Green Building Advisory Committee Meeting
1849 C Street, NW, Washington, DC
November 12, 2013
Meeting Notes

Chair

Bob Fox	Cook Fox Architects

Members

Zaida Basora	Dallas Public Works Department
Eric Beightel	U.S. Department of Transportation
Dan Burgoyne	California Department of General Services
Cynthia Cordova	U.S. Department of Veterans Affairs
Michael Deane	Turner Construction Company
Angela Donatelli*	Office of Management and Budget
Projjal Dutta	New York State Metropolitan Transportation Authority
Hunter Fanney*	National Institute of Standards and Technology
Will Garvey*	Council on Environmental Quality
Bucky Green	U.S. Environmental Protection Agency
Jonathan Herz	U.S. Department of Health and Human Services
Gregory Kats	Capital –E / Good Energies
Nico Kienzl	Atelier Ten
Dennis Maloskey	Pennsylvania Governor's Green Government Council
Barbara Nadel	Barbara Nadel Architects
Victor Olgyay	Rocky Mountain Institute
Kent Peterson	P2S Engineering
Esther Sternberg	University of Arizona
Maureen Sullivan	U.S. Department of Defense
Patrick Tyrrell	Vornado Realty Trust
Timothy Unruh*	U.S. Department of Energy

(*denotes those not present at meeting)

GSA Office of Federal High-Performance Green Buildings (OFHPGB) Participants

Kevin Kampschroer, Federal Director
Ken Sandler, Designated Federal Official
Michael Bloom, Kinga Porst, Bryan Steverson, Project Managers

Additional Presenters

Eleni Reed, GSA Public Building Service (PBS) Chief Greening Officer
Jason Sielcken, GSA Region 8

Introductions

Chairman Bob Fox welcomed committee members and provided an overview of the meeting agenda.

Kevin Kampschroer, Federal Director of GSA's Office of Federal High Performance Green Buildings (OFHPGB), thanked Green Building Advisory Committee (GBAC) members for their two years of service on the committee and for taking an active role in making recommendations to GSA and the Federal Government.

Committee Membership Renewal Plans

Ken Sandler, GBAC Designated Federal Officer, discussed the next steps for committee members who are approaching the end of their 2-year terms in December 2013.

- GSA is developing a proposal to GSA's Administrator to renew committee membership. The renewal process will be transparent and seek a diverse mix of members with significant green building expertise who also meet specific statutory requirements.
- The goal is to stagger committee membership, with Federal members serving 4-year terms, and non-Federal members serving a mix of 2 and 4-year terms.
- Option for renewing non-Federal membership:
    - Conduct search process internally; or
    - Solicit potential new members through a *Federal Register* (FR) notice.
- Applicants will be thoroughly vetted to meet the committee's highly specialized needs.
- The statute limits the GBAC to a total of 15 non-Federal committee members.
- The committee chair position will be opened to a committee vote at the next GBAC meeting in spring 2014.
- Current committee members will be notified if their membership term is ending in December 2013 and will be invited to reapply.

Eleni Reed, GSA Public Building Service (PBS) Chief Greening Officer presented on GSA Sustainability Plan Progress

Eleni Reed provided an update on GSA's success in implementing its sustainability strategy across its building portfolio.

- PBS's primary goal is to deliver best value in real estate services to the Federal government. GSA provides 375 million square feet of workspace to 1.1 million federal employees. About half of GSA's building portfolio is leased space.
- GSA's sustainability efforts have been framed by statutes and Executive Orders (EOs), including EO 13514, which requires all agencies to meet annual targets in energy intensity, renewable energy, greenhouse gas (GHG) emissions, water, waste, etc. GSA is meeting or exceeding its targets and is on track to meet its long term targets for 2020.
- For new construction, PBS incorporates green building requirements through the P100 Facilities Standards. PBS is currently updating the P100 to make it more performance-based. PBS also uses LEED as a benchmark to measure performance.
- Several PBS projects (mostly funded through the American Recovery and Reinvestment Act) demonstrate green building best practices:
    - Federal Center South in Seattle, WA and Edith Green-Wendell Wyatt Federal Building in Portland, OR.
    - Wayne Aspinall Federal Courthouse in Grand Junction, CO: a historic building that aims to be GSA's first net-zero site energy building on the National Register of Historic Places
- For existing facilities, the primary focus is on operational efficiency.
    - PBS is working to increase alternative financing to support more projects.
    - GSA is establishing facility green teams to encourage occupants to take ownership in reducing buildings' environmental footprints, with 30 teams to date.

    - PBS implements sustainable operations and maintenance practices to meet the *Guiding Principles for Federal Leadership in High-Performance and Sustainable Existing Buildings* requirements. GSA operational policies and the LEED for Existing Buildings (LEED EB) Volume program are used as a framework. As part of this effort, 41 GSA facilities have also achieved a LEED-EB certification.
- For leased buildings, PBS is integrating a number of green lease provisions in its leases to advance energy efficiency, commissioning, water conservation, and indoor air quality.
    - Inclusion/adoption tends to vary by market and lease size, with implementation most successful in major urban centers and larger leases.
- PBS is leveraging technology to accelerate environmental performance:
    - Advanced Metering
        - 80% of GSA's total electricity consumption in the owned portfolio is monitored in real time through advanced meters. The data help property managers identify & address anomalies.
    - GSA Building Link
        - This smart building project in 50 buildings (32 million sq. ft.) connects to a central hub management system platform. The system provides building managers with useful information on building operations allowing for faster analysis and more informed decision-making.
    - Rapid Building Assessment
        - This is a quicker, less costly approach to performing building audits, using remote data analytics to identify performance and energy conservation measures. In the pilot phase, GSA found that about 50% of measures identified are typically no- to low-cost.
    - Green Proving Ground (GPG)
        - This technology evaluation program (www.gsa.gov/gpg) uses GSA's portfolio to test cutting-edge technologies that can accelerate achievement of our green building goals.
        - GPG is working with Department of Energy (DOE) to test technologies, and has released 6 technology evaluations to date with 3 more coming soon.
        - Where a technology proves effective, GSA looks at opportunities to deploy in its facilities. For example, GSA is deploying advanced power strips in offices and wireless sensors in data centers.
        - Every year, GPG releases a request for information (RFI) to solicit technologies that may be of interest. The current RFI is available on FedBizOpps.gov and open until December 9, 2013: link at https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=6c6c06e1952cd2e0a5e26ac053c00ad0.

GSA Sustainability Progress: Committee Comments

- Incorporate location efficiency as a greater factor in PBS policy. (GSA is currently collaborating with EPA, leveraging the Smart Location Database to develop a tool that will provide information on scope 3 emissions associated with commuting.)
- Set water meters to differentiate between potable and non-potable water use.
- Provide more system-level submetering.
- Expand other agencies' access to and awareness of GSA tools, programs and training.

Jason Sielcken, GSA Region 8 project manager, presented on the Wayne Aspinall building modernization project, to introduce the Net Zero Energy topic

- Aspinall is a historic 41,000 square foot building. Its renovation was funded through the American Recovery and Reinvestment Act.
- Goals for the project included a pathway to net zero energy (NZE), LEED Platinum certification, improving indoor environmental quality and thermal comfort, reducing water use, using sustainable construction practices, and sustainable historic preservation.
- 4 step process to reach NZE: optimize building envelope, reduce internal loads, design highly efficient systems, and match load with on-site renewable energy.
    - Efficiency technologies include circuit-level electricity metering, a variable refrigerant flow system (VRF), and LED lights installed in historic light fixtures.
    - Efficiency approaches include energy budgets set for building tenants based upon occupancy per square foot, financial incentives through modest rent reimbursements and tenant green teams and building manuals.
    - Renewables include 315 photovoltaic (PV) panels on roof, expected to generate up to 123 KW of electricity. (Canopy was downsized to meet historic preservation guidelines.) A geo-exchange system was installed in alleyways around building.
- The building has achieved goals including:
    - 96% greater energy efficiency than before renovation
    - Reduced water usage by about 30%
    - Diverting 56.4% of waste from landfill
    - Awarded LEED Platinum in September 2013
    - Still working toward NZE goal

Dan Burgoyne, State of California, Task Group Chair presented on Net Zero Energy (NZE) Federal Buildings: Task Group Report & Discussion

Dan led the discussion on recommendations of the NZE buildings task group. (See Draft NZE Background Paper and Recommendations for full proposal.)

- **Defining NZE**: The task group proposed using NZE definitions found in the Whole Building Design Guide (http://www.wbdg.org/resources/netzeroenergybuildings.php), with the Site Energy definition as the preferred definition:
    - **Net Zero Site Energy** - A site NZE building produces at least as much energy as it uses in a year, when accounted for at the site.
- **First priority: Reduce energy use**: The first priority for achieving NZE facilities should always be to reduce energy as much as possible, through various means.
- **Priorities for sources of renewable energy (RE) to achieve NZE:**
    1. Generate energy onsite utilizing building surfaces or building site
    2. If onsite energy production is not possible to the extent needed, then off-site RE sources can be used to generate electricity or hot/chilled water
    3. Install and continue to purchase off-site energy from dedicated generation or Renewable Energy Certificate (REC) programs within a community energy scheme.
- **Recommended policy for NZE on Federal New Construction & Major Renovation**:

1. All new construction & major renovations initiated by 2020 shall be designed and constructed to achieve NZE by 2030
2. Each GSA region shall initiate at least three NZE pilot projects by 2015

- **Recommended policy for NZE on Federal Existing Buildings**
    - Each GSA Region should retrofit and verify 1% of their building area to be NZE by 2020, 10% by 2025, 50% by 2030. Other federal agencies are encouraged to follow similar targets.

Net Zero Energy (NZE) Federal Buildings: Committee Comments

- Restrictions on the use of power purchase agreements (PPAs) constitute a major barrier to Federal procurement of renewable energy, particularly the limitation of civilian agencies from entering into power contracts that extend beyond 10 years, an insufficient time period for most RE system suppliers to recoup their costs.
    - Current policy also requires that at the end of a PPA, ownership of the equipment must transfer to the government, which prevents system owners from claiming RE tax credits, further reducing the attractiveness of PPAs.
    - Therefore the committee should recommend that the government extend PPA periods and identify and resolve other impediments to Federal use of PPAs, and other alternative financing mechanisms.
- The definition of NZE should be expanded beyond individual buildings to include campuses and district energy opportunities, promoting density over sprawl.
- NZE recommendations could require Federal buildings to be "NZE-ready", i.e., maximizing energy efficiency, which is more cost effective than the final NZE step of deploying RE systems.
    - Alternatively, goals could be tied to overcoming barriers to use of RE, particularly the barriers to use of PPAs.
- The use of RECs should be excluded as an option, as it has the least impact on actual use and development of new RE sources.
- Considering the enormity of the Federal building portfolio, the existing building goals should be carefully reviewed to ensure they are achievable.
- While the committee can't delve into the details or develop solutions to all impediments to Federal NZE buildings, it can recommend the Federal government to do so.
- The GBAC agreed by unanimous vote to accept the proposed recommendations as a starting point for developing a more refined version based upon the committee's input.

Michael Deane, Turner Construction and Dennis Maloskey, State of PA, Task Group Co-Chairs, presented on Federal Building Performance Labels: Task Group Report & Discussion

Michael led the discussion on recommendations of the Federal building performance labels task group (see Building Performance Label Task Group Draft Recommendations paper for full proposal):

- Purpose of the task group was not to set new green building performance goals, but to recommend how to clearly, publicly communicate progress toward established goals.
- The group looked at measurement approaches to three parameters: energy, water and indoor environmental quality (IEQ).
- Labeling should be in comparison to consistent baselines distinguished by building type, with performance scales that range from code minimum to high achievement.

Dennis discussed the task group's recommendations on Federal building energy reporting:

- The "Prius effect" shows the value of information feedback on behavior.
- The Federal government already has mandates to meter buildings and meet energy reduction goals, so data should already exist – it's just a question of publicly reporting it.
- Labels should report absolute energy use and energy use intensity per person and sq. ft.
- Energy should be reported for the whole building and if possible, by building system (i.e., submetered) so managers can know where to target activities to improve performance.
- Include asset performance metrics as well as operational metrics, so the relative contributions of design and operations to energy performance are transparent.
- Energy Star Portfolio Manager is recommended as a tracking tool.
- GSA should consider establishing requirements in leases that facility tenants report energy use data.

Dr. Esther Sternberg gave a presentation on the impact of the built environment on human health and well-being, and possibilities for Federal indoor environmental quality (IEQ) reporting:

- Noise, crowding, light, odors, and poor design for way-finding can all trigger stress reactions in building occupants. Chronic stress can lead to many serious health issues. Research has identified ranges of comfort for many potential stressors.
- As research at hospitals has demonstrated, healthier building spaces with views of nature and stimuli that engage the senses can reduce stress, enhance emotional wellbeing and contribute to good health.
- Research is needed to develop better data to identify where and how to improve building design and operation to optimize IEQ.
- A GSA case study found lower salivary cortisol (a stress marker) among occupants of a renovated space in Denver, CO vs. levels in the space before renovation.
- A June 11, 2013 workshop of IEQ experts convened by OFHPGB proposed practices and metrics for a program to promote IEQ best practices in Federal buildings.
- The task group recommends building labeling based on known ranges of IEQ and comfort parameters: e.g. noise in decibels, temperature, air flow. More research is needed to further refine approaches to tracking IEQ parameters.
- A future experimental approach could involve non-invasive monitors worn by volunteers to track human physiological responses to IEQ.

Michael Deane covered task group proposals for Federal building water performance reporting:

- Primary proposed measures are total building water use and total potable water use.
- Additional potential metrics include building system-level water use (i.e., submeter data), water use intensity per person and per square foot.
- Consider tracking and maximizing how many times water is used before it is disposed.
- With a more nuanced understanding of water use, GSA can assess water risk management.

- On one final potential parameter, the task group briefly discussed waste reporting, agreeing that agencies should report on data they are already collecting (e.g. total waste production and waste diversion from landfills, recycling, etc.)

Federal Building Performance Labels – Committee Comments

- The goals of such a labeling proposal should be clearly articulated to maximize opportunities for success.
- GSA and other federal agencies should institute pilot projects to develop and test methodologies and best practices for environmental and health performance reporting.
- The Federal government ought to use existing performance labels, not create new ones. It should also limit the number of labels used, for purposes of simplicity.
- To be most effective, labels (including online display) should be highly visible to public.
- GSA should rank its buildings publicly and acknowledge the best performers.
- Criteria for an effective label include: using universal metrics, limited significant digits, good color coding, and an absolute scale.
- One issue to consider is how often labels would need to be updated.
- The GBAC voted unanimously to accept the draft general recommendations of the task group for review and revision by next meeting.

Working Lunch: Proposal for Considering Carbon in Capital Decision Making
Greg Kats, Capital E

Greg Kats proposed a motion for GSA and the federal government to consider the social cost of carbon dioxide emissions in capital decision making (revised version):

- "All federal building investment, design, construction, retrofit and location decisions should incorporate the social cost of carbon, including carbon from energy use and embedded in materials. The cost of carbon referenced should be the most current calculation as updated by the US Office of Management and Budget."
- Background:
    - The social cost of carbon (SCC) is a Federal interagency estimate of the monetized damages associated with the incremental increase in carbon emissions in a given year. (See materials on the topic online at http://www.epa.gov/climatechange/EPAactivities/economics/scc.html.)
    - This recommendation would not increase the cost of a particular capital project, but would allow agencies to prioritize projects based on environmental impacts. It would promote the best net present value for smarter decision-making.

Considering Carbon in Capital Decision Making – Committee Comments

- The most effective way for this concept to be incorporated into federal capital decisions would be for the Office of Management and Budget to revise OMB circular A-11. GSA does not have the authority to tell agencies what to do in capital budgeting processes.
- Current methodologies and estimates for SCC are controversial, but can serve as a starting point.
- Estimates should incorporate budget needs for climate adaptation.
- The committee voted unanimously to approve the motion, with some minor revisions.

GSA Green Building Demonstration Projects: Findings & Followup

Judi Heerwagen, Ken Sandler, and Bryan Steverson, GSA OFHPGB

Judi and Ken discussed findings and recommendations of the demonstration projects at the EPA Region 8 HQ building in Denver, CO and Fort Carson near Colorado Springs, CO. Bryan previewed the next demonstration projects at Federal Center South (FCS) Federal Building in Seattle, WA, Wayne Aspinall Courthouse in Grand Junction, CO, & Edith Green Wendell Wyatt (EGWW) Federal Building in Portland, OR. (See Demo Findings GBAC Discussion Paper and http://www.gsa.gov/buildingresearch for more information.)

- The Energy Independence and Security Act (EISA) directs GSA to conduct demonstration projects each year on aspects of building performance.
- At the EPA building and Ft. Carson, GSA and our research partners assessed performance of green building systems and occupant interaction with them. Generally we found above average performance and identified ways to raise it even higher.
- Behavioral research:
  - Our behavioral research has focused on the impact of occupant behavior on green building performance and identifying leverage points to influence occupants.
    - EPA building desktop energy use study compared impacts of an informational campaign, a competition and an automatic shutoff system on plugload energy use. The shutoff was most effective, followed by the competition, whereas the information campaign had no impact on energy reduction.
    - EPA building water use study found dual flush toilets not reducing water use, apparently because occupants are used to flushing down, while the setting for a lower flush is up. Therefore, we reversed the flush handles, leading to apparent water savings.
    - Ft. Carson behavior study focused on the potential of the Army's building energy monitor (BEM) program to reduce energy use in 5 buildings. BEMs worked with occupants on two targeted behaviors: nighttime computer shutdowns and temperature setbacks.
      - All buildings showed improvements in computer shutdown, with the biggest changes in civilian (vs. military) buildings. The researchers estimated savings of 4% if these techniques were broadly applied.
      - The BEM model showed major potential – provided leadership selects the right people for the role and reinforces it with visible support
  - Lessons Learned
    - Behavior change is difficult
    - Changing default conditions may be a better option in some contexts
    - However, behavior change can be a useful approach – but know when and how to use it and whose behavior to change
    - Continue to identify approaches that work best and in what contexts
- Building systems research:
  - OFGPGB and our partners assessed the performance of a wide variety of green building systems, and opportunities for enhanced performance, in both projects. Studies which yielded findings ripe for replication and dissemination included:
    - Ft. Carson lighting and daylighting: We assessed lighting performance in 6 building types. These buildings were achieving 50% lighting energy savings, but could raise the savings to 90% through strategies including:
      - Provide consistent, glare-free daylight in all spaces
      - Set baselines at reasonable levels of lighting power density
      - Fine tune lighting levels to meet occupant needs

    - Ft. Carson retrofit optimization: We conducted a modeling exercise using open source tools (Sketch Up, Open Studio, etc.) to evaluate how an office building that had been retrofit from a former barracks could optimize lifecycle-cost effective energy efficiency up to NZE. The model identified a pathway to NZE starting with the most cost effective technology bundles.
    - EPA building data center energy use reduction: We analyzed energy performance of the building data center and identified 6 strategies to cut energy use with payback periods from 0.2-6.3 years, including virtualization, improving air flow & installing more efficient equipment.
- The next set of demonstration projects examines 3 GSA green buildings – a historic renovation (Aspinall), a renovation of a 1970s building (EGWW) and a new building (FCS). Areas of research include:
    - The use, economics and impacts of integrated project delivery (IPD)
    - Indoor daylighting levels and health impacts on occupants (e.g., circadian rhythms)
- OFHPGB asked for the GBAC's input to help prioritize these research findings in terms of their value to the Federal government's efforts to green its building portfolio.

Demonstration Project Findings & Followup – Committee Comments

- Modify GSA purchasing systems & preferences to reflect findings, e.g., on flush handles.
- Energy retrofit optimization tool should be a priority if convenient enough to use to reduce the overhead and investment required for deep energy retrofits.
- Evaluate measurable human health impacts, including sick days and insurance costs.

Project Updates: Kinga Porst, GSA, presented on Submetering and Michael Bloom, GSA, presented on Plug Load Management and the Research into Practice Program

- Submetering work conducted by OFHPGB includes:
    - Posted a business case and a one-page guide to submetering (on GSA's website at http://www.gsa.gov/portal/content/181399).
    - Developing a roadmap for submetering implementation and guidance to help agencies better calculate GHG emissions in leases.
    - Partnering with DOE's Building Technology Office to challenge the private sector to develop low cost submeters.
    - Initiating a pilot with Vornado to submeter a large facility in VA down to the circuit level, to better understand the costs and benefits of a fully-metered building. We hope to compare results with the submetered Aspinall building.
- OFHPGB's Research into Practice Program (RIPP) identifies actionable research and puts it into the hands of building practitioners.
    - The Plug Load Management Suite (http://www.gsa.gov/portal/category/105699) incorporates findings from 12 different research papers, to help facility managers communicate to tenants how and why to change practices to reduce plug loads. The Plug load Reduction Checklist helps facility managers plan & track progress.
    - The Net Zero Energy page (http://www.gsa.gov/portal/content/181035) includes a 3-page guide to NZE with terms, examples, basic action plans, and implications for long-range planning.

GSA Project Updates – Committee Comments

- GSA needs to find ways to better publicize all these web-based materials.
- Need to carefully distinguish audience categories, identify incentives and consider and assist actual implementation.
- Package strategies into a level of savings that makes people pay attention.

Closing Comments

- The NZE and Building Performance Label task groups will coordinate to further refine their recommendations. The three motions should proceed on different paths:
    - On the carbon motion, GSA will work with the GBAC and other federal agencies to draft a proposal for OMB's review to be considered in capital budget planning.
    - On net zero and performance labels, OFHPGB will take these proposals to the GSA Administrator for consideration once the GBAC has finished refining them, including reviewing affordability and practicality issues. Other Federal agencies are encouraged to do the same with their leaders.
- Bob Fox thanked all participants for a very productive meeting.