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# Three State-run Green Building Programs: A Comparative Case Study Analysis and Assessment

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THREE STATE-RUN GREEN BUILDING PROGRAMS  
A COMPARATIVE CASE STUDY ANALYSIS AND ASSESSMENT

A Thesis Presented

By

HAIDEE N. JANAK

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
of the requirements for the degree of

**MASTER OF REGIONAL PLANNING**

September 2009

The Master of Regional Planning Program

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## ABSTRACT

### THREE STATE-RUN GREEN BUILDING PROGRAMS A COMPARATIVE CASE STUDY ANALYSIS AND ASSESSMENT

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Today, more than ever, the issue of sustainable development is at the forefront of how communities have been thinking about growth and the responsibility of government to create ways to accommodate growth while decreasing the carbon footprint of human habitation. The concept of 'green building,' i.e., the practice of using resources more efficiently while creating healthier and more energy-efficient buildings, has become more prevalent in recent years and state governments have begun to mandate or at least promote various levels of green building practices in order to decrease the negative environmental impacts of state construction. In an area of relatively little data, this thesis examines three of the most longstanding state-run green building programs in the country: CA, NY, and MN. Through a thorough literature review, in-depth case study of each state, and surveys/interviews of key people involved with the programs, the importance of the subject is established, and the structure, elements, and progress of each program is examined. A primary goal is to provide insight for other states that are looking into, or in the process of, starting their own green building program. It was found that high-level support for the program can be critical in its initial implementation, and that passing legislation is not necessarily superior to issuing an executive order. Accountability was agreed to be a crucial

component in all three states, and while none of the three programs had a large, full-time staff supporting the program, all of them considered themselves successful. It was determined that measuring progress or success is not as simple as counting the number of completed projects, but also involves types of assistance available, level of government support, outcome potential (e.g. long-term building efficiency, performance), etc.

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# CHAPTER 1

## INTRODUCTION

### **Green Building**

The construction of modern cities in general, and buildings in particular, can have significant negative impacts on the environment: from the clearing of natural areas for building sites and materials, to the burning of fossil fuels for heating and cooling, as well as transporting materials and workers, the ecological impact of modern buildings is enormous. In addition to these environmental impacts, buildings can also have direct effects on the physical and mental health of their occupants, and a degraded environment may also have more indirect aesthetic and spiritual implications. There are, however, current alternatives to such detrimental construction practices and unsustainable use of building materials. Known as “sustainable,” “high performance” or “green” building techniques, their aim is to build with a conscious effort to minimize environmental impacts through careful site selection and design, increased water and energy efficiency, and appropriate sourcing and use of materials. The most common name for this type of construction is “green building.”

Green building is fast becoming a well-known term, not only to environmentalists, but also to those in the construction business and in the public sector who oversee construction. Green building design and construction describes the practice of using resources more efficiently while creating healthier and more energy-efficient buildings (Green Building Solutions, 2008). It has also been characterized as building with a conscious effort to minimize negative and emphasize positive impacts on both the indoor and outdoor environment (ICC, 2007). It touches all aspects of the building process: demolition, design, site placement, construction, renovation, operation, and maintenance. According to the U.S. Environmental Protection Agency (EPA), the

components of green building are: energy efficiency and renewable energy; water efficiency; environmentally preferable building materials and specifications; waste reduction; toxics reduction; indoor air quality; and smart growth (development and conservation strategies that protect the natural environment and make communities more attractive, economically stronger and more socially diverse [EPA]) and sustainable development (term defined below).

Green building is a major component of the broader notion of “sustainable development.” Sustainable development has been defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, chapter 2). This widely used definition came out of the World Commission on the Environment and Development’s 1987 report, *Our Common Future* (commonly referred to as the Brundtland Report), and it was this report that made the concept of human impacts on the environment into a higher-profile international policy issue. The Brundtland Report, along with other reports and commissions that followed, created an organizational context in which the practices of green building could become not just accepted, but more common in the developed and developing world. But it was not only the wider global awareness of the need to change the way we build our cities that has allowed green building to move from a little known concept, advocated mainly by environmentalists, more towards the mainstream. It was also the greater understanding that built environments have a huge impact on the ecological health of the planet and on the personal health of individuals and communities, and that we have a direct ecological stake and economic interest as well as a social responsibility to protect these endowments well into the future.

### **Global Warming as Impetus**

To further galvanize the critical importance of this issue, the reality of global warming has moved to the forefront of the world socio-political conscience. With few exceptions, even the

most resistant political institutions have been forced to finally acknowledge the magnitude and anthropogenic sources of the problem. Considering that about 50 percent of the homes that the United States will need by the year 2030 have not yet been built (Rocky Mountain Institute (RMI), 2009), changing conventional building practices could result in a large percentage of building stock being more “green” in the future. The subsequent public pressure being placed on governments to act has resulted in more local and state governments in the United States establishing green building programs, incentives, and requirements (United States Green Building Council [USGBC], 2003). According to the USGBC, the three main factors advancing the growth of green building today are: the growing number and range of government initiatives at every level of governance; the heightened residential demand for green construction; and improvements in the quality of sustainable building materials.

### **Research Purpose**

This thesis highlights two main goals of green building as the key justifications for a study of green building programs:

1. A decrease in the carbon footprint of buildings, carbon footprint being defined as "...a measure of the exclusive total amount of carbon dioxide emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product" (Wiedmann & Minx, 2007, 4).
2. Improvement of human health by using more natural elements in building design and less harmful building supplies.

Specifically, this thesis examines three state-run green building programs. For purposes of this study, “state-run green building program” is defined as a government mandate requiring that the new construction or renovation (or both) of state-owned or funded projects be built to some

established green building standard. State-run green building programs have taken a number of forms, and have different requirements and extents, although the top-down format is similar by virtue of it being applicable state-wide.

A number of states have taken the lead in encouraging green building by providing state-run programs that promote and support it. An analysis of the most longstanding state-run programs in the country will help provide guidance and exemplars for other states interested in starting new, or improving existing, green building programs. It can also provide the basis by which to study the impacts that these programs are having on environmental and human health.

### **Why State-run Green Building Programs and Why CA, NY and MN?**

Until recently, state-run green building programs were uncommon. Very few existed ten years ago, and even as recently as four years ago, there were barely more than a dozen. There is also a concurrent dearth of in-depth or compiled information about state-run programs. States that are interested in starting programs would have trouble quickly or easily finding out which other states they could look to for models. This is not to say that beneficial information cannot be gleaned from the more prevalent city-run programs and applied at the state level, nor that a state-level program is necessarily superior or more desirable than local initiatives. It is simply that the focus of this study is on state-run programs, and on the opportunities and challenges of promoting green building at that level of political governance.

In 2005, the Massachusetts Executive Office of Environmental Affairs commissioned a study of state-run green building programs that was carried out by Industrial Economics, Incorporated (IEc) of Cambridge MA. It analyzed four statewide public sector “sustainable” building programs it determined to have the best potential to inform Massachusetts, based mainly on the fact that of all the states, those four had public sector green building policies and practices

in place for the longest time (IEc, 2005). This thesis was proposed as a case study of three states with well-established state-run green building programs. Because of the relatively nascent status of state-run green building programs, and because one of the goals of this thesis is to assess their programmatic strengths and weaknesses over time, it would be most useful to select states that have had a program in place long enough that there would be available data from which to draw significant conclusions.

The four states identified in the IEc study were California, New York, Minnesota and Pennsylvania. Preliminary research had already identified California as the state with the longest history and breadth of sustainable building public policy. IEc had identified three other states with established programs, so selecting two of those seemed appropriate. In selecting Minnesota and New York, a good geographic spread for program comparison was achieved. These three states also have a number of significant differences. New York differs from California in that it encourages, instead of requires, state projects to be LEED (Leadership in Energy and Environmental Design) certified (i.e. projects must be built to LEED standards but do not have to take the extra step of obtaining actual certification). Minnesota, unlike California or New York, whose green building initiatives were instituted by executive order, passed legislation requiring sustainable building practices. Minnesota has also created its own green building guidelines, rather than relying on the USGBC LEED standards.

### **Research Questions**

1. In what ways and to what extent do green building practices aim to preserve or enhance the quality of the environment?
2. In what ways and to what extent do green building practices aim to improve the health of the people and communities?



3. In what ways and to what extent are green building techniques cost effective relative to conventional building techniques?
4. What is the history of state-level green building programs in each of the case studies?
5. What is the political/legal status of the program, e.g., legislative versus executive order, mandatory versus voluntary or incentive-based?
  - What are the specific requirements of the programs?
6. What other state-level components exist (e.g. technical support, tax incentives, awareness and promotional campaigns, etc.)?
7. How many new green buildings and green remodels have been built from program inception to 2005, as compared to the number since the 2005 IEc study?
  - Has there been an increase in the rate of green building?
8. What has changed in program organization and implementation since 2005, and how has this affected the rate and quality of green building in the state?
9. What are the main lessons to be learned from these states' programs (what works and what does not) that would be potentially applicable and transferable to other states?

### **Goals and Objectives/Plan of Study**

The primary goals of this thesis are to identify the changes and progress that have been made in the green building programs chosen as case studies since the 2005 IEc study, to compare programmatic elements, identifying strengths and weaknesses, and to formulate the most readily transferable and applicable assessment criteria with which to compare state-run green building programs in terms of relative performance achieving similar goals.

The first objective is to identify and select three of the most established state-run green building programs, while ensuring that there is variation in terms of geographic location and

program type. The next step is to research the organization and evolution of those programs over time. It is critical to ascertain when the program began, who was involved in its creation, and whether there were obstacles to be overcome to implement it, and/or what facilitated its implementation. The organizational structure of each program will be examined, noting individuals or agencies in charge, and budgetary sources and constraints. How the program has changed and grown over the years will be studied using the 2005 IEc report as a baseline and examining specifically whether any of the challenges or programmatic weaknesses identified by IEc have been addressed.

## **CHAPTER 2**

### **LITERATURE REVIEW**

The purpose of this literature review is to establish the benefits of green building and to demonstrate that there is need as well as advantage for society to make a strong transition from conventional construction practices to green building practices. It will articulate the benefits of green building to the environment and to human health. It seeks to identify the strengths and shortcomings of state-run green building programs, and add to the body of existing literature on green building program organization and assessment. This review is divided into the following subsections: *The Impacts of Conventional Buildings*, *The Impacts of Green Buildings*, *Leadership in Energy and Environmental Design (LEED)*, *Cost/Benefits*, *State-run Green Building Programs*.

#### **The Impacts of Conventional Buildings**

The negative environmental consequences of conventional building practices are well documented. According to the USGBC “Green Building Facts” (February 2009), in the United States, buildings account for 72 percent of electricity consumption, 38.9 percent of energy use, 38 percent of carbon dioxide emissions, 30 percent of raw materials use, 30 percent of waste output (136 million tons annually) and 13.6 percent of potable water consumption (equaling 15 trillion gallons per year). According to the Rocky Mountain Institute (RMI), a non-profit sustainability consulting organization, there is a “culture of inefficiency” in the way that buildings are designed and built that is extremely resource-intensive. This usage translates into deforestation, air and water pollution, stratospheric ozone depletion, and increases in the risk of global warming (Roodman and Lenssen, 1995).

According to the Intergovernmental Panel on Climate Change (IPCC), global warming is

being caused by the intensification of the earth's natural greenhouse effect by human activities, primarily the burning of fossil fuels and clearing of forests. The "greenhouse effect" is the trapping of the sun's energy by atmospheric gases that is responsible for warmer temperatures than the earth would otherwise experience (EPA). The looming repercussions of climate change are a driving force behind the newfound appeal of green building requirements and incentives. There is new proof daily that the earth's climate is warming and that there are current as well as potential problems as a result. According to the U.S. National Oceanic and Atmospheric Administration (NOAA) increases in the atmospheric concentration of the greenhouse gas carbon dioxide accelerated last year (Wynn, 2009). This was despite hopes that with the economic downturn causing people to conserve energy and fuel, emissions would fall.

The United Nations-backed \$1.5 billion multi-national research program, called the International Polar Year (IPY), reports that the Arctic and Antarctic are warming faster than previously thought. Even though the IPY experts said the exact speed of these developments was difficult to measure, the investigation verifies that snow and ice are declining in both polar regions, leading to sea level rise and changes in global weather patterns (Reuters, 2009). And if the Antarctic ice sheet melts, geophysicists at the University of Toronto and Oregon State University have shown that North American coastlines would be some of the most affected. Their study has calculated a likely 21-foot sea level rise in Washington DC, flooding a significant portion of the populous city (University of Toronto, 2009). On the West Coast, recent studies have contributed to worries about the demise of agriculture in California because of water shortages resulting from the loss of the Sierra Nevada snowpack (Tankersley, 2009). Green building's focus on reducing carbon footprints can make significant headway in curbing the emissions of greenhouse gases that are accelerating global warming, as well as protecting

important ecological resources and services.

Even after the dust has settled from the construction process, conventional buildings can continue to be unhealthy to their inhabitants. Unhealthy indoor air, caused by the off-gassing of fumes from man-made building materials and HVAC (heating, ventilating, air-conditioning) design standards that don't adequately circulate outside air, is a big problem in the U.S. today. Sick Building Syndrome (SBS) has been acknowledged as a disease by the World Health Organization and is estimated to affect up to 30 percent of new and remodeled buildings worldwide (EPA IAQ website). A nationwide study done in 1987 by Woods, J.E. et al. found that 24 percent of a random sample of 600 office workers perceived air quality problems to exist in their office environments (Kreiss, 1990). Some of the symptoms reported by the workers were tiredness, headaches, congestion, eye irritation and difficulty breathing. Twenty percent felt that the indoor air quality affected their work performance. Regardless of whether attributable to physical or mental health impacts, it is estimated that the combined monetary losses due to the medical and productivity costs of unhealthy indoor air may go as high as tens of billions of dollars a year (Roodman and Lenssen, 1995).

### **The Impacts of Green Buildings**

Nadav Malin (1996,1) writes in *Environmental Building News* that “[c]ollectively we seem to be realizing that it makes no sense to look at the health of the planet and the well-being of humans as separate goals. These two agendas are interconnected on every level.” Many elements of green building work to simultaneously protect the environment and provide health benefits to the people living in it.

To assess the impacts of green building more clearly, it is necessary to establish the components of green building. Because the USGBC is the national leader in green building

certification, and its guidelines the standard adopted by most government entities implementing green building programs, it is appropriate to use the USGBC's established categories. Other studies, such as the 2003 *Costs and Financial Benefits of Green Building* report by Greg Kats, have taken a similar approach, referencing LEED because of its prevalence. Alternative criteria will be analyzed in the Case Study section of this thesis, as one of the study states uses its own green building guidelines. Taken from the latest project checklists (version 3) for new construction (NC) and existing buildings (EB), which are the main types of projects being certified, they are:

1. *Sustainable Sites* – Measures of sustainability based on site selection and development practices, like access to alternative transportation, habitat protection, stormwater management, and heat island reduction.
2. *Water Efficiency* – Including landscaping applications and wastewater reuse.
3. *Energy and Atmosphere* – Mostly energy efficiency criteria, including alternative energy, and refrigerant (air conditioning) management to minimize ozone depletion and global warming contributions.
4. *Materials and Resources* – Use of recycled materials and waste reduction practices, as well as local and sustainable new materials.
5. *Indoor Environmental Quality* – Low-emitting materials e.g. paints, cabinets, and carpets and increased outside air ventilation. Also daylight exposure and end-user control of lighting and thermal comfort.
6. *Innovation and Design Process* – This category awards up to six extra points for performance above LEED standards, having a LEED Accredited Professional on the design team and documenting sustainable building cost impacts.

7. *Regional Priority* – This category, new for 2009, awards up to four points for addressing geographically specific environmental priorities.

The full text of the project checklists for New Construction and Major Renovations, and Existing Buildings: Operations & Maintenance can be found in Appendix A. The checklists represent the latest LEED rating system updates and revisions. Known as LEED 2009, the new version represents a fairly significant change from the previous versions. While the core categories remain the same (except for the addition of Regional Priority), the weight of points has been adjusted to reflect a greater level of importance being given to life-cycle assessment and climate change benefits. The Green Roundtable, Boston Massachusetts' local USGBC affiliate, has put together a LEED Version 3.0 fact sheet available on their website at:

[http://www.nexusboston.com/action/information\\_resources/leed\\_2009.html](http://www.nexusboston.com/action/information_resources/leed_2009.html).

The inclusion in the checklist of some elements of green building are obvious, such as energy efficiency, but it may be less clear how some, like access to alternative transportation, can make a building green. If a commercial building is situated in an area where its tenants and their customers can get to it without having to drive their personal vehicles, the building will have a smaller “carbon footprint” (as defined earlier). This and other elements like habitat protection, which are not a physical part of a building, are included because, combined, all the criteria work to improve the local, regional, and even global environment.

### **Ecological Benefits**

Water efficiency is covered in two main ways: the conservation of potable water supply; and prevention of stormwater runoff, which can pollute area waterways by carrying pollutants from paved surfaces and depositing them in lakes, rivers and streams. Catching stormwater in cisterns or rain barrels and reusing it on the property for irrigation simultaneously conserves

drinking water and decreases stormwater runoff. Permeable paving, rain gardens (strategically placed planted areas) and other stormwater best management practices (BMPs) are used to absorb or prevent runoff. By preventing runoff, these techniques limit a number of negative consequences, such as combined sewer overflows into waterways, non-point source pollution and thereby protects drinking water supplies. It is important to note that the design, construction, maintenance and quality of the materials used in most stormwater BMPs is crucial to ensure their optimal functionality.

Energy efficiency reduces the need for power, thereby reducing the pollutants emitted by power plants, which in turn cuts down on air pollution and greenhouse gas emissions (Frumkin, 2003). Energy efficient heating and cooling systems, windows, insulation and compact fluorescent light bulbs are all examples of BMPs that conserve energy, thereby reducing the use of fossil fuel sources of power. The main benefit of this is a reduction in greenhouse gas emissions.

Another method aimed at slowing global warming, among other benefits, is the use of sustainably harvested or recycled wood products. Less deforestation and degradation of forest ecosystems would slow climate change and preserve biodiversity (Frumkin, 2003) because forests are carbon sinks, absorbing carbon dioxide before it reaches the atmosphere and contributes to the greenhouse effect.

### **Health Benefits**

Green building practices encompass a wide array of more natural and less toxic components of the building process. For example, low VOC (Volatile Organic Compounds) house paints do not emit the fumes that regular paints do, which can make some people feel sick and exacerbate existing conditions such as asthma (EPA, IAQ website). Natural flooring and



cabinetry do not contain the chemicals that carpeting, particle-board and adhesives do. Considering the fact that people spend, on average, 90 percent of the day indoors, it is not surprising that the design of and materials used in the construction of buildings is crucial to overall well-being. Indeed, low VOC paints, adhesives and sealants, and low-VOC emitting carpets, are some of the most likely to be implemented BMPs in LEED NC certified buildings (Yudelson, 2008).

The potentially healthier indoor air provided by a green building has been shown to increase worker satisfaction and productivity rates. In an attempt to show whether green buildings have positive effects on workers, a study was set up to monitor the manufacturing and office staff of a Herman Miller furniture factory (Heerwagen, 2001). Seven hundred workers were moved from an old building to a new, green building, constructed a few miles away. Green elements included energy efficiency, indoor air quality, natural light, and a restored wetlands and prairie landscape on site. The first noticeable effect was actually the lack of an effect. While moving to a new site and adding new staff are both disturbing activities that traditionally have produced at least a temporary drop in productivity, the expected drop did not occur in the move to the new green facility nor with the need to train new employees. Workers were asked to fill out a survey before and after the move. Job satisfaction was higher in the new building, as were self-ratings of work performance, and over 20 percent of the employees expressed an increased sense of being in good spirits while at work. Sixty percent of the workers perceived the new building as healthier. Meanwhile, studies conducted by Carnegie Mellon University's Center for Building Performance have shown that productivity levels in green buildings increase from 0.4 percent to 18 percent (Wilson, 2005), depending on the implementation. In buildings with natural ventilation (such as operable windows) and/or access to the outside, a gain of 0.4-7.5

percent was achieved, while buildings with daylighting systems that provided increased natural light saw a 3-18 percent gain (green-buildings.com).

Another interesting facet of the connection between green building and human health is that the literal greenness of some green building techniques can have salutary effects. Dr. Howard Frumkin, Director of the National Center for Environmental Health, researched the evidence for health benefits of the natural environment and found that “[c]ontact with the natural world may be directly beneficial to health” (Frumkin, 2001, 234). He posits that for the great majority of human existence, human health has been closely linked to the natural environment, since Hippocrates opined 2,500 years ago that there is a definite connection between people’s surroundings and their mental and physical well-being (Frumkin, 2003). Simply seeing natural features, in the yard or out the window can be good for your health.

A well-known study by R.S. Ulrich looked at hospital patient recovery rates when there was a view of nature versus a view of a brick wall. The study paired patients by similarities in age, weight and medical and hospitalization history, and concluded that those with a view of nature were released from the hospital sooner, requested significantly less pain medication, and had fewer negative notes made by nurses (Ulrich, 1984).

A study of prison inhabitants showed that those who had a window in their cells with a view of plants and birds were sick less often than those who did not (Moore, 1981). Studies of office workers with and without nature views showed similar results of fewer sick days, and also lower job stress and higher job satisfaction (Kaplan & Kaplan, 1989). As demonstrated by these studies, people of varying backgrounds in different situations reacted in a similarly positive way to being exposed to nature, strengthening the individual studies’ assertions.

## **Leadership in Energy and Environmental Design (LEED)**

Because of the prevalence of the USGBC's LEED guidelines in state-run green building programs, a brief explanation of LEED is necessary here. LEED is a green building rating system the criteria for which are created by consensus of committee members of the USGBC. The USGBC was founded in 1993 to promote green building in the United States, and is a non-profit organization made up of other organizations, companies, etc., with a stated goal of making green building available to everyone within a generation (USGBC website). From a base membership of 150 companies in 1998, it has grown to over 15,000 today. The LEED rating system was unveiled in 2000 and was the first rating system in the U.S. to take a holistic approach to assessing the environmental and health effects of commercial construction (Yudelson, 2008). LEED is a third party-verified system where applicants estimate the points for which their project qualifies and then receive an inspection by an independent reviewer to verify. Initially begun to rate commercial construction and renovation only, LEED has branched out to encompass all types of building, including the new rating for entire neighborhoods.

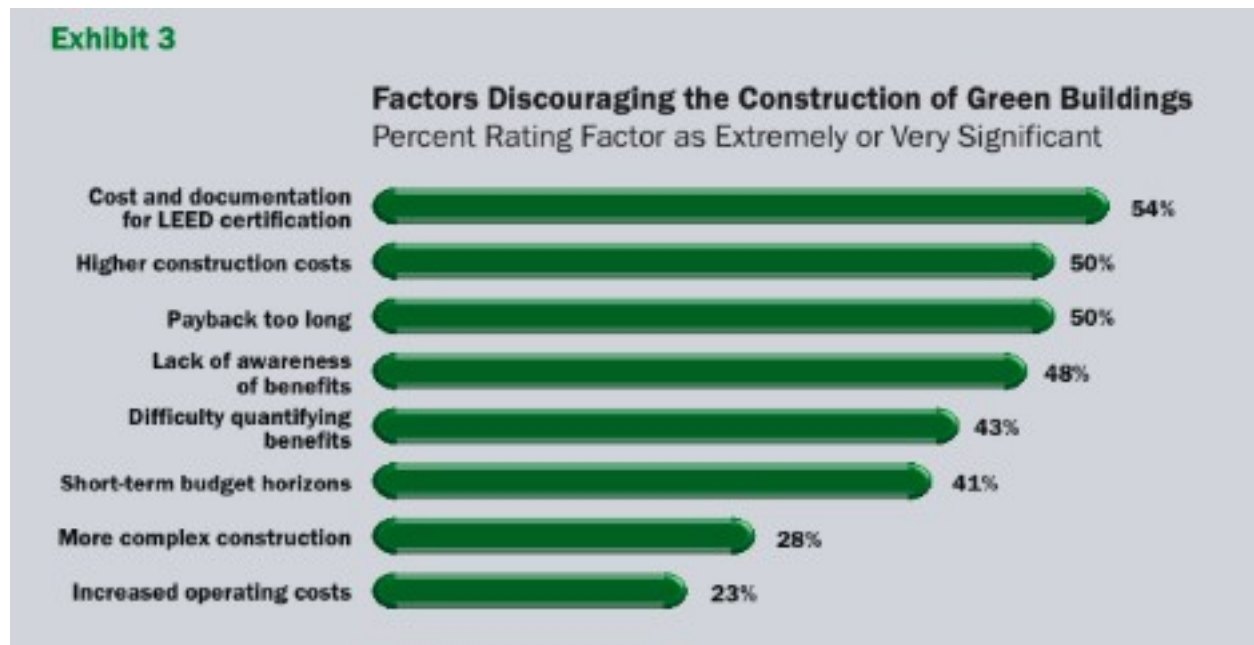
At present the LEED ratings categories are: New Construction, Existing Buildings, Commercial Interiors, Core and Shell, Schools, Retail (pilot phase), Healthcare (pilot phase), Homes, and Neighborhood Development (pilot phase). There are four levels of certification that projects can earn: Certified (more than 40 percent of the core points in the system), Silver (more than 50 percent of the core points), Gold (more than 60 percent) and Platinum (more than 80 percent). In addition to earning a certain number of points, the LEED rating systems have base requirements that all projects must meet for any level of certification. For LEED New Construction certification for example, all projects must take steps to prevent construction activity pollution, attain minimum energy performance and fundamental refrigerant

management, provide storage for and collection of recyclables, reach minimum indoor air quality performance, and take tobacco smoke control measures (or be a smoke-free building).

### Costs/Benefits

Historically, there has been the perception that building green costs more, in the actual construction phase and even taking into account cost savings over time, because of the difficulty in quantifying these factors (Suttell, 2006). This has fostered industry-wide hesitation to fully embrace green building practices. The perception that building green costs more remains the primary obstacle to green building today (Yudelson, 2008).

Turner Construction Company, in its fourth annual survey of the real estate/development/construction industry, found that 87 percent of executives believe that building green costs more. Of these, 50 percent strongly believe that higher construction costs discourage green building construction, and the same percent believe that the payback takes too long. There is the perception that the cost of LEED certification is prohibitive as well (see figure below).



Source: Turner Construction Company, *Green Building Market Barometer 2008* [accessed March 2009].

This perception has likely developed because green building measures can have higher first costs, i.e. sustainable finish products such as bamboo and certified wood generally cost more than standard products (Morris, 2007). But this doesn't take into account trade-offs that can be made by reducing material costs elsewhere, nor does it incorporate design strategies that save money upfront and in the long run. In a study done of 221 buildings, 83 of which were built to some LEED certification level, it was found that the buildings seeking LEED certification did so without needing additional funding (Morris & Matthiessen, 2007). The study found a large variation in costs of buildings even within the same building program category, but the key point was that as long as LEED certification was a goal from the beginning, it did not necessitate an increase from the original budget.

A study of 33 LEED certified buildings in California (all levels of certification) showed an average cost premium on building green of only 1.84 percent, equaling \$3 to \$5 per square foot (Kats, 2003). The study also showed that the buildings' green elements would, on average, result in savings of 20 percent of total construction costs over the life of the building, which works out to more than ten times the initial investment. The 33 buildings were selected because cost data existed for non-sustainable versions of the buildings which enabled the comparison, an apparent rarity in the industry. According to California's Sustainable Building Task Force, for whom the report was compiled, the research demonstrated conclusively that sustainable building can be a cost-effective investment in the long run.

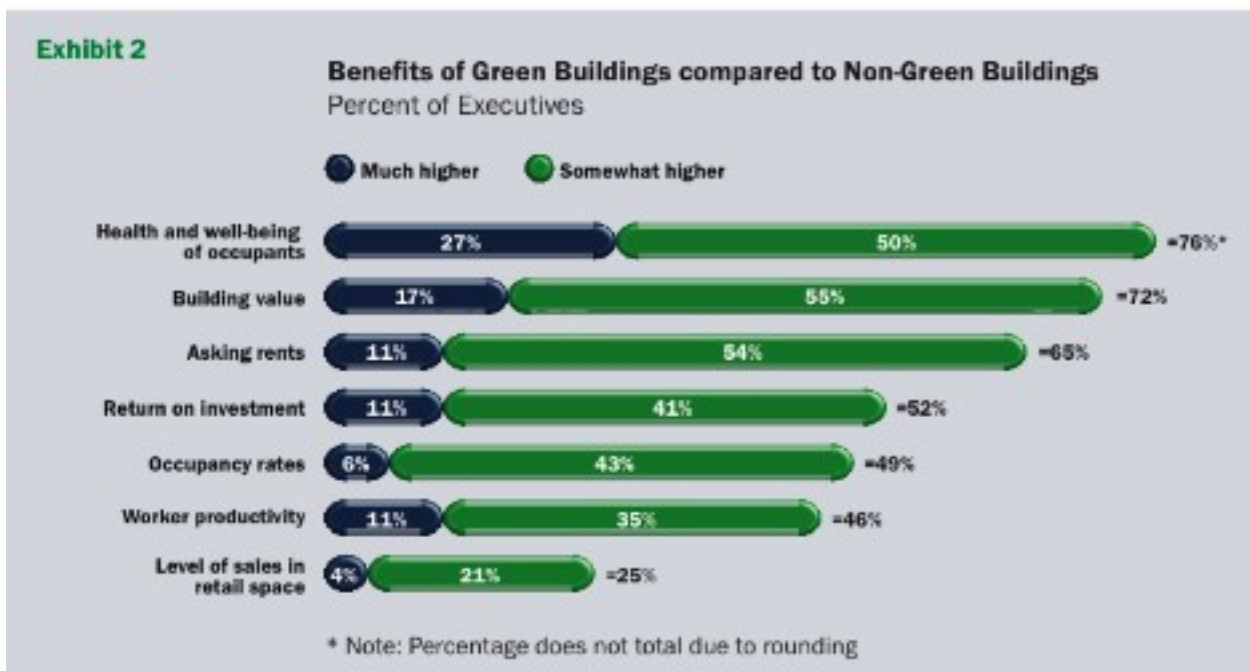
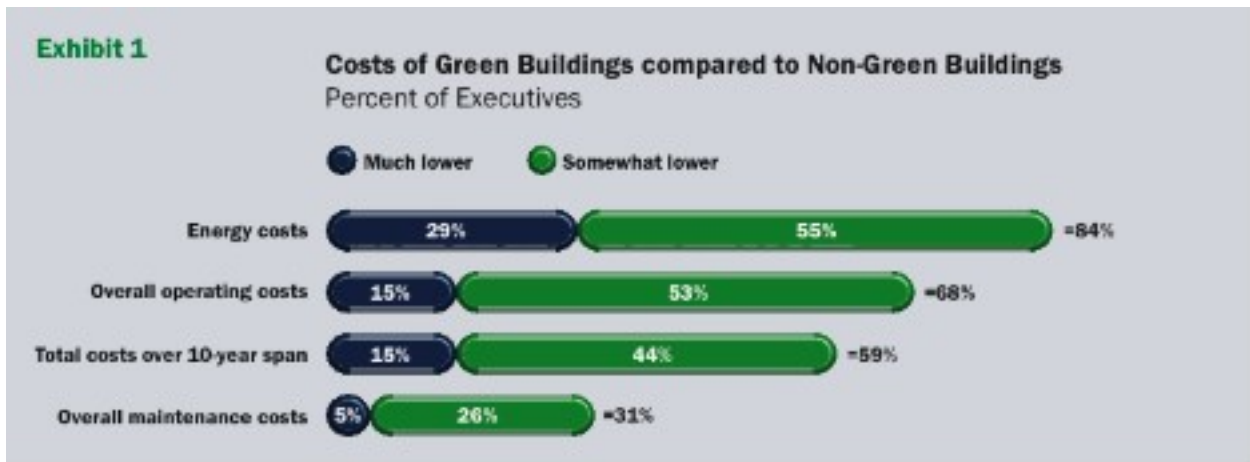
A Madison, WI based design firm wanted to show what the true cost premiums were for a sustainable building, so they redesigned an energy efficient office building that had just been finished to be LEED Gold certifiable, and put it out for competitive bidding. They analyzed bid results to confirm that inflation did not affect the price, and met with many of the subcontractors

to confirm that they included all sustainable design features in their bids. They found that the LEED Gold building would cost about \$4/square foot more, which translates to adding 50 cents/square foot to the annual rent, while quantifiable energy cost savings would be approximately \$1/square foot per year (Buildings.com, 2003). This study shows that although up front costs are higher, the immediate, yearly savings more than make up for it.

Energy savings is probably the easiest to understand of all the financial benefits of green building, and can apply to all types of buildings, while worker productivity, which is much harder to quantify, also has real potential for saving money. A number of studies have calculated the productivity cost benefits of green building BMPs. One study, looking at the effects of high performance lighting (high quality, energy efficient) found that worker productivity increases translated to \$1 to \$2 per square foot per year (Yudelson, 2008). And improved indoor air quality (via BMPs such as better ventilation and low VOC products) has been shown to reduce respiratory illness by 9–20 percent. This translates into 16 to 37 million fewer cases of colds and flu, and annual economic savings of \$6 to \$14 billion (Wilson, 2004). In fact, monetary gains from increased worker productivity, decreased turnover, and decreased absenteeism can surpass energy savings. Some of the other, less obvious, cost benefits attainable by building green are: lower insurance costs; faster lease-out and sales; waste construction disposal costs; tax credits and other incentives; and positive public image (Wilson, 2005).

Looking toward the future, it is notable that the initial cost premium of building green is negatively correlated to the actual direct experience of the professionals involved in each project. As green building becomes more common, and those involved in each aspect of the process get more knowledgeable and efficient, costs will likely be reduced (Yudelson, 2008). And, based on Turner Construction's barometer, the perception that green building does achieve numerous

positive outcomes is on the rise. The figures below show that in most categories the majority of executives believe that costs are lower and the benefits are higher in finished green buildings.



Source: Turner Construction Company, *Green Building Market Barometer 2008* [accessed March 2009].

### State-run Green Building Programs

According to the USGBC there are 31 states that have public sector LEED initiatives implemented at the statewide level. Table 1 below shows a breakdown of these states and the nature of the initiatives, and Appendix B lists the details of the initiatives. The tables are a

summary of the data provided by the USGBC, not an attempt to create a comprehensive listing of states that have green building initiatives. The data is up to date as of 2/01/09. The states in bold have policies that require state owned/funded construction projects to be built to some level of LEED certification, and the case study states are highlighted. Most states do use the LEED system (although not necessarily exclusively), however, preliminary research indicates that other states have non-LEED based programs. In addition, other states are at various stages of discussion and implementation of a green building program (please see the method discussion in Chapter Three for further details).

#### Table Key

<b>Legislation</b>	The state has passed legislation pertaining to green building
<b>Executive Order</b>	The state has an executive order from the Governor pertaining to green building
<b>Code Changes</b>	The state has modified existing building codes to facilitate green building
<b>Tax Incentive</b>	The state has tax incentives in place to encourage green building
<b>Financial Support</b>	Grant and loan programs or other direct funding opportunities are available for green building

Table 1

#### USGBC List Of States With Public Sector LEED Initiatives

State	Legislation	Executive Order	Code Changes	Tax incentive	Financial Support
<b>Arizona</b>		Yes, 2005			
Arkansas	Yes, 2005				
<b>California</b>	Yes, 2008	Yes, 2004	Yes, 2008		
<b>Colorado</b>	Yes, 2007	Yes, 2005			
<b>Connecticut</b>	Yes, 2007		Yes, 2007		Yes
<b>Florida</b>	Yes, 2008	Yes, 2007			
Hawaii	Yes, 2006				
Illinois	Yes, 2007				Yes
<b>Indiana</b>		Yes, 2008			
Kentucky	Yes, 2007				
Louisiana	See Appendix B				
Maine		Yes, 2003			
<b>Maryland</b>	Yes, 2008	Yes, 2001		Yes, 2001	
<b>Massachusetts</b>		Yes, 2007			
<b>Michigan</b>	Yes, 2005				
<b>Minnesota*</b>	Yes, 2007				
<b>New Jersey</b>	Yes, 2008	Yes, 2002			
<b>New Mexico</b>		Yes, 2006		Yes, 2007	



<b>State</b>	<b>Legislation</b>	<b>Executive Order</b>	<b>Code Changes</b>	<b>Tax incentive</b>	<b>Financial Support</b>
New York	Yes, 2008	Yes, 2001		Yes, 2000	Yes
<b>Nevada</b>	Yes, 2005, 2007			Yes, 2006	
North Carolina	Yes, 2007				
Ohio	See Appendix B				
<b>Oklahoma</b>	Yes, 2008				
Oregon				Yes	
Pennsylvania	Yes, 2005				Yes
<b>Rhode Island</b>		Yes, 2005			
<b>South Carolina</b>	Yes, 2007				
<b>South Dakota</b>	Yes, 2008				
<b>Virginia</b>		Yes, 2007		Yes, 2008	
<b>Washington</b>	Yes, 2005				
<b>Wisconsin</b>		Yes, 2006			

\*Minnesota has developed its own sustainable building guidelines that state-funded projects must follow

Source: USGBC <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852#state>

The evidence indicates that places that have green building programs have higher rates of green building construction compared to places that do not. For example, California has the most registered LEED projects in the country (California Integrated Waste Management Board [CIWMB] website), and also has the largest number of green building programs in the nation (38 percent of all programs nationwide, with only 12 percent of the total population) (American Institute of Architects [AIA], 2007).

There are two main ways in which states are promoting green building: by requiring it, and by training or hiring staff to offer technical support to the public. An increasing number of state and local governments are requiring green building standards for government buildings and government-funded building projects. Although green building requirements for some private buildings are increasing, incentives are still the prevalent approach (Wendt, 2008). The practice of creating mandatory green building standards for the private sector is still relatively rare (International Code Council (ICC), 2007). A handful of municipalities have done so, including Austin, TX; Battery Park City, NY (within NYC); Santa Cruz, CA; Seattle, WA; and Telluride,

CO (ICC, 2007), but statewide mandatory green building programs still focus on government buildings. The State of Illinois has organized a Green Development and Construction Program that offers technical support services to residential and commercial designers, builders, realtors, private citizens and industrial manufacturers of building materials (Illinois Waste Management and Research Center, Green Development and Construction Program). The program's staff can help builders calculate cost-benefit analyses, find locations to recycle construction waste, and navigate through the maze of regulatory requirements to ensure that they are all met. Builders in Illinois can now contact one entity in order to get help with all the aspects of a green project, making the whole process seem much less daunting and more worthwhile.

Research studies that analyze state-run green building programs are relatively scarce. The bulk of existing analysis uncovered in this research focuses on the more prevalent city and county-wide programs, and the majority of statewide programs that have been analyzed are not directly overseen by government but rather by private, nonprofit or partnership organizations. This limitation in the literature makes this thesis, with its focus on state-run programs, all the more timely and relevant.

The American Institute of Architects (AIA) undertook a study of municipal green building programs in 2007 (AIA, 2007). Their goal was to analyze the growth and effectiveness of green building policies in cities of 50,000 people or more. They identified a notable lack of current, comprehensive data on green building programs as the impetus for their study, and hoped that their report would provide invaluable information for other municipalities to follow. Their main methodology was to survey representatives from each community. Among their questions were the number of years that the green building program existed; the extent of the program; whether it applied to just public buildings or all buildings; types of incentives offered by communities;

and what the regional strengths and weaknesses were. They created a “Quick Reference Matrix” organized by state and municipality, which is included as Appendix C.

Earlier, a study conducted in 2002 by the National Association of Home Builders (NAHB) Research Center identified and analyzed 26 residential green building programs throughout the country (NAHB, 2002). The NAHB wanted to focus on residential building, and so deliberately excluded commercial green building programs. The study divided each program into categories, summarizing the rating structure, certification method, level of certification, year of inception, number of builders, incentives offered, and number of homes constructed to date. Homebuilders associations administered the majority of programs, leaving only five that were city- or county-run. Also, not a single one was a statewide program. While the focus of this study was mostly on local, residential programs, it can still help complement or supplement a useful framework of criteria by which analysis of state-run programs could be conducted.

A study conducted in 2005 for the Georgia Environmental Facilities Authority identified eleven states that had a statewide green building program in place (Dubose, et al. 2005). The study, conducted by researchers from the Georgia Institute of Technology and Virginia Tech, focused on programs that promoted green building practices for state funded, owned or leased buildings. Most green building programs focus on regulating government construction first and foremost, leaving green building a voluntary or incentive-based endeavor for the private sector in most cities. But the effects of leading by example and providing things like tax incentives and technical support should not be overlooked in the analysis of successful green building programs. The GIT/Virginia Tech methodology included direct interviews, web research and case study analyses. Their study was framed by four elements: Inspiration, Motivation, Implementation and Evaluation. These elements provided a structure the authors created to facilitate the analysis of

different green building programs. Their key findings were organized in terms of “inhibitors” (challenges) and “enablers” (opportunities), listed as an “if, then” scenario. *If* this was the challenge, *then* this would be the opportunity to overcome it.

Also in 2005, the Massachusetts Executive Office of Environmental Affairs (now the Executive Office of Energy and Environmental Affairs [EEA]) retained Industrial Economics, Incorporated (IEc) to research and analyze existing state-level green building programs nationwide in order to support efforts to develop a program in Massachusetts (IEc, 2005). IEc identified four out of 19 states that had public sector programs and policies to do a more in-depth analysis. The four states were California, New York, Minnesota and Pennsylvania. Their main goals were to identify policies that advanced the construction of green buildings and to determine the best management practices in order to develop recommendations for Massachusetts. Their primary methodology was a survey divided into questions pertaining to seven categories: Vision and Leadership; Education and Training; Sustainable Design Metrics; Standards, Codes, and Regulations; Capital Versus Operating Budgets; Incentives; and Bidding and Awarding Process. They supplemented this direct contact with documents available from state websites. This study most closely meshed with the thesis’ original research questions and thus has become an integral guide to the organization of the thesis.

## **Summary**

The preceding literature review has addressed the actual and potential ecological and human health impacts of conventional buildings as compared to green buildings, and has indicated that a more comprehensive transition to green building would have a number of desirable advantages. It has focused on LEED as the most common green building rating system in use in this country and has summarized and explained its components. It has reviewed the

costs and benefits of green building, examining building industry perceptions, and noting potential expenses and savings relative to conventional building. It has discussed several studies regarding green building programs of varied scope and authority that can help guide this thesis. It has determined that there has been limited analysis of state-run green building programs.

The literature review has formed the basis for addressing the key research questions of this thesis, and the methods chapter to follow will outline the process that was followed to select the cases and to conduct the case research and analysis that will constitute the remaining chapters of the study.

## **CHAPTER 3**

### **RESEARCH METHOD**

The Purpose of this thesis is to analyze three of the most longstanding state-run green building programs in the country in order to provide guidance and best practices for other states interested in starting new, or improving existing, green building programs. It is also intended to provide a basis by which to study the impacts that these programs are expected to have on environmental and human health. Key areas that will be explored include the ways in which and the extent to which green building practices aim to preserve or enhance the quality of the environment, as well as the health of people and communities. Program histories, elements and the effect the programs have had on implementing green building in the state will be evaluated. Please refer to the list of research questions, goals and objectives at the end of Chapter One for a more full, detailed discussion of this research strategy.

The first three research questions, which refer to green building programs more generally, were addressed through a review of the academic and professional literature pertaining to the environmental effects of the built environment, the effects of nature on human health, sustainable building design and construction, and the connections between all three. Questions 4-9 focus on state-run green building programs, assessed in terms of their respective origins and development, program capacities and characteristics, and degrees of effectiveness in meeting and measuring specific performance objectives.

#### **Case Study Selection**

In order to research and compare the three states' programmatic elements the comparative case study technique was employed. Case studies are best utilized when seeking to answer the questions "how" and "why." They differ from simple histories in that they involve direct

observation of the events being studied and interviews of the people involved in the events (Yin, 2009). The case study method is also preferred when examining contemporary events. One of the main objectives of case studies is to highlight exemplary projects and concepts that are worthy of replication and can inform future practice (Francis, 1999). In seeking to examine the attributes of three of the most established state-run green building programs in the nation, this research gathers data that lays out concepts that are contemporary and replicable by other states.

Selecting the state programs on which to conduct case studies involved researching on the internet, contacting the Green Roundtable (Boston's USGBC affiliate) and the USGBC, and speaking with professional planners involved in green building. Internet research specifically involved searching scholarly databases for articles and studies as well as utilizing general search engines to find state government, green building, and other websites. In order to select states whose programs were fundamentally similar, it was necessary to define what a "state-run green building program" is for the purposes of this study. The term "state-run green building program" refers to a government mandate requiring that the new construction or renovation (or both) of state-owned or funded projects be built to some established green building standard. This would help ensure that cases be reasonably comparable, i.e., not too heterogeneous. This definition was determined based on the program types assessed in the IEc study and from other research that indicated that this type of state-run program was the most common.

Initial research led clearly to the selection of California as having one of the most established state-run programs, but it was less clear which other states to choose. While most green building professionals agreed that California would be a good study state, there was no consensus opinion identifying any other state with similar credentials, in part because they were more familiar with municipal programs, many of which predate California's state-run program.

The study conducted by IEc in 2005 identified all the states with a state-run green building program, singling out California, Minnesota, Pennsylvania and New York as among the states with the most longstanding programs. Based on the IEc list, California, Minnesota and New York were chosen in order to provide the greatest geographic diversity and because each of those three states had different types of green building requirements and program development histories. Expanding the three-state scope of the thesis to be able to accommodate all four states was considered, but ultimately rejected due to time constraints. Much has happened in the green building field since 2005, so re-examining some of the states that were analyzed in 2005 could show the change and progress the programs have made, as well as give an overview of programs that have been in existence long enough to offer good examples for other states interested in starting or improving their programs.

### **Survey Instrument**

In addition to information gleaned from state websites, key green building personnel in each state were contacted either by email, telephone or both. Each state's program is organized differently, so there is no uniform type of position held by counterparts in each state. There are state personnel from the departments of waste and recycling, general services, energy, and housing, as well as non-government employees within the state university system, or in private architecture and engineering firms. Every effort was made to contact the same people who were surveyed in 2005 or their successors, as well as the person listed as a state contact on the USGBC website. In addition, each contact was asked to recommend other appropriate contacts in their state.

A survey instrument was created for each state to facilitate this interview process and to achieve as much consistency and commensurability in the case studies as possible (see Appendix



D). The process for creating the questions began with an initial brainstorming of which general factors would be most important to know about each state's program. This included questions such as *What has been the most difficult (and easiest) aspect of the program to implement? Who have been the champions of green building in your state? What new green building requirements are in progress in your state?* Then the IEc study's "Results of In-Depth Analysis" section for each of the three states was examined and state-specific questions, based on responses to the IEc survey, were extrapolated. For example, a question formulated for California asked why the state abandoned its original green building rating system in favor of adopting LEED, and New York was asked why its program does not require actual LEED certification. Another reason to create tailored questions was to ensure that this thesis was building on the IEc survey questions and eliciting answers that updated the original responses. As a last step, the IEc survey form was scrutinized to see if any key questions were missed. In addition to seeking updated information on the programs, some questions were included in the survey, even though the answers would not likely change over time, in case a different person could provide further or other information. The interview questions asked by the researchers in the Dubose study (from the literature review) were also examined for additional relevant survey questions. This mix of uniformly consistent and custom-tailored questions allowed for a more fine-grained comparing and contrasting of the respective case studies.

### **Case Study Organization**

The case studies were organized so that the thesis research questions and objectives would be met for each state in parallel order. Each case study begins with a brief history of sustainable development and green building in the state, and a summary of green building implementations up to and as reported by the 2005 IEc study. The next section discusses the developments that

have occurred from the 2005 study to the present day. The third section summarizes the survey data collected for each state.

Two assessment matrices were created to facilitate the temporal and comparative analyses, one listing progression by state over time and the second comparing each program to the others. The elements chosen for inclusion in the matrices were based on the program evaluation conducted in the case studies. California and New York used LEED, although New York does not require certification, while Minnesota created its own set of guidelines. A comparison of LEED and Minnesota's Sustainable Building Guidelines with other kinds of national or state agency certification programs would be extremely informative, but is beyond the scope of this thesis. Key matrix categories include: program start date; level of authority; green building standard used; and results data, i.e., how much green building has resulted from the initiative. The matrices enable key differences and similarities between states to be seen at a glance and in relationship, and provide a template by which future studies could analyze more states or update existing states by filling in the blanks.

### **Delimitations/Limitations**

This thesis looks at state-run green building programs and even more specifically, state-run programs that have mandated green building for state-funded projects. This excludes the potential examination of states that officially encourage green building but do not require it, or that rely on existing government requirements, such as energy codes, that result in some of the same benefits as green building. Nor does it include in its analysis green building programs at the municipal level, or at the state level, but sponsored by non-profit or private organizations. While those types of programs would be interesting and would add significantly to the body of knowledge on green building programs, they are too far beyond the time, resource and method

scope of this particular study to include their analysis as well. Please see the discussion of directions for future research in the final chapter.

It was similarly determined to limit the scope of the research conducted on certification programs. There are a number of other national certification programs, Green Globes for example, and municipalities and states have developed their own guidelines, but the effort to examine and compare them all would not be possible within the chosen research framework.

It is not the intention of this study to closely examine the metrics used to evaluate the quality of different programs' outcomes, i.e. with programs based on LEED certification, it is assumed that a LEED Silver building in one state would be as environmentally healthy as in another. With Minnesota, which uses its own green building guidelines, it is assumed that a building that is certified through their program is roughly equivalent to its LEED counterparts. The aim of this thesis was to compare three different programs' origins, elements and perceived success in constructing green buildings in their state, not to measure the exact levels of greenness achieved.

The USGBC website provides a list of 31 states that have a regulation that involves LEED certification. From this starting point it seemed that it would not be too difficult to research the remaining 19 states to see if they have a non-LEED program, like Minnesota. However, the initial strategy of going to the state's main web page and searching on the term "green building," was soon found to be insufficient. A more thorough technique involved searching state websites for the department that seemed most likely to house a person who would have knowledge of green building initiatives and calling them. This proved very time-consuming, because there is wide variation between states on types and names of departments, so finding a likely department was not straightforward, and the process involved leaving a lot of unanswered messages. In

addition, subtleties, such as the fact that a bill requiring green building was moving through committees and expected to become law in the near future, were taking more time to collect and interpret than expected. Further, it was realized that even if a state was included on the USGBC list for having a LEED-based initiative, that did not mean that it did not have another type of green building requirement in place or in process as well, so completing a truly comprehensive listing of states with green building regulations would be a large endeavor, clearly outside the original scope of this thesis. However, the work has been started, so the data that were collected are included in this thesis as Appendix E. It is also important to note, for the benefit of future research such as this, that the National Association of State Facilities Administrators (NASFA) has a listserv, and so would be able to send an email to the states with representative members. According to Marcia Stone, NASFA Executive Director, the listserv would reach most states, and she was happy to distribute a query about the existence of green building initiatives. This process resulted in far more responses (25 to date), in a fraction of the time spent searching state websites and making somewhat ad hoc 'cold' phone calls. (See final chapter for more on this.)

It was very difficult to obtain information on exact numbers of green buildings built under the state requirements in New York. No websites with the information could be found, nor did the survey participants know, or know where to find out. The state entities affected by Executive Order 111 are required to fill out an annual energy report and list any LEED certified projects, but this yielded evidence of only one LEED certified building since 2005. This may be partially because there appears to be a significant delay before the reports are filed or released. For example, the latest report was dated January, 2009 and accounted for fiscal year 2006/07. According to staff at NYSERDA, because New York does not require LEED certification, just LEED certifiability, there is no tracking of compliant buildings, which posed the largest

limitation. Because of this limitation, it was suggested to utilize the USGBC website's list of certified and registered buildings, but while it is possible to search by state, there is no tracking of whether or not the building is public. Owners are listed, which meant it would be possible to count some obvious state-owned buildings, but there were too many uncertainties to use that method confidently. Moreover, there are 975 registered buildings in the state, which would have made scanning the lists for ownership very time-consuming. And because New York's green building executive order is carried out individually by all the affected state entities (approximately 200), contacting every single one and attempting to find out if they were tracking that data internally was not possible within the time frame of this thesis.

This thesis sought to evaluate the changes that occurred within each program from the 2005 benchmark established by the IEc study, to the present. Specific points made in the study were extracted and framed as survey questions in an effort to garner updated data. The initial plan was to create a table that would succinctly reflect these changes over time, and create a potential model for assessing other programs' progress. In creating the questionnaire for each state as well as when analyzing the responses however, it became clear that creation of an adaptable model would be problematic. Many of the items selected to be updated were either particular to that state, had not changed, or the survey participants did not know the answer. In addition, an intended key measure to assess effectiveness, how many more projects were completed since 2005, turned out to be more complex than initially thought, and not necessarily an adequate measure. Consequently, the idea for a table was abandoned. Principal items, such as the new legislation, initiatives, tax incentives, etc. that had been enacted, and specific changes within the programs since 2005 are discussed in the New Developments sections of the case studies.

Despite these constraints and boundaries on the range of information identified, collected and examined, the method described above nevertheless will allow for an intensive process of case study analysis and assessment, generate significant comparative findings regarding program design and development, as well as indicate potentially transferable ‘best practices’ and ‘keys to success’ among the state-run programs compared. The following chapter will present data from the case studies, and the chapter after that will interpret and evaluate the case studies in relation to one another.

## **CHAPTER 4**

### **CASE STUDIES**

The following three chapters consist of a case study of each of the three focus states, California, Minnesota and New York. Each study is divided into three main sections: Background, New Developments and Survey Results. Additional subheadings pertain to the specific state initiatives and their respective staffing, support and compliance data. The Background section describes a brief history of green building in the state, including and up to the developments reported by IEc in 2005. New Developments describes what has occurred in regards to green building from 2005 until the present. Survey Results categorizes and summarizes the respondent's answers to the survey questions.

## **CHAPTER 5**

### **CALIFORNIA**

#### **Background**

The State of California has long been a leader in environmental stewardship, from passing the largest (in terms of incentives, \$3.2 billion) solar energy policy ever enacted in the U.S. (and second only to Germany worldwide) (Broehl, 2006), to building the largest LEED Gold rated building in the world (at the time of its completion in 2003), the Capital Area East End Complex (Department of General Services [DGS]).

California has a long history of green building initiatives, from before the term “green building” had become part of the national lexicon. The Warren-Alquist State Energy Resources Conservation and Development Act was enacted in 1975 in reaction to the rapidly increasing demand for electric energy. The Act, calling for energy efficiency in buildings, was passed to combat the depletion of natural resources and potential threats to the state's environmental quality (Building Standards Commission [BSC]).

By the 1990's, advocates of green building at the California Integrated Waste Management Board (CIWMB) had begun a campaign for a statewide sustainable building program. They developed an Action Plan to promote an executive-level program and develop a grant program for education and training.

Around the same time, the design and development of the Capital Area East End Complex began. According to IEc, as the largest public building project in the state, with annual energy saving of about \$400,000, the complex served to rally California's various environmental and public health agencies to work together to expand green building efforts.



## **Executive Order D-16-00**

In August 2000, former California Governor Gray Davis signed Executive Order D-16-00. This executive order stated as its main goal to “site, design, deconstruct, construct, renovate, operate, and maintain state buildings that are models of energy, water, and materials efficiency; while providing healthy, productive and comfortable indoor environments and long-term benefits to Californians” (State of California, 2000). It assigned the Secretary for State and Consumer Services, Aileen Adams, the responsibility to coordinate implementation of the executive order, and provide annual status reports to the Governor and Legislature. Secretary Adams established the Sustainable Building Task Force to develop a strategy to achieve the goals set forth in Executive Order D-16-00. The Task Force consisted of representatives from various state agencies with expertise in green building. They came up with Blueprint 2001, a list of 10 recommended action items to best start integrating sustainability objectives into state buildings, including green building standards, incentives and educational materials. An update, Blueprint 2003, gave a progress report on the state’s sustainable building efforts. It highlighted notable policy and program achievements, described key task force partnerships, examined several significant sustainable building projects, and detailed future task force goals (CIWMB website). As of 2003, the state had succeeded in incorporating sustainable building and energy efficiency requirements for over \$2 billion of design and construction projects; reducing average energy use by 20 percent in state buildings; developing green building policies for the public college system; building the East End Complex as well as other green building projects; and publishing the most comprehensive cost-benefit analysis of green building to date. It had also implemented a large grant program and conducted education and training on management of construction waste and selection of materials (IEc, 2005).

In developing its green building program, California implemented its own two-tiered set of standards, but those were soon abandoned in favor of adopting LEED. IEc reported that the two-tier system failed as a result of implementation difficulties. Employees with DGS and CIWMB interviewed for this thesis, attributed the abandonment of the two-tier system to its complexity and lack of accountability that made it impossible to enforce.

### **Executive Order S-20-04: the “Green Building Initiative”**

On December 14<sup>th</sup> 2004, Governor Schwarzenegger signed Executive Order S-20-04, which requires all new and major renovations of state-owned facilities, 10,000 square feet or more, be paid for with state funds to be certified as LEED Silver or higher. In addition, all existing State buildings over 50,000 square feet are required to meet LEED EB (existing buildings) standards (State of California, 2004). Buildings under 10,000 square feet have to follow the same design standard but don't have to be certified. It calls for reducing electricity consumption in state buildings by at least 20 percent by the year 2015 and has provisions for purchasing energy efficient equipment. The order requires creation of a life-cycle cost assessment methodology to be used to evaluate the cost-effectiveness of building design and construction decisions, and their impact over a facility's life cycle. It further requires the creation of a plan to accomplish the benchmarking of all commercial and public buildings in California. The executive order has instructions to encourage cities, counties and schools to follow the provisions of the executive order as well.

Executive Order S-20-04 established the Green Action Team, supplanting the Sustainable Energy Task Force as the entity responsible for implementation of the Order. Like the Task Force, the interagency team is chaired by the Secretary for State and Consumer Services Agency. Other members include the Director of the Department of Finance; the Secretaries of Business,

Transportation and Housing; and a commissioner from the California Public Utility Commission. The blueprint for this executive order is detailed in the Green Action Plan.

### **Staffing and Support**

According to the IEC report, roughly 40 people were assigned to spend significant time on implementing the green building program. Seven were dedicated staff from CIWMB, with four of the seven positions newly created for the program. The Energy Commission had about five dedicated staff and the Air Resources Board a few more, while DGS had a LEED coordinator. CIWMB was in charge of training state employees such as architects, engineers and planners in how to follow Executive Order S-20-04, and many DGS employees became LEED accredited professionals (experts on the LEED certification process). Today, CIWMB has reduced its green building staff to two people who focus mostly on waste diversion and conduct some outreach. This is because implementation of Executive Order S-20-04 has since moved to DGS. DGS only has two staff members focused on green building, however, green building policy has become so diffused throughout the state system that literally hundreds of people are being trained and are working on green building initiatives for their particular agency. According to Dan Burgoyne, Sustainability Manager at DGS, 1/3 to 1/2 of designers, engineers, architects, and project managers are trained fairly extensively on green buildings and LEED. Other agencies, such as the Departments of Transportation (Caltrans), Parks, and Corrections design and build their own smaller buildings, and have received green building training from DGS.

The programs are funded from various sources. From the beginning, LEED is built into all project budgets for new construction or major renovations. LEED for existing buildings is funded from a budget allocation from the State's general fund. This addresses large state owned buildings specifically. Savings from reduced operating costs helps support this program as well.

Retrocommissioning (i.e., improving the energy efficiency and occupancy comfort) of existing buildings is funded through the Department of General Services general fund, with public utilities covering the costs of engineering studies. Retrocommissioning is also partially sustained through energy savings.

Education and outreach activities included annual reports, presentations, fact sheets, websites, and in-person training. Conducting workshops and a presence at green building events and trade shows were the main strategies used to inform the public about green building and the state's program.

### **Compliance**

By 2005, three state construction projects had completed the LEED certification process, while another seven had registered. Of the three, two were new construction and one was a renovation project. Eighteen more projects were in various stages of planning and evaluation to see if it would be cost-effective to certify them. Noting a lack of comprehensive statistics available, IEC reported two LEED certified projects in the University of California system with another two registered, and over 40 projects in the community college system pursuing LEED.

DGS tracks the various green building accomplishments occurring in the state and periodically releases a summary. According to the March, 2009 document, 14 new construction projects have achieved LEED certification; three certified, seven silver and four gold. There are 222 buildings seeking LEED certification, including 24 under 10,000 square feet (which are not required to get actual certification). Six buildings have received LEED for Existing Buildings certification; four gold and 2 platinum. Sixty existing buildings have registered to be certified and DGS has assessed 42 more for possible certification. In keeping with the state's goal to benchmark all occupied state facilities, energy data has been collected for over 97 percent of the

buildings. In addition, the retrocommissioning of 43 projects has been completed or is underway in the effort to retrocommission all buildings greater than 50,000 sq. ft. by June 30, 2013.

According to the USGBC, 327 projects have been LEED certified and 2,274 are registered to be certified in the entire state, as of April 20, 2009.

### **New Developments**

IEc reported a number of issues that existed within California's state program, as well as some goals that were being worked towards, for example, performing post-occupancy (or facility performance) evaluations on all new LEED buildings in the state. While there has been no standard established, some evaluations are taking place, and the state is still working with The Berkeley Center for the Built Environment on this issue. IEc reported that while energy use in LEED buildings is being tracked, water use is not. This is changing right now, as the state prepares to start monitoring water usage. Also, DGS is now working with utility companies to automate the collection of energy use data, which the utilities are required to do by law.

In 2005, the State Energy Code exceeded LEED requirements. In 2007, Title 24 of the California Building Standards Code was changed to exceed ASHRAE 90.1 (The American Society of Heating, Refrigerating and Air Conditioning Engineers energy standard for buildings) by 15-20 percent depending on the building type. So California still exceeds national standards.

On July 17, 2008, the California Building Standards Commission passed the California Green Building Standards Code (commonly referred to as the CalGreen Code). This first in the nation green building code requires all new construction be built to a green building standard outlined in the code. The categories in which sustainable construction practices are required or encouraged are: Planning and design; Energy efficiency; Water efficiency and conservation; Material conservation and resource efficiency; and Environmental air quality. The code applies

to: “every building or structure or any appurtenances connected or attached to such building structures throughout the State of California” (State of California, 2008, 3). As published, it includes mandatory provisions with a delayed effective date for housing, and voluntary standards for hospitals and other non-residential buildings. Adherence to the code will be voluntary through 2009, to allow time to adjust to the new requirements, after which it is expected to become mandatory in 2010. Because many municipalities have more stringent regulations in place, the code is written to defer to local policies where that is the case. BSC is currently working with state agencies and stakeholders to develop the mandatory and voluntary provisions for the 2010 edition of the CalGreen Code. According to Dan Burgoyne of DGS, adherence to the CalGreen Code would not be equivalent to LEED certification. He has personally done an analysis and found that if all the mandatory credits were implemented, a building would not even meet the basic LEED certification level. He points out however, that the purpose of this first edition of the code is to establish a framework in order to decide what to make mandatory in the 2010 edition. In addition, there are items that are included in the code that go beyond LEED requirements. For example, there are more items related to recycled content in cement, moisture control (to discourage mold growth), enhanced equipment durability and life-cycle assessment.

On September 23, 2008, Governor Arnold Schwarzenegger signed Assembly Bill 1389. Item number 38 of this bill would require the Department of Housing and Community Development to review relevant green building guidelines when preparing proposed building standards for submittal to the BSC. Further, it must consider proposing that green building features that are determined by the department to be cost effective and feasible, be mandatory. It also requires the department to provide summaries of its recommendations in an annual report to

the Legislature. In essence this bill will ensure that green building continues in the state even if a change in administration abolishes the Executive Orders.

In an effort to increase the energy efficiency in existing state buildings, buildings 50,000 square feet and larger are undergoing a retrocommissioning process to optimize existing energy systems and improve energy performance. This is expected to yield a reduction in energy use of at least eight percent. Existing buildings are also being retrofitted with more energy-efficient equipment. Retrofit projects are expected to yield a reduction in energy use of at least 12 percent.

The State has begun working with Scientific Communications Systems (SCS) SCS-002 standard to assess the life-cycle impacts of buildings. The aim is to measure the environmental impacts of building construction to try to eliminate environmental tradeoffs. For example, recycled content in cement reduces energy use, but could increase toxic levels in the cement. DGS is involved in a pilot project working with product manufacturers to help establish some baseline impact levels for different materials (Burgoyne, 2009).

According to Dan Burgoyne of DGS, California is participating in a pilot of a portfolio program with the USGBC. The intention is to streamline the certification process for large developers and owners of multiple properties. Some included features will be discounts for certifying multiple projects, and certifying prototypical designs for ease of future certification (for chain customers e.g., Lowe's Home Improvement and Bank of America). The hope is that this will save time and money and ultimately, increase the number of certified green buildings.

## **Survey Results**

### *Respondents*

Two of the people most involved in green building in California in the two most prevalent agencies working on green building agreed to be interviewed and/or filled out the survey form.

Dan Burgoyne is the Sustainability Manager in the Executive Office of the State of California Department of General Services (DGS). He has been in his current position for about seven years and served on the Board of Directors for the USGBC and the California Commissioning Collaborative for part of that time. Prior to that, he worked in building design, construction and project management for about 17 years. He also works in green purchasing and teaches at the University of California, Davis and California State University, Sacramento. Mr. Burgoyne was interviewed for the 2005 IEC study. DGS is in charge of land procurement for the State as well as maintenance of procured buildings.

Gregory Dick is a Senior Integrated Waste Management Specialist with the California Integrated Waste Management Board (CIWMB). He has worked for CIWMB's green building program since 2002. He was recently a member of the Building Standards Commission's Green Building Advisory Committee, and is currently the alternate to the CIWMB Chair on the Collaborative for High Performance School's Board of Directors.

### *Lessons Learned*

After Executive Order S-20-04 was signed, it took approximately six months for agencies to start implementing the requirements. This short adjustment period is attributed to the fact that the order was very clear, and green building in the state had already been encouraged by Executive Order D-16-00. The order was generally accepted without opposition, credited mostly to the Governor's effectiveness as a strong environmental leader. California respondents believe that the top-down approach taken by its leaders has been very successful and instrumental in the success of its program. The greatest ease in implementation has been reported to be in the New Construction Program.



Less simple has been establishing metrics so that progress can be measured. Energy use was not being tracked, so benchmarking had to be done, and there was difficulty in persuading all the agencies to comply. But probably the biggest obstacle in the past and still today is the separation of capital and operating budgets. It is very difficult to convince those in charge of up-front costs to spend more so that money can be saved in the long run. This is especially true when energy efficiency and cost savings can be obtained in cheaper ways. Both survey respondents feel that this will continue to be a problem into the future.

California's state-run program has always been very top-down. The Executive Orders came from the Governor's office and required state employees to organize and implement them. Task forces were established first and were made up of the heads of the different agencies that were subject to the executive orders, orienting them from the onset. DGS reports that there was some resistance to the green building policy from upper management in the past, but this was easily resolved by making the department heads aware of the issue. They would simply refer to the executive order and make it clear there was no room for discussion.

In fact, this is the most important advice coming from California respondents: get executive sponsorship. Without it, they believe it will be far more difficult because people in government are resistant to change. Second, a mandate is also extremely desirable, and can be very effective even without as much high-level support. Accountability is also crucial. California believes that their requirement to achieve LEED Silver certification leaves no doubt about whether a building has met recognized green standards, and they would definitely recommend LEED to other states. A final recommendation is to start out with a pilot project, make sure it demonstrates a high level of environmental and financial benefits, and publicize it well so it will be a great tool to convince those in higher levels of government that green building is worthwhile.

### *Components of Success*

There are more champions of green building now than ever before. The Governor has been instrumental not only for signing the executive order, but as a vocal and recognizable advocate of the environment. There are individual champions within the state agencies and “green teams” have been created throughout state government to ensure that there is green building occurring in all sectors.

Both California respondents believe their green building program is a success. They are both in positions that deal with numerous officials, government entities and the general public, and have the sense that everyone feels good about it; that it is the right thing to do. Also, they can better see the benefits, because at this point there are enough completed green buildings that everyone can see first-hand what has been created.

There are actual measures of success too. In terms of energy use, they are seeing an average 25 percent improvement over energy code in new construction. There is significant energy savings occurring with existing buildings as well. Another measure is that progress is steady. For example, the state is starting to benchmark water use, and zero net-energy building (i.e., producing at least as much energy as is consumed) is gaining ground. Basically, California is beginning to institutionalize green building as part of the normal way of doing business, which they see as genuine evidence of success.

The attitude in California is that the government is expected to lead by example. Support for green building has come from the highest levels which gives it credibility throughout all levels of government and into the private sector. In the government sector, the stick is more effective than the carrot, while in the private sector, incentives are more acceptable. This is how green building has been promoted in California and it has been very successful. A challenge

with a government run program, however, is that it can take significant time to get started, and the building process often takes longer than in the private sector, which affects the ability to gauge progress. There also may be more room for innovation in the private sector, and less scrutiny and justification needed for spending.

Both respondents believe that there has been an increase in green building in the private sector since the public sector program began. This is most noticeable and likely related in the Sacramento area, where private construction is getting LEED certified in order to attract government tenants. It appears that a large number of corporations are recognizing the benefits, including employee retention and health benefits. And it has become generally believed in the real estate industry that green building measures increase a project's value. Another metric is that the number of LEED certified projects keeps growing, and many schools are also participating in green building programs. Moreover, at least 33 municipalities have adopted LEED for city buildings, and eight or nine have mandatory requirements in place for all new construction.

Pursuant to Executive Order S-20-04, California has developed a life-cycle cost assessment protocol. Housed in DGS, the Life Cycle Cost Assessment (LCCA) model is a critical tool in determining whether implementing certain energy conservation measures is cost effective (DGS, 2009). This is most helpful in justifying higher up-front costs when it can be shown that savings will result in the long run. Indeed, according to DGS the most noticeable cost benefits of green building in the state are reduced energy costs and increased building longevity.

#### *Program Standards*

California's green building program began by implementing its own green building standards, which were soon abandoned in favor of LEED. They believe that LEED is taken

more seriously than a self-fashioned program would be, because of its ubiquity and built-in accountability (i.e. third party certification). There is validation in using a known rating system, in that at a national conference for example, a California building can be touted as being LEED Gold rated, and everyone would understand basically what that means. California respondents definitely recommended LEED for other states seeking to implement a green building program.

California twice has used executive orders to encourage and mandate green building in the state, which has worked very well so far. But legislation is thought to be a good strategy as well. Green building legislation in California was recently struck down by Governor Schwarzenegger despite being promoted by DGS, but it had more to do with how the legislation was written than what it was about, since the Governor is generally a supporter of green building mandates. DGS would prefer to see legislation, because that ensures the regulation's longevity even with a change in administration, although at this point, it is doubtful that a new administration would weaken or abolish the green building requirements.

Executive Order S-20-04 works well, despite no express support in the form of technical or financial assistance. California has done a very good job of marketing and advertising its green building program such that it would reflect poorly on an agency to construct a building that didn't achieve a LEED Silver rating. It would likely be a big news story and the fear of negative publicity can be a very good incentive. DGS has been conducting a great deal of outreach, and also provides training for state agencies.

#### *Additional Information*

Assembly Bill 32 was signed into law in 2006 and requires the California Air Resources Board (CARB) to develop regulations and market mechanisms that will ultimately reduce California's greenhouse gas emissions by 25 percent by the year 2020 (CARB, 2009). While

specifically focused on carbon emissions, the legislation still serves as an additional inducement to encourage the carbon-conserving aspects of green building.

The California Environmental Protection Agency hosts the Governor's Environmental and Economic Leadership Awards. Considered the state's highest, most prestigious environmental honor, they are awarded to individuals, organizations and businesses that have demonstrated outstanding environmental and economic leadership. Another example of the top-down approach California takes regarding environmental policy, the awards program is an incentive that promotes a very encouraging atmosphere for green building.

Anecdotally, those involved in the State's green building program make sure to include Governor Schwarzenegger in publicity events as much as possible, because he is a leader who appreciates the limelight more than most, and it benefits the green building efforts being made in California to have such a renowned public figure supporting them.

## **Summary**

California's green building program has been in effect for less than five years but has grown very quickly, in large part because of the support and attention paid to it by Governor Schwarzenegger, who exceeded previous green building policies by signing Executive Order S-20-04. Prior to that, California had a history of environmental policies in the public sector and attitudes in the private sector that likely have contributed to the speed at which green building initiatives and activities have progressed in the state. State buildings are required to obtain at least LEED Silver certification in order to be in compliance with S-20-04, which has made tracking the number of green buildings constructed under the mandate simple, and verifies a recognizable level of greenness.

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## CHAPTER 6

### MINNESOTA

#### **Background**

Minnesota's sustainable history dates back to 1976 when the state's first energy code was passed, legislating energy efficiency measures in new buildings as well as remodels. This was followed in 1980 by a regulation requiring gas and electric utilities to perform pilot conservation programs. The 1980s saw the beginning of prototypical green building design at the University of Minnesota with the Regional Daylighting Center and the Minnesota Building Research Center. The University would continue to play a major role in green building research and implementation up to the present day. In 1994 two electric utilities collaborated to create "Energy Advantage Home," which promoted energy efficiency and sustainable home building practices in the utilities' service territories (USGBC Mississippi Headwaters Chapter).

Minnesota's Office of Environmental Assistance (OEA), collaboratively with local architects, the University of Minnesota and the Hennepin County Facilities Department, created a Sustainable Design Guide for Hennepin County. Published in 1997, it was also promoted statewide by OEA (IEc, 2005). In 1999 it was modified and became the Minnesota Sustainable Design Guide which was adopted by several public agencies and used as a guideline for public buildings.

In 2001, the Center for Sustainable Building Research (CSBR) was established in the University of Minnesota's College of Architecture and Landscape Architecture. CSBR would later become a major player in the guidelines development and data collecting aspects of Minnesota's green building program.

## **The Energy Security and Reliability Act**

Also in 2001, the state legislature passed the Energy Security and Reliability Act, requiring the Departments of Administration and Commerce to develop sustainable building guidelines for all new state buildings that receive bond funding. The Act also required the Department of Administration and Finance to collect information on energy use in all public buildings in order to establish energy efficiency benchmarks and future conservation goals (IEc, 2005). The Governor signed the bill into law on May 29<sup>th</sup>.

Version 1.0 of the Minnesota Sustainable Building Guidelines (also known as B3 for Buildings, Benchmarks and Beyond) went into effect on January 15<sup>th</sup>, 2004 and was designed to be compatible with national guidelines such as LEED, while maintaining regional values, priorities and requirements (University of Minnesota [UMN], 2009). Adopting LEED had been considered but it was decided to expand upon the existing Minnesota Sustainable Design Guide. The general feeling was that guidelines that were more specific to Minnesota would better serve the state, and that they could go further than LEED in some areas, such as water issues (Carter, 2009). The Sustainable Building Guidelines were also designed to be more holistic, in that most of the elements are required, unlike LEED which allows more picking and choosing between categories (IEc, 2005).

## **The Minnesota Sustainable Building Guidelines (MSBG)**

In September of 2006 the Minnesota Sustainable Building Guidelines version 2.0 became available. Version 2.0 is more outcome oriented, focusing on measuring the actual achievements of compliance with the guidelines. To summarize the legislation, the guidelines must: exceed existing energy code by at least 30 percent; achieve lowest possible lifetime costs for new buildings; encourage continual energy conservation improvements in new buildings; ensure good



indoor air quality; create and maintain a healthy environment; facilitate productivity improvements; specify ways to reduce material costs; and consider the long-term operating costs of the building. The guidelines apply to all new buildings, of any size, funded in whole or part by Minnesota bond funds.

The MSBG is not a certification program. Projects receiving state bond money are required to comply by law. Projects are deemed ‘compliant’ rather than certified. Compliance is verified by the planning, design and operations team, and the level of compliance is reviewed and approved by the appropriated agency (the agency who received the bond funds on the project's behalf) (UMN, 2009).

The guidelines are performance-based, meaning that a measure is not just checked off a list when completed. Built into the guidelines is a requirement for explicit documentation that will record progress. There are no points for meeting certain criteria; guidelines are simply required. Three of the five categories include recommended guidelines as well. Outcomes are documented on forms with embedded calculation tools, with the goal to collect data on outcomes wherever possible (UMN, 2009). The performance indicators that should be calculable by applying the guidelines are project life-cycle costs, human impacts and related costs, environmental impacts, and community impacts and related costs. The guidelines are organized into the following categories:

1. *Performance Management* – Support successful performance improvements by documenting progress towards performance criteria throughout the planning, design, and construction phases. Also addresses the creation and use of the team necessary to achieve these goals, and the thorough evaluation of current and future needs so that all facilities are well-utilized and represent a responsible use of economic and natural

- resources over time (life-cycle cost).
2. *Site and Water* – Requires site selection and design measures that avoid (preferably) or protect critical environmental sites. Must have stormwater and soil management plans to mitigate runoff and preserve biological and hydrological functions. Includes light pollution and erosion control measures as well as building and landscaping water efficiency.
  3. *Energy and Atmosphere* – Requires energy use reduction by at least 30 percent and consideration of power usage from renewable energy and cleaner generation systems, as well as considering global warming and ozone depletion potential in selecting refrigerants. Also seeks to provide building performance data for benchmarking activities.
  4. *Indoor Environmental Quality* – Requires the use of low-emitting materials, and tobacco smoke restriction. Also requires comfort measures such as moisture control, ventilation design, thermal comfort and daylight, and other interior environmental conditions to promote occupant health, well-being and productivity.
  5. *Materials and Waste* – Requires life-cycle assessments of at least two alternative scenarios for building assembly materials. The use of salvage, recycled or local materials is encouraged. Waste minimization and recycling is required, during construction and in completed building operation.

The complete checklist of required and recommended guidelines can be found in Appendix F. A link to the website from where the full text of the guidelines can be downloaded is provided in the sources list.

## **Staffing and Support**

Unlike most other programs, the MSBG are managed by a team of consultants, not by any government agencies. Project management and delivery is led by LHB, Inc., a private engineering and architectural firm while the guideline development process is led by CSBR and the public building benchmarking is led by The Weidt Group, a software design firm creating environmental impact assessment software. The annual budget provided for the whole consultant team is \$500,000 a year, coming at least in part from the Minnesota Conservation Improvement Program (CIP) that requires utilities to invest 1.5 percent of their annual income in conservation programs. This amount has not changed from the amount reported by IEc in 2005.

Government agencies are important partners however, with the Minnesota Pollution Control Agency (MPCA) (which merged with OEA in 2005), providing in-house and grant funding to support green building projects. The MPCA's Sustainable Development Unit has sponsored events on green building to raise awareness and increase the capacity of Minnesota builders, designers, architects, contractors, product suppliers, local governments, and state agencies to green the built environment (MPCA, 2009). The B3 consultant team has participated in this outreach work. MPCA has worked with other state and local government officials, community groups, private developers, building professionals, academic institutions, and private citizens to advance sustainable building practices in Minnesota. This has created an abundance of Minnesota-specific green building information. Moreover, the agency has supported creation of design guidelines, product directories, deconstruction and reuse services, local manufacturing of innovative building products, a toolkit for K-12 schools, and demonstration projects.

In terms of full-time staff however, there are very few people working on the state's program at that level. There has actually been a decrease in state staff due to budget cuts. The

consultant organizations spend the most time on it, with CSBR allocating about 1.5 full-time staff, LHB about the same, and the Weidt Group contributing less than one.

## **Compliance**

As of the 2005 IEC study, 10 to 15 projects were underway that were subject to the Sustainable Building Guidelines. In addition, three large public projects had been built according to the 1997 Design Guide and other projects were known to be using the guidelines voluntarily, although how many was not known. Minnesota also had 15 projects in the entire state registered for LEED.

CSBR tracks state projects that follow the guidelines, as well as those that are exempted. They categorize the projects into six groups: those known to be in compliance; those that are likely in compliance; unknown; exempt; likely exempt; and those that believe themselves to be exempt. Progress reporting has been an issue, so it is difficult to say exactly how many buildings have been completed. Of the 109 projects being actively tracked by CSBR, only 2 are known to have been completed, however, another 20 were in middle or final stages of construction, so may actually be completed at this point.

They also are attempting to track projects using the guidelines voluntarily, i.e. not subject to the legislated requirement. There are currently four such projects of which they are cognizant.

According to the USGBC, as of April 20, 2009, 36 projects have been LEED certified and 225 are registered to be certified in the entire state.

## **New Developments**

On May 25<sup>th</sup>, 2007, Governor Pawlenty signed into law the Next Generation Energy Act of 2007. This main purpose of the energy bill is to codify energy efficiency measures and mandate the increasing use of renewable sources of energy, setting specific goals, assigning responsible

commissioners and agencies, and allocating funding (State of Minnesota, 2007). The two main goals of the legislation are: to reduce per capita use of fossil fuel as an energy source by 15 percent by the year 2015; and derive 25 percent of the total energy used in the state from renewable energy resources by the year 2025. To meet these goals in part, the legislation requires that utilities provide programs that facilitate Energy Star-labeling, and LEED or Green Globes certification. Moreover, it sets a goal to achieve certification of 1,000 commercial buildings as Energy Star-labeled, and 100 commercial buildings as LEED Certified or Green Globes-certified by December 31, 2010.

On May 9<sup>th</sup> 2008, the Minnesota legislature required the establishment of sustainable guidelines for major renovations of state buildings. The text of the bill, Section 3, Subdivision 9, Paragraph (a) reads: “The purpose of this subdivision is to establish cost-effective energy-efficiency performance standards for new and substantially reconstructed commercial, industrial, and institutional buildings that can significantly reduce carbon dioxide emissions by lowering energy use in new and substantially reconstructed buildings. For the purposes of this subdivision, the establishment of these standards may be referred to as Sustainable Building 2030” (State of Minnesota, 2008). While deferring to the guideline developers to create a definition for “major renovations,” the legislation does specify that the definition may not refer to less than 10,000 square feet or less than the complete replacement of the mechanical, ventilation, or cooling system of the building or section of the building. The legislation also provides for grants to be awarded for applied research and development projects that identify new technologies or strategies to maximize energy savings, improve the effectiveness of energy conservation programs, or document the carbon dioxide reductions from energy conservation programs. The law applies to all major renovations receiving bond funding after January 1, 2009.

CSBG was again responsible for the new guideline formulation, which was completed and made available for public comment as Public Review Draft Version 2.1. until April 1, 2009. The combined New Buildings and Major Renovations guidelines are called the B3 State of Minnesota Sustainable Building Guidelines (UMN, 2009).

Beginning in 2007 with a pilot phase, Minnesota GreenStar was made public in February of 2008. It is a voluntary residential green building standard and certification program for both new construction and remodels. Run as a non-profit organization, it educates homeowners, builders and remodelers on green building, and provides third-party certification of projects (Minnesota Greenstar, 2009). Simply adopting a national green building standard was considered, but like the guidelines for state buildings, it was decided that an approach that embraces Minnesota's specific climate and natural resources and leverages its building codes, would result in a superior program for Minnesotan users.

## **Survey Results**

### *Respondents*

Two of the three respondents from Minnesota had participated in the 2005 IEc study, Laura Miller and Rick Carter. Another IEc participant, the Director of the CSBR, was not available to be interviewed at the time of this study, so Jonee Kulman Brigham, AIA, LEED AP, Research Coordinator at the Center, agreed to be interviewed in his stead. Ms. Brigham is a co-Principal Investigator for the B3 State of Minnesota Sustainable Building Guidelines. She also works on residential green remodeling guidelines, sustainable post occupancy evaluations, materials life-cycle analysis, and represents the Center as a board member of the Mississippi Headwaters Chapter of the US Green Building Council (USGBC).

Laura Miller is a Green Building Specialist in the Sustainable Community Development division of the Minnesota Pollution Control Agency (MPCA). She has worked on green building for more than a decade in essentially the same position but for different organizations that merged into the current MPCA.

Rick Carter, AIA, serves as Project Manager for the B3 State of Minnesota Sustainable Building Guidelines, and is Vice President of the Minneapolis office of LHB, Engineers and Architects. Mr. Carter is a member of the USGBC and is a LEED Accredited Professional. He helped develop the Hennepin County/Minnesota Sustainable Design Guidelines and has been working on green building and sustainable design for more than 17 years.

### *Lessons Learned*

Survey respondents identified a number of challenges. Submission of documentation and regular reporting to CSBR, which is responsible for tracking participation, has been slow. This is partly because people are busy, not really because they are trying to avoid following the green guidelines per se. But there is no sense of consequences, even though it is the law. Nowhere is it addressed what will happen if a project is not in compliance, so there is no accountability. One strategy being used to address this issue is an online tool being developed by the Weidt Group for tracking progress. This tool is expected to increase the project visibility and incentivize progress reporting. Similarly, a requirement to file a report at the end of the design phase to show that a project is on track would be superior to the current practice of a simple final project sign-off.

Another issue that has arisen involves agencies discovering that they are required to meet the guidelines after the work has begun on a project. Or similarly, there is awareness of the guidelines, but what they actually entail has been a big surprise for some agencies once they look

at them in detail. The lesson in these situations is that outreach and education are extremely important.

IEc noted that the separation of capital and operating budgets was problematic for green building in Minnesota. According to respondents, this has not changed, and is an economic disincentive since money can be lost in the long run by the inability to spend more up front.

Data collection and analysis on green building projects to determine best practices has been difficult. Funding has just been acquired for post-occupancy evaluation through the University of Minnesota, which is a good first step. With the funding, CSBR is piloting a post-occupancy survey tool that will provide feedback on occupant satisfaction and performance outcomes.

Some key advice coming from those involved in Minnesota's program is to focus on measuring actual performance. They are most excited about the fact that their program is designed to lead to quantifiable outcomes. They recommend having performance-based criteria wherever possible, not prescriptive. They use the life-cycle assessment tools from the Athena Institute and emphasize an approach that encompasses a larger picture than a simple *must contain 10 percent recycled materials* (e.g.) approach. In addition, they recommend quantifying the desired outcomes of a green building program and then working backwards to devise the techniques to reach those outcomes. And enforcement is critical, putting measures in place at the very start of a program, so it is clear and participants know there are significant consequences for noncompliance. Education and outreach are very important as are improved tools to help people better understand program details and requirements. Minnesota respondents moreover definitely recommend talking to other states about their programs.



### *Components of Success*

Minnesota's state green building requirements are described as having developed from a 'bottom-up' approach. While there have definitely been key people in government championing the program, e.g., legislators who brought the Energy Security and Reliability Act to the table, there is really not a significant amount of higher-up support. Most of the drive has come from employees from a few state agencies, academia and the building industry. The partnership of CSBR, LHB and the Weidt Group, which runs the state's program, is a case in point.

The consensus among survey participants is that Minnesota's program is a success, although their reasons suggest an array of perspectives. All three respondents acknowledged that there hasn't been much building yet, but they are able to indicate a number of achievements that measure progress. It has transformed the design of bond-funded buildings, and there are several hundred in the design process right now. It is estimated that a B3 building would achieve at least a LEED Certified rating following required measures, and a higher rating if recommended elements were implemented. Minnesota respondents believe it is the design of the program that is evidence of its success. The benchmarking, performance-based regulations, plus the required post-occupancy reporting, will result in one of the most demonstrably successful green building standards in the nation.

The benefits of a state-level program include the ability to lead by example and introduce changes that cross municipal boundaries. Because it is a state program, agencies can customize it to assist them in managing resources and addressing local issues, and making decisions when sufficient data is collected. There is also an opportunity for the program to serve as a vehicle for improved inter-departmental communication and collaboration. In addition, public and private

programs complement each other, and a local program can be more agile than a statewide one, changing to meet needs much more quickly.

While difficult to prove that it is related to the State's program, respondents do believe there has been an increase in green building in the private sector. There has been a noticeable increase in the number of LEED certified and registered buildings since the State's program began, and some localities are talking about adopting green building guidelines (either B3 or LEED) for all new construction.

The number one cost benefit identified by respondents was energy savings. Also cited were return on investment, and reduced absenteeism. This was a challenging question because Minnesota has not collected sufficient data for a large number of projects yet.

Life-cycle assessment is included in the green building guidelines, but it is more intention than actuality at this point. It is addressed at both a required level and a recommended level, the requisite criteria being to conduct life-cycle energy cost analysis and to design at the lowest cost. Respondents agreed there was still much work to do in this area.

The IEc study reported that Minnesota was working on tracking the performance of new buildings using the guidelines. The guidelines explicitly require annual reporting of items such as energy and water use, but the procedure is not very accessible at the moment, and is still being refined.

### *Program Standards*

Minnesota had guidelines that were in use before LEED was established, and moreover, the State wanted a more prescriptive and Minnesota-specific approach. They wanted something that was regionally-focused and outcome-based. The green building mandate became law attached to

an energy bill, and some legislators felt that it had been snuck in. This resulted in a legislative audit and a one-year freeze on funding.

The legislation lacks enforcement, and so operates on an honor system. There is no agency oversight, but despite some procrastination on the reporting end, overall, it seems to be working in terms of encouraging green building.

#### *Additional Information*

The state is tracking the voluntary use of the MSBG to some extent, but not aggressively. CSBR has a database of projects using it, but there is no formal mechanism. They are only aware of a project if it is reported to them. Another hope for the online tools in development is that voluntary users will adopt them, which will make them easily trackable. The guidelines are freely available to interested parties, so in general, there is an assumption that others are likely using them.

There is a lot going on in the mainstream green building arena. The state has adopted the Sustainable Buildings 2030 statute that amends the Minnesota Sustainable Building Guidelines to require that all new state-funded buildings be designed to reduce use of fossil fuel energy 60 percent by 2010, 70 percent by 2015, 80 percent by 2020 and 90 percent by 2025. In addition, the state has allocated money for its implementation. Minnesota Green Star for residential buildings recently started, and Green Communities promotes green affordable housing. The Minnesota Housing Finance Agency requires the use of Green Communities to get funding. There is the potential for competition between Green Star and LEED for homes, but the local chapters have come to an understanding that they are different tools, and even have some joint promotional brochures. There is an effort in its early stages to create a green rating system for cities, which will help connect city policies and the needs of businesses. A green appraisal

system for homes is in development, which will enable an assessment of the value of green measures over time. CSBR was awarded research funding from the USGBC to develop a Midwest green building case study program in conjunction with Milwaukee, WI and Chicago, IL. There are a few green building executive orders as well, pertaining to a goal of a certain number of LEED and Energy Star certified buildings.

### **Summary**

Minnesota's Sustainable Building Guidelines have been in effect for more than five years and are resulting in the significantly more ecologically friendly design of bond-funded buildings. The program was initially championed and is currently run by green building advocates in the private sector, although the help of supportive members of the state legislature was critical in winning passage of the legislation that required development of the MSBG. The status reporting on the buildings built using the MSBG has been lackluster in general, making a count of completed projects difficult, although overall compliance has been good. The Sustainable Building Guidelines are Minnesota-specific and most of the measures are required, which its proponents believe has the potential to result in greener projects than those using established national and international programs.

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## **CHAPTER 7**

### **NEW YORK**

#### **Background**

Sustainability efforts in New York date back to at least 1970 when the New York State Department of Environmental Conservation (DEC) was created. The DEC was established to coordinate the environmental efforts of multiple existing departments, and took control of water quality, air pollution, and solid and hazardous waste issues. Shortly thereafter in 1975, the New York State Energy Research and Development Authority (NYSERDA) was formed. Initially focused on reducing the state's dependence on petroleum, the organization expanded to include research on the environmental effects of energy consumption, development of renewable resources, and advancement of innovative technologies (NYSERDA, 2009). NYSEDA, with its focus on energy conservation and innovative technologies, was well prepared to become the agency most likely to begin advocating for green building, which it did start to do in the early 1990s (IEc, 2005). Early efforts included offering energy efficiency and materials analyses as well as training and assistance in developing design guidelines.

A number of green building projects were built in the 1990s, perhaps the most well-known being Four Times Square in New York City which was considered the first green skyscraper in North America when it was completed in 1999 (USGBC New York Chapter, 2009).

#### **The New York State Green Building Tax Credit**

On May 15, 2000, Governor George Pataki signed the New York State Green Building Tax Credit into law. The intention of the tax credit was to encourage building owners and developers to design, construct and operate buildings that would be energy efficient, use recycled materials,

improve indoor air quality, and incorporate renewable and energy efficient power generation (Department of Environmental Conservation [DEC], 2009). NYSERDA and DEC were responsible for establishing standards within the specific categories outlined by the legislation. Tax credits are available to corporations, utilities, banks, insurance companies and personal income taxpayers for multi-family residential buildings and certain hotels and office buildings. According to the IEc study, this tax credit provision reflected Governor Pataki's commitment to environmental issues and was likely a catalyst for the Executive Order to follow.

### **Executive Order No. 111**

On June 10, 2001 Governor Pataki signed Executive Order No. 111, "*Green and Clean State Buildings and Vehicles*". The order required that "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" (State of New York, 2001, 1) must reduce energy consumption in all the buildings they own, lease or operate by 2010. Part II, section B, *New Buildings and Substantial Renovation of Existing Buildings*, requires that green building guidelines be followed to the maximum extent practicable. It specifically cites the guidelines that accompany the Green Building Tax Credit and USGBC's LEED program. New buildings must achieve a minimum of a 20 percent improvement in energy efficiency performance relative to the State Energy Conservation Construction Code, and renovations, a minimum of 10 percent. Compliance is to be demonstrated by modeling each building according to the federal Department of Energy's DOE 2.1E program or its equivalent and then submitting an Annual Energy Report to NYSERDA. The report focuses on energy performance, but should also provide a description of green building strategies being undertaken (IEc, 2005). Executive Order 111 also requires that 20 percent of electricity purchases come from renewable sources by 2010.

An advisory council on state energy efficiency was created to take charge of the implementation of the executive order and to establish a set of guidelines to assist the affected state entities in following it. The President of NYSERDA was designated as the chair and given the responsibility to ensure the guidelines were created, updated periodically, and followed by the state entities.

The executive order applies to all buildings 20,000 square feet or greater. Buildings less than 20,000 square feet are also required to incorporate significant attributes of green design principles (IEc, 2005). Six working groups were formed to address the key issues put forth in the executive order (there are seven now), with the Green Construction Working Group in charge of developing operating procedures to help achieve full compliance with the green building objective of the executive order (NYSERDA, 2004). It was determined that new state buildings were to be designed and constructed such that they meet the criteria for LEED certification, but certification is not required. NYSERDA concluded that there was no practical way for agencies to provide quantifiable data on the green building efforts that did not get LEED certified, so did not require any reporting other than the Annual Energy Report (IEc, 2005). The guidelines also directed state entities to perform life-cycle cost analyses on energy-efficiency and other green building measures.

### **Staffing and Support**

Protocols and implementation plans have been developed at the level of individual state agencies to comply with Executive Order 111. Five agencies however, have been identified as having the most potential to assist others in implementing green building: the New York State Energy Research and Development Authority (NYSERDA); the Dormitory Authority of the State of New York (DASNY); the Long Island Power Authority (LIPA); the New York Power



Authority (NYPA); and the New York State Office of General Services (OGS).

In terms of the green building requirements, approaches range from achieving LEED certification to less aggressive plans that focus simply on making the best effort possible to achieve compliance. The Dormitory Authority of New York (DASNY) for example, has an “all-green only-green” policy with a goal of LEED certification for all new construction projects, and anything not fitting a LEED program still aiming at specific sustainable goals (Anderson, 2009). Moreover, the Office of General Services (OGS) has formed the OGS Green Building Council which promotes the principles of green building design for their clients, including encouraging LEED certification (OGS, 2009).

Because the green building requirement of Executive Order 111 must be independently implemented by many different agencies, it was not determinable exactly how many state staff personnel work on green building per se. This is also because work on the initiative is shared among multiple employees, with no one person working on it full-time, at least at NYSERDA (Kneeland, 2009).

NYSERDA is the key entity providing green building services in the state. It offers a number of services for energy efficiency in existing buildings including a free energy benchmarking service for state buildings, a technical assistance program, a retrocommissioning program, and a construction program for substantial renovation. Under its New Construction Program, NYSERDA provides computer modeling, design charrette coordination, assistance in obtaining LEED certification, Executive Order 111 assistance, New York State Green Buildings Tax Credit assistance, green materials recommendations, and commissioning (assessing energy efficiency) and life-cycle costing analysis to building design teams. All of the seven New Construction project managers are LEED Accredited Professionals (one still has to take the

exam, but will be certified soon). In addition, NYSERDA provides financial incentives for technical support and for pre-qualified (e.g., efficient equipment and some efficiency measures) and performance based (i.e., verified after installation) energy savings (NYSERDA, 2009).

## **Compliance**

As of the 2005 IEC study, three state buildings had received LEED certification, one Certified and two Silver, while nine other buildings were registered to be certified. The state did not and still does not track the number of buildings that don't actually get LEED certification, so those data are unavailable. The three state employees contacted for this study were asked if they knew the total number of state buildings that were LEED certified or registered, but they did not. DASNY did have data for its own green building program: 23 buildings registered for LEED systems; and three successfully rated buildings.

Reporting on LEED certified buildings occurs in the annual energy reports, although the data are not being compiled. Looking at the most recent Annual Energy Reports (2005/2006 and 2006/2007) it appears that only one more state building has been LEED Certified since the ones listed in the IEC report, although "many," according to the 2005/06 Report, are in the process of going through formal LEED or Energy Star (energy efficiency label) certification. The NYPA headquarters received a Gold rating in the Existing Buildings category in December of 2006 (NYSERDA, 2009).

Because of the lack of tracking of green building construction, New York must depend on other data to assess its progress. NYSERDA reports that on a square foot basis, 35 percent of the projects involved in their New Construction Program are seeking green building assistance, which represents continual growth since services were first offered in 1996. DASNY collects energy efficiency information (i.e., percent better than code) and cost information which, over

time, will provide data to show success in terms energy and cost savings. Also, at least a dozen buildings are eligible for the Green Building Tax Credit.

As of April 20, 2009, the USGBC website lists 113 certified and 975 registered projects in all of New York State.

### **New Developments**

The Green Building Tax Credit was updated by legislation in 2005, allocating an additional \$25 million and extending the credit availability into a Period two, for tax years 2005 to 2009 (DEC, 2009).

As of January 1, 2008, all DASNY projects that involve “new construction, addition, or significant renovation” must strive for LEED Silver certification. While there is no penalty if LEED Silver is not reached, the policy requires a number of steps that would likely result in the certification including submission to the USGBC for rating, which ensures that green measures are being implemented, even if the ultimate goal is not achieved (DASNY, 2009).

Two main changes have taken place in NYSERDA’s green building support program. They have eliminated restrictions on how many buildings a customer may bring into the program, and they are able to offer larger incentive amounts. In addition, they now offer financial and technical support for assessing the energy needs of a building (i.e., plug load analysis). They anticipate being able to provide incentives for fossil fuel conservation measures through the Regional Greenhouse Gas Initiative (RGGI). They are coordinating their green building efforts with their Research and Development group, which offers training in biomimicry (i.e., the seeking of sustainable solutions by emulating nature [Biomimicry Guild, 2009]). The group has offered general biomimicry training and is now planning to offer sector-focused training.

On March 20, 2008, Governor David A. Paterson signed an executive order that continued Executive Order No. 111, “*Green and Clean*” *State Buildings and Vehicles*.

In April 2008, the Governor issued Executive Order No. 4 establishing a State Green Procurement and Agency Sustainability Program (DEC, 2009). The order established an Interagency Committee on Sustainability that is responsible for creating an annual list of sustainable products and services as well as for establishing goals for reductions in paper use and solid waste generation. The committee is also tasked with the development of coordination, reporting and training programs to support agency sustainability efforts. It applies to the same state agencies, public authorities and public benefit corporations as those in Executive Order No. 111. It also requires each agency to have a Sustainability and Green Procurement Coordinator and to develop a sustainability plan. This executive order establishes a position within each agency whose job it is, in part, to help accomplish the goals set forth in Executive Order 111.

On September 29, 2008, Governor Paterson signed A10684, authorizing NYSERDA to create and administer a grant program to encourage the construction of new homes and the renovation of existing homes that follow green building standards and criteria based on LEED for Homes (USGBC, 2009).

## **Survey Results**

### *Respondents*

Three state employees agreed to be interviewed and/or filled out the survey, two from NYSERDA and one from DASNY. Both NYSERDA employees were contacts listed by IEC from their 2005 study, and the DASNY employee was a referral from another IEC contact who thought she would be a better source at this point in time. Craig Kneeland and Charle-Pan Dawson are both Project Managers in NYSERDA’s New Construction Program. Mr. Kneeland

has been working with green building since before Executive Order No. 111, first with the New York State Energy Office, then with NYSERDA starting in 1995. Ms. Dawson is a LEED Accredited Professional and a chemist, with wide experience in the area of green materials science, and indoor air and environmental quality issues. She has managed more than 100 building projects statewide and has been involved in the development of green guidelines for Executive Order No. 111 and The University of Buffalo. She serves on the Board and as an officer for the New York Upstate Chapter of the USGBC.

Jodi Smits Anderson is the Director of Environmental Programs at DASNY where she has been for almost two years. Prior to joining the State government, Ms. Anderson worked on green building design and construction directly for more than six years and was indirectly involved in the industry for another five years prior to that.

#### *Lessons Learned*

NYSERDA, as the agency in charge of providing technical support for the initiative, has had trouble keeping up with demand. Their New Construction Program has been identified as experiencing the most challenges in assisting projects through the program in a timely manner, especially in recent years. A nationwide investigation is being conducted to see what other programs are doing and to locate a template that can assist agencies in streamlining the current process. Another challenge has been insufficient communication between agencies affected by the executive order, resulting in a lack of standardization. In general, the relationships between agencies are thought to be good, with conflicts being dealt with by leadership, which is seen as positive. DASNY, with its new “all-green only-green” policy, is experiencing some resistance in that there is a tendency for people to think that they are exempt from the policy for a given reason. Policy creation would benefit from stronger support from above during discussion and

feedback sessions. Depending on whom was asked, building codes were thought to be either a potential barrier, a major barrier, or neither a barrier nor an aid. An example of code issues at the municipal and county level is the Local Government Sustainability Initiative. Ordinances are passed, and when conflicts arise, time and money are wasted making changes to the code after the fact. As the founder of the Local Governments for Sustainability program, the International Council for Local Environmental Initiatives (ICLEI) provides some financial assistance to aid localities in solving these code conflicts (Dawson, 2009). Another issue noted was that differences in requirements between New York State Energy Code and LEED energy modeling resulted in a building being assessed twice, costing extra time and money (Anderson, 2009). IEC identified the separation of capital and operating budgets to be an issue in 2005, and according to all three respondents, it is still an issue today. Energy savings from conservation and high-efficiency equipment results in cost savings as well, but the state then cuts the facility's operation and maintenance budget, which is a disincentive.

Some of the key strategies that could have mitigated these challenges are to have had more staff on hand from the beginning (of Executive Order 111), and more coalition building, so there would be more efficiency and cooperation between groups. To address potential confusion as to the applicability of green building policies, publicity and outreach from the start are crucial. A major lesson learned in instituting DASNY's policy was that middle management needed more attention and convincing in order to be comfortable implementing the requirements. NYSERDA sponsors a community college course designed to help agencies to overcome some of the major challenges related to capital and operating budget issues.

Overall, the best advice that those experienced with New York's program can offer is to remain flexible and encourage green building rather than mandate it. That way, as it becomes

more mainstream, it can be seen as an opportunity not as a barrier, i.e. more bureaucratic hoops to jump through. There will be better long-term commitments from all those involved, resulting in sustainable long-term programs rather than policies that may change with each administration.

### *Components of Success*

New York has had numerous champions for their green building initiative from both the public and private sector. Governor Pataki, who advocated Executive Order 111 and the Green Building Tax Credit, was influential in creating an atmosphere of support for green building. High-level support is one of the reasons attributed to the popularity of the NYSERDA green building assistance programs in all sectors, public and private. Other champions range from the assistance agencies like NYSERDA and DASNY, to individuals in the private sector and the local USGBC chapters.

All respondents agree that New York's state-run green building program is a success, citing high demand for NYSERDA services and continual increase in the percentage of new project construction going through the program. Awareness efforts have resulted in an increase in the likelihood that a project will incorporate green measures, as has setting of specific target goals.

The government-run program is viewed as an independent, unbiased source of information with no vested interest in a particular product or service. The state in general has more financial and technical resources than localities and ready access to other state employees with expertise in many areas relevant to green building. A state-level program can also act as a key resource for information about technologies and what other localities are doing. State employees however, have found that they cannot readily provide local assistance, although this barrier has been partially addressed by hiring project consultants throughout the state to manage projects on a daily basis and maintain a local presence. Addressing differences between upstate and

downstate, in terms of their respective demographics and climate, may be problematic when a program is applied uniformly statewide, although consistency can also be seen as a strength.

While difficult to determine conclusively, the impression among respondents is that green building in the private sector has been positively affected by the promotion of green building in the public sector. This would not be especially surprising in New York, since NYSERDA has been offering green building services to both the public and private sector since 1996. But since the adoption of Executive Order 111, as well as the Green Building Tax Credit, materials have become more available and there is information regarding costs that did not exist before.

The number one reported cost/benefit to the state has been in energy savings. The Tax Credit is designed so that the more energy a building conserves, the larger the credit, so it has been working effectively. Also, there are additional savings gained from decreased energy use and increased life of energy efficient equipment. NYSERDA reports they see an average 25 percent in energy savings over code (ASHRAE 90.1-2004).

Executive Order 111 directs affected entities to conduct life-cycle assessments on energy-efficiency and other green measures, but this is still not being done widely, if at all. NYSERDA promotes the Athena Institute's life-cycle analysis tools and has sponsored workshops on how to use them. Additional legislation has been proposed that would require life-cycle assessment for certain products and offer funding for a portion of the costs, but it is not a priority in the current economic climate.

### *Program Standards*

New York decided to use LEED standards from the beginning. Proponents of green building within state government had supported LEED and the USGBC since their inception. They believe that LEED is generally recognized as the best green building rating system



available because it is well vetted, it is not self-certifying and it grows and changes. In addition, there has been a personal relationship between NYSERDA staff and many of the people who have worked on LEED over the years, which has fostered respect for the system. It is generally acknowledged that LEED is not without some flaws, but it is still the best system available and New York respondents are happy with it.

The biggest criticism has to do not with LEED itself, but rather with the fact that actual certification is not required under Executive Order 111, which some believe is a significant weakness. There is no enforcement mechanism in Executive Order 111 or in any other program, so that, aside from having to report energy use to the state, any building project claiming to be green without receiving LEED certification, whether public or private, would be self-certifying. The decision to encourage rather than require LEED certification was a compromise, since there was no funding associated with the Executive Order to assist affected entities in implementing it. Its main intent was to provide encouragement and standards, and a number of agencies chose to obtain certification anyway.

#### *Additional Information*

Some additional changes that have taken place since 2005, and issues that were not covered by the questionnaire, were identified by survey/interview participants. A regional greenhouse gas initiative was started by Governor Pataki and acts as an extra incentive that pushes energy savings from a different perspective. Seven state agencies, including NYSERDA and DASNY, have signed onto *The Climate Registry*, “a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry” (The

Climate Registry, 2009). This offers an alternative tracking system for greenhouse gas-specific conservation efforts.

Since the green building initiative in New York began, a greater understanding of LEED has developed, which is viewed as a major benefit, but as green building has become more mainstream, ‘greenwashing’ (disingenuously advertising a product or policy as environmentally friendly) by companies trying to keep market share has also increased.

### **Summary**

New York’s green building executive order has been in place for almost eight years and has survived the transition to a new administration that could have revoked it. The Executive Order, *“Green and Clean” State Buildings and Vehicles*, requires that each affected state entity implement it independently, which has led to a lack of coordination and variations in terminology, execution and reporting. The order requires projects to be built to LEED specifications but not to obtain actual certification, which was thought to be financially prohibitive, while keeping certification voluntary is believed to instill a sense of ownership toward the program’s goals. The program has successfully promoted green building in the state likely in large part because of the preexisting expertise of the NYSERDA staff and the combined effectiveness of the Green Building Tax Credit and Executive Order No. 111.

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## **CHAPTER 8**

### **Overview of Comparative Program Lessons Learned**

The preceding Case Study chapters have constructed the historical framework of three varied state-run green building programs, and described the experiences and opinions of individuals closely involved with them. The following chapter will analyze key aspects of each program and compare them to each other, looking for contrasts that are the most interesting and best demonstrate the diversity, benefits and challenges inherent to each program.

The “Lessons Learned” subsections from each of the three case studies has been compiled and is copied here as its own chapter. The “Lessons Learned” subsections contain the direct advice from the survey respondents as to what they thought would be important to convey to other states investigating starting their own green building program. It is reproduced for the facility of those interested in this knowledge specifically, and for whom a full reading of the case studies would be too time consuming.

#### **California**

After Executive Order S-20-04 was signed, it took approximately six months for agencies to start implementing the requirements. This short adjustment period is attributed to the fact that the order was very clear, and green building in the state had already been encouraged by Executive Order D-16-00. The order was generally accepted without opposition, credited mostly to the Governor’s effectiveness as a strong environmental leader. California respondents believe that the top-down approach taken by its leaders has been very successful and instrumental in the

success of its program. The greatest ease in implementation has been reported to be in the New Construction Program.

Less simple has been establishing metrics so that progress can be measured. Energy use was not being tracked, so benchmarking had to be done, and there was difficulty in persuading all the agencies to comply. But probably the biggest obstacle in the past and still today is the separation of capital and operating budgets. It is very difficult to convince those in charge of up-front costs to spend more so that money can be saved in the long run. This is especially true when energy efficiency and cost savings can be obtained in cheaper ways. Both survey respondents feel that this will continue to be a problem into the future.

California's state-run program has always been very top-down. The Executive Orders came from the Governor's office and required state employees to organize and implement them. Task forces were established first and were made up of the heads of the different agencies that were subject to the executive orders, orienting them from the onset. DGS reports that there was some resistance to the green building policy from upper management in the past, but this was easily resolved by making the department heads aware of the issue. They would simply refer to the executive order and make it clear there was no room for discussion. In fact, this is the most important advice coming from California respondents: get executive sponsorship. Without it, they believe it will be far more difficult because people in government are resistant to change. Second, a mandate is also extremely desirable, and can be very effective even without as much high-level support. Accountability is also crucial. California believes that their requirement to achieve LEED Silver certification leaves no doubt about whether a building has met recognized green standards, and they would definitely recommend LEED to other states. A final recommendation is to start out with a pilot project, make sure it demonstrates a high level of

environmental and financial benefits, and publicize it well so it will be a great tool to convince those in higher levels of government that green building is worthwhile.

## **Minnesota**

Survey respondents identified a number of challenges. Submission of documentation and regular reporting to CSBR, which is responsible for tracking participation, has been slow. This is partly because people are busy, not really because they are trying to avoid following the green guidelines per se. But there is no sense of consequences, even though it is the law. Nowhere is it addressed what will happen if a project is not in compliance, so there is no accountability. One strategy being used to address this issue is an online tool being developed by the Weidt Group for tracking progress. This tool is expected to increase the project visibility and incentivize progress reporting. Similarly, a requirement to file a report at the end of the design phase to show that a project is on track would be superior to the current practice of a simple final project sign-off.

Another issue that has arisen involves agencies discovering that they are required to meet the guidelines after the work has begun on a project. Or similarly, there is awareness of the guidelines, but what they actually entail has been a big surprise for some agencies once they look at them in detail. The lesson in these situations is that outreach and education are extremely important.

IEc noted that the separation of capital and operating budgets was problematic for green building in Minnesota. According to respondents, this has not changed, and is an economic disincentive since money can be lost in the long run by the inability to spend more up front.

Data collection and analysis on green building projects to determine best practices has been difficult. Funding has just been acquired for post-occupancy evaluation through the University of Minnesota, which is a good first step.

Some key advice coming from those involved in Minnesota's program is to focus on measuring actual performance. They are most excited about the fact that their program is designed to lead to quantifiable outcomes. They recommend having performance-based criteria wherever possible, not prescriptive. They use the life-cycle assessment tools from the Athena Institute and emphasize an approach that encompasses a larger picture than a simple *must contain 10 percent recycled materials* (e.g.) approach. In addition, they recommend quantifying the desired outcomes of a green building program and then working backwards to devise the techniques to reach those outcomes. And enforcement is critical, putting measures in place at the very start of a program, so it is clear and participants know there are significant consequences for noncompliance. Education and outreach are very important as are improved tools to help people better understand program details and requirements. Minnesota respondents moreover definitely recommend talking to other states about their programs.

## **New York**

NYSERDA, as the agency in charge of providing technical support for the initiative, has had trouble keeping up with demand. Their New Construction Program has been identified as experiencing the most challenges in assisting projects through the program in a timely manner, especially in recent years. A nationwide investigation is being conducted to see what other programs are doing and to locate a template that can assist agencies in streamlining the current process. Another challenge has been insufficient communication between agencies affected by the executive order, resulting in a lack of standardization. In general, the relationships between



agencies are thought to be good, with conflicts being dealt with by leadership, which is seen as positive. DASNY, with its new “all-green only-green” policy, is experiencing some resistance in that there is a tendency for people to think that they are exempt from the policy for a given reason. Policy creation would benefit from stronger support from above during discussion and feedback sessions. Depending on whom was asked, building codes were thought to be either a potential barrier, a major barrier, or neither a barrier nor an aid. An example of code issues at the municipal and county level is the Local Government Sustainability Initiative. Ordinances are passed, and when conflicts arise, time and money are wasted making changes to the code after the fact. As the founder of the Local Governments for Sustainability program, the International Council for Local Environmental Initiatives (ICLEI) provides some financial assistance to aid localities in solving these code conflicts (Dawson, 2009). Another issue noted was that differences in requirements between New York State Energy Code and LEED energy modeling resulted in a building being assessed twice, costing extra time and money (Anderson, 2009). IEC identified the separation of capital and operating budgets to be an issue in 2005, and according to all three respondents, it is still an issue today. Energy savings from conservation and high-efficiency equipment results in cost savings as well, but the state then cuts the facility’s operation and maintenance budget, which is a disincentive.

Some of the key strategies that could have mitigated these challenges are to have had more staff on hand from the beginning (of Executive Order 111), and more coalition building, so there would be more efficiency and cooperation between groups. To address potential confusion as to the applicability of green building policies, publicity and outreach from the start are crucial. A major lesson learned in instituting DASNY’s policy was that middle management needed more attention and convincing in order to be comfortable implementing the requirements. NYSERDA

sponsors a community college course designed to help agencies to overcome some of the major challenges related to capital and operating budget issues.

Overall, the best advice that those experienced with New York's program can offer is to remain flexible and encourage green building rather than mandate it. That way, as it becomes more mainstream, it can be seen as an opportunity not as a barrier, i.e. more bureaucratic hoops to jump through. There will be better long-term commitments from all those involved, resulting in sustainable long-term programs rather than policies that may change with each administration.

## CHAPTER 9

### INTERPRETATION OF FINDINGS

Chapters Four, Five and Six presented the details of the case studies' green building programs, their histories, programmatic elements and the changes and developments that have occurred in the past several years. Collected survey data were summarized, conveying the specialist knowledge and personal impressions of those closest to the programs. Chapter Nine identifies the key components of the three programs and discusses the major similarities and differences between them. Information is selected from each of the case studies to construct a tabular summary that facilitates comparison between them. The resulting table (Table 2, below) may be used as a guide for similar analysis of other green building programs. In addition, a set of three small tables, showing the changes in staffing and the number of green buildings built since 2005 to the present, follow Table 2. These tables were created as part of this thesis' defense presentation, and are included here for interest.

Table 2 Category Guide:

	<b>State</b>
<b>Date</b>	Date the mandate passed or program began
<b>Program Type</b>	Executive order or law
<b>Mandatory/Voluntary</b>	Choose one
<b>Extent</b>	Size and type of buildings affected etc.
<b>Standards</b>	What guidelines are followed?
Point-Based system?	Do required guidelines allocate points for implementations?
Performance-based system?	Do required guidelines specify desired outcomes?
Penalty for non-compliance?	Yes/no
<b>Guideline Categories</b>	Areas of concentration of green building implementations
<b>Program Elements</b>	What guidelines and services are offered to assist compliance?
New Construction	Is new construction required to comply?
Major Renovation	Are major renovations required to comply?
Existing Buildings	Are existing buildings required to comply?

## Staffing

Full-time?	Are there staff dedicated full-time to the program?
Number of staff	Full or part-time
State agency run?	Yes/no
Department/s or organization/s administering program	List them
<b>Other State-Level Incentives</b>	E.g. tax incentives
<b>No. of Completed New Buildings or Major Renovations</b>	
<b>No. of Completed Existing Buildings</b>	
<b>Biggest Cost Savings</b>	As reported by program
Secondary Savings	As reported by program

Table 2

### State-Run Green Building Program Analysis Table

	California	Minnesota	New York
<b>Date</b>	December 14th, 2004	May 29th, 2001	June 10th, 2001
<b>Program Type</b>	Executive	Legislative	Executive
<b>Mandatory/Voluntary</b>	Mandatory	Mandatory	Mandatory
<b>Extent</b>	<ul style="list-style-type: none"> <li>All State-funded buildings 10,000 square feet or more.</li> <li>Buildings under 10,000 square feet must follow guidelines, but don't have to get certified.</li> <li>Existing buildings over 50,000 square feet</li> </ul>	<ul style="list-style-type: none"> <li>All new buildings, of any size, funded in whole or part by Minnesota bond monies.</li> <li>Major renovations of buildings under 10,000 square feet are exempt.</li> </ul>	<ul style="list-style-type: none"> <li>All buildings owned and operated by affected State entities of 20,000 square feet or more</li> </ul>
<b>Standards</b>	LEED Silver - Certification required	Green Guidelines/B3	LEED - Certification not required
Point-Based system?	Yes	No	Yes
Performance-based system?	No	Yes Tracking and reporting mandatory	No
Penalty for non-compliance?	Yes	No	No
<b>Guideline Categories</b>	<ul style="list-style-type: none"> <li>Sustainable Sites</li> <li>Energy and Atmosphere</li> <li>Water Efficiency</li> <li>Materials and Resources</li> <li>Indoor Environmental Quality</li> <li>Innovation and Design Process</li> <li>Regional Priority</li> </ul>	<ul style="list-style-type: none"> <li>Performance Management</li> <li>Site &amp; Water</li> <li>Energy &amp; Atmosphere</li> <li>Indoor Environmental Quality</li> <li>Materials &amp; Waste</li> </ul>	<ul style="list-style-type: none"> <li>Sustainable Sites</li> <li>Energy and Atmosphere</li> <li>Water Efficiency</li> <li>Materials and Resources</li> <li>Indoor Environmental Quality</li> <li>Innovation and Design Process</li> <li>Regional Priority</li> </ul>

	<b>California</b>	<b>Minnesota</b>	<b>New York</b>
<b>Program Elements</b>	<ul style="list-style-type: none"> <li>• Design guidelines (LEED)</li> <li>• Technical support</li> <li>• Financial support</li> <li>• Annual reports</li> <li>• Trainings</li> <li>• Workshops</li> </ul>	<ul style="list-style-type: none"> <li>• Design guidelines (MSBG)</li> <li>• Technical support</li> <li>• Outreach</li> </ul>	<ul style="list-style-type: none"> <li>• Design guidelines (LEED)</li> <li>• Technical support</li> <li>• Financial support</li> <li>• Annual reports</li> <li>• Trainings</li> </ul>
New Construction	Yes	Yes	Yes
Major Renovation	Yes	No until 2009	Yes
Existing Buildings	Yes	No	No
<b>Staffing</b>			
Full-time?	Yes	Yes	No
Number of staff	4, full time	2 full time, 2 half time	Indeterminate
State agency run?	Yes	No	Yes
Department/s or organization/s administering program	<ul style="list-style-type: none"> <li>• Department of General Services (DGS)</li> <li>• California Integrated Waste Management Board (CIWMB)</li> </ul>	<ul style="list-style-type: none"> <li>• The Center for Sustainable Building Research (CSBR)</li> <li>• LHB, Inc.</li> <li>• The Weidt Group</li> </ul>	<ul style="list-style-type: none"> <li>• New York State Energy Research and Development Authority (NYSERDA)</li> <li>• Dormitory Authority of the State of New York (DASNY)</li> <li>• Long Island Power Authority (LIPA)</li> <li>• New York Power Authority (NYPA)</li> <li>• New York State Office of General Services (OGS)</li> </ul>
<b>Other State-Level Incentives</b>	Grant program	Tax incentives?	Tax Credit
<b>No. of Completed New Buildings or Major Renovations</b>	14	2 reported complete, up to 20 more near or complete, reports pending.	4 LEED certified, numerous others unknown
<b>No. of Completed Existing Buildings</b>	6	0	1
<b>Biggest Cost Savings</b>	Energy Use	Energy Use	Energy Use
Secondary Savings	<ul style="list-style-type: none"> <li>• Increased building life</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced absenteeism</li> <li>• Increased productivity</li> <li>• Employee health (all speculative)</li> </ul>	<ul style="list-style-type: none"> <li>• Increased equipment life</li> <li>• Reduced emissions</li> <li>• Job creation</li> <li>• Indoor air quality</li> <li>• Reduced traveling costs (speculative)</li> </ul>

Table 3

**Past/Present Comparison of Program Personnel and Green Buildings**

CALIFORNIA	Past (up to 2005)	Present (2006 to now)
Staffing	About 15 dedicated	4 dedicated
<b>No. of completed NC or MR</b>	3	20
<b>No. of completed Existing Buildings</b>	0	6
<b>No. of projects registered</b>	7	222 NC/MR, 60 EB
MINNESOTA	Past (up to 2005)	Present (2006 to now)
Staffing	Unknown	2 full time, 2 half time dedicated
<b>No. of completed NC or MR</b>	0	2
<b>No. of completed Existing Buildings</b>	0	0
<b>No. of projects registered</b>	10 to 15	107
NEW YORK	Past (up to 2005)	Present (2006 to now)
Staffing	Unknown	At least one per agency, but likely not full-time
<b>No. of completed NC or MR</b>	3 LEED certified	4 LEED certified (but likely many more certifiable)
<b>No. of completed Existing Buildings</b>	0	0
<b>No. of projects registered</b>	9	At least 23

## **Executive Versus Legislative**

California and New York both have executive orders that mandate the state green building program, while Minnesota passed mandatory legislation. The method by which a mandate came into being does not appear to have much of an impact on how the programs are operated. The biggest potential difference is that a new administration could revoke an executive order, thereby canceling the state's green building program, but that has not yet happened in either California or New York. In California, the new administration penned a new executive order that went further than the previous one, and in New York the succeeding administration reauthorized the green building mandate upon taking office.

Interestingly, it appears that the programs are stronger in the states with executive orders. This is likely because of the high-level support that needed to exist in order for an executive order to be signed. So on the one hand, a program mandated by executive order is more vulnerable to weakening or renegeing by subsequent governors, so could be construed as an inferior way to accomplish green building goals, but in the short-term can result in a faster growing and more fervent program because of support from the highest level of state government. When asked if they thought legislation would be superior to an executive order, most survey participants agreed that it would be, theoretically, but that neither method would be successful without allocating funding and providing technical support. So an executive order with high-level support, funding and technical support, would be preferable to legislation with no high-level champions and with limited funding or technical support provided.

## **Performance-Based Versus Point-Based System**

California and New York both use the USGBC's LEED rating system to guide their green building construction. LEED is a point-based system that offers a wide array of options worth

different numbers of points within each guideline category (see Table 2 for categories). A few items in each category are required in order to receive certification, but it is essentially up to the user to decide which elements to incorporate in their project. Ratings are calculated based on the number of points accrued. This results in potentially large discrepancies between buildings with the same rating level but which utilize different categories to accumulate points. For example, a building could potentially achieve a LEED Silver rating by collecting non-required points in just the Energy and Atmosphere and Indoor Environmental Quality categories. This would be a very different building from another LEED Silver building that concentrated its non-required points in Sustainable Sites, Water Efficiency and Materials and Resources.

Minnesota's guidelines mandate a more balanced approach in that most of the items in each category are required, so a building that is in compliance with the Minnesota Sustainable Building Guidelines will be similarly green to another that is in compliance. Minnesota's guideline creators refer to their system as "outcome-based" because the end result of applying the required elements is a project that will have specific measurable outcomes. In other words, they emphasize performance-based criteria over prescriptive wherever possible so that they can measure results and more easily see the impact of decisions. Additionally, projects must report post-occupancy results to see if the anticipated outcomes were achieved. This reporting requirement, and the focus on outcomes, sets Minnesota's program apart from those that rely on LEED for their green building standard. It is possible, however, for a state to utilize LEED, which greatly facilitates tracking compliance by outsourcing the inspection and certification process to a third party, and require additional elements such as post-occupancy surveys as separate requirements within the mandate.

The MSBG require building life-cycle costs and materials' life-cycle impacts to be



evaluated. In terms of cost, they require a net present value calculation for energy improvements, as opposed to benchmarks, and more extensive life-cycle costing is a recommended guideline. The guidelines complement traditional green building criteria, such as materials with a minimum recycled content, by requiring a material life-cycle analysis that accounts for the environmental impacts of a material throughout its life, from extraction, manufacture, transportation, construction and eventual disposal.

Although the LEED system currently lacks the life-cycle assessment requirements of the MSBG, both California and New York are independently employing life-cycle analyses in their programs. New York is utilizing the Athena Institute's life-cycle analysis tools, as is Minnesota, while California is beginning to work with Scientific Communications Systems' life-cycle analysis tools. New York also has proposed legislation that would require life-cycle assessment for certain products and offer funding for a portion of the costs.

### **Compliance/Enforcement**

Both California and Minnesota require proof that a building has met the green building guidelines created for their respective programs. California's proof is the attainment of LEED Silver certification, while in Minnesota it is the final sign-off by the design team. California's Department of General Services and Minnesota's Center for Sustainable Building Research are in charge of tracking participating state projects. New York, by requiring that affected state entities use the LEED guidelines but not requiring actual certification, has no reliable way of determining if a project is actually in compliance with its executive order. Moreover, the lack of certification precludes an assessment of the level of greenness achieved by buildings that are reported to be in compliance. Since there is no enforcement mechanism in Executive Order 111, and since it is the responsibility of each affected entity (of which there are approximately 200) to

independently implement the order, there is no tracking of total numbers of buildings that have complied or are complying with the order. The significance of this has been that New York has not been able to comprehensively track the number of green buildings that have been constructed since the executive order took effect, nor would it be able to assess total energy, emissions or cost savings that have resulted from the mandate.

Minnesota does not have an enforcement mechanism either, relying on the appropriated agency (i.e., the agency who received the bond funds on the project's behalf) to verify that the project for which it is responsible is complying with the law. There are no real enforceable repercussions for noncompliance, and Minnesota is seeing a disinclination to report on progress in a timely manner, with the same outcome New York is experiencing: difficulty tracking or reporting progress. The difference is that it is extremely likely that buildings built under the MSBG will eventually be recorded and data will be collected, while in New York, how reporting and data collection will be accomplished is more uncertain.

### **Staffing**

Both California and New York administer their programs through state agencies with technical support in both states routed through a single agency. In California, this single agency, the Department of General Services, oversees the state program, while New York leaves administration up to each individual agency involved. For New York this has resulted in a lack of communication between agencies that has been cited as problematic. For example, inconsistent terminology was noted to be occurring between agencies, which likely has contributed to the difficulty in compiling inter-agency project data, a result uncovered in this research.

Unlike California and New York, Minnesota outsources its entire program to a “consultant

team” from the University of Minnesota’s Center for Sustainable Building Research and two private companies. The Minnesota Pollution Control Agency also plays a significant role in providing educational and outreach materials and funding however. It is unclear whether the oversight of the program by non-state entities has a positive or negative effect on program implementation and outcomes.

California and New York also have in common a broad range of employees throughout their various state departments who are knowledgeable about green building, whether they are directly responsible for implementing the respective executive order or not. In California, this is because of how diffused green building is becoming throughout the state, while in New York it is more a result of how responsibility for implementing the executive order is distributed amongst all affected state entities.

### **Measures of ‘Success’**

There is great disparity between how each state measures its program’s “success.” In fact, there is great disparity between how different survey respondents from the same state think about the program’s success. Every survey participant responded that they believe their program has been successful. California has many completed projects, which respondents actually do not cite as a measure of success, but rather the various benefits from green building that are measurable now that there are so many finished projects to evaluate. Another suggested indicator of success is that California is beginning to institutionalize green building as the normal way of conducting business in the state. New York cites the high demand for the green building services offered by NYSERDA as proof, as well as the general increased awareness of green building. Minnesota cites their outcome-based goals, and while not many buildings have been completed, hundreds are in the design phase. It was also mentioned that an analysis was performed to compare the

MSBG with LEED and it was found that a building following Minnesota's guidelines would be at least LEED Certified. This wide variation shows that there are not only many different measures of success but that looking at an exclusive end-result such as "number of green buildings built," would be an insufficient method to measure a program's ability to promote and construct green buildings in a sustainable manner (i.e. into the future, not just in the first few years of implementation). It would be easy to conclude that California's program was the most successful because of how many certified green buildings have been built, and in one sense that appears to be true. But this does not mean the other two states' programs are not successful to some extent in their own rights. What can be said, however, is that California is clearly the most successful at tracking the construction of green buildings, which is likely due to the requirement of actual LEED certification. Minnesota, while relying on self-reporting by project teams, is uncertain of how many projects have been completed, while New York, which requires LEED guidelines be followed with certification voluntary, admittedly is having difficulty tracking compliance.

This chapter has identified and discussed key differences and similarities between each case study state's green building program, as well as elements that were especially interesting and may be particularly informative to other states. The next chapter formulates conclusions based on the interpreted data.

## **CHAPTER 10**

### **CONCLUSIONS**

The number of green buildings built since program inception was initially thought to be an obvious measure of program success, but this has turned out to not be the case. There are many factors involved in the process of state-funded construction, so to compare the actual (absolute or relative) number of completed projects in each state has emerged as an inadequate measure of accomplishment. Also, the reach of the three state programs is different, with Minnesota's program covering all buildings funded through bonds, regardless of size, while California's and New York's programs include building size minimums, and cover all state buildings, and all buildings of "affected State entities," respectively. Also, California's program includes existing buildings, so has extra opportunity for certified projects, while New York's program does not track state totals and relies on agencies' self-reporting, so is likely to be undercounting. And finally, each program was started and went into effect at different times, so looking at the number of completed projects at this moment in time represents different lengths of program operation, again making it difficult to compare based on that measure. That being said, it is interesting to note that California, whose executive order went into effect a few years after either Minnesota's or New York's initiatives began, has completed the largest number of projects by far. But again, without comparing variables like state budgets, construction needs, etc., it is not ideal to use the numbers of completed projects as a measure of achievement, per se.

The two states with executive orders take top-down approaches to implementing green building for state construction projects, and a top down approach seems to result in a faster growing program than a bottom-up approach. California's initiative began a few years after either New York or Minnesota, but has grown and been suffused through the entire state much

more rapidly. New York, also with a top-down approach, hasn't seen quite the results that California has, but still is seeing a measurable increase in green building as reported by individual state agencies. Minnesota, with a legislated mandate in place, does not have as much support coming from the highest levels of government, and it has taken a while for the state program to get off the ground and start seeing results. Therefore, the green building initiative with the strongest composition would be a mandate via legislation, backed by an engaged Governor (or possibly other high-level officials) willing to ensure that funding and technical support are readily available and that marketing is prioritized.

The more support there is for a program, the more green buildings will be built. This is apparent in both California and New York. A mandate alone can be insufficient. In California the support comes largely from the Governor's office and from the requirement to get LEED Silver certification, which makes it clear that it would not be possible to cheat. That voluntary LEED certification in New York works is in large part because of the other programs and incentives available, most notably the green building tax credit which has been utilized for state projects built under Executive Order 111 as well as in the private sector. New York's state energy code has been in place since before the executive order and has facilitated green building. New York also had preexisting energy efficiency experts in NYSERDA assisting state entities and the public, which transferred easily to green building assistance.

Accountability and enforcement are seen to be crucial, but are lacking in two of the three programs. Creating an imitable mechanism for accountability and enforceable penalties for noncompliance would result in a stronger, more productive program.

A large, dedicated staff is not necessary to create a successful program. All three states have fewer than five dedicated green building personnel, although a larger contingency did exist

at the start of each program to help design and launch it. And in the cases of California and New York especially, there are many people involved in the program or ensuring the initiative's goals are met on a part-time basis.

Most of the research questions set out at the beginning of this project have been investigated and answered, but two have proven more challenging to address. Both questions pertained to changes that have occurred since the 2005 IEc study, specifically changes in the rate and/or quality of green building in the state (see research questions 7 and 8). The expectation was that there would be obvious if not significant changes within the programs since the 2005 study was conducted, but that was not the case. The programs are still developing and have grown to varying degrees, but there does not seem to have been a shift in implementation strategy or components since they originated. In New York, the green building executive order was reauthorized by a different administration that came into power, but no changes were made to it. In California, the 2004 executive order, while a significant change from the previous administration's 'energy efficient building' executive order, also has not been modified. Minnesota has recently added 'major renovations' to the types of projects required to follow its guidelines, but that is the only significant change.

In terms of assessing changes in either the rate or quality of green buildings complying with the state programs, none of the states have had significant numbers of completed projects with which to make this evaluation. And moreover, since the programs had so recently begun when the previous study was conducted, it would be difficult or pointless to assess a difference in the rate of green building resulting from them. In addition, the financial recession the country has been experiencing for the past few years has significantly impacted state budgets, which would likely add to the inaccuracy of such an analysis at this time.

Analysis of quality (within each program, not comparing different programs with different guidelines) may be simplest in California, where the requirement for LEED certification would make it possible to compare levels of LEED certification achieved, the base being the required Silver level, up to Platinum. But in New York, with the lack of required LEED certification, and Minnesota, with the similar greenness of projects using the MSBG with its mostly required elements, would make that analysis more challenging.

### **Contributions to the Field/ Implications For Planning**

This thesis has accomplished a number of objectives that can be helpful to Planners and others in state government or the private sector working on issues of sustainability, sustainable development, global warming mitigation, energy efficiency, resources conservation, etc. It:

1. Adds to the relatively limited body of existing knowledge about state-run green building programs.
2. Provides current information on long-standing state-run green building programs and could help facilitate the implementation of more or better programs elsewhere.
3. Garners advice from key individuals implementing their state's program.
4. Provides a method of comparative assessment that is potentially transferable and applicable to other kinds of green building programs.

### **Recommendations for Future Research**

In the effort to reduce this thesis to a manageable size, a number of delimitations were set as discussed in the Methods section. These items, which were either unexplored or too time consuming to be able to complete within the established time-frame, would be excellent topics for future research.

Two different certification programs were employed between the three case study states,



LEED and the MSBG. A comparative evaluation of the qualitative and quantitative differences between these, and other state, national or international programs, would enable a comparison of the level of greenness of buildings certified under different guidelines. As mentioned specifically by one of the survey respondents in a LEED state, he would not know how a building certified under a different program compared to a LEED building; at least not without taking the time to analyze the program himself. Such a study would facilitate communication about green building between states and countries by providing a conversion table of sorts, akin to metric system conversion charts.

This research initially attempted to identify all the states that had a state-run green building program, in order to facilitate selection of appropriate case study states. This task proved to be far too time-consuming to be completed thoroughly, but the creation of a methodically researched, comprehensive list would be a great addition to the body of knowledge of state-run green building programs, and does not currently exist as far as this research could ascertain.

In New York, where LEED certification is not actually required, an accounting of exactly how many buildings there are that claim to be certifiable as well as whether or not they do meet LEED standards would make an interesting project.

Green building is a logical strategy to mitigate the negative environmental impacts of ever-growing human habitation needs. In addition, it has the capacity to improve upon the mental and physical health of people, and can be cost effective as well, so in every sense is a win-win solution to a growing (pun intended) problem. State governments have the opportunity to lead the way in promoting green building and adding to, or paving the road for, development of the green building industry in their state, in this country and in the world.

APPENDIX A  
LEED 2009 NC AND EB CHECKLISTS

**LEED 2009 FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE PROJECT CHECKLIST**

<b>Sustainable Sites</b>		<b>26 Possible Points</b>
<input type="checkbox"/>	Credit 1 LEED Certified Design and Construction	4
<input type="checkbox"/>	Credit 2 Building Exterior and Hardscape Management Plan	1
<input type="checkbox"/>	Credit 3 Integrated Pest Management, Erosion Control, and Landscape Management Plan	1
<input type="checkbox"/>	Credit 4 Alternative Commuting Transportation	3-15
<input type="checkbox"/>	Credit 5 Site Disturbance—Protect or Restore Open Habitat	1
<input type="checkbox"/>	Credit 6 Stormwater Quantity Control	1
<input type="checkbox"/>	Credit 7.1 Heat Island Reduction—Nonroof	1
<input type="checkbox"/>	Credit 7.2 Heat Island Reduction—Roof	1
<input type="checkbox"/>	Credit 8 Light Pollution Reduction	1
<b>Water Efficiency</b>		<b>14 Possible Points</b>
<input checked="" type="checkbox"/>	Prerequisite 1 Minimum Indoor Plumbing Fixture and Fitting Efficiency	Required
<input type="checkbox"/>	Credit 1 Water Performance Measurement	1-2
<input type="checkbox"/>	Credit 2 Additional Indoor Plumbing Fixture and Fitting Efficiency	1-5
<input type="checkbox"/>	Credit 3 Water Efficient Landscaping	1-5
<input type="checkbox"/>	Credit 4 Cooling Tower Water Management	1-2
<b>Energy and Atmosphere</b>		<b>35 Possible Points</b>
<input checked="" type="checkbox"/>	Prerequisite 1 Energy Efficiency Best Management Practices—Planning, Documentation, and Opportunity Assessment	Required
<input checked="" type="checkbox"/>	Prerequisite 2 Minimum Energy Efficiency Performance	Required
<input checked="" type="checkbox"/>	Prerequisite 3 Fundamental Refrigerant Management	Required
<input type="checkbox"/>	Credit 1 Optimize Energy Efficiency Performance	1-18
<input type="checkbox"/>	Credit 2.1 Existing Building Commissioning—Investigation and Analysis	2
<input type="checkbox"/>	Credit 2.2 Existing Building Commissioning—Implementation	2
<input type="checkbox"/>	Credit 2.3 Existing Building Commissioning—Ongoing Commissioning	2
<input type="checkbox"/>	Credit 3.1 Performance Measurement—Building Automation System	1
<input type="checkbox"/>	Credit 3.2 Performance Measurement—System Level Metering	1-2
<input type="checkbox"/>	Credit 4 On-site and Off-site Renewable Energy	1-6
<input type="checkbox"/>	Credit 5 Enhanced Refrigerant Management	1
<input type="checkbox"/>	Credit 6 Emissions Reduction Reporting	1
<b>Materials and Resources</b>		<b>10 Possible Points</b>
<input checked="" type="checkbox"/>	Prerequisite 1 Sustainable Purchasing Policy	Required
<input checked="" type="checkbox"/>	Prerequisite 2 Solid Waste Management Policy	Required
<input type="checkbox"/>	Credit 1 Sustainable Purchasing—Ongoing Consumables	1
<input type="checkbox"/>	Credit 2 Sustainable Purchasing—Durable Goods	1-2
<input type="checkbox"/>	Credit 3 Sustainable Purchasing—Facility Alterations and Additions	1
<input type="checkbox"/>	Credit 4 Sustainable Purchasing—Reduced Mercury in Lamps	1
<input type="checkbox"/>	Credit 5 Sustainable Purchasing—Food	1

LEED 2009 FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE

<input type="checkbox"/>	Credit 5	Regional Materials	1-2
<input type="checkbox"/>	Credit 6	Rapidly Renewable Materials	1
<input type="checkbox"/>	Credit 7	Certified Wood	1

**Indoor Environmental Quality**

**15 Possible Points**

<input checked="" type="checkbox"/>	Prerequisite 1	Minimum Indoor Air Quality Performance	Required
<input checked="" type="checkbox"/>	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	Required
<input type="checkbox"/>	Credit 1	Outdoor Air Delivery Monitoring	1
<input type="checkbox"/>	Credit 2	Increased Ventilation	1
<input type="checkbox"/>	Credit 3.1	Construction Indoor Air Quality Management Plan—During Construction	1
<input type="checkbox"/>	Credit 3.2	Construction Indoor Air Quality Management Plan—Before Occupancy	1
<input type="checkbox"/>	Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
<input type="checkbox"/>	Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
<input type="checkbox"/>	Credit 4.3	Low-Emitting Materials—Flooring Systems	1
<input type="checkbox"/>	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
<input type="checkbox"/>	Credit 5	Indoor Chemical and Pollutant Source Control	1
<input type="checkbox"/>	Credit 6.1	Controllability of Systems—Lighting	1
<input type="checkbox"/>	Credit 6.2	Controllability of Systems—Thermal Comfort	1
<input type="checkbox"/>	Credit 7.1	Thermal Comfort—Design	1
<input type="checkbox"/>	Credit 7.2	Thermal Comfort—Verification	1
<input type="checkbox"/>	Credit 8.1	Daylight and Views—Daylight	1
<input type="checkbox"/>	Credit 8.2	Daylight and Views—Views	1

**Innovation in Design**

**6 Possible Points**

<input type="checkbox"/>	Credit 1	Innovation in Design	1-5
<input type="checkbox"/>	Credit 2	LEED Accredited Professional	1

**Regional Priority**

**4 Possible Points**

<input type="checkbox"/>	Credit 1	Regional Priority	1-4
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**LEED 2009 for New Construction and Major Renovations**

100 base points; 6 possible Innovation in Design and 4 Regional Priority points

Certified	40–49 points
Silver	50–59 points
Gold	60–79 points
Platinum	80 points and above

## LEED 2009 FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE PROJECT CHECKLIST

<b>Sustainable Sites</b>		<b>26 Possible Points</b>
<input type="checkbox"/>	Credit 1 LEED Certified Design and Construction	4
<input type="checkbox"/>	Credit 2 Building Exterior and Hardscape Management Plan	1
<input type="checkbox"/>	Credit 3 Integrated Pest Management, Erosion Control, and Landscape Management Plan	1
<input type="checkbox"/>	Credit 4 Alternative Commuting Transportation	3-15
<input type="checkbox"/>	Credit 5 Site Disturbance—Protect or Restore Open Habitat	1
<input type="checkbox"/>	Credit 6 Stormwater Quantity Control	1
<input type="checkbox"/>	Credit 7.1 Heat Island Reduction—Nonroof	1
<input type="checkbox"/>	Credit 7.2 Heat Island Reduction—Roof	1
<input type="checkbox"/>	Credit 8 Light Pollution Reduction	1
<b>Water Efficiency</b>		<b>14 Possible Points</b>
<input checked="" type="checkbox"/>	Prerequisite 1 Minimum Indoor Plumbing Fixture and Fitting Efficiency	Required
<input type="checkbox"/>	Credit 1 Water Performance Measurement	1-2
<input type="checkbox"/>	Credit 2 Additional Indoor Plumbing Fixture and Fitting Efficiency	1-5
<input type="checkbox"/>	Credit 3 Water Efficient Landscaping	1-5
<input type="checkbox"/>	Credit 4 Cooling Tower Water Management	1-2
<b>Energy and Atmosphere</b>		<b>35 Possible Points</b>
<input checked="" type="checkbox"/>	Prerequisite 1 Energy Efficiency Best Management Practices—Planning, Documentation, and Opportunity Assessment	Required
<input checked="" type="checkbox"/>	Prerequisite 2 Minimum Energy Efficiency Performance	Required
<input checked="" type="checkbox"/>	Prerequisite 3 Fundamental Refrigerant Management	Required
<input type="checkbox"/>	Credit 1 Optimize Energy Efficiency Performance	1-18
<input type="checkbox"/>	Credit 2.1 Existing Building Commissioning—Investigation and Analysis	2
<input type="checkbox"/>	Credit 2.2 Existing Building Commissioning—Implementation	2
<input type="checkbox"/>	Credit 2.3 Existing Building Commissioning—Ongoing Commissioning	2
<input type="checkbox"/>	Credit 3.1 Performance Measurement—Building Automation System	1
<input type="checkbox"/>	Credit 3.2 Performance Measurement—System Level Metering	1-2
<input type="checkbox"/>	Credit 4 On-site and Off-site Renewable Energy	1-6
<input type="checkbox"/>	Credit 5 Enhanced Refrigerant Management	1
<input type="checkbox"/>	Credit 6 Emissions Reduction Reporting	1
<b>Materials and Resources</b>		<b>10 Possible Points</b>
<input checked="" type="checkbox"/>	Prerequisite 1 Sustainable Purchasing Policy	Required
<input checked="" type="checkbox"/>	Prerequisite 2 Solid Waste Management Policy	Required
<input type="checkbox"/>	Credit 1 Sustainable Purchasing—Ongoing Consumables	1
<input type="checkbox"/>	Credit 2 Sustainable Purchasing—Durable Goods	1-2
<input type="checkbox"/>	Credit 3 Sustainable Purchasing—Facility Alterations and Additions	1
<input type="checkbox"/>	Credit 4 Sustainable Purchasing—Reduced Mercury in Lamps	1
<input type="checkbox"/>	Credit 5 Sustainable Purchasing—Food	1

LEED 2009 FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE

<input type="checkbox"/>	Credit 6	Solid Waste Management—Waste Stream Audit	1
<input type="checkbox"/>	Credit 7	Solid Waste Management—Ongoing Consumables	1
<input type="checkbox"/>	Credit 8	Solid Waste Management—Durable Goods	1
<input type="checkbox"/>	Credit 9	Solid Waste Management—Facility Alterations and Additions	1

### Indoor Environmental Quality

**15 Possible Points**

<input checked="" type="checkbox"/>	Prerequisite 1	Minimum Indoor Air Quality Performance	Required
<input checked="" type="checkbox"/>	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	Required
<input checked="" type="checkbox"/>	Prerequisite 3	Green Cleaning Policy	Required
<input type="checkbox"/>	Credit 1.1	Indoor Air Quality Best Management Practices—Indoor Air Quality Management Program	1
<input type="checkbox"/>	Credit 1.2	Indoor Air Quality Best Management Practices—Outdoor Air Delivery Monitoring	1
<input type="checkbox"/>	Credit 1.3	Indoor Air Quality Best Management Practices—Increased Ventilation	1
<input type="checkbox"/>	Credit 1.4	Indoor Air Quality Best Management Practices—Reduce Particulates in Air Distribution	1
<input type="checkbox"/>	Credit 1.5	Indoor Air Quality Best Management Practices—Indoor Air Quality Management for Facility Alterations and Additions	1
<input type="checkbox"/>	Credit 2.1	Occupant Comfort—Occupant Survey	1
<input type="checkbox"/>	Credit 2.2	Controllability of Systems—Lighting	1
<input type="checkbox"/>	Credit 2.3	Occupant Comfort—Thermal Comfort Monitoring	1
<input type="checkbox"/>	Credit 2.4	Daylight and Views	1
<input type="checkbox"/>	Credit 3.1	Green Cleaning—High Performance Cleaning Program	1
<input type="checkbox"/>	Credit 3.2	Green Cleaning—Custodial Effectiveness Assessment	1
<input type="checkbox"/>	Credit 3.3	Green Cleaning—Purchase of Sustainable Cleaning Products and Materials	1
<input type="checkbox"/>	Credit 3.4	Green Cleaning—Sustainable Cleaning Equipment	1
<input type="checkbox"/>	Credit 3.5	Green Cleaning—Indoor Chemical and Pollutant Source Control	1
<input type="checkbox"/>	Credit 3.6	Green Cleaning—Indoor Integrated Pest Management	1

### Innovation in Operations

**6 Possible Points**

<input type="checkbox"/>	Credit 1	Innovation in Operations	1-4
<input type="checkbox"/>	Credit 2	LEED Accredited Professional	1
<input type="checkbox"/>	Credit 3	Documenting Sustainable Building Cost Impacts	1

### Regional Priority

**4 Possible Points**

<input type="checkbox"/>	Credit 1	Regional Priority	1-4
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### LEED 2009 for Existing Buildings: Operations & Maintenance

100 base points; 6 possible Innovation in Operations and 4 Regional Priority points

Certified	40–49 points
Silver	50–59 points
Gold	60–79 points
Platinum	80 points and above

## APPENDIX B

### PUBLIC SECTOR LEED INITIATIVES – DETAILS

STATE	DETAILS
Arizona	<ul style="list-style-type: none"> <li>• Executive Order #2005-05 requires state funded buildings to achieve LEED silver certification and for state funded new construction to incorporate renewable energy</li> </ul>
Arkansas	<ul style="list-style-type: none"> <li>• Act 1770 encourages all state agencies to use green design strategies and creates a "Legislative Task Force on Sustainable Building Design &amp; Practices"</li> </ul>
California	<ul style="list-style-type: none"> <li>• Executive Order #S-20-04 requires new and renovated state funded buildings to achieve LEED silver certification. <a href="http://www.dot.ca.gov/hq/energy/ExecOrderS-20-04.htm">http://www.dot.ca.gov/hq/energy/ExecOrderS-20-04.htm</a></li> <li>• The California Green Building Standards Code aims to reduce water and energy use in buildings. <a href="http://www.documents.dgs.ca.gov/bsc/2009/part11_2008_calgreen_code.pdf">http://www.documents.dgs.ca.gov/bsc/2009/part11_2008_calgreen_code.pdf</a></li> <li>• AB 1389 requires the Department of Housing and Urban Community Development to review relevant green building guidelines when preparing proposed building standards.</li> </ul>
Colorado	<ul style="list-style-type: none"> <li>• Executive Order # D005 05 requires all state buildings to meet LEED for Existing Buildings and incorporate LEED for New Construction. The order also creates a Colorado Greening Government Coordinating Council to develop and implement conservation policies.</li> <li>• Senate Bill 51 requires any new or renovated building with total project cost including 25 percent or more in state funds, be designed and built to a high performance green building standard.</li> </ul>
Connecticut	<ul style="list-style-type: none"> <li>• House Bill 7432 requires the adoption of regulations for buildings consistent with or exceeding LEED Silver for new commercial construction and major renovation projects, or an equivalent standard.               <ul style="list-style-type: none"> <li>○ Applies to projects that receive \$2 million or more in state funding</li> <li>○ Requires revision of the State Building Code to meet or exceed LEED Silver for all private buildings constructed after January 1, 2009 of \$5 million or more, and for all renovations beginning after January 1, 2010 of \$2 million or more.</li> <li>○ Authorizes \$30 million in state bonds, with funds generated to go to on-site renewable energy projects in state buildings pursuing LEED certification.</li> </ul> </li> </ul>
Florida	<ul style="list-style-type: none"> <li>• Executive Order #07-126 requires LEED-NC platinum level for any new building constructed for or by the State, and LEED-EB to be implemented for all buildings currently owned and operated by the Department of Management Services.</li> <li>• HB 7135 requires all new construction and renovation of state buildings to follow the guidelines of LEED or other green building rating systems, including Green Globes and the Florida Green Building Coalition standards.               <ul style="list-style-type: none"> <li>○ Requires the same of the following public entities entering design after July 1, 2008: counties, municipalities, school districts, water management districts, state universities, community colleges, and Florida state courts.</li> <li>○ Requires that all new leases of state-occupied office space must meet Energy Star.</li> </ul> </li> </ul>

STATE	DETAILS
Hawaii	<ul style="list-style-type: none"> <li>• HB #2175 requires each state agency to design and construct buildings to meet the LEED Silver level, or a comparable standard. The law applies to all new state-owned construction of 5,000 square feet or greater.</li> <li>• HRS 46 19.6 requires priority processing for all construction or development permits for projects that achieve LEED Silver or equivalent.</li> </ul>
Illinois	<ul style="list-style-type: none"> <li>• The Green Neighborhood Grant Act directs the Department of Commerce and Economic Opportunity to fund up to 1.5% of total development costs for up to three neighborhoods per year that achieve LEED-ND (neighborhood development) certification.</li> <li>• Public Act #95-0416 amended the School Construction Law directing the Capital Development Board to only issue grants to school projects with LEED for Schools or comparable rating system certification.</li> </ul>
Indiana	<ul style="list-style-type: none"> <li>• Executive Order 08-14, requires all new state buildings earn LEED Silver certification, the EPA's Energy Star rating, two Globes under the Green Globes rating system, or the equivalent under an ANSI accredited rating system. It also requires that all renovations of existing state buildings must follow LEED, Green Globes, or other guidelines.</li> </ul>
Kentucky	<ul style="list-style-type: none"> <li>• HB1 included an addition to KRS 56.776 that instructs the Finance and Administration Cabinet to use LEED or other rating systems to develop green building incentives for private development in the Commonwealth of Kentucky.</li> </ul>
Louisiana	<ul style="list-style-type: none"> <li>• A resolution approved by the Louisiana Recovery Authority in February 2008, founded the State and Local Facilities Construction Authority to support public schools in their pursuit of LEED for schools certification or energy efficiency measures.</li> </ul>
Maine	<ul style="list-style-type: none"> <li>• All new or expanding state buildings are to incorporate LEED guidelines provided that standards can be met on a cost-effective basis.</li> </ul>
Maryland	<ul style="list-style-type: none"> <li>• The High Performance Building Act requires all new public construction and major renovation projects of 7,500 square feet or greater, and intended for occupation, to earn LEED Silver certification or two Green Globes. It also requires that public schools using state funds earn LEED Silver certification or two Green Globes, and will pay half of any extra costs incurred in building green public schools.</li> <li>• The 2001 Executive Order calls for all capital projects greater than 5,000 square feet to earn LEED certification.</li> <li>• The state has approved a green building tax credit for commercial developers</li> </ul>
Massachusetts	<ul style="list-style-type: none"> <li>• Executive Order 484 requires all agencies involved in the construction and major renovation projects of over 20,000 square feet to meet LEED certification, incorporate energy performance 20% better than the Massachusetts Energy Code and outdoor water reduction requirements verified by an independent 3rd party commissioning authority.</li> </ul>
Michigan	<ul style="list-style-type: none"> <li>• Executive Order #2005-4 requires that all state-funded new construction and major renovation projects over one million dollars be built in accordance with LEED guidelines.</li> </ul>
Minnesota	<ul style="list-style-type: none"> <li>• The Next Generation Energy Act of 2007 requires utilities to provide technical assistance for commercial or residential projects that incorporate green building elements in their construction.</li> </ul>
New Jersey	<ul style="list-style-type: none"> <li>• Senate Bill 843 requires all new state-owned buildings of 15,000 square feet or greater to earn LEED Silver certification or equivalent.</li> <li>• Executive Order #24 requires all new school designs to incorporate LEED guidelines.</li> </ul>

STATE	DETAILS
New Mexico	<ul style="list-style-type: none"> <li>• SB543 includes a sustainable building tax credit to promote the construction of high performance green design and construction. The credit applies to LEED for New Construction, for Existing Buildings, for Core and Shell, for Commercial Interiors and for Homes, all at a level of Silver or higher.</li> <li>• Executive Order #06-001 requires all public buildings over 15,000 square feet to be LEED Silver certified.</li> </ul>
New York	<ul style="list-style-type: none"> <li>• A10684 authorizes the New York State Energy Research and Development Authority (NYSERDA) to create and administer a green residential building grant program to encourage new and existing homes to use green building standards and criteria based on LEED for Homes.</li> <li>• Executive Order #111 requires state projects to incorporate LEED Criteria and encourages, but doesn't require, LEED Certification. <ul style="list-style-type: none"> <li>◦ NYSERDA also offers incentives for energy efficiency measures for owners and design teams of any privately owned and operated building, including interest rate buy-downs on loans.</li> </ul> </li> <li>• The New York State Green Building Tax Credit Program provides an income tax incentive to commercial developments incorporating specific green strategies informed by LEED.</li> </ul>
Nevada	<ul style="list-style-type: none"> <li>• AB621 (2007) creates a three-tiered property tax exemption plan, with a maximum of 35% for any private building achieving LEED Silver certification or higher, excluding single-family homes and residential structures three stories or fewer. It amends previous green building tax abatement legislation.</li> <li>• AB3 (2005) requires all state funded buildings to be LEED Certified or higher in accordance with LEED or an equivalent standard.</li> </ul>
North Carolina	<ul style="list-style-type: none"> <li>• Senate Bill 581 gives permission to cities and counties to encourages green building practices through the use of reduced permitting fees or partial rebates for construction projects that achieve LEED certification or certification from other rating systems.</li> </ul>
Ohio	<ul style="list-style-type: none"> <li>• Resolution #07-124, passed by the Ohio School Facilities Commission, requires a minimum of LEED for Schools Silver certification for all future and some previously approved school projects. Gold certification is highly encouraged.</li> </ul>
Oklahoma	<ul style="list-style-type: none"> <li>• HB 3394 requires all state buildings over 10,000 square feet to follow LEED or Green Globes guidelines.</li> </ul>
Oregon	<ul style="list-style-type: none"> <li>• A Business Energy Tax Credit is available for LEED for New Construction, Core and Shell, or Commercial Interiors projects achieving a minimum Silver certification. Projects must also meet certain technical requirements.</li> </ul>
Pennsylvania	<ul style="list-style-type: none"> <li>• Act 46 of 2005 (House Bill 628) provides hundreds of dollars of funding per pupil for public schools with proof of LEED Silver certification or higher, or two Green Globes or higher.</li> <li>• Four state funds provide grants, loans and near-equity investments in energy efficiency and renewable energy projects.</li> </ul>
Rhode Island	<ul style="list-style-type: none"> <li>• Executive Order # 05-14 requires all new construction and renovations of public buildings to meet LEED Silver certification or higher.</li> </ul>
South Carolina	<ul style="list-style-type: none"> <li>• H3034 requires all state-owned and state-funded construction greater than 10,000 square feet, and any major renovation projects of greater than fifty percent of total building space or value, meet LEED-NC Silver certification or comparable standard.</li> </ul>
South Dakota	<ul style="list-style-type: none"> <li>• SB 188 requires all new construction and major renovations of state-owned buildings costing at least \$500,000 and greater than 5,000 square feet to earn LEED Silver, two Green Globes or a comparable standard.</li> </ul>



**STATE****DETAILS**

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Virginia	<ul style="list-style-type: none"><li>• HB 239 made energy efficient buildings a separate class of taxation from other real property. It allows localities to levy equal or lesser taxes on energy efficient buildings, as defined in the code as meeting the performance standards of LEED, Energy Star, Green Globes or EarthCraft.</li><li>• Executive Order 48 instructs all state agencies and institutions constructing state-owned facilities over 5,000 gross square feet, and renovations of such buildings valued at 50% of the assessed building value, to be designed and constructed to LEED standards or EPA's Energy Star rating.<ul style="list-style-type: none"><li>○ It also encourages the private sector to adopt energy-efficient building standards by giving preference when leasing facilities for state use to facilities meeting LEED or Energy Star.</li></ul></li></ul>
Washington	<ul style="list-style-type: none"><li>• Chapter 39.35D of the Revised Code of Washington requires all projects over 5,000 square feet receiving capital funds to be certified to the LEED Silver standard.<ul style="list-style-type: none"><li>○ The code also requires that all K-12 schools be LEED Silver certified or built to comply with the Washington Sustainable Schools Protocol.</li></ul></li></ul>
Wisconsin	<ul style="list-style-type: none"><li>• Executive Order 145 directs the Department of Administration to establish and adopt guidelines based on LEED for New Construction and LEED for Existing Buildings for State Facilities and Operations.</li></ul>

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Source: USGBC <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852#state>

## APPENDIX C

### GREEN BUILDING PROGRAM QUICK REFERENCE MATRIX

# Green Building Program Quick Reference Matrix

City, State	Year Program Began	Applies to: 1–Municipal 2–Commercial 3–Multifamily 4–Single-Family	Web Site	Notes
Phoenix, Arizona	2005	1		Buildings must only be certifiable. The city has LEED-accredited engineers.
Scottsdale, Arizona	1998	1, 2, 3, 4	<a href="http://www.scottsdaleaz.gov/greenbuilding/">www.scottsdaleaz.gov/greenbuilding/</a>	The city requires LEED Gold for municipal buildings and periodically updates its checklists to stay current with technology.
Tucson, Arizona	2005	1	In development	There is another landscape ordinance that addresses commercial buildings as well. There are several water-specific regulations. They also have an office of conservation and sustainable development.
Anaheim, California	2007	1, 2, 3, 4	<a href="http://www.anaheim.net">www.anaheim.net</a> (dept. of public utilities/ green connection)	
Berkeley, California	2004	1, 2, 3, 4	<a href="http://www.cityofberkeley.info/sustainable/">www.cityofberkeley.info/sustainable/</a>	The city is also looking into pushing its energy requirements beyond Title 24.
Burbank, California	2003	2, 3, 4	<a href="http://www.burbankca.org/building/bgreen.htm">www.burbankca.org/building/bgreen.htm</a>	It started as a voluntary program. The ratings are 3-tiered and focus more on getting developers to participate rather than worry about the level that is actually attained.
Carlsbad, California	2007	1		New program with plans to continue developing.
Chula Vista, California		4		
Fremont, California	2006	1	<a href="http://www.fremont.gov/Environment/GreenBuilding/default.htm">www.fremont.gov/Environment/GreenBuilding/default.htm</a>	Applies to Municipal Buildings over 10,000 square feet. Alameda County also offers free consulting to developers shooting for certification.
Glendale, California	2007	2	<a href="http://www.ci.glendale.ca.us">www.ci.glendale.ca.us</a>	LEED Silver, Gold, and Platinum buildings can earn density bonuses.
Irvine, California	2006	1, 2, 3, 4		Irvine has its own 100 pt. rating system for commercial and residential recognition.
La Mesa, California	2007	1		
Livermore, California	2006	1, 2, 3, 4	In development	The mandatory program will require 20 LEED points for commercial and 50 Build It Green Points for residential.
Long Beach, California	2006	1	<a href="http://www.longbeach.gov/plan/pb/apd/green/default.asp">www.longbeach.gov/plan/pb/apd/green/default.asp</a>	The city is also looking into options for a policy regarding private development.
Los Angeles, California	2002	1	<a href="http://eng.lacity.org/projects/sdip/about_us.htm">eng.lacity.org/projects/sdip/about_us.htm</a>	The city has a sustainability task force.
Mission Viejo, California	2006	2, 3, 4	<a href="http://cityofmissionviejo.org/depts/cd/green_building/">cityofmissionviejo.org/depts/cd/green_building/</a>	The program is still in its pilot phase until 2008.
Novato, California	2005	4	<a href="http://www.ci.novato.ca.us/cd/forms/CDP047.htm">www.ci.novato.ca.us/cd/forms/CDP047.htm</a>	The policy is mandatory for new construction and requires 50 GreenPoints.
Oakland, California	2005	1, 2	<a href="http://sustainableoakland.com">sustainableoakland.com</a>	Voluntary for commercial projects. The city has had a Sustainable Community Development initiative since 1998.

QUICK REFERENCE MATRIX

City, State	Year Program Began	Applies to: 1–Municipal 2–Commercial 3–Multifamily 4–Single-Family	Web Site	Notes
Palo Alto, California	2007	1		The city plans on growing the program, and is exploring mandatory points as an option.
Pasadena, California	2006	1, 2, 3	<a href="http://www.ci.pasadena.ca.us/permitcenter/greencity/building/gbprogram.asp">www.ci.pasadena.ca.us/permitcenter/greencity/building/gbprogram.asp</a>	Public buildings, 25,000+ square feet commercial, and 4+ story residential projects are required to be LEED Certified. It is optional for other development.
Petaluma, California	2006	2, 3, 4	<a href="http://www.cityofpetaluma.net/cdd/big.index.html">www.cityofpetaluma.net/cdd/big.index.html</a>	The program is optional for all and there is a \$500 per unit rebate incentive.
Pleasanton, California	2002	1, 2, 3, 4	<a href="http://www.ci.pleasanton.ca.us/business/planning/">www.ci.pleasanton.ca.us/business/planning/</a>	The mandatory portions of the program were passed in 2006, before this it only applied to municipal buildings.
Redding, California	2005	4	<a href="http://www.reupower.com/energysvc/earth-adv.asp">www.reupower.com/energysvc/earth-adv.asp</a>	The Earth Advantage program used Portland as its model. The city owns the electric company so many initiatives concern energy.
Richmond, California	2007	1		LEED Silver is required of municipal buildings. Any project receiving \$300,000+ from the city must also earn Silver or 50 Build It Green points.
Riverside, California	2007	4		The program is brand new as of summer.
Sacramento, California	2004	1	<a href="http://www.cityofsacramento.org/generalservices/sustain/greengoals.htm">www.cityofsacramento.org/generalservices/sustain/greengoals.htm</a>	The city is also working on reducing fees for private solar generation.
San Buenaventura (Ventura), California	2006	1	<a href="http://www.ci.ventura.ca.us/GreenVentura/">www.ci.ventura.ca.us/GreenVentura/</a>	Municipal buildings must be certifiable. The rest is voluntary using LEED and the California Green Builder standards. Voluntary projects are eligible for expedited permitting.
San Diego, California	2002	1, 2, 3	<a href="http://www.sandiego.gov/environmental-services/sustainable/index.shtml">www.sandiego.gov/environmental-services/sustainable/index.shtml</a>	San Diego's program comprises several ordinances requiring municipal buildings be LEED Silver and providing expedited planning incentives to commercial and multifamily developments.
San Francisco, California	1999	1, 2, 3	<a href="http://www.sfenvironment.org/our_programs/overview.html?ssi=8">www.sfenvironment.org/our_programs/overview.html?ssi=8</a>	The city is continuing to advance. This summer the Green Task Force recommended several changes, including mandatory standards.
San Jose, California	2001	1	<a href="http://www.sanjoseca.gov/esd/natural-energy-resources/greenbuilding.htm">www.sanjoseca.gov/esd/natural-energy-resources/greenbuilding.htm</a>	The planning department promotes private green design but the municipal policy is the only one that is official.
San Leandro, California	2006	1		San Leandro builders also receive incentives from Alameda county.
San Rafael, California	2007	1, 2, 3, 4	In development	New mandatory program.
Santa Barbara, California	2006	1, 2, 3, 4	<a href="http://www.builtgreensb.org">www.builtgreensb.org</a>	The policies are voluntary for private development and permits can be fast tracked. There is also a solar recognition program to promote the use of solar energy.
Santa Clarita, California	2005	1		The city has a sustainable purchasing guide that covers almost all of the supplies the city buys.
Santa Cruz, California	2006	1, 2, 3, 4	<a href="http://www.ci.santa-cruz.ca.us/pl/building/green.html">www.ci.santa-cruz.ca.us/pl/building/green.html</a>	Mandatory minimums combined with incentives.
Santa Monica, California	2000	1	<a href="http://greenbuildings.santa-monica.org">greenbuildings.santa-monica.org</a>	

City, State	Year Program Began	Applies to: 1-Municipal 2-Commercial 3-Multifamily 4-Single-Family	Web Site	Notes
Santa Rosa, California	2004	1, 4		The city is considering updates to the program to strengthen it and expand its scope.
Sunnyvale, California	2004	1, 2	<a href="http://sunnyvale.ca.gov/Departments/Community+Development/Planning+Division/Planning-Green+Buildings.htm">sunnyvale.ca.gov/Departments/Community+Development/Planning+Division/Planning-Green+Buildings.htm</a>	City buildings over 10,000 square feet are covered. The city offers a 5 percent floor area bonus to commercial developers.
Boulder, Colorado	1993	1, 4		The residential Green Points system they use is currently being updated again and will likely include commercial and multifamily housing.
Denver, Colorado	2005	1	<a href="http://www.greenprintdenver.org">www.greenprintdenver.org</a>	Currently the program is a resolution but that is being strengthened this fall.
Fort Collins, Colorado	1998	1, 2	<a href="http://www.fcgov.com/opserv/pdf/green-bldg.pdf">www.fcgov.com/opserv/pdf/green-bldg.pdf</a>	It is a very flexible program, with different departments having different incentives. The city is currently working to tie everything together.
Stamford, Connecticut	2006	1	In development	The Sustainable Stamford program encourages private sustainable development.
Washington, D.C.	2007	1, 2		Large commercial buildings will be required to achieve at least a LEED Certified rating.
Gainesville, Florida	2002	1, 2	<a href="http://www.usgbc.org/ShowFile.aspx?DocumentID=1979">www.usgbc.org/ShowFile.aspx?DocumentID=1979</a>	Florida cities are not allowed to amend the state building code at all due to weather in the state. Therefore, the city is working with the state to further coordinate their policy.
Lauderhill, Florida	2006	1, 2, 3, 4		Compliance is voluntary, but all applicable buildings must submit a statement identifying any green design components.
St. Petersburg, Florida	2006	2, 3, 4	<a href="http://www.stpete.org/development/developmentreview.htm">www.stpete.org/development/developmentreview.htm</a>	Sarasota county is very active in promoting green building. The city program is very informal but there is a very good relationship between developers, planners, and normal citizens.
Athens-Clarke County (balance), Georgia	2005	1	<a href="http://www.acclanning.com">www.acclanning.com</a>	In addition to the municipal policy the city has conservation subdivisions to develop better planned neighborhoods.
Atlanta, Georgia	2003	1	<a href="http://www.atlantaga.gov/client_resources/mayorsoffice/green%20initiative/green%20initiatives.pdf">www.atlantaga.gov/client_resources/mayorsoffice/green%20initiative/green%20initiatives.pdf</a>	The EarthCraft Homes program has also been in existence since 1999. Currently, the city is working to shed its reputation for sprawl by developing sustainable communities in addition to single-family buildings.
Honolulu CDP, Hawaii	2004	1, 2		Commercial, industrial, and hotel development can get a one year exemption on real property taxes.
Chicago, Illinois	2004	1, 3, 4	<a href="http://www.cityofchicago.org">www.cityofchicago.org</a> City Departments, Department of Environment	The success of separate programs is unique to the political culture of the city and the mayor.
Bloomington, Indiana	2007	1, 2, 3, 4	<a href="http://www.bloomington.in.gov/planning">www.bloomington.in.gov/planning</a>	The city offers bonus density to qualified projects and also has a Green Acres neighborhood program.
Bowie, Maryland	2003	1	<a href="http://www.cityofbowie.org/green/green.htm">www.cityofbowie.org/green/green.htm</a>	The program is intentionally vague and does not specify LEED or another guideline. The goal is to promote flexible implementation and avoid focusing solely on points in the rating system.

QUICK REFERENCE MATRIX

City, State	Year Program Began	Applies to: 1–Municipal 2–Commercial 3–Multifamily 4–Single-Family	Web Site	Notes
Gaithersburg, Maryland	2003	1, 2	<a href="http://www.gaithersburgmd.gov/pol/default.asp?POI_ID=793&amp;TOC=107;81;388;585;793">www.gaithersburgmd.gov/pol/default.asp?POI_ID=793&amp;TOC=107;81;388;585;793</a> ;	The LEED checklist must be completed by all applicable development. Incentives to be certified include reduced permit fees and city rebates for LEED fees.
Boston, Massachusetts	2007	1, 2, 3	<a href="http://www.bostongreenbuilding.org">www.bostongreenbuilding.org</a>	The program is written into the municipal code as Article 80. The city amended the LEED guidelines to include city specific points for features the community values.
Medford, Massachusetts	2005	1	<a href="http://www.medford.org/Pages/MedfordMA_Energy/FINAL_LAP.pdf">www.medford.org/Pages/MedfordMA_Energy/FINAL_LAP.pdf</a>	The city is also pursuing a wind power project.
Quincy, Massachusetts	2006	1		The city is working on updating older municipal buildings as well as greening new construction. There is a defacto commercial policy but the city didn't want to constrict it with a specific guideline. Developers present their project and itemize green features, then work with planners to improve.
Grand Rapids, Michigan	2005	1		The city is finding better economic arguments for green building and the planning department regularly promotes green design with commercial developers although a formal policy has not been developed.
Bloomington, Minnesota	2005	2, 3	<a href="http://www.ci.bloomington.mn.us/code/Code19_9.html#b19_29">www.ci.bloomington.mn.us/code/Code19_9.html#b19_29</a> see Section 19.29 (g) (4) (F)	Section G-4-F in the code offers a floor area bonus for a specific zoning district. The city tried to promote mixed use development for more walkability.
Minneapolis, Minnesota	2006	1, 2		In addition to LEED, green development must be 35 percent above minimum state energy standards. Due to heating costs in the winter they are primarily concerned with energy efficiency and offer bonus density as an incentive.
St. Paul, Minnesota	2005	1, 2, 3, 4		The city uses Energy Star guidelines for residential. Large commercial structures must go through the Excel Energy program.
Kansas City, Missouri	2004	1	<a href="http://www.kcmo.org/manager/OEQ/cpp-progress.pdf">www.kcmo.org/manager/OEQ/cpp-progress.pdf</a>	The city recently hired a sustainability manager and is currently working on removing barriers to green features within existing code to streamline the process before they worry about expanding the program.
Las Vegas, Nevada	2006	1, 4	<a href="http://www.sustainlasvegas.com">www.sustainlasvegas.com</a> (coming soon)	Las Vegas has established a green building fund to raise money from utility fees and provide grants to cover LEED costs.
Elizabeth, New Jersey	2002	3, 4		The city has a great Urban Enterprise Zone complete with mass transit. There is also an excellent grant program for low income housing. Over the past 15 years or so the downtown area has been completely revitalized.
Jersey City, New Jersey	2007	1		This policy is conceived as the first of many. They are looking into greening everything from roofs to parks to piers. The planning department also has latitude to work with tax abatements to incentivize green buildings.
Trenton, New Jersey	2004	2		Mayor Doug Palmer is the head of the Council of Mayors. Recently he has become more interested in green buildings and the city plans to become more of an example for other eastern cities to follow.

City, State	Year Program Began	Applies to: 1-Municipal 2-Commercial 3-Multifamily 4-Single-Family	Web Site	Notes
Albuquerque, New Mexico	2005	1		The city has a strategic plan to meet the 2030 Challenge with goals for each department. Recently the city began working with a Vancouver consultant to update and expand the green building program.
New York, New York	2005	1	<a href="http://www.nyc.gov/planyc">www.nyc.gov/planyc</a>	PlaNYC is a comprehensive sustainability plan with 10 goals and 170 specific initiatives to help meet them. Much of the plan revolves around renovating existing buildings, since about 85 percent of the buildings that will exist in 2030 have already been built.
Asheville, North Carolina	2007	1		This new program was passed as a first step with serious plans to expand it in the next year.
Wilmington, North Carolina	2005	2, 3, 4	<a href="http://www.stewardshipdev.com">www.stewardshipdev.com</a>	Currently the Lower Cape Fear Stewardship Development Award Program is voluntary and only provides a building award as an incentive.
Winston-Salem, North Carolina	2006	2, 3	<a href="http://www.cityofws.org/Home/Departments/Planning/Legacy/Articles/LegacyToolkit">www.cityofws.org/Home/Departments/Planning/Legacy/Articles/LegacyToolkit</a>	Winston-Salem is a Sierra Club Cool City. It is currently focused on mixed-use planning and walkability.
Cincinnati, Ohio	2006	2, 3, 4	<a href="http://www.cincinnati-oh.gov/cdap/pages/-16936/">www.cincinnati-oh.gov/cdap/pages/-16936/</a>	Cincinnati provides a property tax abatement for private developers. The city is also working with a developer to construct a 68 acre neighborhood to help gather data on pervious pavement and green roofs in particular.
Cuyahoga Falls, Ohio	2005	2, 3, 4		The city provides a density bonus for green development.
Hamilton, Ohio	2007	2, 3		For LEED projects the city amended the code to allow a density bonus and reduced landscaping requirements.
Eugene, Oregon	2006	1		There has also been an ongoing pilot project to expedite plan checks and provide consulting to developers. The city now has a few accredited staff members and are considering extending the pilot to more projects.
Portland, Oregon	2000	1, 2, 3, 4	<a href="http://www.portlandonline.com/osd">www.portlandonline.com/osd</a>	One of the few cities in the country to require new municipal buildings to be Gold rated. Numerous green building initiatives.
Philadelphia, Pennsylvania	2007	1	<a href="http://www.phila.gov/green/index.html">www.phila.gov/green/index.html</a>	The city has maintained a sustainability commission which has recently recommended more transit-oriented development. The planning department is in the process of updating the zoning code as well.
Nashville-Davidson (balance), Tennessee	2007	1, 2, 3		Municipal buildings over 2000 square feet and \$2 million must be LEED Certified. Other projects are offered density bonuses to meet the same standard.
Austin, Texas	1991	1, 2, 3, 4	<a href="http://www.ci.austin.tx.us/citymgr/default.htm">www.ci.austin.tx.us/citymgr/default.htm</a>	The program has been around so long it is just an accepted part of the building process. Planning and permitting have a lot of flexibility with what to offer developers depending on the part of the city they will be in.
Dallas, Texas	2003	1		Dallas has a pilot program that has partnered with Habitat for Humanity to develop green low income housing.

QUICK REFERENCE MATRIX

City, State	Year Program Began	Applies to: 1–Municipal 2–Commercial 3–Multifamily 4–Single-Family	Web Site	Notes
Flower Mound, Texas	2004	2, 3, 4	<a href="http://www.flower-mound.com/env_resources/envresources_greenbuilding.php">www.flower-mound.com/env_resources/envresources_greenbuilding.php</a>	The program is purely voluntary and offers recognition to applicable buildings.
Frisco, Texas	2001	1, 2, 3, 4	<a href="http://www.friscotexas.gov/Projects_Programs/Green_Building/?id=155">www.friscotexas.gov/Projects_Programs/Green_Building/?id=155</a>	Residential construction must meet Energy Star standards. Municipal construction must be LEED Silver and Commercial or multifamily buildings have a Frisco specific standard based on LEED.
Houston, Texas	2004	1, 2, 4	<a href="http://www.houstonpowertopeople.com">www.houstonpowertopeople.com</a>	The city places an emphasis on cooperation between developers and planners. The Quick Start program is designed to provide consultation and the Houston Hope program targets low income housing.
Plano, Texas	2006	1		In addition to the municipal LEED requirements, the city has an interdepartmental group to provide education and consultation for private construction.
San Antonio, Texas	2004	4	<a href="http://www.buildsagreen.org/BuildSAGreen/">www.buildsagreen.org/BuildSAGreen/</a>	The city works with Build San Antonio Green, a program similar to the residential policies in Madison and Atlanta, to recognize and market green housing.
Salt Lake City, Utah	2005	1, 2	<a href="http://slcgreen.com/pages/hpb.htm">slcgreen.com/pages/hpb.htm</a>	Municipal buildings must be LEED Silver and buildings over 10,000 square feet receiving city funds must also be LEED Certified.
Arlington CDP, Virginia	2000	1, 2, 3	<a href="http://www.arlingtonva.us/Departments/EnvironmentalServices/epo/EnvironmentalServicesEpoGreenBuildings.aspx#ACinc">www.arlingtonva.us/Departments/EnvironmentalServices/epo/EnvironmentalServicesEpoGreenBuildings.aspx#ACinc</a>	All site plan projects must submit a LEED Scorecard and employ a LEED-accredited professional. Certain projects are required to earn 26 points, failure to do so results in a \$.03 per square feet fee that is used for green building education.
Chesapeake, Virginia	2007	1		The program is brand new and the next step will be to train municipal employees and conduct an energy audit of existing buildings.
Bellingham, Washington	2005	1		The King County program has expanded to include Bellingham as well. The city is working on a waterfront project as part of the LEED ND pilot.
Seattle, Washington	2000	1, 2, 3, 4	<a href="http://www.seattle.gov/environment">www.seattle.gov/environment</a>	In addition to the requirements for city development, Seattle has a dizzying array of incentives for all kinds of sustainable features.
Shoreline, Washington	2007	1	<a href="http://www.cityofshoreline.com/cityhall.departments/planning/sustainable/index.cfm">www.cityofshoreline.com/cityhall.departments/planning/sustainable/index.cfm</a>	Progress within the city has been somewhat hampered by concerns that municipal government may not be the best place for such action. They like to take cues from the state but recently they have begun to consider incentives as an appropriate action.
Madison, Wisconsin	1999	1, 4	<a href="http://www.cityofmadison.com/Environment/default.htm">www.cityofmadison.com/Environment/default.htm</a>	The driving principle behind the sustainable development is to earn payback on the investments within 10 years. There is more focus on partnerships as opposed to policies. They view education as the best incentive.
Milwaukee, Wisconsin	2007	1		The city recently created an office of sustainability and there is a lot of momentum to keep the program expanding.

## APPENDIX D

### GREEN/SUSTAINABLE BUILDING PROGRAM SURVEYS

#### California

Please respond by typing below the bulleted question in all CAPITALS  
Please provide web links if possible where more information pertaining to the question can be found

- What has been the most difficult aspect of the program to implement?
- What has been the easiest?
- What has surprised you? (this can be about the program or green building in CA in general)
- What would you change if you could go back in time?
- What new green building requirements or ideas are in the works for the state?
- Who are/have been the “champions” in your state? Does anyone stand out recently (from 2005 on)?
- Do you consider the program to be successful and why?
  - What specific measures are being used to judge the success of a green building project?
- What are the pros and cons of a state-run program (as opposed to a municipal or private sector program)?
  - Do you think a state-run program is better? Why or why not?
- What progress has been made, in terms of number of green buildings built/green remodels, or number of buildings for which green designs are in development or have been put out to bid?
  - What other qualitative data has been collected?
- What other programs in the state support green building (including agency-specific and industry or residential programs)?
- Have you seen an increase in private sector green building since the public sector program began?
- What are the most noticeable cost benefits of building green in your state?
- Why weren't the guidelines that were in place before adopting LEED working?
- Why executive order and not legislation? Was legislation considered?



- Why hasn't legislation been successful at passage?
  - Do you think legislation would be superior?
- Does the executive order come with teeth? Technical support? Financial support?
- How would you describe inter-agency communication regarding green building implementations? Are there conflicts?
- What incentive programs exist to encourage green building?
  - Have any been particularly effective? Ineffective?
  - What is new since 2005 and are there more or fewer incentives now?
  - Are any new incentives currently in development or under consideration?
- What example projects are currently being used to promote green building?
- What lifecycle assessment tools have been developed and by whom?
  - Are lifecycle analyses being done consistently and completely?
  - If not, what is being done to address this?
- According to IEc, in 2005, CIWMB had seven people dedicated to sustainable building; the Energy Commission had about five, the Air Resources Board had "a few," and DGS had a LEED coordinator. How have these numbers changed? Are there new staff dedicated to sustainable building in other departments?
- Are new/remodeled schools required to be LEED certified? How does CHPS play into the LEED requirement for state buildings?
- IEc reported that the smart growth efforts in CA were headed by the State Treasurer, with little coordination between that department and others implementing green building. Has that changed now, and how?
- Has the state developed standards for performing post-occupancy evaluations? Have evaluations been done?
- Is energy use in LEED buildings still being tracked? How about water use?
- Do the state Energy code and indoor air quality standards (DHS Standard Practice) still exceed LEED requirements?
- Is the separation of capital and operating budgets still a problem or have they been merged (so that higher upfront costs are explicitly covered by operational savings)?
- What lifecycle assessment tools have been developed and by whom? Are lifecycle analyses being done consistently and completely? If not, what is being done to address this?
- What can you tell me about AB 1389 that requires the Department of Housing and Urban

Community Development to review relevant green building guidelines when preparing proposed building standards?

- How about The California Green Building Standards Code?
- What has changed since 2005 that has not been covered by this questionnaire?

## Minnesota

Please respond by typing below the bulleted question in all CAPITALS  
Please provide web links if possible where more information pertaining to the question can be found

- What has been the most difficult aspect of the program to implement?
- What has been the easiest?
- What has surprised you (this can be about the program or green building in MN in general)?
- What would you change if you could go back in time?
- What new green building requirements or ideas are in the works for the state?
- Who are/have been the “champions” in your state? Does anyone stand out recently (from 2005 on)?
- Do you consider the program to be successful and why?
  - What specific measures are being used to judge the success of a green building project?
- What are the pros and cons of a state-run program (as opposed to a municipal or private sector program)?
  - Do you think a state-run program is better? Why or why not?
- What progress has been made, in terms of number of green buildings built/green remodels, or number of buildings for which green designs are in development or have been put out to bid?
  - What other qualitative data has been collected?
- What other programs in the state support green building (including agency-specific and industry or residential programs)?
- Have you seen an increase in private sector green building since the public sector program began?
- What are the most noticeable cost benefits of building green in your state?
- How would you describe inter-agency communication regarding green building implementations? Are there conflicts?
- How did the green guidelines come about? Why not LEED?
  - Are the guidelines based on LEED, developed alongside LEED or completely separate from LEED?

- LEED has changed a lot since 2005. Is it more in-line with the green guidelines now? What are the current major differences?
- What is the history of the legislation? Was there opposition? Was an executive order considered?
- How is the green building legislation enforced?
  - Is there technical support? Financial support?
- Are capital and operating budgets still funded biannually in separate years? Does this create a barrier for green building because of its typically higher capital costs?
- What incentive programs exist to encourage green building?
  - Have any been particularly effective? Ineffective?
  - What is new since 2005 and are there more or fewer incentives now?
  - Are any new incentives currently in development or under consideration?
- What example projects are currently being used to promote green building?
- The IEc study points out a weakness in the guidelines in that the requirement to build to the lowest lifecycle cost doesn't specify the scope or frequency of lifecycle analysis. Does the latest version of the green guidelines address this issue, or any other lifecycle analysis issue?
- According to the IEc study of 2005, no new staff was hired specifically for implementation of the green building initiative in the State Architect's Office or at OEA. Is there dedicated staff now?
- Is the state tracking the voluntary use of the GB guidelines? If not, is there desire to do so, or talk of doing so?
- Is the state tracking the performance of new buildings using the guidelines?
- What are the latest evaluations of high performance buildings (in dollars saved, energy saved (kw), CO2, etc)?
- What can you tell me about the Next Generation Energy Act of 2007?
- What has changed since 2005 that has not been covered by this questionnaire?

## New York

Please respond by typing below the bulleted question in all CAPITALS  
Please provide web links if possible where more information pertaining to the question can be found

- What has been the most difficult aspect of the program to implement?
- What has been the easiest?
- What has surprised you? (this can be about the program or green building in NY in general)
- What would you change if you could go back in time?
- What new green building requirements or ideas are in the works for the state?
- Who are/have been the “champions” in your state? Does anyone stand out recently (from 2005 on)?
- Do you consider the program to be successful and why?
  - What specific measures are being used to judge the success of a green building project?
- What are the pros and cons of a state-run program (as opposed to a municipal or private sector program)?
  - Do you think a state-run program is better? Why or why not?
- What progress has been made, in terms of number of green buildings built/green remodels, or number of buildings for which green designs are in development or have been put out to bid?
  - What other qualitative data has been collected?
- What other programs in the state support green building (including agency-specific and industry or residential programs)?
- Have you seen an increase in private sector green building since the public sector program began?
- What are the most noticeable cost benefits of building green in your state?
- How would you describe inter-agency communication regarding green building implementations? Are there conflicts?
- Why did New York decide to use LEED standards?
- Why does Executive Order #111 encourage, not require green building measures?
  - Was legislation considered? Why or why not?

- Do you think legislation would be superior?
- Does Executive Order #111 provide technical support? Financial support?
- What incentive programs exist to encourage green building?
  - Have any been particularly effective? Ineffective?
  - What is new since 2005 and are there more or fewer incentives now?
  - Are any new incentives currently in development or under consideration?
- What example projects are currently being used to promote green building?
- What lifecycle assessment tools have been developed and by whom? Are lifecycle analyses being done consistently and completely? If not, what is being done to address this?
- How are the staff who provide green building services organized? Are they dedicated or do they have other duties too?
- According to the IEc report, building codes were not thought to be a barrier to green building. Has anything changed since 2005 to make this more or less true?
- If actual LEED certification is not required how is compliance verified?
- Has progress been made in addressing the challenge posed by capital and operating budgets being separate? According to IEc the Executive Order 111 Green Building Working Group was working on it.
- Is compliance with Executive Order #111 still handled individually by separate state agencies? If there is collaboration, please explain.
- According to IEc, there was an Annual Energy Report released in 2003, but not another one at the time of the study, in 2005. Are there more now? Is this how NY is tracking progress?
- How is A10684, authorizing NYSERDA to create and administer a green residential building grant program, going?
- What has changed since 2005 that has not been covered by this questionnaire?

## APPENDIX E

### GREEN BUILDING INITIATIVES BY STATE

All information from individuals is from March and April 2009. The National Conference of State Legislatures data is dated October 2008.

The NAFSA Listserve refers to an email contact list accessed through the National Association of State Facilities Administrators (NAFSA). Respondents were asked, “Does your state have a state-run green building program? (Defined as a requirement to build or renovate state-owned or funded projects to some green building standard - LEED, Green Globes or other)”

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
<b>Alabama</b>	No		Bob O'Reilly - Architect (334) 242-4803
<b>Alaska</b>	No		Joel St. Aubin - Engineer Sheri Hall w/Housing: no residential program either.
<b>Arizona</b>	Yes	Executive Order #2005-05 of 2005 required all state-funded buildings to achieve LEED Silver certification. The Executive Order also required newly constructed state-funded buildings to incorporate renewable energy. This makes the state the first governmental entity in Arizona to adopt a mandatory green building standard.	National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>
<b>Arkansas</b>	Yes	<ul style="list-style-type: none"> <li>• Arkansas has a state law encouraging State Agencies to pursue LEED or Green Globes rating on all new construction and renovation projects. Act 1770 encourages all state agencies to use green design strategies and creates a "Legislative Task Force on Sustainable Building Design &amp; Practices." This is not a mandatory requirement and most projects opt out due to limited budgets. We are seeing more projects applying for certification but only have a handful so far.</li> <li>• There does not appear to be a push in this legislative session to change this law. However, there are a couple of bills that are focused on energy use reductions in new construction and existing buildings. One such bill will establish a revolving loan fund for energy conservation projects. These bills currently apply only to State Agency and Higher Education facilities. Session should be over today or tomorrow and we should know which ones are enacted.</li> </ul>	Floyd Farmer, PE State Engineer Arkansas Building Authority Phone: (501) 682-5563 <a href="mailto:ffarmer@aba.state.ar.us">ffarmer@aba.state.ar.us</a> NAFSA Listserv

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
California	Yes	<p>AB 1389 of 2008 required the Department of Housing and Urban Community Development to review relevant green building guidelines when preparing proposed building standards for submittal to the California Building Standards Commission. Additionally, the legislation required the department to consider proposing as mandatory building standards those green building features it determined to be cost effective and feasible. In July 2008, the California Building Standards Commission passed the California Green Building Standards Code, which aimed to reduce water and energy use in buildings through landscaping, appliance efficiency, building design, and the use of recycled materials. The code is voluntary through 2009 at which time it becomes mandatory. The Code is written so as to not preempt more stringent local policies. Executive Order #S-20-04 of 2004 required the design, construction, and operation of all new and renovated state-owned facilities to be LEED Silver.</p>	<p>National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>
Colorado	Yes	<p>Senate Bill 51, enacted in 2007, required any new or renovated building whose total project cost includes 25 percent or more in state funds to be designed and built to a high performance green building standard. The law required the State Architect to select an independent third-party certification program, such as LEED. The project must achieve the highest level performance certification possible, which is determined by calculating whether the increased initial costs can be recouped from decreased operational costs within 15 years.</p> <p>Executive Order # D005 05 of 2005 adopted LEED for Existing Buildings and incorporated LEED for New Construction practices for all state buildings. The order also created the Colorado Greening Government Coordinating Council to develop and implement conservation policies.</p>	<p>National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>



STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
Connecticut	Yes	<p>As a state law, in general any project receiving state funding over \$2 million in renovation or \$5 million in new construction/addition will meet LEED Silver, 2 Green Globes or equivalent. House Bill 7432, enacted in 2007, required adoption of regulations for buildings consistent with or exceeding LEED Silver or an equivalent standard. The requirement applies to specific categories of new or renovated state facilities and schools. Also, the state building code must be revised to meet or exceed LEED Silver for certain categories of nonresidential private buildings constructed after January 1, 2009. HB 7432 further authorizes \$30 million in state bonds, the sale proceeds of which are to be allocated to fund on-site renewable energy projects in state buildings pursuing LEED certification.</p>	<p>Bruce Bockstael  Bruce.Bockstael@ct.gov  NAFSA Listserv  and  National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>
Delaware		Legislation pending?	
Florida	Yes	<p>The State of Florida currently has three separate standards for state-owned or funded projects. The three green standards are LEED, Green Globes, and the Florida Green Building Coalition. The Department of Management Services also has the authority to approve another green standard, but has not done so at this time. A state entity will be in compliance with the statute, if the state funded facility complies with any one of the three above-mentioned green standards. All new construction and renovations of state facilities must be in compliance with one of these three standards, per s. 255.252 F.S.</p>	<p>Daniel Hedrick, PMP(r)  Energy Policy Coordinator  Department of Management Services  4050 Esplanade Way,  Suite 315  Tallahassee, FL 32399  Phone: 850.413.9515  <a href="mailto:Daniel.Hedrick@dms.myflorida.com">Daniel.Hedrick@dms.myflorida.com</a> NAFSA  Listserv</p>
Georgia	Yes	<p>Georgia passed the Energy Efficiency and Sustainability Act in 2008 that established green building requirements for state-owned and leased properties. The requirements do not reference a third party rating system such as LEED or Green Globes, but rather establishes an internal "Georgia Peach Green Building Rating System." The details of the system are being finalized now (4/16/09) and should be made public in the coming months (thus there is no web link at this time). The system is not a comprehensive system like LEED, but rather focuses on 4 main areas: Commissioning, Water-Use Reduction, Georgia-Based Products, and Energy-Use Reduction.</p>	<p>Randy Starr LEED AP  Georgia Department of Natural Resources  Engineering and Construction  404-656-6528  <a href="mailto:randy.starr@dnr.state.ga.us">randy.starr@dnr.state.ga.us</a>  2 Martin Luther King, Jr. Drive, Suite 1352 Atlanta, GA 30334  NAFSA Listserv  or  P.J. Newcomb - State Utilities Program Engineer (404) 584-1000</p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
<b>Georgia</b> (cont'd)		Georgia also has 2 executive orders, an April, 2008 "Governor's Energy Challenge" to reduce energy 15% per sq. ft. by 2020 in all state owned or leased buildings. and then in October, 2008 a "water challenge" to reduce use per sq. ft. by 2.5% per year to reach 25% by 2020.	
<b>Hawaii</b>	Yes	<p>HB 2175 of 2006 requires each state agency to design and construct buildings to meet the LEED Silver certified level, or a comparable standard. The law applies to all new state-owned construction of 5,000 square feet or greater, including K-12 public schools.</p> <p>The Hawaii state legislature amended its provisions to Hawaiian counties with HRS 46 19.6, requiring priority processing for all construction or development permits for projects that achieve LEED Silver or equivalent.</p>	<p>National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>
<b>Idaho</b>	No	But they're working on it. Have a state energy program	Rick Johnston - Facilities Manager (208)287-4891
<b>Illinois</b>		<p>In August 2007, the Illinois State Senate amended the School Construction Law (Public Act #95-0416 ). The law directed the Capital Development Board to only issue grants to school projects with LEED for Schools or comparable rating system certification, or to projects that meet the standards set forth by the Capital Development Board's Green Building Advisory Committee. "The Green Neighborhood Grant Act," signed in 2007, made Illinois the first state to create incentives for LEED for Neighborhood Development. The Act directed the Department of Commerce and Economic Opportunity to fund up to 1.5% of total development costs for up to three (3) applicable neighborhoods per year, funds permitting. Applicable neighborhood developments would have achieved LEED-ND certification.</p>	<p>National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
<b>Indiana</b>	Yes	Executive Order 08-14, signed June 2008, required all new state buildings to earn LEED Silver certification, the EPA's Energy Star rating, two Globes under the Green Globes rating system, or the equivalent under an ANSI accredited rating system. The order also required that all renovations of existing state buildings must follow LEED, Green Globes, or other guidelines.	National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>
<b>Iowa</b>	No	But does have some LEED certified buildings	
<b>Kansas</b>			
<b>Kentucky</b>	Yes	Kentucky has established what we refer to as High Performance Building Standards. This is basically a LEED requirement with some different certification levels at different project budget levels. This requirement is not for the private sector.  A link to the information is at: <a href="http://finance.ky.gov/HPBAC.htm">http://finance.ky.gov/HPBAC.htm</a>	Paul Gannoe Finance Facilities NAFSA Listserv
<b>Louisiana</b>		In February 2008, the Louisiana Recovery Authority approved a resolution founding the State and Local Facilities Construction Authority to support public schools in their pursuit of LEED for schools certification or energy efficiency measures. The LRA has allocated \$2.5 million for the creation of this Authority, likely to be operational by January 2009.	National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>
<b>Maine</b>	Yes	Among other "green" or energy-related provisions that are applicable to state public improvement projects, Maine has an executive order that specifically references LEED. It is available at this link: <a href="http://www.maine.gov/tools/whatsnew/index.php?topic=Gov_Executive_Orders&amp;id=21346&amp;v=Article-A">http://www.maine.gov/tools/whatsnew/index.php?topic=Gov_Executive_Orders&amp;id=21346&amp;v=Article-A</a> . November 2003 Executive Order directed all new or expanding state buildings to incorporate LEED guidelines provided that standards can be met on a cost-effective basis (NCSL).	Chip Gavin Chip.Gavin@maine.gov National and Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
<b>Maryland</b>	Yes	<p>The High Performance Building Act of 2008 required all new public construction and major renovation projects of 7,500 sq ft or greater, and intended for occupation, to earn LEED Silver certification or two Green Globes. The High Performance Building Act further required that MD public schools using state funds earn LEED Silver certification or two Green Globes. The High Performance Building Act further added that "the State will pay half of any extra costs" incurred in building green public schools.</p> <p>Maryland's governor issued an Executive Order in October 2001 calling for all capital projects greater than 5,000 square feet to earn LEED certification. The House and Senate passed legislation in April 2005 requiring that a green building standard, such as LEED (Silver), be used for state capital projects.</p> <p>The state has also approved a green building tax credit for commercial developers.</p>	<p>National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>
<b>Massachusetts</b>	Yes	<p>Executive Order 484 of 2007, titled "Leading by Example - Clean Energy and Efficient Buildings", instructed all agencies involved in the construction and major renovation projects of over 20,000 square feet to meet LEED certification. The standard incorporates energy performance 20% better than the Massachusetts Energy Code and outdoor water reduction requirements verified by an independent third-party commissioning authority.</p>	<p>National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>
<b>Michigan</b>	Yes	<p>Governor Granholm issued Executive Directive 2007-22 covering enhanced energy efficiency and conservation by State departments and agencies. The link to the directive is: <a href="http://www.michigan.gov/gov/0,1607,7-168-36898_45122-180298--,00.html">http://www.michigan.gov/gov/0,1607,7-168-36898_45122-180298--,00.html</a>. Michigan's Energy Directive basically says that: 1) new building design shall "strive" to meet the Platinum Level on LEED NC when DMB determines it is attainable. 2) building renovations costing \$1M or more shall also "strive" to meet the Platinum Level on LEED NC when DMB determines it is attainable. 3) facilities maintenance and minor renovations shall be done consistent with LEED Guidelines.</p>	<p>Philip Harlan Human Resources &amp; Training Coordinator DMB Facilities Administration  Phone: (517) 241-4493  Fax: (517) 373-7052  <a href="mailto:harlanp@michigan.gov">harlanp@michigan.gov</a>  NAFSA Listserv</p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
<b>Michigan</b> (cont'd)		<p>We do not require projects to be registered with the USGBC unless the client agency wishes to expend the additional design fees and registration fees required for USGBC registration.</p> <p>The State of Michigan recently won the American Institute of Architects Grand Valley Chapter Sustainable Design Honor Award for the Grand Haven State Park Toilet and Shower Building.</p>	
<b>Minnesota</b>	Yes	<p>Minnesota has a green / sustainable building program.</p> <p>How it works: Projects funded with state bonds/money must incorporate the guidelines. Scope includes:</p> <ol style="list-style-type: none"> <li>1. New buildings and major additions 2001 legislation</li> <li>2. Remodels of 10,000 s.f. or more 2008 legislation</li> <li>3. Upcoming revisions that are underway: Incorporating energy use performance standards for reducing GHG (greenhouse gas) emissions in accordance with Architecture 2030 goals.</li> </ol>	<p>Gordon Christofferson - <a href="mailto:Gordon.Christofferson@state.mn.us">Gordon.Christofferson@state.mn.us</a> NAFSA Listserv</p>
<b>Mississippi</b>			
<b>Missouri</b>	Yes	<p>The State of Missouri does not have currently require a building to meet LEEDS, or any other third party program, but does require buildings over 5,000 square feet to comply with the International Energy Conservation Code 2006. I have copied the revised statute below, and added a link to that statute and one that spells out the Department of Natural Resources' duties regarding energy. Missouri Revised Statutes Chapter 8 State Buildings and Lands Section 8.837 Minimum energy standard to be developed by rule for certain new or renovated state buildings. 1. By January 1, 2009, the department shall establish, by rule, a minimum energy efficiency standard for new and substantially renovated state buildings over five thousand square feet which shall be at least as stringent as the International Energy Conservation Code 2006, or the latest version thereof. 2. All new or substantially renovated state buildings over five thousand square feet for which design of such construction or renovation is initiated on or after July 1, 2009, shall meet applicable provisions of the minimum energy efficiency standard.</p> <p><a href="http://www.moga.mo.gov/statutes/C000-099/0080000837.HTM">http://www.moga.mo.gov/statutes/C000-099/0080000837.HTM</a> <a href="http://www.moga.mo.gov/statutes/C600-699/6400000150.HTM">http://www.moga.mo.gov/statutes/C600-699/6400000150.HTM</a></p>	<p>Harold Coots Senior Project Manager Division of Facilities Management, Design and Construction State of Missouri <a href="mailto:Harold.Coots@oa.mo.gov">Harold.Coots@oa.mo.gov</a> NAFSA Listserv</p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
Montana	Yes	<p>SB 49, effective April 1, 2009</p> <p>(1) New buildings and major renovations constructed under 17-7-202 and new state-leased buildings must:</p> <p>(a) be built and operated as high-performance buildings; and</p> <p>(b) exceed the International Energy Conservation Code most recently adopted by the department of labor and industry by 20% or to the extent that is cost-effective over the life of the building or major renovation.</p>	<p>Jim Whaley - (406) 444-3106</p> <p><a href="mailto:jwhaley@mt.gov">jwhaley@mt.gov</a></p> <p><a href="http://data.opi.mt.gov/bills/2009/billhtml/SB0049.htm">http://data.opi.mt.gov/bills/2009/billhtml/SB0049.htm</a></p>
Nebraska	No	<p>Nebraska has no state legislation for requiring or prescribing a green building standard. There is talk of this however, at both state and local (Lincoln, capital city) levels...but as yet nothing has been proposed in draft or written form that I am aware of, to allow legal action to be taken.</p>	<p>Robert C. Ripley AIA          Capitol Administrator          Office of the Capitol Commission          P.O. Box 94696          Lincoln, Nebraska 68509-4696          402-471-0419  <a href="mailto:Bob.Ripley@nebraska.gov">Bob.Ripley@nebraska.gov</a> NAFSA Listserv</p>
<b>New Hampshire</b>			
New Jersey	No	<p>New Jersey does NOT have a mandated green building program. We have piloted some renovation projects (e.g. the Visitor's Center at Batsto Village in the Pine Barrens of southern New Jersey).</p>	<p>Janet Chinae          Deputy Chief of Staff,          DP/MC          609-292-1243  <a href="mailto:janet.chinea@treas.state.nj.us">janet.chinea@treas.state.nj.us</a>          P O Box 034          Trenton NJ 08625-0034 NAFSA Listserv</p>
New Mexico	Yes	<p>New Mexico's Government Operations Green Building Initiative was created with Executive Order 2006-001 (<a href="http://www.governor.state.nm.us/orders/2006/EO_2006_001.pdf">http://www.governor.state.nm.us/orders/2006/EO_2006_001.pdf</a>). It requires new or renovated state government buildings over 15,000 s.f. to be LEED Silver certified and the building must achieve a minimum delivered energy performance standard of one half of the US energy consumption for that building type (CBECS database).</p>	<p>Erik Aaboe          Energy Efficiency          Lead By Example          Coordinator          NM General Services          1100 S. St. Francis Drive          Santa Fe, NM 87505          505-827-0676  <a href="mailto:erik.aaboe@state.nm.us">erik.aaboe@state.nm.us</a> NAFSA Listserv</p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
New Mexico (cont'd)		<p>New or renovated government buildings between 5,000-15,000 s.f. must achieve a minimum delivered energy performance standard of one half of the US energy consumption for that building type (CBECS database). For government building leased space, preference points are offered in the request for proposals for buildings that meet these standards.</p> <p>NM also has a "Sustainable Building Tax Credit" for the private sector. The SBTC is an income tax credit to encourage private sector design and construction of energy efficient, sustainable buildings for commercial and residential use. The tax credit is based on third-party validation of the building's level of sustainability. Info: <a href="http://www.emnrd.state.nm.us/ecmd/cleanenergytaxincentives/sustainablebuildingtaxcredit.htm">http://www.emnrd.state.nm.us/ecmd/cleanenergytaxincentives/sustainablebuildingtaxcredit.htm</a></p>	
New York	Yes	<p>Yes we have Executive Order 111 - here is a summary below: In an effort to be more energy efficient and environmentally responsible, New York State Governor George Pataki issued Executive Order 111 through the Governor's Office of Regulatory Reform. Executive Order 111 directs all state entities to adopt measures to make new and existing buildings greener. The order calls for the design, construction operation and maintenance of new and substantially renovated existing buildings to follow guidelines, "to the maximum extent possible," for the construction of green buildings. These guidelines include those established by the Green Building Tax Credit law and by the U.S. Green Buildings Council's "Leadership in Energy and Environmental Design," (LEED) Rating System. Toward this end, and by direction of the executive order, "state agencies and other affected entities engaged in the construction of new buildings are required to achieve at least a 20 percent improvement in energy efficiency relative to levels required by the State's Energy Conservation Construction Code (for buildings over 20,000 square feet).</p>	<p>Anna Campas  <a href="mailto:Anna.Campas@ogs.state.ny.us">Anna.Campas@ogs.state.ny.us</a>  <a href="http://ate.ny.us">ate.ny.us</a>            NAFSA Listserv</p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
<b>New York</b> (cont'd)		<p>For substantial renovation of existing buildings, it directs "state agencies and other affected entities ... to achieve at least a 10% improvement." The order also calls for incorporation of energy-efficient criteria consistent with Energy Star and any other energy-efficient levels designated by the New York State Energy Research and Development Authority (NYSERDA) in consultation with the Division of Budget, Office of General Services and Advisory Council on State Energy Efficiency Here is the link:  <a href="http://www.abanet.org/environ/committees/renewableenergy/teleconarchives/061505/Executiveorder111.pdf">http://www.abanet.org/environ/committees/renewableenergy/teleconarchives/061505/Executiveorder111.pdf</a></p>	
<b>Nevada</b>	Yes	<p>AB621, enacted in 2007, amended previous green building tax abatement legislation passed in August 2006 and June 2005, making various changes in the provision of tax abatements and exemptions based upon the use of energy and repealing certain prospective energy requirements for public buildings. Companies that had planned construction projects by December of 2005 and received state approval by February 2007 are not affected by the change. AB621 creates a three tiered property tax exemption plan, with a maximum of 35% for any private building achieving LEED Silver certification or higher, excluding single-family homes and residential structures three stories or fewer. AB621 also removes sales tax exemptions for products or materials used in the construction of eligible buildings. On August 16, 2006, the Nevada Commission on Economic Development adopted a process to allow property tax abatement to any private building achieving LEED Silver certification or higher, excluding single-family homes and residential structures three stories or fewer. AB3 of 2005 required all state funded buildings be LEED Certified or higher in accordance with LEED or an equivalent standard. During each biennium, at least two occupied public buildings whose construction will be sponsored or financed by Nevada must be designated as a demonstration project and be equivalent to a LEED Silver or higher certification, or an equivalent standard. The statute also provided tax abatements for properties which have an eligible LEED Silver building and tax exemptions for products or materials used in the construction of a LEED Silver building.</p>	<p>National Conference of State Legislatures  <a href="http://www.ncsl.org/programs/energy/greenbuilding/gman08.htm">http://www.ncsl.org/programs/energy/greenbuilding/gman08.htm</a></p>



STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
North Carolina		North Carolina enacted Senate Bill 581 in 2007, formally granting permission to cities and counties to encourage green building practices in their jurisdictions through the use of reduced permitting fees or partial rebates for construction projects that achieve LEED certification or certification from other rating systems.	National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>
North Dakota	No	A few state legislators did propose legislation that would require all new buildings meet LEED Silver certification, but it did not pass.	John A. Boyle - <a href="mailto:jaboyle@nd.gov">jaboyle@nd.gov</a> NAFSA Listserv
Ohio		In September 2007, the Ohio School Facilities Commission (OSFC) passed Resolution #07-124, approving the incorporation of energy efficiency and sustainable design features into all future and some previously approved school projects. All K-12 public school projects approved by the OSFC are required to meet a minimum of LEED for Schools Silver certification, with strong encouragement to achieve the Gold level. There is additional emphasis on maximizing Energy & Atmosphere credits. The resolution directs OSFC to cover all LEED registration and certification fees and to provide a supplemental allowance to project budgets for the incorporation of sustainable, green strategies.	National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>
Oklahoma	Yes	HB 3394, enacted in 2007, required all state buildings over 10,000 sq ft to follow LEED guidelines or those of Green Globes. Compliance would be measured by the Department of Central Services. This legislation applies to buildings entering the design phase after July 1, 2008.	National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>
Oregon	Yes	We have a statewide policy that requires state agencies to build to a LEED Silver equivalent for new construction or major renovations. <a href="http://www.oregon.gov/DAS/FAC/docs/1256010.pdf">http://www.oregon.gov/DAS/FAC/docs/1256010.pdf</a> In addition, on the energy side, Oregon has an aggressive energy code through the Building Codes Division, and a mandatory program through the Oregon Department of Energy for state buildings, called State Energy Efficiency Design (SEED) <a href="http://www.oregon.gov/ENERGY/CONS/SEED/index.shtml">http://www.oregon.gov/ENERGY/CONS/SEED/index.shtml</a>	Elin Shepard Sustainability Coordinator State of Oregon, Department of Administrative Services. (503) 373-7132 <a href="mailto:elin.d.shepard@state.or.us">elin.d.shepard@state.or.us</a> or NAFSA Listserv

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
<b>Oregon</b> (cont'd)		<p>We also have other requirements, such as applying 1.5% of the construction cost for solar, saving 20% over the year 2000 usage for state agency buildings, and resource conservation goals of state buildings once they are occupied. Finally, the State is working on new standards and guidelines for energy conservation and green attributes in some buildings that are privately owned but leased to state agencies. There are many incentives for green building in Oregon. The Oregon Department of Energy distributes a Business Energy Tax Credit pass-through program for public sector agencies that distributes 26% of the cost for energy conservation measures, and 35% of the cost for renewable attributes of projects. The Energy Trust of Oregon (ETO) distributes incentives of 10-40% of the cost for ECMs and renewables in projects. There are also grants and other incentives that can be applied on a cost-by-cost basis for certain types of projects, such as an additional technical assistance grant from the ETO for commissioning and energy modeling.</p>	
<b>Pennsylvania</b>		<p>Executive Order 1998-1 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 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.</p>	<p>Industrial Economics, Incorporated 2067 Massachusetts Avenue Cambridge, MA 02140 September 30th, 2005</p>
<b>Rhode Island</b>	Yes	<p>On August 22, 2005, Governor Donald Carcieri signed Executive Order # 05-14 requiring all new construction and renovations of public buildings to meet LEED Silver certification or higher.</p>	<p>National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a></p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
South Carolina	Yes	<p>5.1.10 ENERGY CONSERVATION AND SUSTAINABLE CONSTRUCTION - SC Code Ann §§ 48-52-810 thru 860</p> <p>All projects meeting the definition of a major facility project must be designed to achieve at least LEED Silver certification from the US Green Building Council or at least two globes certification using the Green Building Initiative's Green Globes rating system.</p> <p>Major facilities projects are:</p> <ol style="list-style-type: none"> <li>1. State-funded projects for new construction in which the building to be constructed is larger than 10,000 gross square feet;</li> <li>2. State-funded projects for renovation of a facility in which the renovation will cost more than 50% of the replacement value of the facility or the renovation involves a change in occupancy; and</li> <li>3. State-funded projects for commercial interior tenant fit-out where the leasable area to be fitted out is greater than 7,500 square feet.</li> </ol>	<p>John White State Engineer Office of the State Engineer 1201 Main Street, Suite 600 Columbia, SC 29201 (803) 737-0768 <a href="mailto:jswwhite@mmo.sc.gov">jswwhite@mmo.sc.gov</a> NAFSA Listserv</p>
South Dakota	Yes	<p>The legislature passed a law in 2008 to require all new construction and major renovations of state owned buildings more than \$500,000 and &gt;5,000 sq. feet be built to a green standard. It can be LEED Silver, 2 Green Globes, and another approved ANSI green standard. The program is implemented through the Bureau of Administration (BOA), under its Office of the State Engineer (OSE). The OSE has chosen to build to LEED Silver and can grant waivers as outlined in the legislation.</p>	<p>Kristi Honeywell - <a href="mailto:Kristi.Honeywell@state.sd.us">Kristi.Honeywell@state.s d.us</a> NAFSA Listserve</p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
Tennessee	Yes	<p>We have developed "State of Tennessee Sustainable Design Guidelines" effective in 2008. They can be downloaded at the following web address: Go to <a href="http://www.state.tn.us/finance/rpa/archit.shtml">http://www.state.tn.us/finance/rpa/archit.shtml</a>, which is my web site, then click on "Office of the State Architect", and then click on "Sustainable Design Guidelines" All new construction projects under the SDG will be designed and constructed with a focus on meeting or exceeding minimum standards established by recognized sustainable and energy efficient design organizations such as LEED, Green Globes, and Energy Star.</p>	<p>Mike Fitts -  <a href="mailto:Mike.Fitts@tn.gov">Mike.Fitts@tn.gov</a>            NAFSA Listserv</p>
<hr/> <b>Texas</b> <hr/>			
Utah	Yes	<p>Yes we have an in-house program for State buildings that our division project manages that like other programs has required and optional aspects. We have had the program in place for about 3 years and we are in discussion to update the program; we are looking at the feasibility of LEED V3 as an option to fulfill many of our intended outcomes. Either way we need to update and maintain the referenced standards and energy baselines to exceed code. Many of our projects are in the process of LEED certification now. <a href="http://dfcm.utah.gov/energyEff/highPerfBldgs.html">http://dfcm.utah.gov/energyEff/highPerfBldgs.html</a></p> <p>We have an executive order to increase energy efficiency statewide 20% by 2015 in both public and private sectors. We are in the process of certifying good performing State buildings that we have collected energy data for as Energy Star Certified. We are tracking our buildings performance with the Energy Star Portfolio Manager and are hoping to be a model for energy benchmarking to help the private sector track their facilities' performance and quantify the success of their efforts to reduce energy consumption.</p>	<p>Chamonix Larsen -  <a href="mailto:chamlarsen@utah.gov">chamlarsen@utah.gov</a>            NAFSA Listserv</p>

STATE	PROGRAM?	DETAILS	SOURCE/CONTACT
Vermont	No	There is talk about it. Vermont small-scale renewable energy incentive program to fund renewable energy projects in the state: <a href="http://www.erc-vt.org/incentives/index.htm">http://www.erc-vt.org/incentives/index.htm</a>	Debra M. Baslow VT Dept. of Buildings & General Services 4 Governor Aiken Ave Montpelier, VT 05633-7001 <a href="mailto:Debra.Baslow@state.vt.us">Debra.Baslow@state.vt.us</a> NAFSA Listserv
Virginia	Yes	The Commonwealth of Virginia has implemented a standard that requires state agencies assure new construction, renovations, and maintenance meets minimum standards. Our policy is on our website: <a href="http://www.dgs.virginia.gov/DEB/BCOM/tabid/375/Default.aspx">http://www.dgs.virginia.gov/DEB/BCOM/tabid/375/Default.aspx</a> under DEB notices <a href="http://www.dgs.virginia.gov/LinkClick.aspx?fileticket=bnBnAbGNV68%3d&amp;tabid=405&amp;mid=1130">http://www.dgs.virginia.gov/LinkClick.aspx?fileticket=bnBnAbGNV68%3d&amp;tabid=405&amp;mid=1130</a> All new and renovated state-owned facilities, if the renovations are in excess of 50 percent of the structure's assessed value, that are over 5,000 gross square feet shall be designed and constructed consistent with LEED Certified, or alternative criteria as mentioned above (see Virginia Energy Conservation and Environmental Performance Standards).	Steven M. Matsko, PE State Review Engineer Division of Engineering and Buildings Commonwealth of Virginia 804-371-7548 <a href="mailto:Steven.Matsko@dgs.virginia.gov">Steven.Matsko@dgs.virginia.gov</a> or Bert Jones, RA Director Division of Engineering and Buildings Phone # (804) 225-3870 <a href="mailto:Bert.Jones@dgs.virginia.gov">Bert.Jones@dgs.virginia.gov</a> NAFSA Listserv
Washington	Yes	The Washington Governor, by executive order, requires all new state construction to meet LEED Silver standards. Also, the National Guard Bureau has, for a number of years, required LEED Silver standards for new construction or major renovation, but self-certified. That has now changed (2007) to require certification via Green Building Council at LEED Silver or higher.	J. Duncan Crump, Master Planner Construction Facilities Management Office Washington Military Department Camp Murray, Washington NAFSA Listserv
West Virginia			
Wisconsin	Yes	Executive Order 145 of 2006 directed the Department of Administration to establish and adopt guidelines based on LEED for New Construction and LEED for Existing Buildings within 6 months.	National Conference of State Legislatures <a href="http://www.ncsl.org/programs/energy/greenbldgman08.htm">http://www.ncsl.org/programs/energy/greenbldgman08.htm</a>
Wyoming			

## APPENDIX F

### MINNESOTA SUSTAINABLE BUILDING GUIDELINES

#### MSBG VERSION 2.0 GUIDELINES

##### PERFORMANCE MANAGEMENT

###### Required Guidelines

- P.1 Guideline Management
- P.2 Planning for Conservation
- P.3 Integrated Design Process
- P.4 Design and Construction Commissioning
- P.5 Operations Commissioning
- P.6 Lowest Life Cycle Cost

##### SITE AND WATER

###### Required Guidelines

- S.1 Avoidance of Critical Sites
- S.2 Stormwater Management
- S.3 Soil Management
- S.4 Sustainable Vegetation Design
- S.5 Light Pollution Reduction
- S.6 Erosion and Sedimentation Control
- S.7 Landscape Water Efficiency
- S.8 Building Water Efficiency

###### Recommended Guidelines

- S.9 Appropriate Location and Development Pattern
- S.10 Brownfield Redevelopment
- S.11 Heat Island Reduction
- S.12 Transportation Impacts Reduction
- S.13 Wastewater Management

##### ENERGY AND ATMOSPHERE

###### Required Guidelines

- E.1 Energy Use Reduction by at Least 30%
- E.2 Renewable and Distributed Energy Evaluation
- E.3 Efficient Equipment and Appliances

###### Recommended Guidelines

- E.4 Atmospheric Protection

##### INDOOR ENVIRONMENTAL QUALITY

###### Required Guidelines

- I.1 Restrict Environmental Tobacco Smoke
- I.2 Specify Low-emitting Materials
- I.3 Moisture Control
- I.4 Ventilation Design
- I.5 Thermal Comfort
- I.6 Quality Lighting
- I.7 Effective Acoustics and Positive Soundscapes
- I.8 Reduce Vibration in Buildings
- I.9 Daylight

###### Recommended Guidelines

- I.10 View Space and Window Access
- I.11 Personal Control of IEQ Conditions and Impacts
- I.12 Encourage Healthful Physical Activity

##### MATERIALS AND WASTE

###### Required Guidelines

- M.1 Life Cycle Assessment of Building Assemblies
- M.2 Evaluation of Environmentally Preferable Materials
- M.3 Waste Reduction and Management

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