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# GREEN BUILDING POLICY OPTIONS FOR THE PUBLIC SECTOR

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## ABSTRACT

*Green building is receiving increased attention in the public sector in the United States. Over the past ten years, public sector organizations have gone from “testing the waters” with green building pilot projects to developing wide-reaching policies that incorporate green building practices and standards as a formal part of capital project decision processes. A variety of approaches have been employed at the federal, state, and local levels that encourage or require green building practices on public sector projects. To date, however, there has been no systematic evaluation of the pros and cons of these policy options to provide a basis for organizations considering how best to construct a program to meet the needs of its specific context. This paper identifies, compares, and contrasts options that have been incorporated as part of green building programs for states and other public sector organization seeking to motivate green building practices in their capital projects and facilities. Three categories of options are considered: Policy, Program, and Evaluation options. The paper evaluates alternatives within each of these categories according to their potential social, environmental, and economic impacts as well as their likelihood of implementation success within the context of public agencies. The findings of this paper contribute a palette of options for policymakers to consider when drafting policies for their organizations, along with program options to be considered by those who must implement the policies. This work contributes a foundation for future research to further understand the relative effectiveness and impacts of policy elements on green building practice within public sector organizations.*

## KEYWORDS

Green building; policy; capital project; public sector

## INTRODUCTION

Green building is a concept receiving growing attention in the United States among both public and private sector organizations. The scope of what is considered “green” with regard to the built environment ranges from energy efficient components and systems, to materials and systems low in toxics or otherwise healthy for indoor environmental quality, to resource-efficient materials incorporating recycled or rapidly renewable content and more. Recent policy at the federal level (Federal Executive Order 13423) references guidelines for Federal Leadership in High Performance and Sustainable Buildings, aimed at achieving goals such as the following (Federal MOU 2006):

- Reduction in total cost of ownership of facilities
- Improvements in energy efficiency and water conservation

- Provision of safe, healthy, and productive built environments
- Promotion of sustainable environmental stewardship

Among the facility-related areas addressed by the guidelines are integrated design, energy performance, water conservation, indoor environmental quality, and environmental impact of building materials. These strategies form the core of the concept of green building. Agencies ranging from the Department of Defense to the General Services Administration to the State Department have endorsed these concepts as being a part of their agencies’ goals in providing sustainable services to their constituencies (ibid.).

A similar structure for defining green building is offered by the Leadership in Energy and Environmental Design (LEED) Green Building Rating Sys-

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tem.\* This point-based rating system, developed and maintained by the United States Green Building Council (USGBC), is a commonly-referenced metric within many existing policies (Pearce et al. 2005a), although it is not the only such system offered as a reference standard in all U.S. policies. The LEED system is structured around the categories of Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, and Indoor Environmental Quality (USGBC 2006). The LEED rating system also includes a supplemental category for Innovation in Design credits not covered under the existing credit structure. The categorization of considerations is consistent across all rating systems under the LEED banner, and represents a broad spectrum of potential actions available on the level of specific projects that can be taken to increase the sustainability of those projects.

Although systems such as LEED exist to evaluate and compare the relative “greenness” of built facilities, determining how best to motivate action toward green building on the part of public agencies has not been extensively studied. With growing interest in green building among federal, state, and local governments in the United States, the options available to policymakers to encourage green building are many and varied, with potentially substantial differences in likelihood of success across different implementation contexts. Some guidance exists (e.g., ISWG 2006) in the form of templates or recommended structure and content for program implementation, but this content does not provide any specific guidance on how individual agencies should best tailor general guidance to their situation. The U.S. Green Building Council itself has produced a toolkit for state and local governments (USGBC 2002), but this toolkit is focused exclusively on the LEED rating system as a framework for policy implementation. While LEED is a broadly accepted and widely recognized framework for green building, not every political jurisdiction is willing to endorse or require a single rating system as part of policy for reasons ranging from concerns regarding the fairness of endorsing a proprietary rating system to fears that not every element of the rating system will be applicable to agency facilities (Pearce et al. 2005a).

Existing policies at different levels of government, whether LEED-based or otherwise, have met with varying degrees of success in different political, environmental, and social contexts, but to date no overview has been conducted to evaluate what works in different political and organizational contexts, or why. This paper, based primarily upon the results of a formal study of nine existing state-level policies and seven agency-level policies within an individual state (*ibid.*), represents a first step toward that end. The data obtained from the state-level study is supplemented by additional data from both local and federal agencies in the United States as well. The purpose of this paper is to identify, compare, and contrast generalized policy options included in public sector green building policies in the United States in terms of factors that would influence their likelihood of success in different political and organizational contexts. The paper describes the case-based approach used in the study to obtain and document information about public sector green building policies, followed by criteria used to evaluate policy and program options. Next, the paper presents three categories of options (Policy, Program, and Evaluation) that can be combined into a public sector policy for green building, and evaluates those options based on the criteria established earlier. The paper describes four clusters of options representing different types of implementation scenarios, and describes situations in which these options may apply. The paper concludes with an overview of key areas for future research that will further the knowledge base regarding green building policies and move public sector organizations toward the effective implementation of green building.

## APPROACH AND METHODOLOGY

Policy options considered here were developed based on existing programs identified and described using a case study methodology with nine states having active green building policies in Fall 2005 (*ibid.*). These nine states included all but two states during the analysis period identified as having active green building programs. The two states not included were contacted to participate in the study, but did not respond to requests for information. Telephone inter-

\* See <http://www.usgbc.org> or <http://www.leedbuilding.org> for more information on the LEED rating system.

views with key public officials and others involved in the development and implementation of each state's policy, along with review of policy and program documents and web sites, were used to identify key attributes of each state's policy along with any information available on how well each option worked within its specific context and what impacts each option had in practice. The nine state case studies were supplemented with additional case studies of seven agencies within the State of Georgia undertaking green building initiatives of various types despite the lack of a formal policy or mandate at the state level within this state at the time (Pearce et al. 2005a; Pearce et al. 2005b). Additional information regarding program options, their impacts, and their ease of implementation was also derived from the following sources:

- Telephone interviews and document reviews related to a new green building policy for the City of Atlanta (Pearce et al. 2005a)
- Interviews with personnel from the US Air Force (Pearce 2003; Pearce 2004) and US Army (Pearce & Fischer 2001a, b)
- Data collected during 16 short courses on sustainable facilities and infrastructure systems delivered at US Army and US Air Force installations around the United States from 2000 through 2004, documented in individual training reports.

This paper represents a synthesis of these data. Evaluation criteria for potential program elements were developed in four broad categories of interest to public sector organizations who propose, recommend, justify, evaluate, or implement green building policies: social impacts, environmental impacts, economic impacts, and ease of program implementation, hereafter referred to as implementability. In parallel to the development of these evaluation criteria, options were defined for three different categories of green building programs: policy options, program options, and evaluation options. These options were based on best practices identified in other states as well as knowledge of practices used by other non-state green building programs around the world. Options within each of these categories were evaluated by the research team in terms of the four evaluation criteria and configured into four potential sce-

narios for implementing green building in a public agency, as follows:

- Maintaining Momentum
- Working with the Willing
- Coalition and Consensus
- Legislating LEED

This paper presents the results of this analysis, including definitions of the evaluation criteria and options being evaluated, results of the evaluation, scenario configurations and implications, and areas for further research in determining how to design green building policies to have maximal effect in different contexts.

## WHAT DOES A GREEN BUILDING POLICY NEED TO SUCCEED?

Designing a successful green building policy within the complex context of a government agency is difficult by any standard. Multiple stakeholder perspectives must be considered and aligned behind a common vision and plan of action. Clear benefits that outweigh potential risks must be shown from social, environmental, and economic perspectives to support the case for changing the status quo. Finally, the implementability of the specific program elements themselves must be carefully considered in designing programs and policies to ensure their sustainability and effectiveness in the long term, despite the constantly evolving and shifting political nature of government organizations. The following subsections describe each of these considerations in greater detail.

### *Stakeholders of a Green Building Policy*

One of the most important challenges in determining a recommended course of action for a public sector green building policy is considering the perspectives and interests of each of the categories of stakeholders who will be affected by such a policy. These stakeholders include, in no particular order:

- *Owner agency personnel*, including agency heads and facilities staff who will be responsible for interpreting the policy, implementing its requirements, and evaluating the results with regard to capital projects
- *Supporting agency personnel*, such as state energy offices, state property offices, or departments of general services who may be responsible for man-

aging funding to implement green building programs to serve multiple other agencies

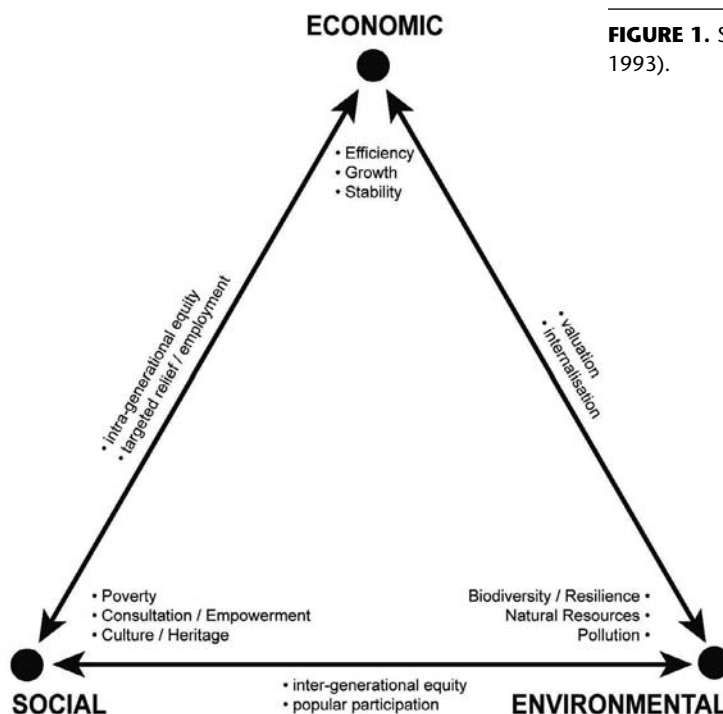
- *Elected officials*, whose endorsement of a green building policy exposes them to the potential political risks and rewards the policy might bring as it is implemented
- *Facility occupants*, who will benefit from high performing buildings but may suffer if facility scope must be reduced to achieve high performance, or if building technologies do not perform as anticipated
- *Taxpayers*, who will provide some or all of the funding to support green building programs and who will benefit from increased environmental quality and enhanced productivity of government employees who occupy high performance buildings, as well as a reduced tax burden to cover lower operating expenses
- *Industry groups and companies*, who provide capital project-related services for publicly-owned buildings and will be required to comply with policy requirements and deal with associated implications for how they do business
- *Lobbies*, who represent key taxpaying industries or non-profits in the jurisdiction, who are sensi-

tive to the potential influence of policies on their constituencies

Any one of these stakeholder groups has the potential to either offer support or contribute to derailing a green building policy as it is put forth. Owners and supporting agencies in particular will play a strong role in the ongoing success and sustainability of a green building program for publicly-owned buildings.

### Potential Green Building Program Risks and Rewards

A variety of potential risks and rewards are also associated with green building programs, and must be considered when designing a program configuration. Since the ultimate objective of a green building program is to increase the sustainability of facilities in the jurisdiction, the three basic elements of sustainability (Social, Environmental, and Economic criteria) provide a balanced basis to evaluate and compare potential program designs (Munasinghe 1993; discussed as the “Triple Bottom Line” by Elkington 1997 and others). Figure 1 illustrates how these considerations balance each other to work toward a sta-



**FIGURE 1.** Sustainability considerations (Munasinghe 1993).

ble human society in which stakeholder needs and aspirations are met in the present while capacity to meet the needs and aspirations of future generations is preserved (after WCED 1987).

**Social Considerations.** From a social standpoint, multiple factors contribute to the success of a green building program. Since this study is primarily focused on green building programs undertaken by public agencies, socio-political factors are considered here from the standpoint of elected officials who will mandate or endorse green building policies, the occupants and facilities staff of buildings subject to the policies, and the taxpayers and tax-paying industries whose interests those agencies serve.

From the government standpoint, including both elected officials who make policy and agency stakeholders who implement or experience the direct impacts of policy, social considerations include how well these agents are able to meet their obligations to the public toward achieving greater good. Potential rewards of green building programs and policies include (e.g., Kats 2003; Portland Energy Office 1999; Romm & Browning 1995; US DOE 2003; US Green Building Council 2004; Wilson 2005):

- Increased effectiveness of facility occupants, potentially resulting in better services provided by those agencies to their constituencies
- Improved image/reputation of environmental leadership both within the state and with respect to other states

From the standpoint of the constituencies whose interests government serves, effective green building programs and policies can indirectly offer, in terms of potential social rewards (ibid.):

- Support for economic development for local industries and resultant increase in economic health and quality of life
- Increased health and productivity due to improved environmental quality
- Availability of funding from savings in facility operations and maintenance costs to enhance other programs
- Better service from more efficient and effective government employees

These potential rewards are likely to result from effective implementation of green building programs, but there are also social risks if programs do not perform as expected, primarily associated with the opportunity costs of funding invested in green building programs and facilities if they do not result in performance improvements (e.g., Winter 2004; Myers 2005; Johnston 2000; Greenspirit Strategies 2004; Bray & McCurray 2006; Best 2005; Athena 2002). If programs do not perform well, government agencies are accountable to taxpayers for how funds have been spent. With programs that are new or not well understood, the perceived political risk associated with endorsing them may outweigh the promise of benefits (e.g., Pearce 2001c; Pearce et al. 2005a).

**Environmental Considerations.** The second category of considerations centers on the natural environment and the impacts on ecological systems and resource bases that can be mitigated and/or improved by implementing green building programs. Potential rewards include (see Wilson 2005 for a good overview):

- Reduction in resource consumption, e.g., water, energy, materials
- Reduction in waste, destruction, and pollution that lead to ecosystem degradation and biodiversity loss, e.g., solid waste, wastewater/water pollution, air pollution, and site disturbance
- Increase in sustainable site development practices and improvements in transportation efficiency.

As with social rewards, potential environmental rewards must also be weighed against potential risks if programs do not behave as expected. Environmental risks include considerations such as unproven or unfamiliar construction materials and technologies that fail in operation and must be replaced, requiring additional resources to address the problem. While the potential for innovative technologies and practices to “backfire” is inherent in all innovation (Rogers 2004), it is especially ironic in the case of environmental technologies, where replacement potentially entails more waste and resource consumption than installing a traditional alternative in the first place (Pearce 2001c).

**Economic Considerations.** The third category of evaluation criteria focuses on economics, including

direct costs and benefits associated with green building policies and programs, and indirect costs and benefits that occur as a result of better-performing capital construction processes, the facilities that result from them, and the impacts of those facilities on their occupants. The most obvious economic cost impacts of green building programs and policies are the direct costs of implementation. Categories of program implementation costs include (e.g., Pearce 2004; Bennett & James 1998):

- Program administration costs
- Cost of project registration/documentation/certification
- Increased first cost of projects due to innovative or nontraditional systems, additional design and construction requirements, building commissioning, etc.
- Increased life cycle costs of projects for operations and maintenance of systems unfamiliar to maintenance personnel, etc.
- Program marketing costs
- Training costs
- Technical assistance costs
- Evaluation/compliance costs

These costs are coupled with the risk of remediation costs if unknown green building technologies do not perform as expected. Potential quantifiable areas of savings resulting from effective green building program implementation include (ibid.; see Wilson 2005 for a good overview):

- Savings in operating and maintenance costs, e.g., energy costs, system replacement, water/waste-water treatment, waste disposal
- Savings in first cost due to system optimization, design “right-sizing,” reduced waste generation, recycling revenues, etc.
- Reduced liability, e.g., for human health risks
- Reduced environmental management/compliance costs
- Improved productivity and employee retention

Many indirect economic benefits can also stem from green building programs, including value of resources saved for future use, value of environmental image, and value of environmental quality due to

avoided negative impacts, although these kinds of costs are not typically included directly in decision making since they are difficult to quantify and attribute to specific project decisions (e.g., Bennett & James 1998). Nevertheless, all of these factors should be considered at least conceptually in terms of evaluating the costs and benefits of green building programs and designing policies that optimize benefits for stakeholders.

Together, social, environmental, and economic impacts of a program provide a balanced measure of the ultimate performance of a program in terms of its influence on sustainability of facilities in a state. These three categories of impacts serve as the fundamental basis for evaluating program designs in this paper, along with program implementability, discussed next.

***Implementability Considerations.*** In addition to the likely social, environmental, and economic impacts that may result from a green building policy, the design of the program itself contributes to its potential to succeed within its organizational and political context. From an organizational standpoint, implementability includes program compatibility with standard operating procedures, constraints, and conventions of implementing organizations. Specific considerations for implementability include (Rogers 2004; Vanegas & Pearce 2000; Pearce et al. 2005a):

- Compatibility with statutory requirements and funding processes
- Availability of a trigger to establish urgency of need for the program, e.g., an energy crisis
- Degree of individual change required of agency personnel affected by the program
- Level of additional burden imposed by the program on implementing agents
- Existence of enthusiastic change agents and support networks with appropriate stature and resources within the organization
- Existence and observability of rewards or benefits for program achievement
- Absence or ability to mitigate potential risks associated with program implementation
- Likelihood of strong political endorsement or, conversely, significant political opposition to the program by lobbies or other constituencies

These factors influence the degree and rapidity with which individuals and organizations adopt new or unfamiliar technologies and practices that have the potential to improve their existence. Together with the potential risks and rewards each program option offers, implementability considerations can help predict which program designs will “take hold” and be successful in achieving their full potential.

## GREEN BUILDING POLICY OPTIONS

In defining the elements that could be incorporated as part of an overall green building policy or program for a public sector organization, three basic categories of options emerge: Policy options, whereby formal guidance is put in place to require or encourage green building activities; Program options, which may provide funding, information, or other needed resources to make green building easier to achieve; and Evaluation options, which serve to measure the outcomes of the program and evaluate its success. The next three subsections describe potential options within each of these three categories, along with their pros and cons in terms of the evaluation criteria identified in the previous section.

### Policy Options

Policies can come in the form of an executive order signed by a governor or public leader, a bill passed by legislature, or even an internal agency directive issued by the executive staff. The following options could be made in any of these forms:

- *Meet LEED or equivalent.* A policy can mandate compliance with a specific set of green building guidelines. A straightforward method would be to require that buildings meet some specified level of the USGBC's LEED standard, but a different set of guidelines or alternative rating system could also be used. This option can be implemented with varying degrees of rigor, ranging from requiring buildings to simply meet the standard on an honor basis to requiring a formal third-party certification process. The scope of the mandate can also be varied by: 1) limiting the policy to specific building types, such as offices; 2) limiting it to buildings of a certain scale, such as over \$1 million or greater than 25,000 ft<sup>2</sup>; 3) applying it to a subset of all agencies; or 4) only

requiring each agency to do one pilot project under the policy (Pearce et al. 2005a).

- *Endorse and encourage LEED or equivalent.* Another approach is to issue a policy which does not mandate any specific action but instead officially endorses green building as a priority for public facilities and encourages agencies to voluntarily adopt green building practices.
- *Create programs to encourage green building activity.* In addition to being used to show support for green buildings, policies can also be used to create programmatic elements that provide inspiration and support for implementation of green building practices by agencies, as discussed in greater detail in the next section of the paper under Program Options. While these programs can be created independently of official policy documents, in some cases a policy such as an executive order gives politicians an opportunity to officially support and endorse a program and provides reassurance for implementing agencies.
- *Create a working group or task an agency to develop standards or plans.* In a situation where there is support for green buildings but not a consensus about what standards to use and/or how far reaching and firm a policy needs to be, establishing a working group to investigate the issue is a possible option. This option is a useful first step and gives a clear signal of a leader's support for the issue. Creating a working group in the form of a council or task force gives leadership the opportunity to have input from critical stakeholders in a fair and open process. This approach also avoids some of the political risks inherent in mandating a specific set of guidelines to a resistant agency population.

Table 1 lists each of these options along with possible impacts they may have in terms of the four evaluation criteria.

### Program Options

A variety of program options has been developed by public sector agencies or organizations for increasing uptake of green building techniques and practices. Programs can be established through formal policies or can be created on an ad-hoc basis. Critical to the success of all programs is a source of funding and

**TABLE 1.** Green building policy options: Pros and cons.

	<b>Require LEED or Equivalent</b>	<b>Encourage LEED or Equivalent</b>	<b>Encourage Green Building in General</b>	<b>Create Council or Task Force to Set Standards</b>
Social	May create jobs if done externally. Occupants may be healthier and happier in their workplaces. Increased productivity is possible.	Same as requiring LEED, but with likely fewer participants and subsequent reduced costs and benefits.	Benefits and costs are program-specific.	Long-term impacts may result from eventual greater uptake of subsequent policies. Resulting network can provide inspiration for independent action and opportunity to share lessons and experiences.
Environmental	Reduced environmental impact and demands on infrastructure.	Reduced environmental impacts and demands on infrastructure, although lower impact than mandate due to lower uptake.	Benefits and costs are program-specific.	Long-term impacts may result from eventual greater uptake of subsequent policies.
Economic	Increased costs due to certification fees and commissioning (if not already standard practice), but expected life cycle operational savings.	Lower cost of implementation than mandate due to lower uptake; potentially lower life cycle cost savings as well.	Could be costly to implement; depends on the nature of the programs specified. Benefits are also program-dependent.	There may be direct implementation costs for meeting support and documentation.
Implementability	Greater personal load for implementers if done in house. Some oppose LEED for various reasons. Often constitutes an unfunded mandate. Provides temptation to do things that may not be cost effective or appropriate just to get points.	Potentially lower uptake, but those who do adopt are less resistant. Can be used as a springboard for a future requirement while building support. Gives formal political endorsement to people inside agencies who already aspire to do green building. Lower probability of "point-mongering".	Gives formal political endorsement to people inside agencies who already aspire to do green building, and gives specific direction on how to proceed. Does not offend people by imposing requirements without support. Provides tools and resources to support the end goals.	Works well to achieve broad consensus and buy-in as long as all key parties are represented. Adds additional workload to volunteer participants. Requires strong leadership and effective facilitation. Recommendations from the council may carry more weight than simple political mandates. Gives alternative factions the chance to present themselves to the council and be carefully evaluated. Provides a mechanism for figuring out the most appropriate way to accomplish goals.



support to build, promote, and continue the efforts undertaken by those programs. Potential program options include:

- *Technical support.* Providing technical support can be useful for creating green building capacity and overcoming ignorance about new and innovative green building techniques which may be different from the ways things have typically been done. Technical assistance can be provided directly by the specific agency designated to promote green building or indirectly by providing funding for technical assistance by external providers.
- *Training.* Unlike technical support that provides assistance for specific projects, training opportunities can be used to inform facility stakeholders on topics ranging from general sustainability, green building principles, or LEED requirements, to technical details of specific technologies. Public agencies may not need to implement training internally but instead may increase the number of personnel attending existing sustainable building training events by subsidizing the cost of training, providing release time to attend, or merely encouraging attendance.
- *Guidance documents.* Many public sector organizations have found that it is useful to create agency-specific guidance documents to distill the plethora of available information on green building into a more concise format that contains information relevant for their specific context. These documents can be a tailored version of LEED that highlights the strategies that have been most successful for similar projects (e.g., USGBC 2002; Pearce et al. 2005c), tailored checklists to address attributes of that agency's projects, or guidebooks containing more detailed information (Bosch & Pearce 2003).
- *Demonstration projects.* Demonstration or pilot projects are implemented to show what green buildings entail and demonstrate their benefits in the context of a real project without necessarily committing to an ongoing policy. A successful pilot project can help dispel the fears and objections of opponents, and incurs a much lower political cost and risk than formally adopting a policy requiring these actions for *all* projects. If successful, pilot projects can be a precedent to-

ward establishing a policy at a later time (Pearce et al. 2005a).

- *Incentives/subsidies.* Rather than mandating that agencies adopt green building practices, another approach is to reward agencies that are "ahead of the curve" in already pursuing these practices and provide motivation for other agencies to follow their lead. Incentives observed in some states, for instance, include reimbursing the cost of LEED certification, governor's awards for most sustainable new building, and positive press coverage (ibid.).
- *Modified institutional practices.* Procedural barriers can make achieving green building difficult, and programs to modify institutional constraints can help to facilitate green building actions. Examples include contract vehicles for commissioning or energy savings performance contracting, waiving one-year contract limit requirements, prequalification of contractors or products, and others (ibid.).

Table 2 (pp. 166–167) lists each of these program options along with possible impacts they may have in terms of the four evaluation criteria.

### **Evaluation Options**

Evaluation addresses program compliance and/or policy effectiveness, either at an individual building level or overall. Sometimes but not always, policies explicitly specify how compliance should be measured or demonstrated, along with reporting and accountability requirements that program implementers must follow to document compliance (Pearce et al. 2005a). These measures also provide data for overseeing agencies to use as a basis to evaluate the effectiveness of the program as a whole. Voluntary program evaluation is also possible. Options include:

- *Third-party Certification, LEED or equivalent.* This method is effective for ensuring that specific buildings follow prescribed green building guidelines. This mechanism creates a clear metric with little administrative burden on government for ensuring compliance, but it does put responsibility on the agencies managing the construction process. Certification through third party organizations such as the USGBC also carries a price that some organizations have found to be a bar-

rier when they would rather put that funding directly into the building (ibid.). Developing other forms of third-party validation is also possible.

- *Regular reporting requirement.* This requirement can be combined with third-party certification. Some states, for instance, have set periodic reporting requirements for agencies to report back to a central agency, committee, or council on their green building accomplishments and whether or not they followed any policies that have been established (ibid.). Reporting requirements may create a greater sense of accountability, which ultimately results in greater action.
- *Performance monitoring and reporting.* Monitoring actual building performance helps to ensure that the design intent of a facility is realized in practice, and can be supported by requirements to regularly report performance. A requirement that agencies address and develop an action plan for how they will remedy any performance deficiencies can be even more powerful.
- *Post-occupancy evaluation.* In addition to rating systems that help to guide design and operationalize “green” during a project, evaluation of post-occupancy performance is a useful tool to ensure that buildings are indeed meeting their design intent and thereby making progress toward the underlying or driving goals of the green building policy such as energy savings. Post-occupancy evaluations may range from a simple walk-through to intense investigative studies using a variety of research methods to correlate physical factors with occupant-related outcomes. Post-occupancy evaluation can include (Federal Facilities Council 2002):
  - Utility studies, including power and water consumption
  - Employee productivity studies
  - Absenteeism studies
  - Indoor air quality testing
  - Occupant satisfaction evaluations
  - Acoustical studies

Whatever the mechanism or mechanisms for evaluation, measuring the impacts of green building policies and programs is essential to remain accountable to taxpayers who ultimately support those programs and benefit from their existence. Table 3

(p. 168) lists each of these evaluation options along with possible impacts they may have in terms of the four evaluation criteria.

## GREEN BUILDING PROGRAM SCENARIOS

There are a number of different paths that public sector organizations could take in the pursuit of greening publicly-owned or -operated facilities. This subsection lays out four distinct paths toward implementation: (1) maintaining momentum; (2) working with the willing; (3) coalitions and consensus; and (4) legislating LEED. These scenarios build upon the policy, program, and evaluation options listed earlier to create a continuum of action levels for green building that could be undertaken by government organizations. The following subsections describe each scenario in greater detail, along with pros and cons based on a synthesis of interview data.

### *Scenario 1: Maintain Momentum*

One possibility is to take no new action and to allow current green building activities in the public and private sectors to continue without intervention. Considerable interest in green building already exists in many jurisdictions, as evidenced by the growing number of conferences, technical and popular coverage of green buildings, and other indicators documented quantitatively (USGBC 2003). Even in the absence of a policy or additional programs, many public sector building portfolios are likely to continue to become more efficient in terms of resources and perform better over time due to these existing efforts. The Maintain Momentum option represents a no action scenario in which market trends toward green building drive increased building performance without additional intervention.

**Pros.** This scenario has the benefits of requiring no additional funding or action to implement and therefore is a very low cost and easy approach to green building for public agencies. It also does not require any political capital; no high-level officials need to support it in order for it to continue.

**Cons.** Without ramping up existing programs or policies, public sector organizations choosing this option will likely fall behind their peers who are ac-

**TABLE 2.** Green building program options: Pros and cons.

	Technical support	Training	Guidance documents/tools	Demonstration projects	Incentives/subsidies	Modified institutional practices
Social	May increase confidence to try innovations; adds capabilities to teams that don't already have them; can make green building seem like something that requires expert assistance and disempower individuals.	May increase confidence to try innovations; may provide networking opportunity and peer interaction; may build greater internal capacity and support since it empowers individuals who receive training.	May increase confidence to try innovations. Individually empowering, but essentially an individual effort; no specific opportunities for networking.	Occupant benefits can derive from green design. Long-term impacts may result from eventual greater uptake of green building best practices that are effectively demonstrated on these projects.	Impacts may result from greater uptake of green building best practices.	Impacts may result from greater uptake of green building best practices.
Environmental	Impacts may result from eventual greater uptake of green building best practices.	Impacts may result from eventual greater uptake of green building best practices.	Impacts may result from eventual greater uptake of green building best practices. Depending on the nature of the document, can help to tailor efforts to those most effective for the specific context, e.g., what works best in a given climate.	Environmental benefits from green design of demonstration facility. Long-term impacts may result from eventual greater uptake of green building best practices that are effectively demonstrated on these projects.	Impacts may result from greater uptake of green building best practices.	Impacts may result from greater uptake of green building best practices.

Economic	Have to pay for implementation, but ultimately will speed learning curve and build broadly applicable capacity that can result in long-term savings.	Have to pay for implementation, but ultimately will speed learning curve and build broadly applicable capacity that can result in long-term savings.	Less expensive because it is generated once but used many times. Relatively minimal ongoing costs for updating, and dynamic options that are self-updating are possible.	Could capitalize on existing green buildings by designating them as demonstration projects and promoting them. Access to different funding sources and donations is often possible. Funding commitment is project by project, not an ongoing commitment.	Direct first cost of implementation varies by program type, e.g., paying for LEED certification or commissioning. Should be phased out over time.	No cost outside normal operating costs for government agencies, unless feasibility studies or similar are required.
Implementability	Technical assistance does not ensure uptake, but at least it applies to an immediate real project situation. Potential exists to capture and transfer lessons learned via centralized tech support provider. Depending on who provides the support, can generate or suppress market capacity.	Providing training does not ensure uptake. The next relevant project may not happen soon.	Requires individual adaptation to specific cases. May have to provide dissemination and training to ensure widespread effective use. Can be tailored to meet the culture, constraints, and needs of the organizational context, and therefore be more easily adopted. Does not ensure uptake.	Lower risk of perceived failure on these projects (since they are designated as pilots/demonstrations) encourages greater innovation. Improves the implementability of future projects due to ability to learn from these special cases.	Greatly reduces the most significant barrier to implementation: perceived increased first cost.	One effort can be used multiple times by multiple agencies and projects. Examples include contract vehicles for commissioning, waiving one-year contract limit requirements, prequalification of contractors or products, etc.

**TABLE 3.** Green building evaluation options: Pros and cons.

	Third-party certification	Regular reporting requirements	Performance monitoring and reporting	Post-occupancy evaluation
Social	Pride in certification outcomes; external validation; visible reward for achievement.	Introduces accountability. Can also introduce a spirit of competitiveness and motivation to excel. Visible and public acknowledgement of achievements.	Introduces accountability. Opportunity for feedback and action may empower facility manager to proactively deal with problems, resulting in greater occupant satisfaction and productivity.	Most likely option to give good information on true social impacts that can be applied as lessons to future projects. Can be empowering to occupants.
Environmental	Ensures that basic standards are met, but doesn't necessarily guarantee environmentally beneficial outcomes during operation.	Can build on third-party certification and encourage positive environmental outcomes.	Encourages meeting environmental performance goals during operation rather than just meeting standards up front.	Encourages meeting environmental performance goals during operation rather than just meeting standards up front.
Economic	First cost of implementation can be considerable; risk that certification is not achieved.	Can be minimal cost to implement; work imposed on existing personnel.	Ongoing program costs can be considerable, but afford the opportunity for operational adjustments that can result in savings.	Ongoing program costs can be considerable, but afford the opportunity for operational adjustments that can result in savings. Likely to employ a third-party to perform.
Implementability	Generally a one-time event per building. Considerable opposition may exist regarding the level of effort and cost required. Many stakeholders have to provide data to meet third-party certification requirements, making documentation complex and difficult. Risk that certification is not achieved.	May require a centralized person to continually pester agencies for data. Can be piggybacked on other data submittal requirements such as annual performance or status reporting.	Requires initial investment in monitoring equipment or possible employment of a third-party. Benefits from ongoing data analysis and interpretation. Agency maintains control and can take immediate action to remedy defects as they are discovered. Proactive.	Fear of identifying problems that are otherwise not obvious. Could be embarrassing or reflect poorly on the project team or building. Perception of less control than with performance monitoring. Likely to be a one-time event, not ongoing.

tively making progress in greening their facilities. Such organizations may also miss out on many of the benefits of having a greener building portfolio and as a result have suboptimal buildings with higher operations and maintenance costs than necessary. Inaction could have negative consequences for industry in the jurisdiction as well, since green buildings represent a fast growing, profitable market, and public sector programs and policies can play a valuable role in building private sector capacity for goods and services to support green building.

### ***Scenario 2: Working with the Willing***

A slightly more aggressive approach would be to celebrate and reward current green building activities within the jurisdiction. Such a program would reach out to agencies and agency staff already receptive to green buildings, providing them with the tools they need to be successful. At the federal and state levels, some agencies have made considerable progress on their facilities in the absence of formal policy, while other agencies have expressed interest in or are actively experimenting with green building practices on their projects (e.g., Pearce et al. 2005a, b). Much can be accomplished by working with these groups of people to reward early adopters and encourage those who are willing to test the concept and become adopters themselves. This encouragement can come in the form of a policy that gives support and endorsement for the activities of the willing, and through programs that provide tools, guidelines, and incentives to act such as funding to cover certification costs or commissioning. It is also possible to pursue this path solely with the determination of organizations that already provide technical support to reach out to public sector facility planners. It may not even be necessary to create new programs – the desired ends can be achieved to some degree by extending the reach of existing programs.

**Pros.** This approach allows people to come to green building techniques on their own timeline and of their own volition. Accordingly, they may be more likely to buy in and embrace strategies as their own after trying them, resulting in greener public buildings without facing opposition to legislation. This approach also may result in selection of green building technologies based on likelihood of success and

appropriateness criteria, rather than based on a goal of maximizing points within a rating system. By making existing programs available to public agencies, this approach would build support and a larger network of green building advocates, paving the way for stronger legislation in the future.

**Cons.** Taking this approach might leave some green building advocates impatient for action, since change would occur more slowly than with a legislative mandate requiring adherence to green building guidelines. The possibility exists for underparticipation in voluntary programs, although growing interest in green building makes this unlikely.

### ***Scenario 3: Coalitions and Consensus***

A still more active approach taken by many states with green building policies is to establish a council or working group to develop an overall vision and plan of action for increasing green building (Pearce et al. 2005a). Councils seem to be most effective when they are created by senior leadership, but they can also be successfully implemented as a grass roots initiative (ibid.). Critical to the success of this approach is bringing the right people onto the council and making sure that all stakeholders are represented. The ultimate aim of this approach is to rally strong support and alignment across multiple constituencies, thereby increasing political momentum while creating discrete recommendations at the program and evaluation levels that have broad buy-in. The outcome of such efforts often provides a foundation for subsequent policy that requires implementation of the recommendations of the council.

**Pros.** This strategy builds broad support among all stakeholders represented in the coalition or council, and creates buy-in for recommendations since they were developed by representatives of all constituencies. This process affords taking everyone's concerns into account. Precedent for working groups often exists within public agencies, as well as the institutional capacity and knowledge resulting from prior efforts. Substantial industry alignment and interest often has already been established as part of prior efforts, and could be tapped to provide representation on a council.

**Cons.** Without effective facilitation and directives, this process can continue indefinitely and may not result in clear consensus or discrete, actionable recommendations. Recommendations of the council, while likely to represent consensus, may not represent the most expeditious approach to greening public sector buildings and may be biased in favor of the interests of the strongest constituents. Not all considerations may be taken into account, particularly when their economic impacts are not directly felt. If the process is not inclusive, it could breed animosity among un- or under-represented stakeholder groups.

#### **Scenario 4: Legislating LEED**

A fourth scenario, Legislating LEED, falls at the most aggressive end of the spectrum in that it represents a strong mandate that has survived the legislative process and requires documented compliance with an external standard. Variations on this scenario exist, including mandating LEED compliance via executive order instead of legislation, incorporating reasonable exclusions to focus LEED efforts on buildings where it is most likely to be beneficial, or use of a third-party standard other than LEED. However, this scenario represents the most aggressive action among the four scenarios considered, since it requires explicitly addressing questions such as which standard, what buildings, how to measure, who pays, and who is responsible in such a way that all stakeholders buy in and do not derail the process before the policy is in place.

**Pros.** Legislating LEED is still quite innovative from the standpoint of states in general (Pearce et al. 2005a). Such a policy would provide “bragging rights” and set adopting organizations apart as taking green building seriously. If successful, this kind of policy could result in many LEED certified buildings for the adopting jurisdiction. Referencing an industry standard such as LEED provides a common understanding of requirements among stakeholders and a concrete way to measure achievement.

**Cons.** This approach requires considerable political capital to achieve. There may be disagreement about who will pay for requirements such as project registration and certification, since additional resources are required to support these activities. Requiring

compliance with a third-party standard could encourage facility owners to make suboptimal decisions to achieve compliance, rather than striving for the best building in each circumstance even if it does not meet the stated goal. If the mandate is achieved via an executive order or other non-legislative directive, there is risk of poor implementation and abandonment when government leadership changes. Leadership may not be willing to support such a policy – lobbies may complain too loudly, or the business case may not yet be strong enough to appeal to decision makers. Failed policy attempts may instigate fierce opposition, making it more difficult for future policy attempts and delaying overall progress toward green building as a result.

#### **Discussion**

While the most aggressive option of *Legislating LEED* could be the desired end state of a policy process for a public sector organization, several steps must be taken and assets put in place before such a policy could be successful. On the other end of the spectrum, *Maintaining Momentum* represents essentially a “do nothing” alternative, and is likely to continue the trend toward green building even with no actions or resources expended on the part of government.

In the middle of these two extremes are the *Working with the Willing* and *Coalitions and Consensus* options, which could be undertaken as interim steps toward an eventual goal of LEED legislation with comparatively little friction. *Working with the Willing* could be implemented with as little as a commitment on the part of existing programs to apply their resources to publicly-owned buildings, or as much as a broad array of new, well-funded programs dedicated specifically to supporting publicly-owned facilities. Likewise, *Coalitions and Consensus* could range from a self-started grassroots initiative among state facilities managers to a formally established task force appointed by leadership to tackle the problem.

Any combination of *Working with the Willing* and *Coalitions and Consensus* options would likely be effective in increasing the level of green building activity undertaken for publicly-owned buildings. Specific program designs should take into consideration available funding and institutional support along with the evaluation criteria for specific options de-

scribed in previous sections. The optimal configuration of these elements requires knowledge of both (a) the current specific needs and information gaps of owner agencies, versus (b) the available programmatic resources presently in place that could be leveraged to meet these needs. A gap analysis would reveal options for programmatic investment that could better meet agency needs without duplication or redundancy.

## **RECOMMENDATIONS FOR FUTURE RESEARCH AND IMPLEMENTATION**

While these actions hold the potential to move public sector organizations toward greater adoption of green building practices, it is important to remember that the ultimate goal is greater sustainability among public sector facilities. Adoption of green building technologies does not necessarily equate to more sustainable buildings over time. The most expeditious path to that end for a public sector organization must continue to evolve as political and environmental contexts change. Any set of actions taken to promote green building must take into account these contexts or risk not only its own failure but also hindering future green building efforts as well.

Several immediate next steps are recommended as short-term actions for public sector organizations contemplating the development and implementation of green building policies and programs. Each of these steps also holds the potential for additional research to determine the relationship between programmatic efforts and outcome effectiveness, and should also be investigated with regard to generalizing findings of this work to apply to the private sector as well as the public sector. The following subsections describe each of these next steps in greater detail.

### ***Building the Business Case for Green: Building Performance Data Collection as Part of Regular Facility Reporting***

While many facility decision makers in public agencies interviewed as part of this study believe green building makes good business sense, there is still a gap between this general belief and the level of confidence required to take action to incorporate green building innovations in future projects. Much green building activity within government is presently vol-

untary, not mandated, and achieving additional buy-in requires solid evidence that reduces risk of innovation for decision makers. A strong business case is also useful to motivate legislative or executive action for more formal green building mandates or endorsement.

From whence should such evidence come? A variety of studies across the United States have begun to comprise a body of evidence to support the business case for green building (e.g., USGBC 2004; US DOE 2003; Winter 2004; SBW Consulting 2003; Packard Foundation 2002; NEMC 2003; Matthiessen & Morris 2004; Kats 2003; Johnston 2000; Greenspirit 2004), but much of it remains anecdotal and incommensurable, and transfer of findings to specific organizations and their contexts is often difficult or impossible. Green building is still comparatively new in many jurisdictions, and most green buildings that have been built are not presently being systematically monitored to verify their performance in operation. A mechanism is needed to capture consistent performance information along with initial design and construction parameters to firmly establish a basis for the business case for green building in public sector buildings.

Many public sector agencies require regular data reporting on capital facilities as part of portfolio management, and provide building information updates on a regular basis about facility age and condition, available space, energy use, and other key parameters. With careful thought, sustainability-related data collection could be piggybacked on these efforts to provide an unprecedented level of consistent, regular data about real building performance over the life cycle. Performance could then be correlated with initial green building design and construction tactics, resulting in a quantitative evaluation of what tactics really make most sense for public sector buildings.

To reach this point, sustainability-related variables must be identified and prioritized, and potential approaches to cost-effectively mining values for those variables or directly collecting information on them must be evaluated. The outcome of this effort would be a set of performance parameters for public sector buildings that provide the capability to distinguish between green and traditional buildings and correlate with specific building practices, attributes, and tactics. The benefits of this initiative would derive from



systematic knowledge of what works well in individual contexts, along with enhanced confidence in (and hopefully greater adoption of) green building practices for publicly-owned buildings.

### ***Developing Investment and Funding Recommendations: An Inventory/Gap Analysis of Organizational Resources and Needs***

To determine the most effective use of resources for program implementation in a specific context, a critical next step is to conduct a comprehensive inventory of specific organizational needs related to green building implementation and, in parallel, an inventory of available resources to support green building goals. One starting point is an inventory of existing agency guidelines and documents related to the capital project process to identify strategic entry points for sustainability (see Pearce 2005b for one example), and developing green building tools, language, guidelines, and other resources to support green building within the context of existing organizational practices and procedures. In short, there is a need to map and prioritize opportunities for green building programmatic support within current agency operating procedures.

Concurrently, a regularly updated inventory of local, regional, and national resources relevant for agency green building efforts is needed to determine what assets are presently available to the organization. The degree of resource utilization by the organization and the degree of impact stemming from their use is also important to understand what resources are most effective within specific agency contexts. Many widely available resources may be unknown to agency stakeholders and therefore be subsequently untapped by them. Such an inventory could be the basis for an educational program or online resource guide that specifically targets the needs of public sector decision makers. A gap analysis would reveal areas in which additional programmatic investment is needed to support agency actions, and additional funding could be pursued from both traditional sources such as federal energy dollars and nontraditional sources such as private foundations to support these investments.

An inventory of needs and resources could be used as a basis for beginning a dialogue with potential public sector users of tools. The purpose of this

dialogue would be to determine the kinds of support agency staff feel they need to begin greening their building projects, and start mapping existing resources to those needs. Most likely there will be some needs that can be met with existing programs, while others can be met with enhancements to existing programs. Areas of need may also exist that cannot be met with current programs and for which new tools must be developed. The benefit of this action would be the effective use of existing resources and the ability to make strategic decisions about what new programs will be most critical to advancing green building within the organization.

### ***Developing a Unified Vision and Plan of Action***

If green building practices are to flourish among publicly-owned facilities, key stakeholders involved in planning, designing, constructing, operating, maintaining, and decommissioning those facilities must agree on a vision for what is desirable, and develop a coordinated and aligned plan of action to achieve that vision. As discussed earlier, the *Coalitions and Consensus* path for green building offers good potential for generating broad support and buy-in by represented stakeholders and can provide a platform for developing both the vision and action plan. The most basic structure of a coalition to support green building for publicly-owned facilities would be a voluntary council of interested parties who agree to establish a nexus of green building support for the jurisdiction. This working group could include both public agency facilities staff as well as elected and/or appointed officials and members of the private sector who have an interest in green building for the jurisdiction.

Through formal facilitation, such a group could generate draft policies and program recommendations that could be used to rally support and identify potential sticking points with constituencies throughout the jurisdiction. It could iteratively refine those drafts into policies with a high probability of executive or legislative success while generating momentum and enthusiasm among stakeholders of the policies. If senior leadership were receptive and supportive of such efforts, a formally appointed commission could achieve similar ends with even greater efficiency.

The outcome of a working group, be it voluntary or formally appointed, would be a broadly supported vision for what green building should look like for publicly-owned buildings within the organization's jurisdiction, plus a discrete and tangible action plan specifying intermediate steps necessary to achieve the vision. With sufficient iteration and refinement, those steps could be coupled with specific funding and implementation plans to support the execution of the entire action plan. The eventual result would be a broadly accepted and endorsed plan that could be issued as an executive order to motivate implementation. Consensus-based planning is likely to result in more willing and widespread adoption of green building goals and tactics than directives issuing from a single source. As such, the working group approach stands a higher chance of developing a plan that will be successful in achieving the true goal of this project: increased sustainability for publicly-owned buildings.

## CONCLUSIONS

The effectiveness of policy options depends on many factors specific to the context of implementation, including the level of expertise and experience with green building already existing in that context, the structure and culture of the organization in which the programs are being implemented, and the financial and other resources that can be applied toward the program. While observations made in this paper are based on a synthesis of data collected across multiple public sector organizations, the most effective approach for a given organization will depend on where that organization stands in its process of green building. Based on the findings of this paper, public sector stakeholders can consider a palette of policies and programs derived from the experiences of others that can be adapted to fit the context and requirements of their situations. The options and criteria established here can be adapted contextually and developed in more detail as needed to support the most effective selection of program elements to maximize the chances of success of those programs within their individual context.

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