

Introductions

Designated Federal Officer Ken Sandler welcomed committee members and provided background on the Green Building Advisory Committee (hereafter “the Committee”) and an overview of the meeting agenda.

Chairman Greg Kats welcomed all Committee members and expressed his excitement to have everyone together again. He commended the Committee for its work and influence on Executive Order 13693 and looked forward to hearing more from the presenters and Task Groups.

Kevin Kampschroer, Federal Director of GSA’s Office of Federal High-Performance Green Buildings (OFHPGB), shared his enthusiasm in knowing that the Federal government is progressing with net zero energy, net zero water and net zero waste goals. Mr. Kampschroer was eager to hear about the reports and proposals of the committee, which have been extremely helpful to date.

As an update, OFHPGB is working with the Public Buildings Service (PBS) on review and consideration of the Committee’s proposals regarding the social cost of carbon and net zero energy buildings. Kevin gave special thanks to Committee member Victor Olgyay for offering the services of the Rocky Mountain Institute to voluntarily conduct an analysis of the potential costs to GSA of adopting all or part of the net zero energy building proposal.

Optimizing the Daylight Ecosystems in Buildings

Bryan Steverson and Judith Heerwagen, GSA OFHPGB

Mariana Figuerio, Rensselaer Polytechnic Institute, Lighting Research Center

Bryan Steverson began with an introduction to GSA’s daylighting research.

- Americans spend about 93% of our time indoors, with 25% of that time spent at work. Under these conditions, many people are not exposed to the amount of daylight that our bodies require.
- Light is the primary synchronizer of circadian rhythms (sleep-wake patterns). Insufficient light can create circadian disruption.
- Workplaces present the best chance for most adults to be exposed to needed daylight.
- GSA is conducting research to answer the question: Can daylight be a health benefit related to its importance in stimulating circadian processes?
- GSA is investigating how to intentionally enhance health and well-being through building design choices and get that knowledge incorporated into professional practice.
- This research encompasses five GSA buildings:
 - Wayne Aspinall Federal Building (Grand Junction, CO)
 - Edith Green-Wendell Wyatt Federal Building (Portland, OR)
 - Federal Center South (Seattle, WA)
 - GSA Headquarters (Washington D.C.)
 - GSA Regional Office Building (ROB) (Washington D.C.)
- The first three recently incorporated daylighting into their designs, while the GSA HQ building did so for part of its space. ROB, the control building, is an old-fashioned, deep-cored building, originally designed to be a warehouse.

Next, Dr. Mariana Figuerio (joined by her colleague Dr. Mark Rea) presented the daylighting research methodology and results to date.

- Plants and animals exhibit patterns of behavioral and physiological changes over a roughly 24-hour cycle – a.k.a, circadian rhythms, including the sleep-wake cycle.
- Light is the primary synchronizer of circadian rhythms, and morning light in particular helps reset or entrain circadian rhythm and our biological clocks.
- Scientists have discovered that we need higher amounts of light to activate our circadian system than what we need to see. The circadian system is what we call a “blue-sky detector” seeking blue light (ideally morning light) for synchronization.
- Light during the day (red light and any wavelength) keeps people alert throughout waking hours.
- Circadian disruption has been associated with health impacts including poor sleep, higher stress, increased anxiety and depression, increased smoking, cardiovascular disease, type 2 diabetes, and breast cancer.
- The Daysimeter device was developed to measure circadian stimulus, i.e., the light people receive that can activate their circadian systems. The device also measures activity and rest patterns.
- Project Overview
 - Perform building measurements (summer and winter).
 - Collect personal light exposure with the Daysimeter (7 days) and survey workers.
 - Hypothesis: Buildings with more access to daylight provide more circadian stimulation to workers, leading to better sleep quality and mood, especially in summer months, when there is more daylight availability.
- Methodology
 - Performed morning, midday, afternoon and evening spot photometric measurements during winter and summer months.
 - Conducted lighting experience survey.
 - Placed stick Daysimeters to collect continuous light measurements.
- Results & Discussion
 - Amount of circadian stimulation was significantly higher in summer than in winter.
 - Highest amount of light was received during work hours – except for the control building, ROB, whose occupants experienced low sleep efficiency and duration.
 - The research has not been able to show a relationship between light exposure and moods, partly due to small sample size.
 - Building orientation, desk space location and floor height influenced the amount of circadian stimulation received by workers:
 - In general, north façade, higher floors, and desk spaces closer to windows received the highest amount of daylight.
 - In winter, south and east façades received more light than in summer.
 - Furniture layout, positions of shades and luminaires need to be taken into consideration in order to increase daylight penetration in the building.
 - Care should be taken to avoid direct and reflected glare.
 - Electric lighting plays an important role in desk spaces located in south, west and perhaps east façades and those located away from windows.
- Limitations and future work
 - Lack of a sufficient sample size in control building.

- Workers do not remain in a single place within office:
 - Pendant measurements underestimate circadian light exposures
- Telecommute may reduce overall light exposure, as workers in this sample receive the greatest amount of light at work (except at ROB).
- Individual differences may play a role.
- Circadian stimulation (CS) threshold is not known; neither is the relationship between amount and duration of exposure:
 - A CS of 0.1 seems to be the threshold and 0.3 the ideal, but further studies are needed to test this hypothesis.
- How can this information be put into practice?
 - Encourage designers to factor circadian stimulus into daylighting design.
 - A biological watch may track a person's circadian time and provide a recommendation for when to receive or avoid light

Dr. Judith Heerwagen summarized the daylighting workshop and key takeaways:

- The daylighting workshop convened a diverse group of experts to work though the question of how to optimize building systems with daylighting (e.g., technologies, behavioral, furniture, etc.).
 - What are some of the actions and best practices that GSA can start implementing now, based on what we know today?
- A key takeaway is that daylighting exists within a building “ecosystem” – affected by technology, interior design, organizational culture and behavior.
- One suggestion was to develop daylight maps of buildings to use for space planning.
- At the workshop, participants discussed practical solutions regarding the optimal use of glass, desk space arrangements and ways of introducing vertical partition lighting.
- Federal agencies need to work with employees, labor unions, designers and architects to facilitate understanding of these issues and responses to them.

Optimizing the Daylight Ecosystems in Buildings – Committee Comments

- Quantify and emphasize the connection between sleep patterns and productivity – but also keep the focus on health, as a topic that generates broad interest.
- Every floor should have a light oasis, a specific room where there is high circadian stimulation and where people can come and stay in for 15-30 minutes a day. Ensure break rooms are designed with daylight access.
- Consider incorporating less expensive daylighting improvements wherever possible, e.g., lower cubicle partitions.
- Provide specific guidance to designers – e.g., tradeoff of energy penalties vs. daylight gains from glazing; providing quality over quantity of daylight delivered.
- Develop performance specifications to encourage manufacturers to build innovative products to meet those specifications.
- Investigate the new, more dynamic lighting products being developed at optimal wavelengths, although they do not provide the full benefits of daylighting and views.
- NASA is doing research on programmable color-tunable LED lights for their space stations. It would be interesting to work with them on before and after measurements.
- Note the specific lighting needs of older adults, a topic of the [Environments for Aging](#) conference and one for which the Lighting Research Center has developed [guidelines](#).

as well as [research on lighting for low vision](#) being conducted by the National Institute of Building Sciences with funding from the Rothschild Foundation.

The Committee voted unanimously to support the following motion:

- The Committee strongly supports GSA’s work in understanding and quantifying the impacts of daylighting on productivity and health as valuable, cost-effective, and worthwhile.

Portfolio Prioritization: Task Group Report & Discussion

Sarah Slaughter, Built Environment Coalition, Task Group Co-Chair

Brendan Owens, U.S. Green Building Council, Task Group Co-Chair

The Advisory Committee considered and voted on a series of member-generated motions last fall, leading to the creation of two task groups to develop these motions into full proposals: the Portfolio Prioritization Task Group and the Energy Use Intensity (EUI) Task Group.

- Portfolio Prioritization Task Group Objective:
 - Assess existing and emerging strategies, methods, and tools to advance federal agencies' capabilities to more easily meet sustainability and resilience performance objectives through prioritization of facility investment strategies.
 - The objective takes into account federal mandates, regional and national environment priorities, climate change risk management, specific project attributes and portfolio strategies.
- Desired Outcomes:
 - Identify strategic approaches to advance federal agencies' capabilities to proactively analyze and prioritize portfolio planning actions with respect to regional and national environmental priorities.
 - Develop processes to ensure that highest priority performance objectives are consistently achieved throughout the portfolio of federal facility assets
- There are many existing and emerging federal mandates that agencies must address. The question is how to strategically plan and manage a portfolio of buildings rather than deal with them on an ad hoc (building by building) basis.
- Critical requirements to meet:
 - Sustainability objectives – such as reducing greenhouse gases, energy and water use;
 - Improved facility space utilization – facility consolidation and disposition of underutilized assets;
 - Resilience requirements – including the ability to adapt to climate change and other impacts over time.
- Opportunity/Challenge
 - New ways to strategically incorporate these combined goals into portfolio planning and management processes;
 - Planning that takes advantage of synergistic benefits of specific strategies across the full portfolio that can be realized at the project level.
- Task Group Plan
 - Collect reference and background materials on “best in class” for sustainability plus resilience planning.
 - Hold workshop(s) with National Academies’ Federal Facilities Council (FFC).
 - Identify existing and emerging approaches, methodologies, tools, strategies.

- Act as a catalyst for federal portfolio planning improvements.
- Workshop Planning
 - The FFC is very interested in working with the Committee and has resources to plan, accommodate and provide summary reports for up to two workshops.
 - The Task Group proposes to hold the first workshop in the summer, and a second in the fall, possibly in conjunction with the next Committee meeting.
 - The first workshop will focus on sharing current implementation strategies and success stories regarding portfolio planning in the areas of sustainability, resilience and footprint consolidation.
 - Workshop structure will be multiple panels and discussion breakout sessions.
 - The second workshop will focus on tools, methods, and justification of strategic portfolio prioritization.
 - The Task Group is seeking a federal agency to volunteer to pilot identified planning strategies and tools. Results and findings of such a pilot would be reported at the spring 2016 Committee meeting.
 - Committee members are requested to share additional portfolio planning reports or resources and recommend potential workshop speakers or attendees.

Portfolio Prioritization Task Group – Committee Comments

- Learn from private sector and other countries grappling with many of the same issues. Healthcare in particular is ahead of the curve on such planning.
- Need to be clearer about who we want involved and desired outcomes.
- Specify the level of effort and involvement for the piloting agency.
- Identify and highlight mission benefits to agencies.
- Build more communication among design teams and budget experts into the process.
- Include consideration of budget constraints, and how to take full advantage of resources such as Energy Savings Performance Contracts (ESPCs).
- The commercial real estate market should also be educated on these strategies, re: EO 13693 management implications for leasing property to the government.

The Committee voted unanimously to support the following motion:

- The Committee views the work of the Portfolio Prioritization Task Group as valuable and strongly encourages the execution of the workshops both individually and with agency representatives.

Working Lunch – Presentation on new Executive Order 13693, Planning for Federal Sustainability in the Next Decade and Discussion: Federal Progress & Opportunities on Climate Change

Kevin Kampschroer, Federal Director, GSA OFHPGB

- The new [Executive Order \(EO\) 13693](#), “Planning for Federal Sustainability in the Next Decade” takes into account many lessons learned as the federal government has implemented a series of sustainability laws and executive orders over the past decade.
 - Builds on and extends (to 2025) goals set in Energy Policy Act of 2005, Energy Independence & Security Act of 2007, and last EO 13514. Also requires that the “Guiding Principles” for federal green building, established 2006, be updated.

- Expands definition of renewable electrical energy, creates new category of “alternative energy” (including thermal energy) and combined category of renewable and alternative called “clean energy,” with targets set for renewable and clean energy use.
- Requires the federal government to reduce direct (Scope 1 & 2) greenhouse gas (GHG) emissions overall by 40% and individual agencies to set their own (Scope 1, 2 & 3) GHG reduction goals. (GSA to date has achieved 43% reduction.)
- Consolidates policy goals from diverse sources, covering data centers, ESPCs, resilience, procurement, renewables, fleet, water, etc.
- Adds new measures, e.g., on leased space GHG emissions reporting and supply chain GHG emissions disclosure & reporting.
- Requires new buildings to start process of design for net-zero energy – and net-zero water and waste where feasible – in 2020, and report on net-zero existing building goals for 2025.
- For implementation, EO puts stronger focus on training and regional coordination, and requires every agency to:
 - Designate a Chief Sustainability Officer to represent agency, including to Interagency Sustainability Steering Committee;
 - Post an annual Strategic Sustainability Performance Plan reporting goals and progress;
 - Have progress evaluated through OMB Scorecard (green, yellow, red)
- In announcing EO, the President gathered a group of CEOs of the largest government contractors and asked them to publically commit to reducing GHG emissions.
- The [Energy Efficiency Improvement Act](#) would direct GSA to develop model green lease provisions.
- Most effective way to reduce GHG emissions from federal buildings is to reduce square footage through well-planned consolidation (in line with “[Reduce the Footprint](#)” policy).
 - Need to provide adequate meeting room space and set social norms with open plan workspace – e.g., make it okay to tell loud talkers to “get a room.”
- In terms of changing occupant behavior to be more sustainable, key strategy is to set building settings to make sustainable conditions the default.
- GSA is doing interesting work on submetering by subsystem and by tenant. GSA is working with the Department of Energy to produce low cost meters at \$100 or less, which will be installed and piloted in GSA’s 1800 F building.

Presentation on new Executive Order 13693 – Committee Comments

- Federal government should set the standard for sustainability and drive the market.
- Building consolidation trend underlines the need to revise Energy Use Intensity (EUI) measures to ensure density is not penalized – even though it doesn’t always lead to major energy increases, due to telework trends and efficiencies realized.
- Defense Department is pioneering campus level net zero targets, whereas new EO focuses on the individual building level, which is challenging and may have less impact.
- Without funds budgeted to implement the EO requirements, and with challenges like sequestration, need to facilitate and promote federal use of funding tools like ESPCs.
- Need to tie EO to agency missions, e.g., for HHS, health is paramount.
- Consider developing an internal federal carbon trading program.

Energy Use Intensity (EUI): Task Group Report & Discussion

Drake Wauters, AIA Technical Design for Building Performance, Task Group Co-Chair

Projjal Dutta, New York State Metropolitan Transportation Authority, Task Group Co-Chair

- Introduction
 - This proposal seeks to identify concepts for GSA and other federal agencies to apply building energy metrics that address wider energy use impacts resulting from facility decisions.
 - We arrive at a more comprehensive energy picture if we leverage the value of current Energy Use Intensity (EUI) metrics and consider two more factors:
 - User population density (occupants, which may include agency staff and visitors) of each facility; and
 - Transportation energy necessary for users to access the facility.
 - This broader metric would help inform decision makers about the energy impacts and GHG emissions of their options when considering facility design & location.
- Expanding the Concept of EUI
 - EUI, as currently based on energy consumption per square foot, can penalize workplace consolidations because they shrink the denominator. The metric therefore needs to be re-defined to account for occupant density.
 - Transportation is a major consumer of energy:
 - A building's location can have a greater impact on energy consumption than green features incorporated into it.
 - An accurate EUI has to factor in distances traveled by occupants and the mode of that travel.
 - The new, expanded metric should be a single agglomeration of per square foot energy consumption, occupant density, and transportation energy use.
- Energy Use Intensity to Density Metric
 - Develop a new facility energy metric that incorporates occupancy – proposed Full Time Equivalent Occupant (FTEO) concept reflecting hours of occupancy (by employees and visitors) as well as employment.
- Transportation Energy Metric
 - Develop a new transportation energy metric estimating energy use by occupants in commutes to and from federal buildings.
 - Example comparing energy use of high-rise urban building vs. much greater use by low-rise suburban office park due to commuter impacts. Research has found GHG per person (Kg CO₂E) to be higher in low density areas.
- Some analyses and tools have attempted to factor in transportation as a component of building operational energy, e.g., the Center for Neighborhood Technology (CNT) has tried to unify and normalize these factors into one Transportation Energy Intensity metric. (See References in EUI TG proposal.)
- GSA's Urban Development/Good Neighbor program is working with EPA's Smart Growth program to release a tool this year estimating GHG emissions based on location.
- The task group has discussed the possibility of identifying funding for contractors to analyze options for revising the EUI metric.

Energy Use Index Task Group – Committee Comments

- Metric and tools should measure both energy and GHG emissions.

- Federal agencies need to reduce EUI using the traditional definition, but could additionally use an expanded EUI metric for more detailed planning and management.
- Could call this metric “transport, occupancy and energy use intensity”.
- Focus on how to spur desired transportation behavior after constructing a green, transit-accessible building – e.g, use of incentives/disincentives, competition, public disclosure.
- Further research is needed pertaining to energy impacts of telecommuting.
- Promote mixed-use developments and leverage opportunities like combined heat & power.
- New composite EUI metric will require greater normalization of information plus data from federal agencies to verify it.
- One caution: use/emissions per person could fall while absolute impacts rise.
- This new EUI metric could fit nicely into portfolio prioritization strategy as well.
- NIST developed the [Building Life Cycle Cost \(BLCC\) Program](#) to provide computational support for the analysis of capital investments in buildings.
- EUI TG should identify current technical analyses and where more analysis is needed.

Chairman Greg Kats proposed the following motion, which the Committee approved unanimously:

- **Motion 3:** The Green Building Advisory Committee recognizes the value and importance of the work being performed by the Energy Use Intensity Task Group and GSA should do its best to provide resources and support to continue the Task Group’s work.

The Energy Use Intensity Task Group Co-Chairs will detail the scope and support needs for GSA, and look into other potential sources of support as well.

Topics Proposed by Committee Members

Social Cost of Carbon Resolution

Committee Chair Greg Kats asked GSA to provide a status update on progress in piloting the social cost of carbon (SCC) concept proposed by the Committee.

- The intent of capturing this cost of carbon is to influence the choice between different design options. Cost of carbon may not be the largest factor but it can be used as a helpful discriminator in the budgeting phase. In the long run, it pushes project teams to make their projects more attractive from a cost of carbon standpoint.
- GSA has merged SCC piloting with an existing project on life cycle analysis (LCA). GSA Region 3 Office previously had applied LCA to three buildings in Baltimore, and GSA is now looking for Regional offices to pilot LCA as part of the planning process.
- A major challenge for GSA is that the people involved in capital projects do not know how to identify and calculate the cost of carbon, and lack good shortcut methods.
- GSA proposes to collect this current year’s crop of budget proposals and bring in DOE FEMP to examine and advise on methods to incorporate SCC.

Product and Material Selection

Brendan Owens raised a question to the Committee about whether or not it has worked on the human health impacts of materials selection.

- The Advisory Committee has not ventured into human health impacts of materials selection, beyond Building Performance Labels Task Group discussions of indoor environmental quality.
- There is currently momentum to pay attention to materials selection. GSA could play a significant role in sending a signal to the market that GSA desires products that promote better sustainability and health impacts.
- Part of the challenge is obtaining the information to assess products. GSA can leverage its market power to emphasize certain materials or product specifications over others.
- Product disclosure is one approach, but only a means to increase awareness and facilitate alternatives assessments among products, not the ultimate end.
- Ken will put issues of product and material selection and supply chain on the agenda of the next Advisory Committee meeting in fall 2015, and work with interested Committee members to flesh these ideas out for discussion.

Public Comment Period

- There were no public comments from visitors.

Closing Comments

Ken Sandler encouraged Committee members to send any additional comments on the two Task Group proposals to him ASAP.

Kevin Kampschroer thanked all of the participants for a highly substantive discussion and for all the work leading up to it.