facilitating, and promoting research, development, transfer of technology, commercialization, and marketing of biobased products and bioenergy
USDA	Department of Administration Energy and Environment	www.usda.gov/energyandenvironment/	Policy and guidance on energy and water efficiency and other sustainability topics

*This is not meant to be an all-inclusive list of Federal programs related to green building, but rather to highlight those of most relevance to the greening of Federal facilities.

Federal Green Building Research Update

By Ken Sandler, EPA, with contributions from Drury Crawley, DOE

The role of the Federal government as a funder and facilitator of research is extremely important. While such research helps develop technologies and approaches for use both inside and outside of the Federal government, it also creates the opportunity for Federal agencies to become the laboratories and showpieces of cutting-edge green technologies.

The 2003 OFEE report, *The Federal Commitment to Green Building: Experiences and Expectations*, identified a tremendous need for further research on green building. Since that report was published, there have been a number of initiatives to fill this need:

- The USGBC formed a Research Committee in 2005, and EPA has a cooperative agreement with this committee to develop a Green Building Research Agenda. The Research Committee is completing two tasks under this grant:
 - A report on current funding of green building research that summarizes and compares funded projects by different Federal agencies and other sources. It will be finalized in early 2007.
 - The Green Building Research Agenda, which should be completed and disseminated by mid-2007. To begin the process of developing this agenda, the Research Committee convened a workshop in September 2006, hosted by the Rockefeller Foundation, which brought together top green building research experts from across the country.
- The Federal Facilities Council of the

National Academies of Sciences will also be releasing a Research Agenda in 2007 that will include a section on research needed for sustainable facilities.

- On the issue of indoor environmental quality (IEQ), there have been a number of important developments in recent years. On the issue of mold and moisture, in 2004, The Institute of Medicine issued a report, *Damp Indoor Spaces and Health*, which found sufficient evidence of a link between damp buildings and respiratory and other health problems. In January 2005, the U.S. Surgeon General held a Workshop on Healthy Indoor Environment, featuring many of the most important researchers in this field, and bringing prominence to their work. In March 2005, EPA released *Program Needs for Indoor Environments Research* (PNIER) (<http://www.epa.gov/iaq/pubs/pnier.pdf>), a comprehensive research agenda for IEQ. In 2006, EPA gave a grant to the Lawrence Berkeley National Labs to develop a “resource data bank” that brings together and makes available the best research on IEQ, health and productivity. Meanwhile, the Federal Interagency Committee on Indoor Air Quality (CIAQ), established in 1989, continues to meet quarterly, serving as a forum for Federal agencies to share information on their IEQ research.
- EPA’s Office of Research and Development (ORD) has also shown increasing interest in green building in recent years as part of its new Sustainability program (www.epa.gov/sustainability). ORD is now including green building as a

category in its Small Business Innovative Research (SBIR) grants. Green building research projects are also being funded under the Collaborative Science and Technology Network for Sustainability program and the National P3 (People, Prosperity and the Planet) student design competition.

- DOE is creating benchmark prototypes for commercial buildings based on the Commercial Buildings Energy Consumption Survey (CBECS) and other data. These will be both existing buildings and new buildings—hypothetical for use in simulation studies, evaluation of new technologies, and other purposes.
- DOE did a preliminary study of the potential for obtaining zero-energy buildings across the entire commercial sector. The preliminary results found that it was possible in more than 60 percent of the building floor area with 1-2 story buildings able to become ‘zero energy’ most of the time. The final report is expected to be published in the next few months.
- In terms of costs and benefits, there have been several important developments, including the October 2004 GSA cost study (http://www.wbdg.org/ccb/browse_doc.php?d=90) and EPA’s compilation of statistics on buildings and the environment in December 2004 (<http://www.epa.gov/greenbuilding/pubs/gbstats.pdf>). However, there remains an enormous amount of work to be done on these issues.

The 2007 outlook for filling some additional gaps in green building research is promising. On the topic of performance measurement, >>>

Green Building Measurement: SF GreenPRINT Scores Results

By Timonie X. Hood, EPA Region 9, and Mark Palmer, San Francisco Dept. of the Environment

Making the impacts of our buildings real to the public and decision makers is critical to advancing green building. Equally important is the need to compare the environmental and economic results achieved through various green building practices and technologies. The resulting information can drive decisions today as well as the research priorities for the future.

Wouldn't it be nice to have a simple scorecard that could explain, with real numbers, the environmental and economic impacts of green buildings? Yes, and it has become a reality through SF Green Project Reporting and Information Tool, <http://www.sfgreenprint.org>. SF GreenPRINT quantifies individual building-level

environmental and economic impact information that can also be aggregated across agencies or entire sectors, such as the Federal government, local government, or a university system. The web-based application tracks and reports on the environmental benefits and economic savings that accrue to a building owner throughout all phases of the design and construction of green building projects using the LEED™ Green Building Rating System. Developed by the San Francisco Department of the Environment under a grant from the EPA Region 9 office, it was designed to be adapted to incorporate other organizations' local environmental and economic metrics and unique requirements.

SFGreenPRINT:

Monitors the progress of projects and LEED™ for New Construction and Major Renovations, Existing Buildings, and Commercial Interiors (LEED™-NC, LEED™-EB, and LEED™-CI) credits for which they are applying.

Evaluates green building projects based on calculated environmental and financial savings based on achieving specific LEED™ credits.

Incorporates adjustable settings to reflect local avoided emissions, energy and water rates, tipping fees, and other data that varies across the nation.

Provides an Environmental Scorecard with an automated .pdf file generator to show the status and effects of green buildings in the agency, including project location, certification level, environmental impact, and cost savings.

Reports on green buildings at the project level and provides aggregated data across multiple projects to support overall impact assessment and project comparisons.

San Francisco and EPA are working with Federal agencies and the USGBC to make this tool publicly available. SF GreenPRINT can be viewed at <http://www.sfgreenprint.org>. For additional information, please contact Timonie Hood at 415-972-3282 or hood.timonie@epa.gov. ■

Environmental Scorecard

cas2.1: California Academy of Sciences

	Construction Documents
Sustainable Sites	[View Notes and References]
Environmental Benefits	
Volume of stormwater diverted	2,000,000 gal/yr
Area of restored habitat	216,337 sq ft
Area of open space (beyond code requirements)	433,054 sq ft
Number of cars potentially removed from road	35 cars
Avoided CO2 emissions from removed cars	57,160lb/yr
Economic Savings	
Value of diverted stormwater	\$ 9,400 /yr
Value of added open space	\$ 2,836,503
Value of avoided CO2 emissions from removed cars	\$ 257/yr
Water Efficiency	[View Notes and References]
Environmental Benefits	
Volume of water saved	8,487,295 gal/yr
Volume of wastewater reduced	90,000 gal/yr
Economic Savings	
Savings from reduced water use	\$1,697/yr
Savings from reduced wastewater production	\$423/yr
Total savings from water efficient credits	\$2,120/yr
NPV of water savings over 20-year life cycle	\$26,425
Energy And Atmosphere	[View Notes and References]
Environmental Benefits	
Reduced electricity use	2,601,577 kWh/yr
Reduced natural gas use	55,056 therms/yr
Avoided emissions: CO2	1,609,245 lb/yr
Avoided emissions: NOx	1,668 lb/yr

The SF GreenPRINT Scorecard for the New California Academy of Sciences Building in Golden Gate Park. The project's green design is anticipated to provide economic and pollution avoidance savings of nearly \$375,000 annually, plus more than \$7.1 million in net present value utility savings, landfill disposal costs, and added open space value.

>>> the FEMP-led Interagency Sustainability Working Group will be developing guidelines on data reporting metrics across the Federal government for high performance and sustainable buildings. Recommendations will be provided for metrics related to each of the five

guiding principles for Federal Leadership in High Performance and Sustainable Buildings (see related article on the MOU). Among other potential applications, the development of standardized sustainability metrics will support Agency reporting related to the new

Executive Order and OMB's Real Property Asset Management Plans and Scorecards; the revision of the High Performance Federal Buildings Database; and the potential application of the SF GreenPRINT tool tailored specifically to Federal buildings (see related article on SF GreenPRINT). ■

Applying a Life Cycle Perspective to Federal Construction Specifications

By Alison Kinn Bennett

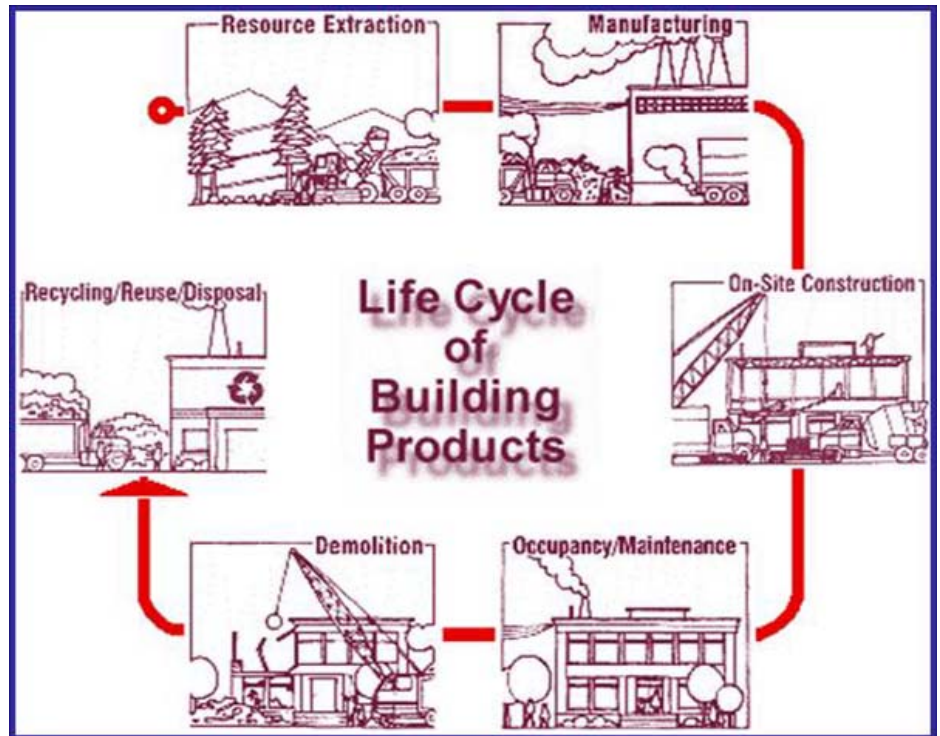
Reprinted with permission from *Building Design+Construction*. Copyright 2005. Reed Business Information. All rights reserved.

While life cycle assessment is applicable to the design process primarily by informing design decisions, the construction specifier's role is crucial in delineating the specific, enforceable submittal and environmental performance requirements for the contractor. To do so, specifiers need accurate and meaningful information about the life cycle impacts of products and services.

There is disagreement, however, on the most effective way to take this information and apply a life cycle perspective to purchasing. To some, a thorough, methodical analysis is indispensable, no matter how time-consuming and expensive it may be. To others, an abbreviated life cycle process, in which a long list of potential environmental attributes or impacts (or both) is narrowed to a few, allowing for comparison across a product or service category, would be preferable. Ideally, specifiers would have all the necessary data and easy-to-use tools to make scientifically defensible purchasing decisions based on LCA methodologies.

However, LCA is an evolving science with significant data gaps and limited tools. Given these current realities, the EPA-sponsored *Federal Green Construction Guide for Specifiers* (Federal Guide) promotes LCA in construction projects "to the greatest extent possible" and provides guidance for collecting and utilizing environmental and health impact data where available.*

The Federal Guide encompasses more than 60 sections, organized according to the Construction Specifications Institute MasterFormat. It is a voluntary tool providing multiple performance-based options that allow for flexibility in application.



It contains sample language intended to be inserted into project specifications as appropriate to the owner's environmental goals. In addition, through a number of notes, the Federal Guide educates specifiers about life cycle impact issues, federal environmental mandates, and helpful resources on green building.

The Federal Guide's key contribution with regard to LCA is in its identification of submittal requirements for the collection of life cycle-based environmental performance data. Specifically, in Section 01611—Environmental Requirements for Products, model language is presented for requiring product and service providers to submit data via an ASTM standard questionnaire, an expanded Material Safety Data Sheet, or an acceptable Life Cycle Assessment methodology.

ASTM E2129-05, "Standard Practice

for Data Collection for Sustainability Assessment of Building Products," includes a 10-page survey of general and product-specific questions covering the five categories: 1) materials (product feedstock); 2) the manufacturing process; 3) the operational performance of the installed product; 4) the impact of the building product on indoor environmental quality; and 5) the corporate environmental policy of the company manufacturing or fabricating the building product. By requiring contractors to solicit these survey responses from product manufacturers or suppliers (or both), specifiers can gain access to useful information that will assist them in making environmentally preferable purchasing decisions.†

Similarly, Material Safety Data Sheets (MSDSs) can be a gold mine of environmental and health impact >>>

> > > information. An MSDS is required by the Occupational Safety & Health Administration to include information such as the physical and chemical characteristics and hazards of hazardous chemicals in the product, including health hazards and the potential for fire, explosion, and reactivity; precautions for safe handling and use; and emergency and first aid procedures.[#]

Building on these required elements, the American National Standards

Institute has developed a standard format (ANSI Z400.1) that includes six additional topics that may be useful for gaining a broader environmental perspective on products. This expanded MSDS is required in a number of other countries; thus, many manufacturers doing business outside the U.S. may already have the information. The Federal Guide includes model language for requesting product manufacturers to submit information on the following:

- ISO 14040: Environmental Management—Life-Cycle Assessment—Principles and Framework
- NIST’s Building for Environmental and Economic Sustainability (BEES) Life Cycle Assessment Tool
- Other per agency policy and/or project goals

On a higher level, these submittal requirements, as well as those identified in Technical Sections 2-16, are useful beyond the task of product selection. First, the documentation serves to verify and record compliance with specified construction procedures—which is of key importance to federal agencies in meeting their responsibilities under EPA’s Comprehensive Procurement Guidelines, USDA’s Biobased Purchasing Guidelines, the USGBC’s LEED™ rating system, and various “Greening of Government” Executive Orders.

More importantly, by actively seeking and considering life cycle information, the federal government can send a clear signal that its business will go to those who most thoroughly address their product’s environmental impacts. Thus, federal specifications are not only critical to furthering the science of LCA but also to fostering competition and encouraging a market-driven approach to continual improvement of environmental performance. ■

* The Federal Green Construction Guide for Specifiers may be found on the Whole Building Design Guide at: <http://fedgreenspecs.wbdg.org>.

+ Refer to ASTM’s website at: http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE_PAGES/E2129.htm?E+mystore

MSDSs are required under OSHA Hazard Communication Standard 1910.12001.

Toxicological information

Identify acute data, carcinogenicity, reproductive effects, and target organ effects. Provide a written description of the process used in evaluating chemical hazards in the preparation of the MSDS.

Ecological information

Include data regarding environmental impacts during the acquisition of raw materials, manufacture, and use. Include data regarding environmental impacts in the event of an accidental release.

Disposal considerations

Include data regarding the proper disposal of chemicals. Include information regarding recycling and reuse. Indicate whether or not the product is considered to be “hazardous waste” under the US EPA Hazardous Waste Regulations 40 CFR 261.

Transportation information

Identify hazard class for shipping.

Regulatory information

Identify federal, state, and local regulations applicable to the material.

Other information

Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts, and give the date MSDS was prepared.

Finally, the Federal Guide provides model language intended to assist agencies in applying LCA methodologies to the greatest extent possible. In doing so, the Federal Guide delineates various options for developing acceptable LCA data for

submittal. Options include the following:

- ASTM E1991: Standard Guide for Environmental Life Cycle Assessment of Building Materials/Products,

Lifecycle Building Challenge

Designing this Building, and the Next

In the U.S., construction and demolition debris (C&D) comprises 60 percent of total materials, excluding food and fuel. C&D accounts for a third of total waste generated each year, largely attributable to renovation and demolition rather than new construction. The status quo can be changed by using strategies of lifecycle building to halt the increasing amounts of construction waste.

It is crucial to note that most buildings are demolished before reaching their end-of-life because building needs change over time. Consequently, a key goal of lifecycle building is to create structures that are flexible and adaptable to suit varying needs. In this way, a school can be modified as the student body changes size, or an office building can be converted into apartments. Creating adjustable structures saves time and money by minimizing future demolition.

An additional benefit of creating building components that are easily disassembled is that a building can be updated in a way that minimizes construction waste. For example, the electrical systems can be

modernized without demolishing the walls and ceilings because the building's original designs plan for modifications by creating removable and mobile parts. As a result, renovations can be carried out more easily, with fewer economic and environmental costs.

By asking the building and environmental communities to examine solutions along the entire lifecycle of a building, the Lifecycle Building Challenge will produce designs that anticipate the future use of building components. Instead of producing construction waste at the end of a building's life, entire structures can be dismantled and incorporated into other buildings.

The Lifecycle Building Challenge is sponsored by EPA, the American Institute of Architects, the Building Materials Reuse Association, and West Coast Green. The competition will be divided into two tiers: students and professionals. The professionals will be asked to submit built and unbuilt work, while the students will be asked to submit only unbuilt work. The categories for submissions include:

Building: an entire building

Component: a single building assembly or connector

Service: a tool, system, practice, or method

The competition will run in 2007 from mid-January to mid-June when the entries will be judged by an expert panel including representatives from the public and private sectors, as well as academia.

Strategies of lifecycle building include:

- Retaining documents that specify how the building should be deconstructed
- Minimizing secondary finishes and sealants that make disassembly more difficult
- Focusing on high-quality craftsmanship, which will provide an incentive for reuse
- Prioritizing methods to reuse high CO2 embodied materials, such as concrete

As a result of the competition, it is expected that contestants will create strategies and tools for facilitating deconstruction. Current barriers to deconstructing a building include: nails and glues that make disassembly difficult and result in degraded materials, the high costs of labor for disassembling and separating a building, lack of communication of a building's plans to future owners, and unavailability of tools to easily disassemble buildings. By exercising creativity and creating innovative solutions, contestants will address real world problems.

The challenge partners invite all Federal agencies to join the challenge as an outreach partner. For more information on the Lifecycle Building Challenge, visit www.lifecyclebuilding.org or email info@lifecyclebuilding.org. ■



Using an EMS to Green Federal Construction - One Site at a Time

By Melinda Tomaino,

Associate Director of Environmental Services at the Associated General Contractors of America

Example EMS/Green Building Integration Language:

Reduce water usage 20 percent by 2010 (EMS Objective and Target)

Action Plan 1: Renovate all of the facility's water closets with water conserving features

Action Plan 2: Refigure landscaping to reduce irrigation needs by planting native vegetation

Reduce energy usage 50 percent by 2010, 75 percent by 2020 (EMS Objective and Target)

Action Plan 1: Renovate building roof to meet requirements of ENERGY STAR®

Action Plan 2: Update lighting fixtures throughout facility to include motion sensors and energy efficient bulbs

Action Plan 3: Investigate improvements to heating, ventilation and air conditioning systems

Federal facilities are developing environmental management systems (EMS) to help them meet environmental requirements. In addition, facilities are exploring how an EMS can guide green purchasing decisions and help accomplish the goals of pollution prevention initiatives, such as the Federal Electronics Challenge. It comes as no surprise that facility managers also can use an EMS to achieve the green building commitments in the Federal Leadership in High Performance and Sustainable Buildings MOU.

Most likely, a facility's EMS already identifies environmental goals that may serve as stepping stones to incorporating green principles into the design, construction, and renovation of its buildings. Goals to increase energy efficiency, use renewable energy, conserve water, purchase biobased and recycled content products, prevent waste, and increase recycling are called for by various Executive Orders. Moreover, Executive Order 13148, in addition to requiring EMS development, establishes the goals of preventing pollution at the source, reducing the use of toxic materials and ozone depleting substances, and promoting environmentally beneficial landscaping. A facility's green building efforts will likely build on — and refer back to — these well-established EMS goals.

Through an EMS, a facility considers the

life cycle environmental impacts of all its activities, thereby positioning it to “integrate environmental accountability into agency day-to-day decisionmaking and long-term planning processes.” (Executive Order 13148)

Integrate Green Building into EMS

The “plan-do-check-act” ISO 14000 model for EMS development enables a facility to review its EMS and add environmental aspects and action plans that help it continually improve performance and address new concerns, such as green building. To incorporate green building commitments into its EMS, a facility should go through its existing goals, such as water conservation, and add related green building action plans. The facility's EMS team generates these action plans and determines how the facility will track progress. The associated action plans and operational controls guide staff through the green building process and reference applicable resources and tools – such as the WBDG's

GSA's Public Buildings Service is incorporating green building into its Sustainability and Environmental Management System. GSA's SEMS focuses on many of the individual green building fundamentals discussed in this article and also seeks to incorporate green building recognition – through the continued attainment of green building certifications under the LEED™ Green Building Rating System. (Closing the Circle News, Spring 2006) ■

Federal Green Construction Guide for Specifiers. The EMS structure also helps a facility implement green building training, communication, and auditing efforts.

Achieve Green Building Certifications

Third-party certification of new construction is a valuable way to demonstrate a commitment to green building principles and can provide a general picture of green building adoption across all of an agency's facilities. In fact, a facility may need to achieve certification to meet an agency-wide EMS goal. As such, the facility's EMS could have an action plan for green building certifications. The plan should connect with the other green building-related EMS goals and provide the resources and contacts necessary for the facility to complete and submit the paperwork for certification.

Communicate EMS Goals to Contractors

Effectively communicating green building and other EMS goals to contractors is an important element of an EMS. E.O. 13148 and the ISO 14000 series of standards for EMS development call for contractor awareness and training. A facility can communicate its EMS goals by preparing a briefing packet for contractors that highlights the unique environmental attributes of a given project, referring to the contract documents and specifications for additional information. Communication on a green building project is especially important as the facility may rely on the contractor to collect the necessary paperwork for green building certification. ■

Don't Forget the "EE" in GREEN

By Maura Beard, EPA ENERGY STAR® Buildings Program

Buzz...buzz...buzz. That's the sound of energy and enthusiasm around the "green building" movement. We're all talking about it – the desire for environmentally friendly buildings where we live, work, and play. But what does it really mean when a building is green?

Standards for green consider a number of factors, including recycled and renewable materials, water savings, indoor air quality, siting, and energy efficiency ("EE"). Yet, upon a closer look, many buildings touted as green may be no more – and perhaps even less – energy efficient than their browner neighbors. The terms 'sustainable' and 'high performance' building offer no stronger guarantee of energy efficiency.

Why are green buildings not always energy efficient buildings? There are several reasons, including the way green rating systems treat and define efficiency, as well as changes that inevitably occur from the design stage to building operation. Some of the prevailing methods for defining green, sustainable, and high performance buildings allow efficiency to be traded for other environmental attributes, rather than making top efficiency a required feature. Adding to the confusion, even those buildings that appear to be efficient may in fact be designed to use more energy than the average building in operation today. This paradox is the result of defining efficiency based solely on a 'better than energy code' approach that compares a building designed to exceed the local energy code with the same building designed to just meet code. Using this approach, a building design can look much more efficient than it would with basic, code-compliant features, but still perform poorly against similar buildings in the market.

The good news is that there's a solution – and the Federal government is helping lead the way.

Why Energy Efficiency Matters

Buildings are responsible for at least 38 percent of greenhouse gas emissions in the U.S. – and of this total, commercial buildings are responsible for 17 percent of the total energy consumed as well as 17 percent of greenhouse gasses emitted¹. We know there are significant opportunities to reduce energy use. In fact, the most efficient commercial buildings operate with 10 times less energy per square foot than the least efficient. Even more surprising, many new buildings use substantially more energy per square foot than older buildings. Buildings that are energy efficient are likely to have better indoor air quality, as well as greater satisfaction and comfort for occupants.

Decisions made during design and construction set the course for lifetime energy use – and the associated cost and environmental impact – of buildings. For a typical office building, energy represents 30 percent of variable costs, and the single largest controllable operating cost. Over the life of the building, energy cost is a staggering sum. The difference in energy costs between a typical building and an efficient building can be several million dollars. For example, buildings that have achieved the ENERGY STAR® label for superior energy efficiency use 40 percent less energy than average buildings. A recent study found that, conservatively, "[t]hese savings are equivalent to about \$0.50 per square foot per year in lower energy costs. For a 100,000 ft² office building, this translates to an annual energy bill that is \$50,000 below that of an average building."² Over the building's 40 year lifetime, the savings grow to \$2 million. And these are just the direct financial benefits. Evidence is growing that a

more energy efficient building is also a more valuable building. For example, USAA Realty increased the market value of a property in California by \$1.5 million as a result of energy efficiency improvements, according to the sales broker.³

The environmental benefits of energy efficiency are just as impressive – and important – as the financial benefits. With less energy needed to run buildings, power plants emit fewer greenhouse gases. More and more organizations are recognizing the need to manage climate risk. Insurance companies and pension funds are looking to reduce their investment risks, and multinational companies are pursuing carbon reduction strategies across their operations. California, New York, and many other states as well as local governments are developing carbon reduction and emissions trading programs. Associations and professional societies, such as the Building Owners and Managers Association (BOMA International), the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), and the American Institute of Architects (AIA) are beginning to focus their members on the importance of reducing energy use and the carbon footprint of buildings. The AIA's 2005 'High Performance Building Position Statement' reflects the growing recognition that building design can – and should – strive to reduce energy use. Going a step further, the "2030 Challenge", adopted by the U.S. Conference of Mayors, AIA and others, calls for all new buildings to be carbon neutral by the year 2030.

Certainly, most building designers and owners who achieve a green building standard would expect that their building will use less energy than its neighbors and achieve the financial and environmental benefits described >>>

>>> above. Unfortunately, the reality is that many buildings labeled as green are not energy efficient.

What Can You Do?

In short – don't forget energy efficiency when you're thinking green. Set clear energy efficiency goals based on how real buildings perform, and verify actual performance using the same market-based data as part of your overall efforts to be green. Designers, architects, and building owners can do just that with the help of ENERGY STAR® – which provides energy targets for specific types of buildings, grounded in real energy data from a large sample of existing buildings.

For many types of new buildings, ENERGY STAR's Target Finder provides an energy performance target of 1-100 that accounts for expected differences in energy use due to business activity, such as hours of operation and number of computers, as well as weather variations. The target is derived from statistical analysis of DOE's Commercial Building Energy Consumption Survey. A new building should be designed for top energy efficiency, which translates to a target of at least 75, the level at which a building design qualifies for the "Designed to Earn the ENERGY STAR" recognition. Buildings designed to achieve a target of 90 would use 50 percent less energy than the average building, meeting AIA's 2010 target. Of course, blueprints don't save money or reduce emissions – so verifying building performance once it is operating is a critical step.

For existing buildings, ENERGY STAR's Portfolio Manager uses the same approach as Target Finder to rate actual energy performance based on 12 months of energy bills. Buildings rating 75 or higher may qualify for the ENERGY STAR® and are in the top 25 percent of buildings across the country.

To date, 159 Federal buildings have earned the ENERGY STAR®. Will your building be next? As Mahatma Gandhi once said, "The difference between what we do and what we are capable of doing would suffice to solve most of the world's problems." It's not enough to talk about being green. We must act.

This is our time to lead – to make a difference.

For more information about ENERGY STAR®, please visit www.energystar.gov. ■

1 "Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2004," USEPA #430-R-06-002, April 2006.

2 "Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings," Greg Kats and Jeff Perlman, February 2006, EPA 430-S-06-003.

3 Communication with Brenna S. Walraven, Executive Director, National Property Management, USAA Realty Company.

Case Study: NOAA Satellite Operations Facility

The new 208,000 gross square foot NOAA Satellite Operations Facility consists of 140,000 square feet (sf) of adaptable open office space, a 60,000 sf satellite control and operation center, and underground parking for 286 cars. The facility contains the National Environmental Satellite, Data, and Information Services, which manages the operational Earth-observing satellite systems of the United States. The architectural and engineering design for the complex incorporates many sustainability features. The facility is housed largely under one of the largest green roofs in the country, totaling 140,000 sf. The office space is located partially underground and built into the existing slope on the site. This lowers thermal gain to the building by utilizing the insulating properties of the earth. Light wells, skylights, and court yards are distributed throughout the floor plan to ensure occupants have access to natural lighting. High performance filtration, UV lights are used to minimize airborne contaminants from entering air stream. Materials were selected to minimize off-gassing of VOCs. Full commissioning of the building systems was required in order to ensure correct operation and inter-system working. This minimizes problems during the move-in period from non-functioning systems while maximizing system efficiency. ■



Understanding IEQ in Buildings

by Ken Sandler, EPA

Enhance Indoor Environmental Quality is a major section in the new MOU, Federal Leadership in High Performance and Sustainable Buildings. The MOU marks the first time that indoor environmental quality (IEQ) requirements have been applied to Federal facilities, and, as such, it is likely to introduce new concepts and procedures to many Federal facilities management and staff. While IEQ attracts much interest for its health and productivity benefits, it remains probably the least understood of all major categories of green building issues.

The goal of this article is to briefly explain the IEQ requirements of the

MOU, how they fit together in a larger context and why they are so important. Additional guidance specific to these requirements is available on the Whole Building Design Guide at <http://www.wbdg.org/sustainablemou>, and much more information (including EPA guidance documents when finalized) is available at EPA's indoor air quality website, www.epa.gov/iaq.

IEQ is immensely important because people spend approximately 90 percent of their time in buildings - they are our habitat, and as such, we need to ensure that they continue to meet our needs. Yet studies have routinely found indoor air to have pollution levels 2-5 times

higher than the outdoors. Health impacts that have been linked to poor indoor air quality include respiratory irritation, asthma, allergies, poisoning (as by carbon monoxide) and cancer.

The most important thing to understand in order to improve IEQ is that it requires a systems approach. It is not as easy as just purchasing a few products with green labels on them or buying an air cleaner. In fact, there are three steps to effective control of the indoor environment, basically in the

following order of importance:

- 1) Controlling pollution sources
- 2) Ventilation
- 3) Filtration

While the MOU does not cover all three of these steps in detail, it touches on key related points. Pollution source control is dealt with through three provisions in the MOU: Protect Indoor Air Quality during Construction, Low-Emitting Materials, and Moisture Control. Ventilation is covered under Ventilation and Thermal Comfort. Filtration is briefly addressed in the guidance referenced by the latter, though not in detail; EPA has informational documents on filtration and air cleaning on the website cited above.

Construction and renovation processes present significant opportunities to introduce pollutants into buildings and, therefore, they require adequate controls. Many products have their highest emission rates when first introduced to the building. For this reason, the MOU recommends procedures for flushing out new buildings with extra ventilation for at least 72 hours before occupancy, and after occupancy as required.

There are additional IEQ controls needed for construction and renovation, and the MOU requires that Federal facilities follow the guidance of the Sheet Metal and Air Conditioning Contractor's National Association (SMACNA), particularly their Indoor Air Quality Guidelines for Occupied Buildings under Construction, 1995.

Two potential sources of contamination that can be introduced to buildings at any point in their lifecycles are products and moisture. Both wet products (such as paints, coatings, sealants, and adhesives) and dry ones (such as particleboard, carpeting, >>>



Carl T. Curtis - National Park Service, Omaha, NE, USA

>>> and furniture) have the potential to release harmful emissions in the form of volatile organic compounds (VOCs). It is important, therefore, when ordering products, to obtain as much information as possible about product emissions, from the manufacturer or other sources, and to order those products that emit the least VOCs. Although VOCs vary widely in their harmfulness to human health, the most prudent course is to procure products which emit no VOCs, or as little as possible. Some VOCs found in products are associated with serious health effects, and should be avoided, including formaldehyde, methylene chloride, and benzene.

A different type of indoor air pollution is microbial contamination, including mold, the main source of which in buildings is uncontrolled moisture. This is a relatively new issue that has received a great amount of attention in recent years. The Institute of Medicine published a report in 2004, *Damp Indoor Spaces and Health*, which found associations between damp buildings and health effects including asthma and other respiratory problems. There also have been a number of high profile lawsuits over mold in homes and other buildings. As a result, the prominence of this issue for building professionals has increased substantially.

The key to mold control is a simple principle - control all major sources of moisture. The MOU commits signatory agencies to "establish and implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage and mold contamination." EPA is developing a Moisture Control Guidance to help agencies do just that.

As the draft guidance discusses in detail, there are two basic components to moisture control in buildings:

- Preventing water intrusion or condensation in areas of a building that must remain dry, and
- Managing water in areas of a building that are regularly wet because of their use (e.g., bathrooms, kitchens, and custodial closets).

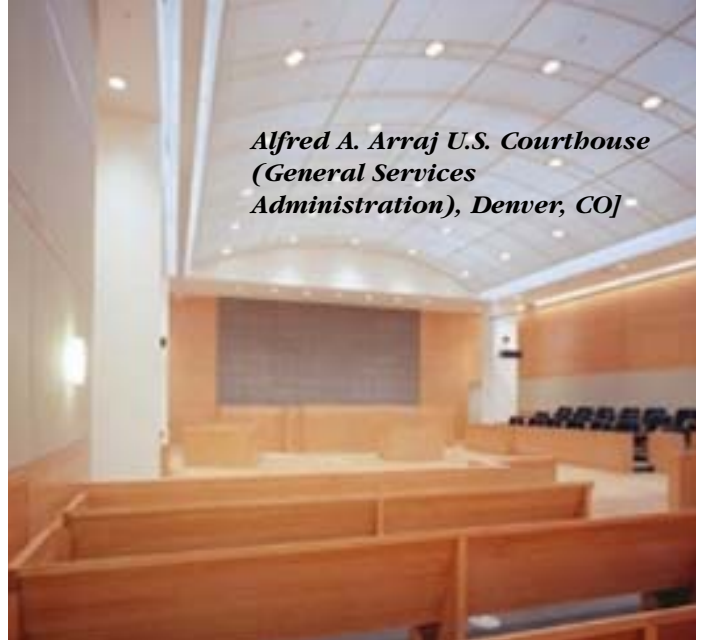
Preventing water intrusion involves

ensuring proper drainage and water tightness of buildings and their components, and maintaining plumbing, HVAC systems, and other components regularly to avoid leakage issues. Avoiding condensation involves managing buildings to avoid the confluence of humid air in

buildings and cold surfaces where this air might condensate. In areas that regularly produce moisture, such as bathrooms, water must be managed through exhaust fans and other means. These principles need to be considered and applied during the design, construction, and operation and maintenance phases of a building's life cycle.

For all we do to control indoor air pollution, there will always be some level of pollutants in the building, introduced by occupant behavior (including breathing!) and other sources. For this reason, ventilation in buildings is necessary. The MOU requires that building managers follow the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality. This standard specifies ventilation rates appropriate to specific building spaces, uses and occupancy levels, as well as outlining procedures for proper design, operation, and maintenance of the HVAC system and other building components.

Two other topics covered in the MOU are thermal comfort and daylighting, both of which may affect occupant health, comfort, and productivity. Typically, the most common source of complaints in buildings is occupants who feel too hot or cold, and indeed, excessive hot or humid conditions in buildings can exacerbate problems of both microbial contamination and VOC levels. The MOU specifies compliance with ASHRAE



*Alfred A. Arraj U.S. Courthouse
(General Services
Administration), Denver, CO]*

Standard 55-2004, Thermal Environmental Conditions for Human Occupancy.

Some studies have found greater daylight in buildings to be linked to occupant satisfaction and performance levels. The MOU requires that Federal buildings achieve a minimum daylight factor of 2 percent (excluding all direct sunlight penetration) in 75 percent of all space occupied for critical visual tasks.

A final set of practices critical to good IEQ, but covered in another section of the MOU, is commissioning. With the complex web of systems that make up buildings today, it is essential to check and verify that systems are operating as intended, and are meeting the needs of building owners, managers, and occupants.

EPA recently initiated a cooperative agreement with ASHRAE to develop an Advanced Indoor Air Quality Design Guide for Non-Residential Buildings. Although this project is expected to take several years to complete, it is intended to provide more in-depth guidance on all of the issues covered above.

Maintaining good indoor environmental quality requires a continuing commitment on the part of buildings staff and management. The point is not simply to "check the box" that your buildings staff is following the guidance discussed above, but to keep these guidance materials on hand, regularly consult them, and check building systems and conditions to ensure that your buildings remain healthy and productive environments. ■

U.S. Coast Guard ISC Kodiak Water Leak Detection and Other Water Efficiency Efforts

by Mike Brown, U.S. Coast Guard

It was early 1990, and it was the beginning of energy awareness activity. "Where is the energy going, who is using it, why is it being used" were the typical questions being asked. Water was low on the list of concerns at that time. However, one person asked, "how much water should the Integrated Support Command (ISC) Kodiak site be using?" We were not able to answer the question. While asking around, we received comments such as, "We generally use more water in the winter. There are occasional spikes in the spring - indicating leaks. Don't worry, when the leak is really big it comes out of the ground and we fix it." No one knew what water consumption should be.

We consulted a standard design book for civil engineers and did some rough calculations based on known industrial loads and the population served by the system. Based on the calculations we determined that ISC should have been using only .4 million gallons per day (MGD), compared to actual use of an average 1.5 MGD. We were off by a factor of almost four. There was obviously plenty of room for improvement, but we were not sure where to start.

One of our employees suggested sonic vibration leak detectors. We searched around, and found a company that used computerized sonic leak detection. In the first year of the leak detection program, we hired the company and immediately found several significant leaks. Fixing these leaks saved an average of .3 MGD. We determined that the site did not have enough "points" along the


line that could be used for the sonic detectors. In the second year, we put out a contract to install additional "listening stations" so that additional leak detection efforts could occur.

In the third year, we conducted another leak detection project and found significant additional leaks, adding up to another .3 MGD of savings. We performed one additional leak detection project in the fourth year. At that point, the leak detection program payback was reduced, so we decided to make it a bi-annual program. We also monitor the main meter at the water plant and take immediate action when the use goes above a certain level for more than three days.

Using an energy savings performance contract (ESPC), we will be installing water saving showerheads, sink aerators, pressurized toilets, and low flow faucet devices. We will also replace all of our washing machines and dryers with front loading washers (40 percent saving) and Energy Star®

dryers. Toilets, showerheads, faucets, and washing machines approximately split the water savings. We are including other water measures such as the elimination of single pass water cooling systems in a few buildings. Estimated water savings are 38,000,000 gallons/year, with a total savings of energy and water being valued at \$277,000.

Please contact Mike Brown at 907-487-5320 ext 229, Mike.B.Brown@uscg.mil, for more information regarding ISC Kodiak's water efficiency efforts. ■



LEAK REPORT

FILE NO.


Leak No.: **06** Priority: **3** Date: **May 10, 2005**

Location: **Access Road (Tank Farm), Kodiak, AK**

Remarks: **Isolated HF leak sound at valve only. Closed valve / no change. (Ref. Sheet No. C02)**

CORRELATION	DETAILS			
NONE	Estimated GPM	0.25	Site Marked	No
	Suspected Leak Type	Valve	Lines Traced	No
	Cover Type	Soil	Set up	N/A
			Verified	Yes
		Est. Accuracy	N/A	

LEAK SET-UP DIAGRAM



PLEASE FILL-IN THE BOX BELOW AND FAX (907-917-5822) OR MAIL THIS SHEET BACK TO US SO THAT WE MAY BETTER SERVE YOU

FIELD RESULTS	LEAK RATE:	Measured <input type="checkbox"/> Estimated <input type="checkbox"/>
	LEAK TYPE:	
	ACCURACY:	(± Distance from X)

EPA's GreenScapes Program - New Tools to "Green" Beyond the Building

by Jean Schwab, EPA

Green buildings are all the talk these days. But what about the thousands of acres of land on which these "green" buildings sit? The discussion of a building's "environmental footprint" must not ignore the tremendous environmental impact that occurs on the land during construction, operations, maintenance, and eventual removal of the building. The use of economically and environmentally costly landscaping is everywhere—along roads and highways and at commercial buildings, parks, industrial sites, school campuses, and military installations. By simply changing these landscapes to "GreenScapes," landowners and land managers can save valuable economic and natural resources.

GreenScapes is a multi-media program that is designed to provide cost-efficient and environmentally friendly solutions for landscape design, construction, and maintenance — large and small. The goal is to preserve natural resources and prevent waste and pollution by encouraging organizations and individuals to make more holistic decisions regarding their landscape practices and purchases. GreenScapes promotes practices and products that still meet the user's needs but have a better environmental profile than current methods.

GreenScapes is also an EPA Partnership Program. The GreenScapes Alliance is an ever-growing group of organizations, large and small, coming together to undertake and promote green land care practices. With our Partners and Allies, GreenScapes combines government and industry into a powerful, unified influence to advocate a multimedia view of environmental stewardship in land

management including offering the following new tools and resources:

Helping Federal Facilities Incorporate Environmentally Beneficial Landscaping into Their Environmental Management Systems (EMS)

GreenScapes and the EPA EMS program have developed guidance for Federal facilities entitled, Integrating Environmentally Beneficial Landscaping into Your EMS. The document provides practical guidance, potential language, and examples of environmentally beneficial landscaping practices for each of the EMS elements prescribed by ISO 14001 standards. The intended audience includes Federal facility staff tasked with developing an EMS and reducing the environmental impact of facility landscaping activities; however,

this guidance document will help any organization to add sustainable landscaping practices to an existing EMS or the incorporation of sustainable landscaping into the development of an EMS. This piece can easily be used by any private or public organization that is looking to incorporate green landscaping into their EMS. You can find this on the GreenScapes Web site, www.epa.gov/greenscapes, under the "Resources" section.

GreenScapes Develops Cost-Benefit Calculators

GreenScapes developed four downloadable online calculators for various GreenScapes activities that easily demonstrate the cost-savings associated with environmentally friendly landscaping. The calculators (for decking, erosion control, pallets, and resource conserving landscaping) demonstrate that these activities >>>



GreenScapes
Environmentally Beneficial Landscaping

>>> are often cost competitive and provide numerous environmental benefits. The GreenScapes calculators allow you to compare costs between environmentally preferable methods and using virgin materials. They can aid in your decision making and implementation of more sustainable landscape design, construction, and operations and maintenance. For example, using recycled plastic/wood composite lumber instead of pressure treated southern yellow pine for a 600 square foot deck results in lifetime cost savings of \$5,000 to \$6,500 based on the decking cost calculator. Calculators for drip irrigation and landscape waste management will be finished by the end of the year and also added to the Web site. The calculators can also be found in the "Resources" section of the GreenScapes Web site.

Sustainability in Landscape Design, Construction, and Maintenance

Planned landscapes includes site types such as large campuses, public parks and conservation areas, private resort and recreation areas, and transportation and utility corridors. GreenScapes is working with the American Society of Landscape Architects (ASLA) and the Lady Bird Johnson Wildflower Center on the Sustainable Sites Initiative (SSI) to fill the gap that now exists in our ability to establish site performance goals to guide site design and transform markets.

The SSI will provide a basis for measuring and recognizing sustainability in landscape design, construction, and maintenance. By

creating performance targets and a means for verifying their attainment, the SSI will create incentives for project leaders to optimize opportunities to achieve maximum site performance in stormwater management, biodiversity protection, pollution reduction, and other types of resource stewardship. Ultimately, the metrics and targets identified through the information generated by the SSI could in the future be integrated with existing building rating credit systems such as LEED™ or act as a stand-alone site tool.

For tips on how to GreenScope, additional information about EPA's GreenScapes program, or to join the GreenScapes Alliance, please visit the GreenScapes Web site at www.epa.gov/greenscapes or contact Jean Schwab at: schwab.jean@epa.gov. ■

Office of the Federal Environmental Executive

White House Task Force on Waste Prevention and Recycling

Ed Piñero **Federal Environmental Executive**

Dana Arnold Chief of Staff

Juan Lopez Senior Program Manager

Alison Kinn Bennett Agency Representative

Jeannette Saunders Secretary

The Office of the Federal Environmental Executive thanks the U.S. General Services Administration for its generous help and support in producing this newsletter.