IEc

Analysis of Green Building Programs

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prepared for:

Massachusetts Executive Office of Environmental Affairs, and the Massachusetts Sustainable Design Roundtable

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INDUSTRIAL ECONOMICS, INCORPORATED

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EXECUTIVE SUMMARY

INTRODUCTION

In support of the Massachusetts Sustainable Design Roundtable, Industrial Economics, Incorporated (IEc) examined sustainable building programs and practices in other states. Specifically, under the direction of the Massachusetts Executive Office of Environmental Affairs (EOEA), IEc conducted a preliminary review of the public sector sustainable building, or "green building," programs and practices implemented in other states, and on the basis of this review, selected four state programs for in-depth analysis. From this in-depth analysis, we identified policies and program activities that have advanced the construction of green buildings in other states, and discerned "best practices." Based on the findings, IEc developed recommendations for consideration by the Sustainable Design Roundtable in its deliberations regarding the development of a green building program for the Commonwealth of Massachusetts.

FINDINGS

The results of our preliminary review reflect a growing recognition of the wide range of economic, environmental, and health benefits of green buildings. Many states, counties, and cities have initiated efforts to develop programs and policies that promote green building practices. Many of these initiatives have a public sector component that serves both as an example to private sector development, and as a stimulus for the design and construction industries to develop relevant capabilities and utilize cost-effective green building technologies. We identified 19 states that have green building initiatives with a public sector component. Thirteen of these have been established in the last five years, and 11 were established, at least in part, by executive orders. The U.S. Green Building Council (USGBC) has been instrumental in promoting green building nationally, particularly through the development of the Leadership in Energy and Environmental Design (LEED) standards which are explicitly referenced by 13 of the 19 states' public sector green building initiatives.

Based on the results of our preliminary review, we conducted in-depth analysis of four relatively well-established state green building programs — California, Minnesota, New York, and Pennsylvania. For the in-depth analysis we relied primarily on interviews with state officials who are involved in green building activities, including policy development, program implementation, technical assistance, or project design and construction. The interview questions were organized according to the roundtables's seven topical working groups — Vision and Leadership; Education and Training; Sustainable Design Metrics; Standards, Codes, and Regulations; Capital Versus Operating Budgets; Incentives; and Bidding and Awarding Process.

In talking with officials involved in state green building programs in the four states analyzed, we encountered enthusiasm for sharing the lessons learned from their efforts. A consistent and emphatic message that we heard from all four states is the importance of green building "champions" at a high statewide level, and even more importantly at the agency level where building activities are concentrated. Champions can be groomed in a number of ways that involve education and training. Officials in California and Pennsylvania also noted the importance of having at least one green building demonstration project that state officials can tour in order to see that these buildings are feasible, look and function similar to "regular" buildings, and create environments valued by their occupants.

We also learned that executive orders in three of the four states (California, New York, and Pennsylvania) catalyzed the initial success as well as continued progress in the construction of green buildings. Our research suggests that executive orders that are specific in terms of expectations regarding building standards, training, reporting, and compliance, and in terms of an organizational structure for implementing the order, are most effective. In Minnesota, legislative action has been an important catalyst. In general legislation is more effective than executive orders because it is more likely to be enforceable and is less susceptible to changes in political leadership.

Academic support is also an important part of each of the four states' efforts to advance a green building agenda. Local universities have provided a wide range of support including: conducting research to demonstrate the cost-effectiveness and benefits of green buildings in the state; developing design standards and guidelines; providing technical assistance in applying design guidelines and standards to green building projects; providing training to state personnel; and collecting and analyzing building performance data.

In addition to academic support, all four states offer financial incentives for construction of green public buildings. Money from utility surcharges typically funds these incentives. The states have found that such incentives are important in bridging the gap between the capital costs of conventional and green buildings. California has a mature program, and financial incentives have been curtailed recently; incentives may not be needed once a program is well-established and/or perceived as mandatory.

Our review of state programs also revealed that LEED has become an industry standard that is either in use, recommended for use, or considered for use in at least 13 states including California, New York, and Pennsylvania. In 2005, at least five states have issued executive orders or passed legislation mandating the use of LEED in public sector construction. Although LEED is widely and successfully used, it has well-known shortcomings. As a result, Pennsylvania is considering the development of a "LEED Plus" standard that would mandate certain LEED rating points to overcome some of it shortcomings. Minnesota has adopted entirely different performance-based guidelines in part to address a major shortcoming of current LEED standards — inadequate

consideration of lifecycle impacts. California, on the other hand, has been very pleased with LEED and requires that all public buildings be built to the LEED Silver standard. Officials note that recent revisions have improved LEED and that the USGBC is planning additional revisions that will address lifecycle impacts.

RECOMMENDATIONS

Based on the findings summarized above, IEc has developed recommendations to the Sustainable Design Roundtable for each of the roundtable's seven focus areas. IEc's specific recommendations are listed below. The findings supporting each of these recommendations and the underlying rationale are presented in Chapter 4.

VISION AND LEADERSHIP

- Adopt consistent use of the term "high performance buildings" to capture more completely the benefits of green buildings.
- Draft an Executive Order focused exclusively on high performance buildings that (1) establishes clear expectations, (2) identifies the universe of projects and/or agencies subject to the order, and (3) describes specific training, reporting, and compliance expectations or requirements.
- Include in the Executive Order: (1) the creation of a senior position for a technically qualified professional who will champion and be responsible for the coordination of all high performance building programming that occurs at the state level; (2) the creation of a permanent entity within state government, under the direction of this senior professional, that is granted explicit authority to coordinate high performance building activities across agencies; and (3) a requirement that each state agency with property development responsibilities identify a designated representative to be the agency's internal coordinator of high performance building activities.
- Provide funding for long-term support of local academic centers that can provide continuous research and technical services.
- As a near-term tactical strategy, make energy and energy cost savings a centerpiece of a state high performance building initiative.
- Select a building (or two) currently at the earliest design stage and identify it as an "official" high performance building demonstration project.

EDUCATION AND TRAINING

- Sponsor a year-long seminar series that introduces a broad array of state personnel to the principles and practices associated with high performance buildings.
- Make participation in the state-sponsored seminar series a minimum qualification for any internal agency staff who will be responsible for

management and oversight of private consultants during a high performance building project.

- Review core documents produced in other states and incorporate or adapt specific elements in any new or updated Massachusetts high performance building guidelines or training materials.
- Develop an outreach program that provides specific resources and training to county and municipal planning departments.

SUSTAINABLE DESIGN METRICS

- Explore adopting a mandatory "LEED Plus" standard for public construction that would include: requiring a needs assessment for new construction, surpassing the existing energy code by 20 or 30 percent, addressing Massachusetts priorities such as the construction waste ban, and attaining a minimum number of credits in each area.
- Have a representative from Massachusetts state government sit on a LEED core committee to ensure that LEED continues to evolve and improve in ways that maximize benefits to Commonwealth projects in the long-term.

STANDARDS, CODES, AND REGULATIONS

- Explore the feasibility of updating the existing state energy code to ensure that it promotes energy efficiency.

CAPITAL VERSUS OPERATING BUDGET

- To bolster requests for additional capital funding for high performance projects, develop a system for analyzing lifecycle cost savings and presenting the results to legislators and agency budget managers.

INCENTIVES

- Tap into state utility-funded energy conservation monies to offer: 1) incentives for capital investments that conserve energy and operating costs; and 2) other programming and incentives that promote energy efficiency in public building projects.
- Provide direct incentives such as grants to state and local government agencies, bonuses to design teams, and energy design assistance. The coordinator of the state high performance building entity should oversee such incentives.

BIDDING AND AWARDING PROCESS

- On all large high performance building projects, mandate the use of credentialed, professional green building consultants. To facilitate this policy, issue an RFQ for professionals or firms that wish to be included on a list of "preferred" high performance building consultants.

- Reference the selected high performance building standard (e.g., LEED Plus) within bid specifications.
- Consider adopting a “design-build” procurement process for large public projects.
- If feasible under state policy, explore leasing high performance buildings instead of constructing them.

CHAPTER 1 | INTRODUCTION

The Massachusetts Executive Office of Environmental Affairs (EOEA) retained Industrial Economics, Incorporated (IEc) to provide research and analytic services in support of the Massachusetts Sustainable Design Roundtable, a public/private collaboration formed to develop strategies for the promotion of sustainable design practices in Massachusetts public building projects. Specifically, EOEA asked IEc to examine the public sector sustainable design, or "green building," programs and practices already in existence in other states and, on the basis of this examination, to develop a set of recommendations for consideration by the roundtable.

We initiated our research by conducting a preliminary review of all states in which there is evidence of a past or current state-wide initiative to promote or require the use of green building techniques in public construction. This preliminary review allowed us to characterize the nature and extent of state green building programs nationwide and to select four states to analyze in greater depth.

The results of our preliminary review reflect the attention being paid nationally to sustainable development and smart growth, and a growing recognition of the wide range of economic, environmental, and health benefits of green buildings. This recognition has led many states, counties, and cities to initiate efforts to develop programs and policies that promote green building practices. As an example to private sector development, many state and local governments' efforts target public sector construction. We identified 19 states that have ongoing, recently active, or emerging green building initiatives that include a public sector component. These states are listed in Exhibit 1. Basic information on the green building programs in these 19 states is summarized in Appendix A.

Based on our preliminary research on green building programs in these 19 states, we make the following general observations.

- Of the 19 identified public sector green building initiatives, 13 were formally established within the last five years; thus most are not well-established, fully-functioning programs.
- Of the identified green building initiatives, 15 appear to be currently active at a statewide level. Of these 15, 10 were established at least in part by Executive Order, and five are or are expected to be codified by legislation. (See Figure 1.)

- At least 13 states (AZ, AR, CA, CO, ME, MD, MI, NV, NJ, NY, PA, RI, WA) make (or have made) explicit programmatic reference to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards, though the way in which these standards are applied varies considerably from state to state.
- At least three states (CA, NJ, OR) have distinct green building initiatives focused on K-12 schools.

EXHIBIT 1 PUBLIC SECTOR GREEN BUILDING INITIATIVES

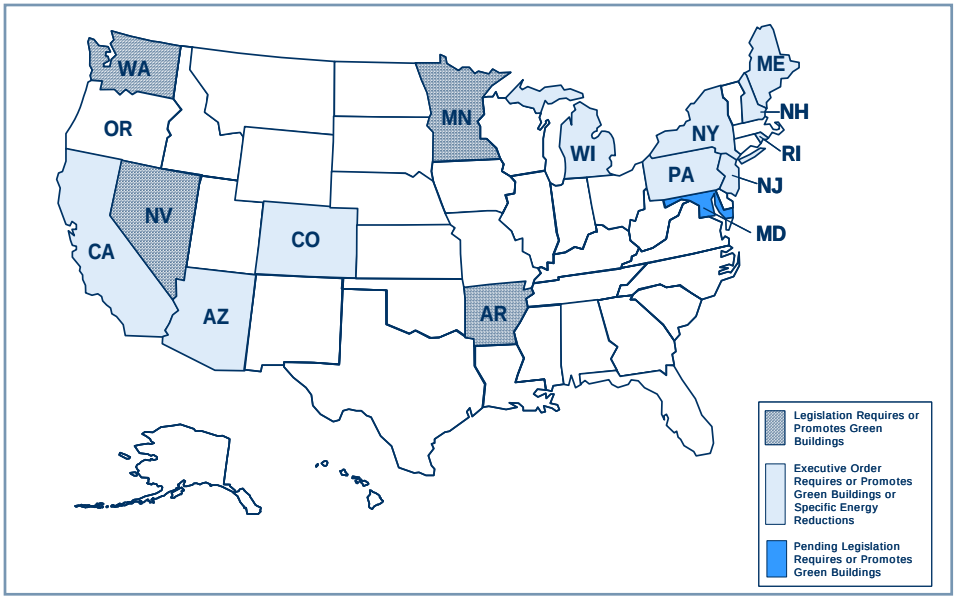
State Level
(ongoing, recently active, or emerging programs that include a public sector component)

Arizona	Illinois	Minnesota	New York	Pennsylvania
Arkansas	Maine	Nevada	North Carolina	South Carolina
California	Maryland	New Jersey	Oregon	Washington
Colorado	Michigan	New Hampshire	Rhode Island	

City and County Level
(incorporate or considered incorporating LEED standards into municipal construction projects)

Acton, MA	Boston, MA	Gainsville, FL	Phoenix, AZ	Sarasota Co, FL
Alameda Co., CA	Bowie, MD	Houston, TX	Pleasanton, CA	Scottsdale, AZ
Albuquerque, NM	Calabasas, CA	Issaquah, WA	Portland, OR	Seattle, WA
Arlington, MA	Chicago, IL	Kansas City, MO	Sacramento, CA	Suffolk Co., NY
Arlington, VA	Cook Co., IL	King Co., WA	Salt Lake City, UT	Austin, TX
West Hollywood, CA	Atlanta, GA	Dallas, TX	Long Beach, CA	San Diego, CA
District of Columbia	Los Angeles, CA	San Francisco, CA	Berkeley, CA	Eugene, OR
New York, NY	San Mateo Co., CA	Boulder, CO	Frisco, TX	Omaha, NE
Santa Monica, CA				

FIGURE 1 STATES REQUIRING OR PROMOTING GREEN BUILDING PRACTICES IN PUBLIC CONSTRUCTION



The remainder of this report focuses on the in-depth analysis of four state programs--California, Minnesota, New York, and Pennsylvania. Chapter 2 describes our approach to the in-depth analysis, including our rationale for selection of these four states. Chapter 3 presents the results of each of the four state studies. Finally, Chapter 4 presents our recommendations to the Massachusetts Sustainable Design Roundtable.

CHAPTER 2 | APPROACH TO IN-DEPTH ANALYSIS

Based on our preliminary review of state green building programs, we selected eight states (Arizona, California, Michigan, Minnesota, New Jersey, New York, Oregon, and Pennsylvania) to examine at a level of detail sufficient to determine the four states that would best serve the purpose of informing the roundtable's deliberations through more in-depth analysis. For each of these eight states we developed preliminary "fact sheets" (provided as Appendix B of this report) that describe the genesis of the initiative, its scope and potential magnitude (as measured by the annual state construction budget), its use of design standards, and its achievements to date.

Based on our preliminary research we proposed to conduct more in-depth analysis of public sector green building initiatives in California, Minnesota, New York, and Pennsylvania. A principle reason for the selection of these states was the fact that they were among the first to consider public sector green building policies and practices, and thus would be best able to provide examples of actual experience. Additional, state-specific factors further supported this decision: California is home to a multi-agency task force that addresses coordination issues similar to those likely to appear in Massachusetts; Minnesota is the best example of a state that developed and is implementing state-wide design guidelines that are distinct from LEED; as a neighboring state actively promoting green buildings, New York can serve as a useful analogue for Massachusetts policy makers; Pennsylvania currently has more LEED-certified public buildings than any other state.

Our primary sources of information for the in-depth analyses were telephone interviews with state officials who are involved in green building activities at the policy, technical assistance, or project levels. We supplemented our research with documents available on state web sites. To ensure that our interviews were appropriately focused, we developed a list of questions organized by topic corresponding to the roundtable's seven working groups — Vision and Leadership; Education and Training; Sustainable Design Metrics; Standards, Codes, and Regulations; Capital Versus Operating Budgets; Incentives; and Bidding and Awarding Process. We made a draft version of these questions available to roundtable members and produced a final version based on comments we received. (Appendix C contains the final set of questions.) We provided the questions to interviewees in advance of the scheduled interviews.

From our preliminary review we identified a principal contact person in each of the four states selected for in-depth analysis. We solicited suggestions from this and each subsequent contact person for additional people within the state government who could

provide useful information on one or more of the seven topics of interest. Appendix D contains the names and contact information for the people whom we interviewed or who offered written responses to our questions. We have also included in Appendix E the Executive Orders and legislation that support current green building-related activity in the four states.

The information we obtained through interviews and supplementary research serves as the basis for the two elements that together form the remainder of this report: Results of the In-depth Analysis, Chapter 3, which presents state-specific findings with respect to each of the topic areas; and Recommendations, Chapter 4, which is organized by topic area and supported by our synthesized findings.

CALIFORNIA

In the late 1990s, green building advocates at the California Integrated Waste Management Board (CIWMB) embarked on developing sustainable building programming, which first took shape in an Action Plan to develop an executive-level program, a grant program for education and training, and a guidebook. The Capital Area East End Complex (East End), the state's first showcase project, was designed and constructed during this time. It was the largest state building project in California history, and as a result of incorporating green building design techniques, it saves approximately $400,000 a year in energy costs. The project became a rallying point to bring California's various environmental and public health agencies together to expand the utilization of green building techniques.

In August of 2000, former California Governor Gray Davis signed Executive Order D-16-00, which called for "incorporation of sustainable building practices into the planning, operations, policymaking, and regulatory functions of State entities" and required regular reporting on progress toward these goals. The Executive Order formalized the role of the previously established Sustainable Building Task Force in advancing green building; the Task Force brought together representatives from over 30 government agencies in the state to coordinate green building activities. The State and Consumer Services Agency, the agency which oversees public real estate development, building standards, and procurement, coordinated the Task Force. The Task Force developed a *Blueprint for Sustainable State Facilities* and a 10-point plan for better integrating sustainability considerations into state buildings, including the development of green building standards, bidding specifications, educational materials, and incentives. The *Blueprint* stressed saving tax-payer dollars and improving building quality, in addition to reducing negative public health and environmental impacts; leading with cost-saving and human comfort arguments is a strategy that staff continue to use when explaining the benefits of green building in California.

California's green building programming grew steadily in the early 2000s and expanded to include schools and residential construction in addition to public sector construction. Among many activities, California implemented a large grant program for encouraging sustainable building, conducted education and training on construction waste management and material selection, and funded the most comprehensive analyses of green building financial costs and benefits to date. California originally designed its own

set of green building standards, but experienced implementation difficulties, which ultimately led policy-makers to adopt LEED instead.

In 2003, California issued a progress report on green building activities (*Blueprint 2003*). In December of 2004, Governor Schwarzenagger signed Executive Order S-20-04, which requires LEED Silver certification for new state buildings and state buildings undergoing significant renovation. Although various pieces of legislation have been introduced to codify green building requirements in California, none have been enacted. However, California has had many green building successes under the auspices of executive orders, including a substantial number of green buildings built and in process, and positive changes in policy and programming that position green building as an increasingly mainstream public sector practice in the state.

VISION AND LEADERSHIP

- Following the 2004 Executive Order, which requires building to at least LEED Silver in state construction, the Sustainable Building Task Force was reconstituted as the Green Action Team. The Green Action Team is coordinated through Department of General Services (DGS), a department of the State and Consumer Services Agency, and is focused on LEED implementation in addition to the state's other green building activities. DGS is charged with LEED implementation for most public sector building projects (with the exception of CalTrans, Corrections, and CalPERS, which manage their own construction projects). The Green Action Team recently produced a Green Action Building Plan for implementing the Executive Order.
- Significant staff resources have been dedicated to program implementation in California. CIWMB has seven people dedicated to sustainable building; the Energy Commission has about five dedicated staff; and the Air Resources Board has a few more. DGS has a LEED coordinator, overseeing the implementation of LEED by DGS project managers. Roughly 40 staff spend significant time on the implementation of the green building program from all agencies combined. In general, these were existing staff who have refocused on green building (except at the CIWMB, where four of the seven green building positions were newly created).
- The Collaborative for High Performance Schools Program (CHPS) program is a significant component of California's green building efforts. CHPS began as a challenge from the California Energy Commission to the state's utilities to join together to green California's schools. About the same time, the CIWMB received a request from the Los Angeles Unified School District for support in greening its schools. These two efforts came together and the CHPS program developed from there. CHPS conducted its first trainings for school decision-makers and design professionals in 2000 and released a corresponding two volume Best Practices Manual in 2001. CHPS was aware of LEED and

contacted USGBC to see if they were interested in developing LEED standards for schools but USGBC declined at the time. Without a set of school-specific LEED standards, CHPS developed a rating system for schools and released it as a third volume of the Best Practices Manual in 2002. CHPS is now a nonprofit organization with representatives from utilities, state agencies, and other organizations, and its materials are used nationally. The CHPS criteria are not required for schools in California, although adoption of CHPS has been increasing. Fifteen school districts including the top five school districts in California have adopted resolutions calling for new construction to follow CHPS. CHPS has been tentatively selected as the guidelines for energy and resource efficient schools in accordance with the 2004 executive order, and a bill currently pending in the state legislature would require schools to follow the CHPS guidelines when future bonds are passed. The current draft would also provide funding to cover up to 50 percent of any increased capital costs.

- State agencies implementing California's green building programming recognize the value of Smart Growth, but California's smart growth efforts have been led as an initiative of the State Treasurer and there has been very little coordination between the two programs. Staff noted that the lack of coordination was not deliberate, and that future coordination may be beneficial to both programs.

Measurement

- The 2003 *Blueprint* update highlights several areas where California made progress on green building in the public sector between 2000 and 2003, including: incorporating sustainable building and energy efficiency requirements into specifications for over $2 billion of design and construction projects; reducing average energy use in state buildings by 20 percent; developing green building policies and projects at the state's public colleges; building the East End and other green building projects; and publishing a cutting-edge analysis of the cost-effectiveness of green building.
- The Green Action Team will assemble the next report on the progress of all state green building efforts and an update on LEED buildings projections by December 2005.
- To date, three state construction projects have undergone LEED certification: two were new construction and one was renovation of an existing building. Another seven projects have registered. In addition, DGS is currently evaluating 18 or 19 projects in various stages of planning to determine how close they are to meeting LEED and if LEED could be cost-effectively

applied.[1] DGS will apply for additional capital funding to build recommended projects to LEED Silver.

- In addition to state construction, California's public universities (both University of California and CalState schools), as well as California's community colleges, are pursuing green building. Although comprehensive statistics are not available, examples of green building include two built LEED projects within the University of California system and another two projects registered in the system, and over 40 projects currently pursuing LEED within the community college system.
- The CHPS website lists 11 schools that are built to green building standards and another 11 schools in progress, although there are likely many more schools in progress than are listed on the site. Currently, CHPS is not tracking outcomes such as energy reductions in a comprehensive fashion.
- The Berkeley Center for the Built Environment has conducted post-occupancy evaluations, which California refers to as facility performance evaluations, for a few LEED buildings in California. Only case studies are available; the center is currently conducting a larger analysis that includes projects outside of California. The center's goal is to perform facility performance evaluations on all new LEED certified buildings in California.
- The state is in the process of developing standards for performing post-occupancy evaluations. Standard metrics will include: occupant satisfaction with features such as lighting, ventilation, and air quality.
- The East End project is being extensively studied as it is a large project and achieved a LEED Gold rating. The Berkeley Center is currently doing a study on absenteeism at the complex, and the Department of Public Health did follow-up testing on indoor air quality and found that low-emitting products significantly improved indoor air quality.
- The state is tracking energy use in LEED buildings, but water use is not being actively tracked. A number of jurisdictions in California do not even have water meters, eliminating the possibility of tracking water use.

EDUCATION AND TRAINING

- CIWMB staff train architects, engineers, planners, school district officials, school facilities personnel, and even the general public on why and how to build green. DGS project managers are being trained in implementing the 2004 green building executive order and its LEED certification requirement, and many DGS staff have become LEED accredited.

[1] This evaluation process is being conducted through design charette and consultation with LEED professionals.

- Staff have also found that it is critical to identify individuals that have real state building authority, educate them on green building and budgeting issues, and have an executive order or legislation hold them accountable to meet sustainable building goals.
- Annual reports, Power Point presentations, fact sheets, websites, and in-person training are all being used to provide sustainable design education. Some generic tools and resources are used, but state agencies have also produced many custom resources targeting specific audiences.
- Staff use the website, fact sheets, reports, public hearings, workshops and presence at green building events and trade shows to inform the public (broadly defined to include green building professionals, visitors, and the general public) about California's program and its successes.
- California does not have data on the effectiveness or outcomes of its education efforts. No formal mechanism is currently in place to ensure that lessons learned from one project are transferred to other projects.

SUSTAINABLE DESIGN METRICS

- California originally adopted a state-specific standard, the "California Tier 1 and Tier 2 Energy Efficiency and Sustainable Building Measures Checklists." Tier 1 contained mandatory requirements, and Tier 2 contained additional, voluntary standards. Implementation of these standards was quite onerous. Project managers had to actively make a case for using any materials that were not considered cost-effective to meet Tier 2 standards, so few people followed Tier 2. Some of the specifications were vague; for example, the recycled content specification did not specify a percentage, while other standards were overly prescriptive. DGS had responsibility for ensuring that project managers filled out long checklists related to each of the Tiers; project managers found the checklists to be tedious and time consuming, and were reluctant to follow the process. The Tiers standards were also weak because they did not address integrated, whole building design and only applied to the design phase of projects; a process did not exist to carry it through the construction phase.
- California implemented the Tiers standards for about three years before shifting to LEED. Compared to the Tiers standards, LEED is more streamlined and flexible. Officials in California express great satisfaction with LEED from both ease of implementation and environmental/public health perspectives, and they recommend LEED adoption to other states.
- California is the only state in the country that has LEED requirements for existing buildings in addition to new construction. Renovations of existing buildings 50,000 square feet or more must meet LEED certification requirements.

- Commissioning is part of the LEED process. For new construction, this includes verifying that the design meets the owner's specification in the design phase. The process also requires that the contractor designates a LEED point person to ensure that construction is meeting the LEED criteria specified. Even independent of LEED, the commissioning process is very helpful for maximizing the energy performance of buildings. A recent study of 220 buildings conducted by the Lawrence Berkeley National Laboratory showed high rates of return and benefits tied to building commissioning alone, independent of LEED certification.

STANDARDS CODES AND REGULATIONS

- Most building codes in California exceed LEED standards (i.e., California's Title 24 energy code). Therefore, meeting the energy code satisfies the LEED energy requirements. Some features, such as waterless urinals, have been handled differently in certain local jurisdictions, but the state is not required to comply with local codes, so varying standards are not a problem for state construction.
- Some experts have raised concerns that LEED does not adequately consider indoor air quality, but California has recently developed indoor air quality standards that exceed LEED. These requirements, referred to as DHS Standard Practice, stipulate that building materials must not contain formaldehyde and that they emit low or no VOCs. These requirements are currently being tested through pilot projects. Ultimately, all building materials used in public projects in California will need to be independently certified as meeting these criteria. Anticipation of these requirements has already brought about transformation in the manufacture of some building materials.

CAPITAL VERSUS OPERATING BUDGET

- The budgeting process in California occurs five to seven years before projects are constructed. This long-time frame and the separation of capital and operating budgets is an impediment to green building. Staff noted that it would be beneficial to merge capital and operating budgets for projects so if there are higher upfront costs, they are explicitly covered by operational savings.
- The state commissioned a study of the financial costs and benefits of green building. The results of this meta-analysis of previous studies are detailed in: *The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force*. One of the main findings of the study is that an upfront investment of less than two percent of construction costs yields lifecycle savings of over ten times the initial investment. This report helped to advance the state's green building agenda. Another report that has informed California's programming is Davis Langdon's comparative analysis of the cost

of buildings that were built to LEED standards and those that were not. The study found no statistically significant difference between the costs of the LEED and non-LEED buildings.

- Pursuant to the charge of the 2004 Executive Order, California is developing a lifecycle cost methodology to apply to projects. The goal is to both demonstrate the cost-effectiveness of green building techniques and to ensure that project managers actively identify techniques and materials that will have the greatest long-term benefits to a building's performance, instead of haphazardly picking LEED credits. The state is considering modifying the lifecycle analysis model used by the federal government (Building Life-Cycle Cost, or BLCC, model). The model is currently being reviewed by the Department of Finance. The state wants to ensure that the chosen model will not only consider energy use and benefits, but also other benefits. Version 3.0 of LEED will go ever further in addressing lifecycle costs.

BIDDING AND AWARDING PROCESS

- California found that referencing the required LEED standard within building specifications minimizes issues with the bidding and awarding process.
- California has piloted a "design-build" system for projects. It calls for one team to bid on both the design and construction of a project, based on a fixed budget and minimum green criteria. In this way, firms compete over delivering the "greenest" project for the money. This process differs from the conventional "design-bid-build" process where different firms address design and construction. For smaller projects, California will likely retain the design-bid-build process, but officials plan on expanding the use of design-build for larger projects given the success realized with the pilot projects.

INCENTIVES

- Training and education have been the main tools used to break down barriers (real or perceived) to sustainable design in public construction in California.
- Four California utilities offer energy efficiency planning assistance for new construction through the Savings by Design program.[2] The program offers design assistance, rebates to owners, and incentives to design teams to build projects that exceed California's energy code. These tools have been very effective in promoting energy efficiency in building and greener building in general.
- CIWMB has periodically offered broad grant funding to promote green building. Some of these grant programs were effective at assisting public

[2] http://www.savingsbydesign.com/

projects, but others were not effective due to financial structuring rules. Large state building projects are approved by the state legislature for a specified budget, and even if a grant or other incentive is available to cover additional capital costs associated with green building, projects often cannot access that grant funding because doing so required going back to the legislature to request an increase in the budget cap. For example, CIWMB provided funds to install rubberized asphalt concrete on the East End project, however, the project's funding was reduced by an equal amount because the project would have had to seek a budget increase, which would have delayed the project.

- The use of incentives in the public sector in California is not as prevalent now. For example, the most recent CIMWB grant program was limited to funding the use of building products containing recycled rubber from waste tires.
- The State Architect website offers links to available financial incentives.[3] However, the website indicates that grants to cities, counties, and local governments from CIWMB are not available right now, and the other grants listed are offered by county governments and not available to public projects.

GENERAL LESSONS LEARNED

- Inter-agency collaboration has been critical in advancing California's green building programming. The various task forces that have coordinated implementation have had representation from over 30 agencies. Managing the original team was difficult because it had no operating budget; CIWMB had to supply coordination and administrative support. If the state can give program funding to an interagency body coordinating activities, it can be very beneficial in advancing green building programming.
- Including local government in the initial planning stages of a state green building program can be very beneficial. Local officials bring fresh energy and perspective, and they tend to move faster because of their smaller scope. Including local governments is also a good way to build and retain champions. Even during changes in administration, green building momentum can grow through local champions by tying them into state-level collaboration.
- One of the best ways to advance green building is to develop a successful and illustrative project for people to rally around. The Ridgehaven project in San Diego was a case study example used early-on to demonstrate cost savings and to garner support from top-level decision-makers. This was an excellent comparative case study because it consisted of two almost identical buildings, one that one had green features and another that did not.

[3] http://www.dsa.dgs.ca.gov/Sustainability/incentives.htm

- Cultivating champions at the highest level of government has also been critical in California; it has enabled the program to move forward very quickly. Some events were key in cultivating champions. For example, a DGS staffer was sent to an intensive, project-based workshop for leadership training. He did his project on green building, and subsequently had a big influence on the development of the state program. Other strategies included using green building tours as an effective way to communicate benefits. Getting high-level people on tours provides advocates with a captive audience, and allows projects to speak for themselves. Also, getting high-level people out of their office and daily routine is very helpful for communicating with them. Green building tours in California have included people from the executive and legislative branches. Finally, it also helps to bring in an expert to sell the concept to top-level decision-makers; the expert should be widely respected and armed with solid cost-based arguments for green building, as well as an understanding of political context.
- Using an executive order to advance green building can be successful with high-level leadership, as has been California's experience, although legislation would be useful as well. Various pieces of green building legislation have been introduced several times in California and are currently pending.
- In the absence of green building legislation, demonstrating continuity in high-level support for green building was important for convincing agency staff that the state was serious about the program, and that it was not going to disappear with new leadership. Both the former and current governors of California have been very supportive of green building. Governor Schwarzenegger has ensured top-level leadership; the Green Action Team includes six of his top officials. This perception of permanence has pushed the culture change necessary to implement bidding, design, and oversight processes for building green in the public sector. In addition, management memos have helped implement the executive orders in California because they help clarify who is and is not exempt from the orders' requirements.
- It is important to be able to hire expert consultants with knowledge of, and commitment to, green building. If agencies rely only on large architecture and engineering firms with whom they have existing contracts, they may not have access to the experts needed, as some green building challenges are very specialized and site-specific. It is useful to retain flexibility in expert hiring, for example by using non-competitive contracts for smaller jobs and requiring access to certain expertise within bid specifications.

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MINNESOTA

Sustainable building programming in Minnesota dates back to the mid-1990s, when green building advocates at the state's Office of Environmental Assistance (OEA), the University of Minnesota Architecture School, local architectural firms, and the Hennepin County Facilities Department collaborated on an OEA grant to develop a Sustainable Design Guide for Hennepin County. The Design Guide was published in 1997. During the late 1990s, OEA promoted use of the Design Guide statewide, beyond Hennepin County. At the same time, use of LEED became more prevalent, and green building advocates in Minnesota debated whether to adopt LEED, or to modify and expand the Sustainable Design Guide.

In the Minnesota 2001 Energy Security and Reliability Act, the state legislature required the Departments of Administration and Commerce, with the assistance of other agencies, to develop Sustainable Building Guidelines for all new state construction. The guidelines are mandatory for all new buildings receiving funding from the Bond Proceeds Fund after January 1, 2004. The Energy Security and Reliability Act also required the Department of Administration and Finance to maintain information on energy use in all public buildings in order to establish energy efficiency benchmarks and conservation goals. In January of 2003, the State of Minnesota issued a BETA version of the Minnesota Sustainable Building Guidelines. In early 2004, the major agencies affected by the guidelines met to discuss implementation of the guidelines. Version 1.0 was released in June 2004. Several public construction projects currently underway are subject to the requirement to use the guidelines and others are using them voluntarily.

The Sustainable Building Guidelines are the cornerstone of the state's green building program. The guidelines are more rigorous than LEED in that most elements are required, which encourages builders to address impacts more holistically. The guidelines are designed to be utilized at the earliest stages of project planning, and call on project managers to assess the lifecycle impacts of location-specific design and materials choices. These characteristics of the guidelines reflect Minnesota's emphasis on performance-based metrics, i.e. on accounting for the true costs of building.[4]

To aid in the implementation of the guidelines, Minnesota is providing education and training programs for design and construction practitioners, cataloging green buildings in Minnesota, documenting the pollution prevention benefits and energy cost savings of these buildings, and providing direct technical assistance to users of the guidelines. Minnesota is developing lifecycle assessment tools and directories of preferable construction products. The state has also published toolkits for green building in public schools and other informational resources. Minnesota emphasizes technical assistance to local communities in addition to greening state building practices; both Hennepin and

[4] The Minnesota Sustainable Building Guidelines "set up a process that will eventually lead to a full accounting of the actual human, community, environmental, and lifecycle economic costs and benefits of sustainable building design." From State of Minnesota Sustainable Building Guidelines, Executive Summary, 2004.

Dakota counties have been very active in construction of green buildings in the public sector. Minnesota also provides tools and information to promote green building in the private and residential sectors.

VISION AND LEADERSHIP

Program Origins and Scope

- The collaboration among staff at OEA, academics, and green building advocates in private sector architecture and engineering firms, who are often collectively referred to as Minnesota's "consultant team," was the catalyst for advancing green building practices in Minnesota; progress made to date has been the result of a continued, bottom-up effort on the part of committed advocates. The program has not been bolstered by high-level political support. In fact, the legislative language which mandates use of the guidelines for public buildings was inserted in an energy bill by a sympathetic legislator late in the legislative process, when passage of the bill was likely. Otherwise, required use of the guidelines may not have passed on its own.
- Staff at OEA have tried to address Minnesota's green building efforts within the context of existing sustainable communities and pollution prevention initiatives as much as possible.
- The scope of Minnesota's green building efforts is broad, covering public buildings, commercial facilities, and schools. However, the requirement to use the Sustainable Building Design Guidelines is only applicable to new public construction receiving bond funding, which could be state or local facilities. Buildings receiving this funding are typically state buildings or large projects; K-12 schools typically do not use state bond funding. Implementation of the initiative is about a year or two behind schedule because a bond bill was not passed in 2004. About 10 to 15 new buildings are receiving 2005 bond funding and are thus required to meet the guidelines. These include several Department of Corrections buildings, as well as police and fire stations. In addition, the University of Minnesota has voluntarily elected to use the guidelines in several major remodeling projects. All of these projects are still in the planning phases. The state is not comprehensively tracking projects that are using the guidelines voluntarily.
- Part of the green building statute passed in Minnesota's 2001 energy bill was a benchmarking component that provides funding (from Clean Air Act CIP funds) to benchmark the energy performance of all existing public buildings that are 5000 sq. ft. or more, with a minimum of two utilities (e.g., electric and gas). An estimated 8,000 public buildings meet these criteria in Minnesota. The information collected through benchmarking will help the state make better decisions about where to focus its financial resources. For example, Minnesota

has over 60 armories; once all armories are benchmarked, decision-makers can focus resources on energy retrofitting the lowest-performing armories first, and shorten payback periods. This is only the second year of data collection; results will not be available for another year. Eventually the state would like benchmarking activities to be merged with the guidelines implementation so that all new buildings are also benchmarked.

- The state's green building initiative is funded through conservation improvement money collected by the utilities on the order of $500,000 annually, which is a separate funding source than that which funds the benchmarking study discussed above. No new staff were hired specifically for implementation of the green building initiative in the State Architect's Office or at OEA. Minnesota relies heavily on its consultant team of architects, engineers, and academics for technical support in implementing the guidelines.

Oversight and Measurement

- Minnesota has 10 to 15 projects underway that are subject to the requirement to use the new Sustainable Building Guidelines. In addition, other projects are using the guidelines voluntarily; the number is not known. Three large public projects have been built according to the 1997 Design Guide. Several other projects at the state and local level were built in accordance with the Design Guide. (Exact numbers are not available.) Minnesota also has identified 41 energy high performance buildings built in the state; these are a mix of public and private projects and may overlap with other projects noted. Minnesota has 15 projects registered for LEED; it is not known how many of these are public projects. In addition, Minnesota has one public LEED certified building (an elementary school) and two ongoing public projects which are pursuing LEED accreditation.
- The State Architect’s office is now responsible for the general implementation and oversight of the guidelines, but each agency is responsible for day-to-day implementation. The Process Management section of the Sustainable Design Guidelines requires that someone be designated to oversee the green building requirements of each project, but implementation of the guidelines relies on self-policing by the user.
- Outcome data are required to be submitted at end of each project stage. The University of Minnesota maintains these data and will use them to determine the benefits of the guidelines and to recommend improvements; the data will not be used for compliance/enforcement. In the current legislative year, the State Architect's Office will request an extension of funding for tracking the performance of new buildings using the guidelines. The degree of tracking and analysis may depend on funding availability.

- There is no direct penalty for failing to implement the guidelines. However, agencies may need to demonstrate/document the sustainable building benefits achieved in the past in order to receive additional bond funds.
- The University of Minnesota will evaluate outcomes of implementing the guidelines. It is relatively easy to evaluate the energy impacts of a building because energy simulations are required by the guidelines. Evaluating water impacts is similarly straightforward. Evaluating materials is more complicated. The guidelines are moving away from a checklist of properties that specify a minimum recycled content of materials, and toward a lifecycle assessment of alternative materials. While recycled materials generally have environmental benefits, a specification for recycled content is seen as a surrogate standard until more information is available on materials lifecycle impacts. A project is currently underway to develop lifecycle assessments of building materials in Minnesota, to implement this part of the guidelines. Human impacts such as occupant health and comfort are more difficult to evaluate; some post-occupancy evaluations have been conducted to measure these impacts and others are underway.
- Minnesota has conducted evaluations of existing green buildings and has shown some impressive results. A study of the progress of 41 high performance buildings throughout the state estimates $5.15 million dollars and 55 million KwH in savings annually, corresponding to a reduction of 55,000 tons of CO_2 and two pounds of mercury annually.[5] In addition, a preliminary analysis of the three new state buildings being constructed according to the guidelines (and slated for completion this fall) estimates 5,900 pounds of air pollution (including CO_2, NOx, SOx, and particulates) will be abated annually compared to if the project was built to code.
- Minnesota did not rigorously track benefits from implementing the 1997 Sustainable Design Guide.

EDUCATION AND TRAINING

- Minnesota does not have a standard or directive specifying that state agency staff be trained in green building practices, but since development of the Sustainable Design Guidelines, training is becoming more systematic. In addition to using its consultant team for training, OEA partners with other organizations— including local chapters of the U.S. Green Building Council (USGBC), the American Institute of Architects (AIA), and the National

[5] Minnesota has defined "high performance" as buildings operating at 30 percent better than the state energy code, but otherwise not necessarily "green."

Association of the Remodeling Industry (NARI)— to offer education and training.

- OEA's sustainable building website has a wealth of Minnesota-specific sustainable building information to assist organizations seeking state bond funds to implement sustainable building. Resources available include an online database of Minnesota sustainable building materials, a directory of Minnesota sustainable building materials retailers, and information on demonstration/pilot projects.
- Minnesota's consultant team is developing lifecycle assessments of building products, and lifecycle cost calculators. These tools can be used in conjunction with the guidelines or on their own; they will be available to the public when complete. The consultant team is also responsible for education and outreach regarding implementation of the guidelines.
- Other than the information provided on the state's website, OEA is undertaking additional activities (trainings, guidance) to raise awareness of green building among commercial and residential builders.
- Minnesota OEA staff have reached out to local governments extensively to promote green building practices, and the guidelines are being used widely by local entities not required to use them. For example, Dakota County has developed its own version of the guidelines and has constructed more sustainable buildings than any other county in state. OEA regularly cites the Dakota County response as an excellent example of how local governments can adapt the guidelines to local needs.

SUSTAINABLE DESIGN METRICS

- As noted above, the Minnesota Sustainable Design Guidelines are the cornerstone of the state's green building efforts. Adherence to the guidelines is required for projects receiving state bond funding from 2005 forward. Minnesota currently has 10 to 15 projects underway that are subject to the guidelines. Six of these are pilot projects that are being intensely tracked. These include three at the University of Minnesota and one at a Minnesota college.
- The LEED standards have gained momentum in Minnesota in last year and a half but mainly in the private/commercial sector. Minnesota preferred to develop its own set of design guidelines for the public sector.
- Minnesota's standards address building-specific factors that affect environmental impacts, and occupant health and productivity impacts, in contrast to uniform prescriptive standards like LEED. For example, LEED issues separate credits for the use of recycled, renewable, and local products. A

project might import a renewable product from overseas rather than use a locally produced, recycled content product because project managers are trying to attain the LEED renewable credit instead of the recycled-content credit. The Minnesota guidelines remove this false choice by evaluating products and impacts collectively and encourage projects to purchase the environmentally best choices on a case-by-case basis.

- Unlike LEED, Minnesota's guidelines contain a Planning for Conservation section that is intended to look at the building itself as the primary environmental issue and assess early on whether the building is necessary or whether the same building function(s) could be achieved by using existing buildings in different ways. The Performance Management section of the guidelines is intended to capture process items (like commissioning) which cut across all media areas, but which LEED considers only under the energy category.
- The guidelines are structured as "tasks by phase," similar to LEED, and each task is described in detail. Minnesota has made its guidelines transparent to LEED so that projects can easily apply for LEED certification even if they follow the Minnesota guidelines. The guidelines are flexible; they describe how to address each criterion, but make it clear that there is more than one way to go about it.
- As discussed above Minnesota's consultant team is developing several tools (such as a lifecycle calculator and worksheets) to help make the guidelines easier to use, but progress on these materials has suffered some setbacks. The state has developed a tool for water calculations that is built into the guidelines to ensure that contractors are meeting the required 30 percent water reduction goal. Because all of the tools are not yet completed, OEA sometimes refers inquiries regarding projects not receiving bond funding to the 2001 update of the original 1997 Design Guide.
- The Center for Sustainable Building Research at the University of Minnesota is part of the consultant team and offers assistance on green building projects, including the bond-funded projects required to utilize the guidelines.
- A member of Minnesota's consultant team noted that use of LEED grew rapidly in the late 1990s and early in this decade, but growth has plateaued a bit. Many papers have criticized LEED for the same shortcomings that led Minnesota to develop its own guidelines. In response, the USGBC is modifying LEED to be more performance-based. However, changing LEED is difficult and slow; whereas in Minnesota it is possible to get decision-makers together to address implementation issues quickly. Because of this, it is easier for Minnesota to be pushing the envelope than USGBC.

STANDARDS, CODES AND REGULATIONS

- Each agency in Minnesota has its own set of design and construction standards in addition to the state building code, and some of those standards do not allow for green building materials or technologies to be utilized. For example, the Department of Health will not allow waterless urinals under its design and construction standards, but the Department of Transportation's (DOT) standards do allow for waterless urinals, which are being placed in all new DOT buildings.
- Some of the existing design and construction standards already incorporate green building practices, and policy-makers need to be careful about avoiding unnecessary duplication. Standards pertaining to storm water quality are a good example; many federal, state, and local agencies have their own storm water rules and regulations affecting construction in Minnesota. Adding new storm water standards in the guidelines would have been duplicative, so instead the guidelines reference existing standards. It is very important that the guidelines reinforce, not conflict with, the progress already made in different agency standards.

CAPITAL VERSUS OPERATING BUDGET

- In Minnesota, capital and operating budgets are both funded biannually, but in separate years. This creates an institutional division between the two types of funding, which is very problematic for green building, where typically higher capital costs are offset by operating cost savings.
- One of the guidelines addresses lifecycle costs and there are currently lifecycle costing tools available to guidelines users. One such tool is the Building Life-Cycle Cost (BLCC) software — a lifecycle cost tool used by the federal government. The guidelines specify the use of this tool and its BLCC lifecycle assumptions. One flaw in the guidelines with respect to lifecycle costs is that the scope and boundaries of the process are not well defined. While the legislation specifies that buildings be constructed with the lowest lifecycle costs, it does not specify at what level lifecycle analysis should be performed or how often (e.g., conduct an analysis of the whole building design, or of a window type).
- "Payback" is actually a poor method for trying to understand investments. Even something with a 20 to 30 year payback period can have positive cash flow in the short-term. This needs to be explained in layman's terms in order to address the capital versus operating cost conundrum.

INCENTIVES

- The only direct financial incentive offered for green building is a small OEA grant program for developing tools and models. This is an ongoing program but it has been significantly downsized due to recent budget cuts.
- A consulting group to the state utility (XCel) offers an Energy Design Assistance incentive, funded by the utilities. The program is only available in XCel's service area, which excludes large parts of northern and western Minnesota. Buildings larger than 50,000 square feet are offered free, early stage review of energy system design through three complimentary meetings with the consultants. The comprehensive review addresses HVAC equipment design, building shell, daylighting and artificial lighting, and controls. If the building owner follows the consultants' energy system design recommendations, the utilities offer incentives such as rebates for energy-conserving equipment and reduced peak usage rates. The program is available to any entity, including state agencies, schools, and the private sector. A smaller program for buildings between 15,000 and 50,000 square feet is also offered. The program applies to new buildings and major renovations. These energy design assistance incentives help to create a culture conducive to promoting sustainable building, as addressing energy conservation often leads to broader thinking about potential savings from other green building techniques.

BIDDING AND AWARD PROCESS

- Since the Minnesota legislation requires use of the Sustainable Building Guidelines for projects receiving bond funding, the state does not have to include green building specifications in RFPs any longer. Previously, three new state buildings built using the 2001 update of the original Design Guide were awarded under RFPs with green building specifications. However, the green building criteria were not weighed at the same level as cost elements, and may not have been enforceable. The winning design firms happened to be interested in green building and proposed ways to incorporate sustainable building practices into the new buildings within budget. It was the interest and support of the project architects in combination with the bid specifications that ensured that green building criteria were implemented.

GENERAL LESSONS LEARNED

- For Minnesota, it has been very important to harness the will of the private sector and interested academics to experiment with and advance green building. A collaborative approach is very useful. In Minnesota's case, the collaboration of the public agencies, industry professionals, and the academic community

provided credibility and the critical mass necessary to build momentum and advance green building. A concrete example of collaboration was the in initial grant for the 1997 Sustainable Design Guide. This effort was driven by a team of players representing 50 to 75 percent of the stakeholders. Engaging all stakeholders makes the process more difficult initially, but it improves results.

- Support at the highest levels of government is very helpful for moving a green building program along quickly and funding it adequately; Minnesota's program has had very spotty political support. It is crucial to find and encourage green building champions who are willing to push the issue and advocate for funding. A bottom-up, collaborative, grassroots approach was absolutely critical in Minnesota, but the initiative would have been even more successful with top-down support.
- One recommended approach for promoting green building to state agencies is to sell sustainable design first and foremost as a sound business approach that happens to also have environmental and health benefits. Data are now available to substantiate the "sound business approach" argument, which is far more convincing to high-level policy-makers than environmental or moral arguments.
- During the first year of Minnesota's green building initiative, an advisory group of people from outside the state who had experience in green building provided assistance to OEA and to project managers. This was also important to effective program development and implementation.
- Conducting pilot projects to help project managers use the guidelines successfully has been very important for demonstrating green building feasibility and benefits. It matters very little what the guidelines say if the first people who use them have a bad experience; the first experiences with any new process as elaborate as the guidelines must be good ones.
- It is important to create a climate of sharing, learning, support, and encouragement. Sharing both positive and negative experiences will allow the program to grow. People are often hesitant to share what has not worked for fear of discouraging others from undertaking green building projects, but this is important information to obtain and assess.
- It is a necessary to strike a balance between guidelines that are easily understandable, implemented, and monitored and those that will actually accomplish the state's green building goals. Allowing short-term economics and an emphasis on accruing points to drive the decision-making can yield poor results.
- In regions where green building activity has not taken root in the private sector and/or a critical mass of professionals skilled in green building does not exist,

LEED is a nice package of tools and information to introduce green building practices. However, in Minnesota, a critical mass of interested professionals agreed that they should go beyond LEED.

- Construction of public sector green buildings can be accomplished without legislation, if a strong executive is pushing the agenda. (This was not the case in Minnesota.) Without a legislative approach in Minnesota, green building was occurring and would probably continue on agency-by-agency basis. The effort would be spotty with some agencies leading the charge, and others ignoring it. But with legislation, all agencies are now embracing it.

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NEW YORK In June 2001, Governor George E. Pataki signed Executive Order No. 111 ("Green and Clean State Buildings and Vehicles") which directed state agencies "to be more energy efficient and environmentally aware." Specifically, the order established certain energy efficiency goals for "all agencies and departments over which the Governor has Executive authority, and all public benefit corporations and public authorities the heads of which are appointed by the Governor."[6] At present there are approximately 200 separate entities subject to Executive Order 111. With respect to new state buildings (or substantial renovations) the Order instructed the affected entities to follow, to the maximum extent practicable, both the LEED guidelines and the guidelines established under the private sector Green Building Tax Credit in design, construction, and operation and maintenance activities. In addition, the Order established a requirement that all new buildings constructed for state agencies or other affected entities achieve at least a 20 percent improvement in energy efficiency performance relative to the State Energy Conservation Construction Code and that all affected entities seek to ensure that 20 percent of their annual electricity needs in 2010 are met by renewable energy sources.

The Governor also directed the New York State Energy Research and Development Authority (NYSERDA) to coordinate implementation of the Executive Order. One of NYSERDA's first steps was to produce guidelines to assist affected entities in the development of their own detailed implementation plans. As part of the guideline development process, NYSERDA established six Working Groups (including one focused on green buildings) to address areas specified in the Order.

Although NYSERDA is the de facto center of green building activity in the public sector in New York, its work in this arena is still very much focused on its core mission of promoting tools and technologies related to energy production and use. In other words, a green building in New York is first and foremost an energy efficient building. The technical assistance and incentives that are available, as well as the annual Executive Order compliance reporting, are all rooted in the goal of reducing the amount of energy consumed by public buildings in New York. Specific policies and practices related to green buildings have been and continue to be developed at the level of individual state agencies, with support provided as requested by NYSERDA.

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[6] Specifically, a 35 percent reduction in leased, owned, or operated building energy consumption by 2010 relative to 1990, and the establishment of "peak electric demand reduction targets for each state facility by 2005 and 2010."

- Prior to 2000, NYSERDA was already six years into an effort (largely the initiative of one person) to offer "greening" (i.e., energy efficiency and materials analyses) of individual buildings across the state. Training and assistance in developing design guidelines were also added to NYSERDA's initial green building services. These early efforts were funded initially by an EPA pollution prevention grant and subsequently with money from the New York Flexible Technical Assistance ("FlexTech") program, which provides energy efficiency and other services on a 50/50 cost share basis with project participants. More recently, money collected through the statewide System Benefit Charge (SBC) on utility bills has been the primary source of funding for technical assistance and has enabled NYSERDA to provide incentives to offset a portion of the cost of certain measures that reduce the use of electricity. With SBC funds, NYSERDA also provides assistance in complying with LEED, the private sector Green Building Tax Credit, and Executive Order 111. Other green building services offered by NYSERDA include design charrettes, green guidelines (New York City Department of Design and Construction, Battery Park City Authority, University at Buffalo, Green Guide for Healthcare Construction, and the World Trade Center), commissioning, training, and low interest loans.
- Executive Order 111 reflected Governor Pataki's interest in and commitment to environmental issues. It was most likely catalyzed (at least in part, since the Executive Order covers more than green buildings) by the passage of the Green Building Tax Credit in 2000.
- Protocols and implementation plans for Executive Order compliance are being developed at the level of individual state agencies. With respect to the green building requirements, approaches range from LEED certification as a standard goal or practice to less aggressive plans that focus simply on "best efforts" to achieve compliance.
- New York does not maintain a separate office dedicated to the development and implementation of a green building program. The NYSERDA staff who organize and provide green building services are housed within the Energy Efficiency Services group. NYSERDA staff agree that it is fair to characterize their efforts as those of a "virtual" organization structured around a concept rather than a budget line item.
- New York recognizes that the success of its green building and other Executive Order-related green building initiatives is dependent upon the ability of affected entities to leverage the resources and technical services provided by other State entities. Four agencies in addition to NYSERDA have been specifically

identified as the primary potential sources of this leverage: the Dormitory Authority of the State of New York (DASNY), the Long Island Power Authority (LIPA), the New York Power Authority (NYPA), and the Office of General Services (OGS).

- State entities subject to Executive Order 111 are required to submit an Annual Energy Report to NYSERDA that focuses on energy performance but also provides a "description of strategies undertaken to meet EO requirements for new building construction." [NYSERDA determined that there is no practical way for the agencies to provide quantifiable reports on their green building efforts.] These reports are not building specific but rather cover all facilities associated with a particular entity. According to NYSERDA, these descriptions are generally limited to statements that the entity is in fact in compliance.

EDUCATION AND TRAINING

- In January 2002, NYSERDA hosted three meetings at which DASNY, LIPA, NYPA, and OGS described programs and services relevant to Executive Order compliance to an audience of more than 450 state personnel.
- NYSERDA provides direct compliance-related assistance to many state entities. For example, NYSERDA staff have participated in more than 20 training seminars for agency procurement officers and business officials and have held workshops for personnel responsible for the operations and maintenance of individual facilities.
- NYSERDA has underwritten multiple LEED workshops, including one for SUNY-Buffalo and another for the New York Department of Environmental Conservation and DASNY. DASNY, OGS and NYSERDA now have a number of LEED accredited staff.
- The State University of New York (SUNY) at Buffalo's High Performance Building Guidelines are intended to serve as a starting point not only for the SUNY system but for all agencies affected by the Executive Order. NYSERDA has near-term plans to hire a consultant who will conduct a training program based on these guidelines.
- The Design for the Environment guidelines produced by the NYC Transit Authority (part of the Metropolitan Transit Authority, which is subject to the Executive Order) are a model for transit-related development around the world.
- The Office of General Services formed an internal Green Building Council to "interpret Executive Order 111 as it applies to our work; provide green building services to our clients; further educate ourselves and our clients about the principles of green building design, and document our progress." The Council

publishes a semi-regular newsletter to document its activities, disseminate information, and describe success stories.

- Statewide public outreach is generally limited to the publication of short case studies available through the NYSERDA web site.

SUSTAINABLE DESIGN METRICS

- Under the guidelines created pursuant to Executive Order 111, all new construction of 20,000 gross square feet or larger that is designed, constructed, operated, managed or maintained by a state entity is required to achieve a 20 percent improvement in energy efficiency performance relative to the State Energy Conservation and Construction Code. Compliance with this requirement is to be demonstrated by modeling each building using the federal Department of Energy's DOE 2.1E program or its equivalent.
- New state buildings greater than 20,000 gross square feet are also required to be designed and constructed such that they meet the criteria for LEED certification. Certification is not required. The reason provided for the lack of a certification requirement is as much philosophical as practical: the public sector should not be subject to more stringent requirements than the private sector, which is not required to certify buildings to receive the Green Building Tax Credit.
- In addition, new state buildings greater than 20,000 gross square feet are required to comply with four of the criteria established as part of the Green Building Tax Credit regulations. These criteria address indoor air quality testing, the implementation of an indoor air quality management plan during construction, the development and implementation of an indoor air quality operations and maintenance management plan, and the commissioning of specific systems, equipment and components.
- The standards described above apply to buildings constructed for state entities even if design and construction is privately funded (but they do not apply to leased facilities).
- In order to be considered compliant with the Executive Order, new buildings that are less than 20,000 gross square feet are directed to "incorporate the significant attributes of green design principles" (specifically Site Planning, Water, Energy, Materials and Resources, and Indoor Environmental Quality).
- NYSERDA staff report that LEED has worked well as the standard for public construction and would recommend it to states considering a similar program. Despite LEED's imperfections, New York officials view it as the best standard available and, perhaps more importantly, value the fact that it goes through an extremely thorough review process.

STANDARDS CODES AND REGULATIONS

- Building codes are not reported to be a barrier to public green buildings in New York. The 2002 Energy Conservation and Construction Code establishes minimum energy efficiency requirements, including both prescriptive and performance-related measures. It also explicitly makes possible the use of new materials and innovative energy-conserving techniques.
- At the same time, it was noted that, while generally moving in a "greener" direction, codes are still minimum requirements.

CAPITAL VERSUS OPERATING BUDGET

- Capital and operating budgets are distinct in New York, which is recognized as a challenge for green buildings. The issue of how to address this challenge is currently on the agenda of the Executive Order 111 Green Building Working Group. This group is includes staff from NYSERDA, the Dormitory Authority, State Construction Fund, Office of General Services, Department of Environmental Conservation, New York City Transit Authority, Metropolitan Transportation Authority, Department of Corrections, and the Governor's Office.
- The New York State Office of Mental Health is singled out as an entity that has succeeded in getting more money for capital budgets based on projected operation and maintenance cost savings. Their success has been based, simply put, on a high degree of credibility with the Division of Budget gained through a combination of strong leadership and very high quality documentation produced in collaboration with private sector consultants and the best available resources from other public agencies. The Office of Mental Health's efforts, which are focused on energy efficiency, began in the early 1990s in response to a prior Executive Order (issued by Governor Mario Cuomo) that also mandated a reduction in state agency energy consumption. Credibility with the budgeting authorities (i.e., the ability to influence budgeting decisions) has been maintained over time through the nurturing of an internal culture that takes great pride in the agency's achievements and continuously seeks out ways to improve energy efficiency performance.
- The NYSERDA guidelines associated with Executive Order 111 direct state entities to perform lifecycle cost analyses on energy-efficiency and other green measures. Nevertheless, such analyses have reportedly been slow to catch on in New York. NYSERDA recognizes this deficiency and is trying to take steps to increase its use. For example, NYSERDA is contracting with the Athena Institute to provide seminars on lifecycle analysis tools as an aid in early project development.

- NYSERDA encourages an integrated approach to building design and construction and offers both seminars and hands-on assistance to those who seek to utilize this approach.
- A wide variety of incentives are offered through NYSERDA to help address the incremental costs of designing and constructing buildings that meet sustainable design or higher energy performance guidelines. (See below for a detailed description of currently available incentives.)

INCENTIVES

- NYSERDA administers the System Benefits Charge-funded New York Energy $mart New Construction Program, which offers both capital cost and technical consulting incentives to building owners and leaseholders to improve the energy efficiency and environmental performance of new and existing buildings in the commercial, industrial and institutional sectors. In the most recent incentive round (effective 1 January 2005) a total of $10 million is available to conduct technical assessments of energy efficiency and other green measures and to offset incremental capital costs associated with the purchase and installation of equipment which reduces the use of electricity.
- NYSERDA staff note that while the incentives are effective and are accelerating the adoption of sustainable design practices in new construction activities (approximately 10 percent of all public and private projects, with more than 2,000 applications since program inception in September 1999), offering incentives and ensuring that they are well spent is a significant administrative burden.
- The penetration rate appears to be even greater (on a percentage, though not a dollar, basis) within public-sector construction due to a generally greater awareness of NYSERDA and the available incentives.
- Direct capital cost incentives are based upon expected improvements in building energy performance beyond a "standard" design. These direct incentives are available in three "packages" tailored to projects of varying size and development stage.
  - "Pre-qualified equipment incentives" target small- to medium-sized construction, particularly those that are beyond the design phase and offer limited opportunity for substantial revisions. The maximum incentive is $50,000 per project with the exception of projects employing geothermal technology, which are eligible for up to $120,000. The incentive is paid after equipment installation and project completion.
  - "Custom measure incentives" are designed for projects that have not progressed beyond the schematic design phase and intend to pursue

energy efficiency opportunities beyond those offered in the pre-qualified incentive package. Incentives are paid only for those measures that exceed Energy Code requirements by at least 10 percent and are paid upon project completion. This incentive is capped at 50 percent of the estimated incremental cost up to $120,000 per project. The incentive also cannot reduce costs to less than a one-year simple payback.

  - "Whole building design incentives" are available when a project seeks to examine interactions between energy efficiency improvements and their effects on overall energy needs. To be eligible for this incentive a project cannot have progressed beyond the schematic design phase. The whole building design incentive is based on the performance of the building relative to the Energy Code. For example, a building that is predicted to perform 20 - 25 percent more efficiently than the Energy Code will receive $0.18 per kilowatt-hour (kWh) saved as well as $290 per kilowatt of peak (summer) load curtailment ($160 per winter kW). Incentives are capped at 60 percent of estimated incremental costs up to $300,000 per project (with a single measure cap of $200,000), except when a project achieves LEED certification. Capital cost incentives for LEED certified projects are capped at 75 percent of incremental costs up to $330,000 for certified projects that achieve at least two points in the Optimize Energy Efficiency category, or up to $375,000 for certified projects that also achieve at least four points in the Optimize Energy Efficiency category. As with the custom measure incentive, whole building capital cost incentives cannot reduce costs to less than a one-year simple payback and will only be paid upon documentation of project completion. Incentives are only paid for those building that exceed Energy Code requirements by at least 10%.

- Four additional direct capital cost incentives are available:
  - On top of the whole building design incentive, a flat-rate incentive of $7,500 (projects less than 50,000 square feet) or $15,000 (projects greater than or equal to 50,000 square feet) is offered for buildings that receive LEED certification and at least two points in the Optimize Energy Efficiency category. Though earmarked to offset LEED compliance costs, this incentive can be applied to any cost.

  - Participants receiving whole building design or custom measure incentives are also eligible for incentives when they incorporate measures that help manage peak load consumption. For projects in the Consolidated Edison service area, the incentive is the lesser of $100 per kilowatt of curtailed peak summer load or 60 percent of the incremental cost for load curtailment features. Outside the ConEd area the incentive is reduced to $50 per kilowatt. To receive this incentive, projects must also

agree to participate for two years in a demand reduction program offered by the New York State Independent System Operator. This program pays participants to reduce their power consumption during peak periods.

  - Participants receiving whole building design or custom measure incentives can receive up to $200,000 per project (capped at 60 percent of incremental costs) for the design and installation of advanced solar and day lighting technologies.
  - Projects that agree to a post-occupancy evaluation of building energy performance within two years after the building is operational can receive an additional incentive equal to the lesser of 100 percent of incremental costs or 10 percent of the other capital cost incentives that the project has received.
  - NYSERDA also offers a low-interest loan program for energy efficiency measures and measures that meet the criteria of LEED or the Green Building Tax Credit.

- In addition to direct capital cost incentives, NYSERDA offers five types of technical consulting incentives.
  - NYSERDA will pay for up to $5,000 worth of expert technical assistance to help design teams assess opportunities to participate in the custom measure or whole building design incentive programs. NYSERDA will also pay half of any technical assistance costs over $5,000, subject to a maximum NYSERDA contribution of $100,000.
  - NYSERDA will pay the first $5,000 for building commissioning services and half of any commissioning costs greater than $5,000 up to a maximum contribution of $50,000.
  - NYSERDA will pay half of the cost, up to a maximum contribution of $50,000, for technical assistance in the assessment and selection of non-energy green measures. These are defined as measures that meet the criteria of LEED or the Green Building Tax Credit.
  - To help identify peak load reduction opportunities and to develop a load curtailment plan, projects can also take advantage of technical assistance services made available through NYSERDA-approved contractors. NYSERDA will pay the first $5,000 and will pay half of any costs greater than $5,000 up to a maximum contribution of $50,000.
  - A design team incentive is available for projects in the whole building design incentive program that exceed State Energy Code performance requirements by at least 15.1 percent. This incentive is based on projected kilowatt-hour savings and reaches a maximum of $15,000 (at

$0.04/kWh saved) for projects that achieve performance that is at least 30.1 percent above Code requirements.

- Under the terms of the current $10 million incentive round, an individual customer is eligible for capital cost incentives for only one project. The maximum combined project incentive is capped at $500,000.

BIDDING AND AWARD PROCESS

- As described above, the responsibility for developing specific approaches to achieve compliance with the green building and other requirements of Executive Order 111 rests with individual state entities. DASNY, for example, has rewritten standard contracts to reflect green building and commissioning requirements and the New York City Transit Authority has written its own guidelines (Design for the Environment).

GENERAL LESSONS LEARNED

- New York has received LEED (Version 2) certification for three new state buildings, the headquarters of the Department of Environmental Conservation (Silver), a community center on the SUNY Buffalo campus (Certified) and the Region 1 Headquarters for the Department of Transportation (Silver). In addition, at least nine other state buildings are registered with the USGBC. NYDEC and SUNY account for most of these facilities, though the State Thruway Authority and Department of Transportation also own or occupy registered buildings.
- Measurement of specific progress toward the achievement of Executive Order goals focuses on reductions in energy use. In July 2003, NYSERDA published the first (and to date only) Annual Energy Report, designed to track the state's progress. The key metric is an Energy Use Index (EUI) which looks at energy use on a per square foot basis and compares it to a target EUI corresponding to the Governor's goal of a 35 percent reduction from a 1990 baseline by 2010. The 2002 EUI indicated an 8.9 percent reduction relative to 1990, although it was noted that much of the reported progress was attributable to established programs in affected state entities that pre-date the Executive Order.
- The green building experience of officials in New York leads them to highlight the importance of individuals as well as top-down directives in achieving success. Keys to success are buy-in from sufficiently high ranking officials within the government, champions within those agencies who are dedicated to the concept and willing to make the effort to move it forward, and even the careful selection of consultants who demonstrate real commitment to green building practices.

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PENNSYLVANIA The origins of Pennsylvania's current public sector green building activities trace back to 1996 when then Secretary of the Department of Environmental Protection (DEP) James Seif created the Office of Pollution Prevention and Compliance Assistance. The mission of this office was to create working relationships with Pennsylvania industry in order to achieve common environmental protection goals and go "beyond compliance." In 1998, Governor Tom Ridge sought to build on this theme when he signed Executive Order 1998-1, which created the Governor's Green Government Council (GGGC), an organization comprising representatives of more than 40 state departments, offices, commissions, boards, councils, authorities, and agencies.

The GGGC's purpose is to "facilitate the incorporation of environmentally sustainable practices . . . into Commonwealth government's planning, operations, and policymaking and regulatory functions . . .." Under the terms of the Order, each executive agency is required to develop an annual plan describing how it intends to incorporate such practices into its specific functions, with an initial focus on building design and management, environmentally friendly commodities and services, vehicle purchases and management, and recycling. The order provides relatively little in the way of expectations or directions for green buildings in Pennsylvania.

From this modest base, however, Pennsylvania has asserted itself as a leader in the development of high performance green buildings through what appears to be a concerted effort to "learn by doing." In fact, the Commonwealth's first public green building, a DEP regional office that pre-dates the original LEED standard, was not an unqualified success on all fronts. However, this first experience was beneficial as a source of lessons learned and perhaps equally if not more importantly as a tangible demonstration of the green building concept that others within (and outside) state government could see and, hopefully, emulate.

What stands out in the Pennsylvania case is the fact that successes to date appear to be the result of the creation and nurturing of a "green climate" that is short on mandates but long on voluntary action. While not by any measure an across-the-board shift in policies and procedures, a number of individual state agencies do appear to be motivated to lead by example. Absent the leadership provided by these agencies and any strict requirements, it is easy to assume that green building practices, at least within the public sector, would be gaining significantly less traction.

Evidence of continued interest in the green building agenda, and particularly in its energy-related dimension, is Governor Edward Rendell's signing of Executive Order 2004-12 in December 2004. This Order calls on the Department of General Services to coordinate the efforts of all Executive Agencies in seeking out ways to improve energy management and conservation in state facilities and to develop no-cost or low-cost energy conservation measures for all state-owned and leased buildings. The Executive Order

specifically mentions the use of green building practices as a tool to help achieve this objective.

VISION AND LEADERSHIP

- Pennsylvania's systematic movement toward high performance green buildings in the public sector grew out of a broader initiative to "green" state government, an initiative that took shape with the signing of an Executive Order, and the creation of the Governor's Green Government Council, in 1998.
- However, the concept of green buildings within state government pre-dates the Executive Order. In 1996, then-DEP Secretary James Seif instructed one of his staff to turn a planned regional office into a "demonstration" green building. From that point forward, DEP has been the clear leader, both conceptually and practically, in pushing the green building agenda within state government.
- Under the terms of the Executive Order, and within the framework of the GGGC, green building efforts in Pennsylvania are very broad in scope. Essentially, the council seeks to encourage and support green building practices in any construction undertaken by an executive agency, independent agency, or school district. At the same time it is important to recognize that the order is strictly voluntary -- there are no actual green building requirements.
- Pennsylvania does not maintain a separate, dedicated office to direct, support, or otherwise get involved in green building activities. However, the GGGC staff appear to play a critical role that belies its small size (currently an executive director and three technical assistants), providing assistance upon request, serving to organize and disseminate information, and assuming a leadership role within state government in promoting green building practices.
- Administratively, the GGGC staff are within the budget of the DEP's Office of Energy and Technology Development but support the Council's Co-Chairs, the Secretaries of Environmental Protection and General Services.
- The 1998 Executive Order requires the GGGC to compile the annual plans developed by each agency subject to the Order and to deliver a single report to the Governor each September. These reports (or "Green Plans") describe, in narrative form, agency accomplishments with respect to one or more "environmental sustainability" issues (the 2005-2006 includes buildings, management, land use, power, procurement, transportation, and recycling).

EDUCATION AND TRAINING

- In 1999, in cooperation with Carnegie Mellon University (CMU) and others, the Council published "Guidelines for Creating High Performance Green Buildings." This document was developed primarily as a tool to stimulate private sector green building activity, and thus served as an early demonstration of the Commonwealth's intention to lead by example.
- In 1999, the GGGC arranged for the CMU School of Architecture to deliver a year-long seminar series on green building design and engineering. This well-attended series, open to all commonwealth employees, was specifically targeted at architects and engineers within the Department of General Services and other Commonwealth agencies. The Governor's Green Government Council has since provided additional training sessions, conducted by outside experts, that are open to both the public and state employees (though it has admittedly been difficult to get state employees to attend).
- The GGGC has developed a set of videos (available on their web site at www.gggc.state.pa.us) that generally make the case for green buildings. The council describes these as "motivational" in nature. While the videos have been very well-received (the USGBC uses some of them for its own training program), it is the intent of the council to produce additional videos that address the "how?" rather than just the "why?" A major target audience for these new videos would be local planning and zoning officials, who have reportedly been a barrier to the implementation of green building practices in Pennsylvania.
- The GGGC also offers charettes and other targeted technical assistance for significant projects upon request.
- The GGGC and DEP believe that construction of the South Central Regional Office building (the first state green building) was a critical educational tool. Though other buildings have been constructed since, this first effort served as a practical demonstration of high-concept principles and demonstrated that if government can build green, anyone can.

SUSTAINABLE DESIGN METRICS

- Through the GGGC, Pennsylvania promotes and employs the LEED standards, but does not require certification although DEP and the Department of Conservation and Natural Resources are committed to LEED silver certification as their basic standard. As noted above, the Executive Order that has catalyzed most of the public green building activity in Pennsylvania does not establish any specific requirements.

- Pennsylvania did look at developing its own modifications to LEED, but determined it would be too costly and time consuming to create and maintain its own standard. The commonwealth values the strength of LEED as a common, unifying standard and takes comfort in the fact that continuing revisions will likely continue to bring improvements and lower certification costs.
- Nevertheless, the GGGC is exploring the possibility of establishing, by Executive Order, a "LEED Plus" system that would mandate minimum point requirements in certain LEED categories in addition to a requirement that new buildings receive at least 85 points under the federal Energy Star certification process.
- At least five state agencies (the Departments of Conservation and Natural Resources, Transportation, and Environmental Protection, the Turnpike Commission, and the Pennsylvania Housing and Finance Agency) have made commitments to design new buildings to meet LEED standards. Four universities within the State System of Higher Education (West Chester, Clarion, Indiana, and Edinboro), have made a similar commitment.
- Pennsylvania does not have a systematic program to measure post-construction performance of green buildings. The GGGC has a strong interest in acquiring these data, and is currently working to develop such a database. In addition to standard metrics (e.g., reduced energy usage) the Council is very interested in documenting the indirect benefits (e.g., health and productivity) of green buildings thinking, for example, that it might be possible to use such data to reduce health care insurance premium costs.
- The DEP has been particularly aggressive, and thus far is alone, in establishing specific design standards for its new, green buildings. As described below, DEP's green buildings are leased rather than owned. During its second green building project, DEP and CMU developed specific performance standards that would be required of the lessor. These standards establish minimum required performance with respect to the building's energy budget, lighting budget, HVAC chiller, glazing, interior surface temperatures, ventilation, indoor temperatures, cooling humidity, and heating humidity.
- The DEP performance criteria are now included in the Department of General Service's general performance standards and specifications for all facilities leased by the Commonwealth. The current administration is in the process of implementing a new energy management Executive Order (EO 2004-12) under the auspices of which the GGGC intends to update the lease specifications and make them minimum commonwealth building standards. A draft update of the specifications is expected by late October 2005.

STANDARDS CODES AND REGULATIONS

- Pennsylvania recently adopted the 2003 International Codes issued by the International Code Council as a uniform statewide construction code (UCC). The state has not adopted any supplements to the 2003 codes. Each of the 2,565 Pennsylvania municipalities was allowed to decide whether to administer and enforce the UCC locally. Many initially chose to opt out of the system (creating a significant obstacle to green buildings due to the potential for many jurisdiction-specific standards), though the Department of Labor and Industry web site now reports that "a number of" municipalities have reversed their initial decision and have now adopted the statewide standard.[7]

CAPITAL VERSUS OPERATING BUDGET

- Like most states, Pennsylvania budgets capital costs and operating costs separately, with no mechanism for moving money between accounts to perhaps cover initial green building cost premiums with future operating savings.
- DEP has done more than any agency to model lifecycle costs, though generally only at the system level. One concern noted is that lifecycle analysis, while informative, may not always be a good indicator of actual savings (at least not with the tools currently available). DEP has also made an effort to apply integrated engineering principles to its projects.

INCENTIVES

- Other than possible enhancements to an agency's reputation (both within and outside the state government) Pennsylvania does not offer specific incentives to encourage green building practices in the non-education sector.
- The Public School Building Authority does offer grants to support green building projects at K-12 schools (generally enough to cover costs associated with LEED certification).
- In addition, the Pennsylvania General Assembly recently passed legislation that creates a financial incentive (in the form of an increase in allowable construction costs) for K-12 schools that achieve at least a Silver LEED rating.

BIDDING AND AWARDING PROCESS

- The state's bid and award system is an impediment to green building practices. Pennsylvania is a design-bid-build state, so the whole team does not have input at the initial design stage. As a result, the opportunity for an integrated design-

[7] Based on a list updated on 30 August 2005, 2,335 of Pennsylvania's municipalities (91 percent) have now opted to use the UCC.

build process is usually lost. It is possible to waive the standard process, although a perception remains that doing things differently will be unjustifiably time-consuming and costly.

- On a statewide level Pennsylvania does not incorporate green design standards into building specifications (DEP and Conservation and Natural Resources remain the only agencies that do this on a consistent basis). As described above, however, part of the GGGC's agenda is to convince the Department of General Services of the cost-effectiveness of developing and implementing standard specifications for high performance buildings.

GENERAL LESSONS LEARNED

- As of August 2005, there are seven LEED certified buildings occupied by state agencies. The Department of Environmental Protection occupies four buildings certified (all at the Gold level) under LEED Version 2. The DEP also occupies two buildings certified under LEED Version 1 (one Bronze, one Gold). The seventh certified public building is the Turnpike Commission's Central Administration Building, which achieved certification under LEED Version 2.
- In addition, at least five public facilities are LEED registered, including a building on the campus of West Chester University, a state park visitor center, two Department of Conservation and Natural Resources facilities, and an office occupied by the Pennsylvania Housing and Finance Agency.
- According to the September 2005 statewide Green Plan report, the DEP will occupy four additional LEED-certified facilities during the coming year, while the Turnpike Commission, Department of Conservation and Natural Resources, Department of Transportation, and multiple State System of Higher Education campuses have LEED-certifiable buildings currently in design or construction.
- Pennsylvania, through the efforts of the GGGC and individual state agencies, has very clearly set out to lead by example, using its own efforts in the public sector to catalyze green building activity in the private sector.
- Pennsylvania officials strongly believe that a general mandate, in their case in the form of an Executive Order, is useful but hardly sufficient as a means to achieve progress in high performing green buildings. Simply put, the key factor in advancing the green building agenda is putting buildings up, and in order to do this it is critical to identify champions, support their efforts, and give them credit for their successes. These champions do not necessarily have to be at a certain level within the bureaucratic hierarchy (though a higher-level champion may of course have greater influence). Some degree of authority is necessary, but the key is to find individuals who have a strong interest in moving the agenda forward.

- Despite the significant progress Pennsylvania has made in developing a green building-friendly climate and constructing high performance green buildings, there is a clear sense that changes in state policies and procedures (e.g., mandated specifications or performance standards) will be necessary to achieve even greater success.

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CHAPTER 4 | FINDINGS AND RECOMMENDATIONS

IEc's in-depth analysis of four state green building programs reveals some common themes in terms of practices that have been effective in advancing green building activity. Based on our synthesis of the findings, we present specific recommendations to the Sustainable Design Roundtable for each of the roundtable's seven focus areas. We present these recommendations as independent of one another, but note that the roundtable will need to consider potential relationships between recommendations that it ultimately adopts in developing an integrated set of recommendations to the Governor.[8] IEc's recommendations are listed below. Each recommendation is accompanied by one or more supporting findings drawn from the individual state analyses. Where a finding describes a particular state action that is the same or similar to our recommendation, the state's name appears as **bold** text.

VISION AND LEADERSHIP

ADOPT CONSISTENT USE OF THE TERM "HIGH PERFORMANCE BUILDINGS" TO CAPTURE MORE COMPLETELY THE BENEFITS OF GREEN BUILDING.

- A number of terms are used interchangeably to describe construction practices that explicitly consider site selection, waste minimization, energy efficiency, water conservation, indoor environmental quality, and other environmental factors.
- The default phrase is “green building," used to denote both structures and practices. The risk associated with this term is the potential that its use will reinforce the (mis)perception that these buildings and practices are on the fringe rather than in the mainstream and deliver predominantly environmental rather than cost saving and productivity benefits.
- Some states, including **California** and **Minnesota**, have adopted the term "sustainable design” instead of, or in addition to, reference to "green" buildings. Though richer and more holistic in meaning, the concept of sustainability carries with it a greater emphasis on long-term benefits that are often difficult to quantify and as such may not be particularly well-suited to the task of catalyzing near-term action.

[8] For Example, if the roundtable decided to recommend mandating LEED Plus for all new public building construction, then recommendations for education and training and incentives should support implementation of LEED Plus.

- Other states, such as **New York** and **Pennsylvania**, have started to adopt the phrase "high performance buildings." This choice of words is better suited to conveying the more immediate benefits that a carefully designed structure can provide with respect to operational cost controls, energy efficiency, occupant productivity, etc. The term encompasses high performance on all measures, not only energy efficiency.

DRAFT AN EXECUTIVE ORDER FOCUSED EXCLUSIVELY ON HIGH PERFORMANCE BUILDINGS THAT (1) ESTABLISHES CLEAR EXPECTATIONS, (2) IDENTIFIES THE UNIVERSE OF PROJECTS AND/OR AGENCIES SUBJECT TO THE ORDER, AND (3) DESCRIBES SPECIFIC TRAINING, REPORTING, AND COMPLIANCE EXPECTATIONS OR REQUIREMENTS.

- Carefully crafted legislation mandating construction of high performance buildings is preferable to an Executive Order (as legislation is more likely to be enforceable and less likely to be susceptible to changes in political leadership), but is presumably a more challenging undertaking. **Minnesota** is the only state of the four analyzed that has enacted a law pertaining to high performance building; it stipulates that all projects receiving a certain type of bond funding adhere to the state's Sustainable Design Guidelines from 2005 forward. Some **California** legislators have introduced bills addressing green building, in particular green building in primary and secondary schools.
- Absent legislation, an Executive Order that directs state agencies to adopt and implement high performance building policies is critical, though not necessarily sufficient, in ensuring meaningful progress.
- Executive Orders clearly catalyzed the success stories and the progress that continues to be made in advancing a high performance building agenda in **California**, **New York**, and **Pennsylvania**. At the same time, we heard from New York and Pennsylvania in particular that top-down directives are only a starting point that by themselves cannot be expected to generate results since they have few real teeth. The people who use the Executive Order to push the agenda are the real drivers of success.
- In **Minnesota**, where legislative and project success has largely been built upon a grassroots foundation, political support has in fact been somewhat spotty. The feeling among leaders of the initiative is that greater success could be achieved with more support from political leaders.

INCLUDE IN THE EXECUTIVE ORDER: (1) THE CREATION OF A SENIOR POSITION FOR A TECHNICALLY QUALIFIED PROFESSIONAL WHO WILL CHAMPION AND BE RESPONSIBLE FOR THE COORDINATION OF ALL HIGH PERFORMANCE BUILDING PROGRAMMING THAT OCCURS AT THE STATE LEVEL; (2) THE CREATION OF A PERMANENT ENTITY WITHIN STATE GOVERNMENT, UNDER THE DIRECTION OF THIS SENIOR PROFESSIONAL, THAT IS GRANTED EXPLICIT AUTHORITY TO COORDINATE HIGH PERFORMANCE BUILDING ACTIVITIES ACROSS AGENCIES; AND (3) A REQUIREMENT THAT EACH STATE AGENCY WITH PROPERTY DEVELOPMENT RESPONSIBILITIES IDENTIFY A DESIGNATED REPRESENTATIVE TO BE THE AGENCY'S INTERNAL COORDINATOR OF HIGH PERFORMANCE BUILDING ACTIVITIES.

- A consistent and emphatic message from all four states analyzed is the importance of high performance building "champions," both at a high, statewide level, if possible, and, even more importantly, at the agency level where building activities become concentrated. Absent committed agency leadership and continuous support for those charged with carrying out high performance building plans, little can be expected to be accomplished.
- The Executive Orders in **California**, **New York**, and **Pennsylvania** created or led to the identification of organizational entities that serve an important function as the locus of information sharing, training, and technical services within each state. California's 2004 Executive Order specifies roles and responsibilities for different agencies, and lays out specific milestones (e.g., evaluation of existing projects for LEED certification) and reporting requirements.

PROVIDE FUNDING FOR LONG-TERM SUPPORT OF LOCAL ACADEMIC CENTERS THAT CAN PROVIDE CONTINUOUS RESEARCH AND TECHNICAL SERVICES.

- Academic support has been and continues to be an important component of each of the four states' efforts to advance a high performance building agenda.
- The School of Architecture and its Center for Sustainable Building Research at the University of Minnesota have been key players in the grassroots effort to promote high performance buildings in **Minnesota** and will continue to do so as the repository for, and analyst of, all project performance data. The Center for Sustainable Building Research also provides direct technical assistance to high performance building projects using the state's Sustainable Design Guidelines.
- In **New York**, the University at Buffalo (part of the SUNY system) spearheaded the effort to develop High Performance Building Guidelines, which are designed to become a standard reference for all state agencies.
- In **Pennsylvania**, Carnegie Mellon University has provided significant assistance both in the development of statewide guidelines and the provision of training to state personnel.
- The Center for the Built Environment at the University of California, Berkeley supports the high performance building agenda by analyzing and documenting the benefits of completed projects. The Center has completed several post-occupancy evaluations of high performance buildings in **California** and nationally.

AS A NEAR-TERM TACTICAL STRATEGY, MAKE ENERGY AND ENERGY COST SAVINGS A CENTERPIECE OF A STATE HIGH PERFORMANCE BUILDING INITIATIVE.

- Building "green" is increasingly resonant with the public and with parts of the political leadership, succeeding where a narrower focus on energy efficiency

has traditionally fallen short. However, in the current energy and economic climate an emphasis on the energy savings and the energy cost savings that high performance buildings can deliver is likely to have more than the usual traction.

- Within the four states analyzed there is a recognition that "selling" high performance buildings is much easier when it is based on a sound and compelling economic argument.
- Both **New York** and **Pennsylvania** have Executive Orders that emphasize the value of high performance buildings in achieving desired energy reduction goals. Successes are routinely described in terms of energy and energy cost savings.
    - In **Minnesota** and **California**, where the legislative and executive mandates are more explicitly "whole building," principal measures of success are also energy and energy cost savings.

SELECT A BUILDING (OR TWO) CURRENTLY AT THE EARLIEST DESIGN STAGE AND IDENTIFY IT AS AN "OFFICIAL" HIGH PERFORMANCE BUILDING DEMONSTRATION PROJECT.

- Officials in **California** and **Pennsylvania** in particular noted that for some people it takes actually seeing and touching to understand that high performance buildings: 1) are feasible and real; 2) look and are functionally similar to “regular” buildings; and 3) create a healthy environment valued by their occupants.
- In both of these states, early "demonstration" projects were key elements in proponents' ability to push the high performance building initiative. In **California**, the Capital Area East Complex was the key demonstration project, as it was the largest state building project in California history, and as a result of incorporating high performance building techniques, it saves approximately $400,000 a year in energy costs. The **Pennsylvania** DEP developed its Southcentral Regional Office as a "green building demonstration project" at the specific direction of the DEP Secretary.

EDUCATION AND TRAINING

SPONSOR A YEAR-LONG SEMINAR SERIES THAT INTRODUCES A BROAD ARRAY OF STATE PERSONNEL TO THE PRINCIPLES AND PRACTICES ASSOCIATED WITH HIGH PERFORMANCE BUILDINGS.

- **Pennsylvania**, with the support of design experts at Carnegie Mellon University, presented a well-attended and well-received, year-long seminar series for state personnel. A similar, though shorter, training series in **New York** also drew a large audience of state personnel. Staff training is an integral element of high performance building programs in **California** and **Minnesota** as well.

- **Minnesota** utilizes its own consultant team as well as outside organizations—including local chapters of the U.S. Green Building Council (USGBC), the American Institute of Architects (AIA), and the National Association of the Remodeling Industry (NARI)— to offer education and training.
- Consistent with the idea that individual champions are critical to a program's success is the need to ensure that agency staff are well-versed in high performance building concepts and implementation tools, either to manage projects themselves or, more likely, to be able to engage productively with designers, architects, builders, and other outside consultants.

MAKE PARTICIPATION IN THE STATE-SPONSORED SEMINAR SERIES A MINIMUM QUALIFICATION FOR ANY INTERNAL AGENCY STAFF WHO WILL BE RESPONSIBLE FOR MANAGEMENT AND OVERSIGHT OF PRIVATE CONSULTANTS DURING A HIGH PERFORMANCE BUILDING PROJECT.

- Despite a growing knowledge base within state agencies, optimizing the benefits of a high performance building project will typically be dependent upon the inclusion of a design professional who can explain and implement a cost-effective, integrated construction process. In order for a design team to function effectively it will need to include an agency staff person with a minimum level of high performance building knowledge and, more importantly, an ability to ask the right questions.

REVIEW CORE DOCUMENTS PRODUCED IN OTHER STATES AND INCORPORATE OR ADAPT SPECIFIC ELEMENTS IN ANY NEW OR UPDATED MASSACHUSETTS HIGH PERFORMANCE BUILDING GUIDELINES OR TRAINING MATERIALS.

- Other states have spent considerable time developing effective tools to help implement their own high performance building initiatives. Furthermore, they are eager to share this information with others who share their objectives. At this stage in the development of high performance building policies and practices it would be wise to take advantage of this information.
- Examples of core documents include, but are not limited to: the University at Buffalo High Performance Building Guidelines;[9] the **Pennsylvania** Model Green Office Leasing Specifications;[10] and the **Minnesota** Sustainable Design Guidelines;[11] and the **California** Collaborative for High Performance Schools (CHPS) Best Practices Manual.[12]

DEVELOP AN OUTREACH PROGRAM THAT PROVIDES SPECIFIC RESOURCES AND TRAINING TO COUNTY AND MUNICIPAL PLANNING DEPARTMENTS.

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[9] http://wings.buffalo.edu/ubgreen/guidelines.html

[10] http://www.gggc.state.pa.us/gggc/cwp/view.asp?a=3&q=152512

[11] http://www.sustainabledesignguide.umn.edu/

[12] http://www.chps.net/manual/

- **Minnesota** in particular offers the example of an effort to support county and municipal governments in their adoption of high performance building guidelines or in their adaptation of statewide guidelines to local circumstances. For example, Dakota County in Minnesota has developed its own version of the Minnesota Sustainable Building Guidelines and has constructed more high performance buildings than any other county in the state. **California** also actively encourages and supports high performance building programming at the city and county level, as has utilized the support of local leaders in advancing the state's green building agenda.

  - As described above, one of the most effective strategies for promoting a high performance building agenda is to put structures in the ground that provide tangible evidence of their practicality and benefits. As **Minnesota** has demonstrated, a bottom-up approach can be an important complement to, or catalyst for, top-down directives.

SUSTAINABLE DESIGN METRICS

EXPLORE ADOPTING A MANDATORY "LEED PLUS" STANDARD FOR PUBLIC CONSTRUCTION THAT WOULD INCLUDE: REQUIRING A NEEDS ASSESSMENT FOR NEW CONSTRUCTION, SURPASSING THE EXISTING ENERGY CODE BY 20 OR 30 PERCENT, ADDRESSING MASSACHUSETTS PRIORITIES SUCH AS THE CONSTRUCTION WASTE BAN, AND ATTAINING A MINIMUM NUMBER OF CREDITS IN EACH AREA.

- LEED is increasingly an industry standard that is in use, has been recommended for use, or is being considered for use on a statewide basis in the public sector construction activities of at least 13 states, including **California**, **New York**, and **Pennsylvania**.[13] In calendar year 2005 to date, at least five states (Arizona, Michigan, Nevada, Rhode Island, and Washington) have issued executive orders or passed legislation mandating the use of LEED in public sector construction.

- Although LEED is widely and successfully used, it has well-known shortcomings. Most generally, many green building experts and policy-makers agree that the threshold for basic LEED certification may not be high enough to label a building as "high performance" or sustainable. More specific criticisms of LEED include: inability to address state and local priorities; failure to assess whether a new building is needed or if existing building(s) could accommodate likely tenants; allowing point accumulations in narrow areas instead of ensuring that impacts are addressed in all areas; and failure to address the lifecycle impacts of materials. To address the last point, **Minnesota** is undertaking groundbreaking, locally-specific lifecycle assessments of construction materials, but this work is not completed and would take significant resources to transfer to another state.

[13] The 13 states are: Arizona, Arkansas, California, Colorado, Maine, Maryland, Michigan, Nevada, New Jersey, New York, Pennsylvania, Rhode Island, and Washington.

- **Pennsylvania** is considering the development of a "LEED Plus" standard that, for example, would mandate specific LEED rating points and would require buildings to achieve a specific Energy Star rating level.

HAVE A REPRESENTATIVE FROM MASSACHUSETTS STATE GOVERNMENT SIT ON A LEED CORE COMMITTEE TO ENSURE THAT LEED CONTINUES TO EVOLVE AND IMPROVE IN WAYS THAT MAXIMIZE BENEFITS TO COMMONWEALTH PROJECTS IN THE LONG-TERM.

- LEED is in a constant state of revision and expansion. Staff from **California** emphasized the importance of continued interaction with the USGBC to provide input to and keep abreast of changes. Recent revisions have improved the system's treatment of site selection criteria, among other improvements, and state staff noted that future revisions are likely to address lifecycle impacts.
- LEED has a straightforward process governing core committee membership that opens up membership to interested individuals as vacancies open up.[14]

STANDARDS, CODES, AND REGULATIONS

EXPLORE THE FEASIBILITY OF UPDATING THE EXISTING STATE ENERGY CODE TO ENSURE THAT IT PROMOTES ENERGY EFFICIENCY.

- **California** and **New York** noted that recently adopted energy codes allow for innovative, energy efficient technologies and are consistent with high performance building. A more stringent code allows policy-makers to either reference the code within the green building guidelines, or set a higher bar for energy use than would have been possible if the energy code did not promote energy efficiency.

CAPITAL VERSUS OPERATING BUDGET

TO BOLSTER REQUESTS FOR ADDITIONAL CAPITAL FUNDING FOR HIGH PERFORMANCE PROJECTS, DEVELOP A SYSTEM FOR ANALYZING LIFECYCLE COST SAVINGS AND PRESENTING THE RESULTS TO LEGISLATORS AND AGENCY BUDGET MANAGERS.

Steps in developing such a system could include: 1) mandating lifecycle cost analysis for large projects and providing training to staff tasked with conducting analyses; 2) developing and implementing a standard template for presenting lifecycle cost savings to legislators and agency budget managers; 3) developing a process and schedule for identifying individuals to present the information; and 4) appointing one person to track lifecycle costs analyses and outreach.

- All states are encountering difficulties in overcoming the typically higher capital cost of building high performance buildings. No state has developed a panacea for reconciling separate and uncoordinated capital and operation budgets with the economics of high performance building.

[14] http://www.usgbc.org/Docs/About/Committee%20FAQ.pdf

- All four states analyzed have ongoing activities related to lifecycle cost analysis. The **Pennsylvania** DEP has perhaps done more than any agency within these states to model lifecycle costs at the building system level. **New York** has a lifecycle cost analysis requirement for energy efficiency measures in its Executive Order implementation guidelines, but the practice has reportedly been slow to catch on (though NYSERDA plans to contract with the Athena Institute to provide seminars on lifecycle costs analysis). **California** and **Minnesota** are both developing lifecycle cost methods to be applied in the near future to all projects meeting a certain size threshold; both states are considering modifying the federal Building Life-Cycle Cost (BLCC) software and adopting the modification as their standard.
- **New York** and **California** stress the importance of educating legislators, budget management staff, and project management staff on the costs, payback periods, and operating savings associated with high performance buildings. Officials at the New York Office of Mental Health have succeeded in garnering additional capital funding for high performance building projects by developing (with the support of expert consultants and the best available public sector resources) well-documented, highly credible analyses demonstrating the long-term operation and maintenance cost savings associated with specific capital improvements. California suggested packaging and presenting information on lifecycle cost savings in a format that is accessible to legislators and staff, and using well-respected experts to present information.

INCENTIVES

TAP INTO STATE UTILITY-FUNDED ENERGY CONSERVATION MONIES TO OFFER: 1) INCENTIVES FOR CAPITAL INVESTMENTS THAT CONSERVE ENERGY AND OPERATING COSTS; AND 2) OTHER PROGRAMMING AND INCENTIVES THAT PROMOTE ENERGY EFFICIENCY IN PUBLIC BUILDING PROJECTS.

- **California**, **Minnesota**, **New York**, and **Pennsylvania** all rely heavily on funding from the utilities to fund high performance building incentives. The most common source of funding is the system benefit charge; a predictable and flexible source of funding for high performance building activities. For example, **New York** offers an extensive array of capital cost incentives and technical consulting services; $10 million was available in 2005. The funding has been an important and popular bridge between conventional and high performance building capital costs. Approximately ten percent of all eligible public and private projects in New York are believed to have utilized these incentives, with an even higher penetration rate among public projects.

PROVIDE DIRECT INCENTIVES SUCH AS GRANTS TO STATE AND LOCAL GOVERNMENT AGENCIES, BONUSES TO DESIGN TEAMS, AND ENERGY DESIGN ASSISTANCE. THE COORDINATOR OF THE STATE HIGH PERFORMANCE BUILDING ENTITY SHOULD OVERSEE SUCH INCENTIVES.

- Energy design assistance is provided by **California**, **Minnesota**, **New York**, but is a particular program focus in **Minnesota**, where it is offered free to new buildings and major renovation projects. Energy design assistance includes a comprehensive look at HVAC equipment design, building shell, daylighting, artificial lighting, and controls. It helps to create a culture conducive to promoting high performance building, as addressing energy conservation often leads project managers to think more broadly about potential savings from other high performance building techniques
- Incentives offered initially by a new high performance building program can be curtailed once the program is well-established and/or perceived as mandatory. For example, **California** used to offer a grants to state agencies and local governments to incorporate high performance building techniques, but the use of incentives has been curtailed now that high performance building has become more widely accepted, and the state has mandated that most state building projects achieve the LEED Silver standard.

BIDDING AND AWARDING PROCESS

ON ALL LARGE HIGH PERFORMANCE BUILDING PROJECTS, MANDATE THE USE OF CREDENTIALED, PROFESSIONAL GREEN BUILDING CONSULTANTS. TO FACILITATE THIS POLICY, ISSUE AN RFQ FOR PROFESSIONALS OR FIRMS THAT WISH TO BE INCLUDED ON A LIST OF "PREFERRED" HIGH PERFORMANCE BUILDING CONSULTANTS.

At a minimum, consultants should: (1) be LEED certified; (2) have demonstrated expertise on a minimum number of green building projects; and (3) provide positive references.

- It is important to select consultants carefully. As interest in high performance buildings grows, the number of practitioners seeking a share of the market will grow as well. Given the potential complexity of a truly integrated design and construction process and the additional investment that may be needed to undertake a high performance building project, the qualifications of consultants who seek to provide services should be carefully evaluated.
- Staff in **California** emphasize the need to have ready access to a cadre of high performance building experts, as project challenges often demand expertise in specialized areas. They find that the large architecture and engineering firms on retainer sometimes do not have the specialized experts needed to address specific issues.
- Both **New York** and **Pennsylvania** officials emphasized the importance of retaining highly-qualified consultants at the earliest stages of individual projects in order to ensure that high performance building objectives are realized to the maximum extent possible.

REFERENCE THE SELECTED HIGH PERFORMANCE BUILDING STANDARD (E.G., LEED PLUS) WITHIN BID SPECIFICATIONS.

- All four states analyzed indicated that high performance building criteria should be incorporated within bid specifications, and **California, Minnesota,** and **New York** have effectively done so. If the high performance building standard is mandatory in a state, simple reference to the standard within the RFP is adequate. However, if the standard is not mandatory, high performance building criteria need to be given significant weight relative to other criteria to ensure that bidder scores on high performance building criteria effectively influence the overall evaluation. Before the **Minnesota** Sustainable Design Guidelines were required, Minnesota included high performance building specifications in an RFP for three new state buildings. However, the green building criteria were not weighed at the same level as cost elements, and may not have been enforceable. It was the interest and support of the project architects in combination with the bid specifications that made these green projects possible.

CONSIDER ADOPTING A "DESIGN-BUILD" PROCUREMENT PROCESS FOR LARGE PUBLIC PROJECTS.

- **California** has found that a "design-build" process is more accommodating of high performance building than the more conventional "design-bid-build" process where different teams address design and construction. Under a recently piloted "design-bid" system, California agencies establish a combined budget for design and construction, and minimum high performance building criteria for the project. Bidding teams compete to meet or exceed the performance criteria, and agencies evaluate the best-value choice from a whole-project perspective. For small projects, California will likely retain the design-bid-build process, but they plan on expanding the use of design-build for large projects given the success realized with the pilot projects.

IF FEASIBLE UNDER STATE POLICY, EXPLORE LEASING HIGH PERFORMANCE BUILDINGS INSTEAD OF CONSTRUCTING THEM.

- Recognizing that the state's traditional bid/award process would not easily enable construction of high performance buildings, **Pennsylvania**'s DEP has made it a practice to lease new buildings from private developers and has adopted a set of high performance building lease specifications which require developers to guarantee achievement of energy and indoor environment performance standards.
- **New York**'s DEC used a lease-to-own arrangement to build its Albany headquarters (the first LEED accredited public building in New York). The private builder was able to take advantage of the New York state green building tax credit as part of the construction financing, effectively using a private sector incentive to further New York's public sector high performance building goals.