Recommendations

The Federal government has made significant progress with green buildings to date, and none of the barriers discussed above appears to be insurmountable. Several options for working to overcome these barriers and advance the practice of green building in the Federal government were identified through the interviews and are outlined below.

Financial and Budgetary Structure

Numerous interviewees identified the Federal budgeting bias in favor of initial cost decisions, and against the use of life cycle costing, as the number one barrier to the further success of Federal green building. This is an issue that agencies will have trouble addressing on their own because it requires changes in the implementation of OMB policy, and possibly by Congress as well. OFEE, as a White House office with jurisdiction that extends beyond any individual agencies, is well positioned to work through an interagency group with OMB to address this major concern.

Instituting life cycle costing represents the most formidable challenge of all the options discussed, since it would involve changing the heart of Federal budgeting policy. Effective policy improvements would go a long way in promoting environmental design. As such, recommendations include:

- Strengthen LCC Requirements on Environmental Design and Construction. As previously mentioned, existing statutory language and OMB guidelines already call for LCC-based analysis for Federal capital investments, but despite this, first-cost decisions often prevail. A new Executive Order could mandate the development of clear guidance and implementation by OMB as well as by each agency's budget office. Furthermore, making progress in this important area will require more specific procedures and assignment of responsibilities. For example, an Executive Order might require that each capital project be accompanied by a long-term projection (e.g., lifetime or 20-year) of energy and water operating costs. This use/cost projection would be signed off by both the responsible agency official and by OMB, and become a permanent record (benchmark) for that building. In general, agencies should consider the following costs over the full life cycle of the building when weighing design alternatives:

    - Energy, water, and other utility operating costs;
    - Other operation, maintenance, and repair/replacement costs;
    - Reuse, recycling, or disposal of post-use materials and equipment;
    - Occupant health and related costs (e.g., absenteeism, disability, health care for workplace injuries); and
    - Other costs and benefits of environmental design that may be quantifiable in the future, as a result of ongoing research.

    As discussed below, further research quantifying the costs of green building are necessary.
- Collaborate with Chief Financial Officers Council. OFEE and OMB should collaborate with the Chief Financial Officers Council to examine the issue of LCC, recommend solutions, and implement them.

- Educate Agencies and Congress about Benefits of Integrated, Green Building Design. OFEE and OMB, in coordination with GSA, DOE/FEMP, and EPA, should educate agencies and Congress about the value and the mechanics of incorporating LCC and other environmental design decisions at the building planning and design stage.[66] Education efforts should highlight how integrated design processes and environmental design charrettes save money and improve building design. Training can point out that many design decisions (e.g., siting and building envelope) can mean the difference between a high performance building and a mediocre one, so it is important to invest in smart design. OFEE should assist OMB in developing guidance noting that such charrettes do not infringe upon the limited budget allotment (six percent) in the Brooks Act for design costs, and that the intent of this restriction is to limit the dollars spent on construction documents, not to limit options for integrated design.

- Educate Comptrollers and Procurement Officials about Benefits of Integrated, Green Building Design. OFEE and OMB, in coordination with EPA and DOE/FEMP, should educate comptrollers and procurement officials about the current acquisition philosophy in which performance standards incorporate longer-term costs. Information should highlight the fact that the largest cost to the government is the salaries of the employees in the building and that some environmental design features can potentially improve productivity and health of building occupants (although more research on this topic is needed).

- Train OMB and Agency Staff about Benefits of Integrated, Green Building Design. OFEE, in coordination with EPA and DOE/FEMP, should conduct joint training sessions with both agency capital budget specialists and OMB budget examiners on how to apply the LCC criteria to actual projects (or hypothetical, but realistic case studies). This should include:

  -Training OMB budget reviewers to evaluate agency requests based on LCC and environmental design; and

  -Working with OMB staff to ensure effective implementation of Circular A-11, Part 2, Sec 55, which already calls for LCC and environmental design in agency requests.

- Clarify and Revise OMB Policy. While OMB policy already encourages an emphasis on LCC, these directives need to be promoted much more prominently and implemented more aggressively in the agencies and within OMB. Specifically, OFEE, EPA, and DOE/FEMP should work with OMB to:

  -Clarify OMB Guidance by establishing a strong standard of LCC practice for Federal agencies that includes specific examples of LCC and a definition of LCC, clarifying what costs should be included. ASTM standards developed under Subcommittee E6.81 on Building Economics can provide a starting point for this effort.

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[66]The Federal Facilities Council of the National Research Council 2001 report entitled "Sustainable Federal Facilities: A Guide to Integrating Value Engineering, Life Cycle Costing and Sustainable Development" provides a good blueprint for doing so. See <**http://www.nap.edu/books/0309072999/html/5.html**>.

-Revise OMB A-11's evaluation criteria (used by OMB budget examiners) to include higher point allocations for capital budget submissions that show life cycle costs (including water, energy, and other O&M costs) and incorporate environmental design.

-Explore lease-purchase financing options for certain energy-efficient equipment in new (or existing) buildings. Currently, such leasing for "installed" equipment[67] is unduly restricted because of the method used by the OMB to "score" leases, as required by the Anti-Deficiency Act.[68] At present, OMB requires agencies to set aside funds equal to total future lease payments, which negates the advantage of lease financing. Instead, for energy-saving equipment (i.e., at ENERGY STAR® or FEMP-designated efficiency levels) the OMB set-aside requirement should be based on *net* future costs (i.e., the difference between lease payments and annual energy cost savings).

- Institute and Incentivize Performance-Based Standards. The Federal government should continue to test, demonstrate, and refine the concept of performance-based standards for architects and contractors. Many respondents noted that a fixed percentage fee for building design can be a constraint on investing in sustainability design at the early design stages of a project, when it is often most cost-effective. To date, there have been a few experiments, in the Federal sector and elsewhere, with incentive-based design and construction fees based on the building's actual energy (and other) performance. OFEE could help agencies initiate more pilot projects using incentive-based fees, with careful experimental design and evaluation.

- Link Construction and O&M Budgets. Propose legislation to link agency construction and O&M budgets for buildings.

- Address Individual Agency Budget Issues. An interagency task force, or individual agency leads, can be tasked with tackling individual agency budgeting obstacles, such as those discussed at DoD. Additional training of individual agency's CFO, budget staff, and other relevant personnel may be required.

Education

In some ways, gathering and disseminating information on green building to educate Federal agencies and their employees is among the easiest options to pursue. However, this effort does require an investment in staff time and funding. It also requires adequate thought and planning to ensure that the right message and level of information gets to the right audiences. Furthermore, education in itself is not enough, and more direct actions, such as meetings between OFEE and upper to mid-level management at certain agencies, will be necessary to spur implementation.

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[67]In contrast to vehicles, copiers, etc. which can be removed if the lease is terminated.
[68]See the Department of Labor's Anti-Deficiency Act website at: <**http://www.dol.gov/oasam/regs/statutes/antidef.htm**>.

- Develop an Education and Information Plan. OFEE, in coordination with GSA, EPA, and DOE/FEMP, should develop an information and education plan that focuses on key audiences and their needs, and determines how to get the right information to them. The plan should also lay the groundwork for a relationship between OFEE and key sustainability workgroups, with whom OFEE should coordinate in the development and implementation of this plan. Specifically,

  -Upper- and middle-level management: Develop clear policy guidance on key environmental design issues; provide examples of green building policy memos from other agencies; garner testimonials from top executives at agencies where green building is most ingrained; and develop brochures on the business case for green building and disseminate other key resources.

  -Facilities staff and contractors: Provide detailed technical training and design guidance on how to make green building succeed; provide detailed case studies and business case information; disseminate detailed construction specs and model contract language from reputable sources; and provide opportunities to share information and experiences with peers from across the government.

  - Develop Associated Training. OFEE, in coordination with GSA, EPA, and DOE/FEMP, should set up training or workshops on environmental design at Federal conferences (e.g., budget conferences, facilities conferences, environmental compliance conferences, and procurement conferences). Compile a list of relevant associations or groups that convene meetings of relevant Federal staff. Integrate environmental design information into these training forums. Information should be targeted and tailored to meet the needs of each specific audience. In addition, on-line training tools could be used by Federal building professionals right at their desks.

  - Develop a Green Building Module for Agency Environmental Management Systems. OFEE, in coordination with EPA, should develop a guide for incorporating green building practices into agency- and facility-level EMSs.

  - Convene a White House Conference. Convene a White House-sponsored conference on Federal green building to raise the profile of the issues in the Federal sector and beyond. Such a conference could also be used to gather input from key stakeholders from the public and private sectors on aspects of a new Executive Order.

  - Disseminate Information Online. OFEE should use its website to help raise the profile of some of the interagency green building efforts (e.g., those listed in *Appendix C*), and perhaps work to bring some Federal green building resources (e.g., policies, case studies, databases, research, and training materials) together. OFEE should also request that other agencies highlight key information on their websites to reach a wider audience.

  - Leverage Existing Tools and Trainings. OFEE should work to leverage existing tools and training to further educate on green building issues. FEMP and EPA, in particular, have a large collection of such resources

(including training, publications and direct technical assistance), and OFEE should continue to partner with these agencies wherever possible to promote their resources. For example, OFEE and FEMP should collaborate to more fully market the WBDG website as an excellent reference with a wide range of information related to environmental design.

Research

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. Therefore, research recommendations include:

- Quantify the Costs and Benefits of Green Building. Data on the life cycle costs of green building are necessary in order to make the business case for green siting, design, construction, O&M, and deconstruction or disposal. Starting with the great work presented in DOE/FEMP's *The Business Case for Sustainable Design in Federal Facilities* and utilizing the enormous amounts of data being collected by the USGBC and others, EPA, DOE, and GSA should begin to quantify the costs and benefits of green building practices, products, and processes.

- Expand NIST's BEES LCA Tool. The BEES LCA tool should be expanded to cover more products to be of greater use to Federal designers.

- Research Indoor Environmental Quality (IEQ) and Its Affects on Worker Productivity and Health. Research to evaluate current best practices for IEQ and to better establish the relationship between IEQ, energy use, human health, and workplace productivity is a high priority. The growing, but diverse scientific literature suggests that substantial benefits in health and human performance are possible with appropriate building design and operational procedures,[69] but research is needed to further quantify these relationships and to evaluate and refine best practices. For example, there are currently competing and sometimes conflicting testing and certification programs dealing with pollutant emissions from products used in buildings. Research is needed to establish generally accepted standards, solidly based on public health criteria. Broad research needs agendas are being developed within the Federal government that can help guide this research.[70]

- Measure Performance. The most important question to answer is not whether a building has environmental design *intent*, but how well it actually performs. And, for many

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[69]The estimated value of these benefits range in the tens of billions of dollars. See, for example, Fisk, William J (2000). Health and Productivity Gains from Better Indoor Environments and Their Relationship with Building Energy Efficiency. Annual Review of Energy and the Environment. 25:537-566. For a bibliography or related literature, see Lawrence Berkeley National Laboratory and partners' Indoor Health and Productivity Project website at <**http://www.IHPcentral.org**>.

[70]EPA's Office of Radiation and Indoor Air, in conjunction with other EPA offices, is developing Program Needs for Indoor Environmental Research. The current draft document is anticipated for release in the fall of 2003. Also see the National Occupational Research Agenda developed by the National Institute of Occupational Safety and Health, described in Mendell et al (2002). Improving the Health of Workers in Indoor Environments: Priority Research Needs for a National Occupational Research Agenda. *Public Health Matters, American Journal of Public Health*. Vol 92, No. 9. 1430-1440.

aspects of green building, we still do not know much about how well LEED™ or other environmentally designed buildings actually perform. An ongoing research and analysis effort is needed to monitor and assess the actual performance of new green federal buildings, based on tracking and benchmarking, to identify important trends (positive or negative) and provide feedback to the policies and procedures governing new construction as well as operation and maintenance. In addition, appropriate performance benchmarks for Federal building types not currently represented in the LEED™ rating system (e.g., homes, conference/training centers, laboratories, hospitals) are needed. One example is the EPA- and DOE-sponsored work on criteria for high-performance laboratory buildings,[71] which the USGBC may soon incorporate in the LEED™ development process.

- Interagency Sustainable Buildings Research Council. OFEE, in conjunction with new and existing interagency councils devoted to issues of sustainability and general buildings research, should convene an Interagency Sustainable Buildings Research Coordination Council, consisting of private, academic, and public sector experts. The purpose of this Council would be to help coordinate, direct, support, and apply Federal sustainable building research.

  To be effective, this Council must garner sufficient high-level commitment from member agencies, have access to resources (directly or through the participating agencies), and build on prior and ongoing work by groups such as the Carnegie Mellon-based Advanced Building Systems Integration Consortium (ABSIC)[72] and the University of California at Berkeley-based Center for the Built Environment (CBE).[73] In addition, the efforts of the National Science and Technology Council (NSTC) Subcommittee on Construction and Building[74] and the relevant R&D activities of the National Research Council Board on Infrastructure and the Constructed Environment (NRC/BICE) Federal Facilities Council[75] are invaluable.

  Such an interagency research council could survey current Federal research that supports making buildings more sustainable, identify what gaps exist and how they could be filled, and identify where Federal building projects could help pilot technologies being researched, thereby leveraging the missions of both the research and building community to serve the needs of both. Depending on the findings and recommendations of such a council, OFEE could pursue various strategies (e.g., Executive Order and/or legislation) to ensure that Federal green building research is coordinated and fully funded.

Robust Rating Systems and Metrics

- Contribute Expertise to LEED™ 3.0 for New Commercial (NC) Buildings. OFEE should work with agencies and USGBC to focus on concerns with LEED™ NC and discuss options to meet these concerns in the next update of LEED™ 3.0. It is not recommended that the Federal government try to develop its own rating system independent of LEED™, as it is clearly more practical to piggyback on the work and

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[71] See EPA's Labs for the 21st Century website at <http://www.epa.gov/labs21century/>.
[72] See the Advanced Building Systems Integration Consortium website at <**http://www.arc.cmu.edu/cbpd/html/absic/**>.
[73] See the Center for the Built Environment website at <**http://www.cbe.berkeley.edu/**>.
[74] See the NSTC Subcommittee on Construction and Building website at <http://www.bfrl.nist.gov/860/c_b/>.
[75] See the NRC/BICE Federal Facilities Council website at <http://www7.nationalacademies.org/ffc/>.

reputation of LEED™ than to duplicate USGBC's efforts to both develop and maintain such a system.

- Contribute Expertise to LEED™ Systems for Other Categories. In addition to working with USGBC on the LEED™ rating system for new commercial buildings, Federal representatives should also work with USGBC, in a coordinated fashion, on relevant new LEED™ systems being developed, including LEED™ for Existing Buildings, for Multiple Buildings, for Core and Shell, for Commercial Interiors, for Laboratories, and for Homes.

Coordination and Integration

As this report illustrates, many within the Federal government are working on green buildings, but additional coordination and integration are needed. OFEE should work with other agencies to help coordinate green building work through an interagency group and, through that group, develop the needed tools to implement effective green building strategies.

- Create Senior Interagency Green Building Council. OFEE can play a critically important role in ensuring that Federal policy and Federal actions are well thought out and well coordinated. In particular, OFEE should work with the Interagency Sustainability Task Force and the various other groups across the Federal government to create a senior policy group to coordinate current Federal efforts on environmental design, including research, education, finance, standards development, measurement, implementation, and policy. Effective coordination will help ensure that Federal environmental design efforts are well integrated and resources are used as effectively as possible.

- Identify Additional Tools. The interagency council, as part of its work, should identify the tools needed for the agencies to effectively develop and implement green building strategies, including whether an executive order is appropriate. Among other issues, the council should address energy efficiency minimums, healthy indoor designs, water stewardship, building commissioning, improving and meeting LEED™ and using other tools, metrics, and monitoring, benchmarking, and reporting.