

An Analysis of Residential Green Building Best Management Practices:

*Implementation Recommendations to the
New Jersey Meadowlands Commission - September, 2006*



INSTITUTE FOR MEADOWLANDS STUDIES

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This report is a product of the Institute for
Meadowlands Studies (IMS), Center for Urban Policy Research,
Edward J. Bloustein School of Planning and Public Policy,
Rutgers, The State University of New Jersey, for the
New Jersey Meadowlands Commission.

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**New Jersey
Meadowlands
Commission**



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EXECUTIVE SUMMARY

This report, produced for the New Jersey Meadowlands Commission (NJMC or Commission), is a product of the Rutgers Center for Green Building and the Institute for Meadowlands Studies, both within the Edward J. Bloustein School of Planning and Public Policy at Rutgers, the State University of New Jersey. It identifies opportunities for green building and associated infrastructure improvements in the Meadowlands for residential development and redevelopment, an important land use within the Commission's jurisdiction.

The objectives of this research correspond to and support a number of strategies outlined in Chapter 10: System Plans of the NJMC's January 2004 Master Plan. These include the promotion of innovative technology such as the Leadership in Energy and Environmental Design (LEEDTM) Green Building Rating System developed by the U.S. Green Building Council (USGBC), the promotion of environmental education and awareness, realizing the opportunities provided by brownfield and grayfield sites, the encouragement of emission reductions from mobile and stationary sources, the cultivation of a sense of place unique to the District, and a continuation of effort to make the development review process more efficient and effective.

Based on an assessment of best management practices, this work recommends green building and associated infrastructure practices that can be adopted by the NJMC. Specific data are drawn from an original telephone survey of green home building programs across the United States as well as from academic journals, trade magazines and green building organizational Web sites.

Our research suggests that many green building improvements that are beneficial to homeowners, residential property managers, tenants, and area residents can be implemented in a manner wherein their benefits outweigh their costs. These include the introduction of energy- and water-saving techniques and equipment, renewable energy building systems, healthier indoor air quality systems and materials, building material reuse, and the reduction of solid waste. The study also raises the question of whether a more ambitious undertaking—the pursuit of an LEED-ND (Neighborhood Development Green Building Rating System) project—might be feasible. The forthcoming LEED-ND views development through a wider-angle lens than its sibling LEED modules in incorporating the principles of Smart Growth and pedestrian-oriented design, the latter often referred to as New Urbanism.

Implementation strategies include the provision of educational resources for developers, local government entities, and existing and future homeowners and renters; building code changes; expedited plan review; and density awards.

The remainder of the current document is organized as follows. Part One discusses the role of residential development in the Meadowlands District and the opportunity for green building. Part Two provides an in-depth analysis of green building housing trends. Part Three presents suggestions for the implementation of a green housing building policy in the Meadowlands. An economic benefit-cost analysis of green home building is integrated throughout Part Two and is summarized in Part Three.

PART ONE—RESIDENTIAL DEVELOPMENT IN THE MEADOWLANDS¹

The founding mandates of the Meadowlands Commission are, “To protect the delicate balance of nature; to provide for orderly development; and to provide facilities for the disposal of solid waste.” As such, the Commission strives to achieve a successful balance between environmental preservation and economic growth and development. It does this within its 30.4-square-mile (19,485 acres) district utilizing a variety of powers including, but not limited to, the:

- preparation, adoption, and implementation of a master plan, zoning and subdivision regulations and/or redevelopment plans to effectuate the intentions of the plan;
- acquisition of land through purchase, lease, easement, or eminent domain;
- establishment of engineering standards for purposes of land reclamation and construction;
- implementation and operation of an inter-municipal tax sharing account.

The activities of the Meadowlands Commission are overseen by a seven-member board of commissioners chaired by the Commissioner of the New Jersey Department of Community Affairs. Fourteen municipalities in Bergen and Hudson counties comprise the Meadowlands District. The constituent municipalities are Carlstadt, East Rutherford, Little Ferry, Lyndhurst, Moonachie, North Arlington, Ridgefield, Rutherford, South Hackensack, and Teterboro in Bergen County and Jersey City, Kearny, North Bergen and Secaucus in Hudson County. The Meadowlands is located just over 5 miles west of New York City in northern New Jersey and is bordered by Route 46 on the north, Routes 1 and 9 and the freight rail line owned by Norfolk Southern and CSX Corp on the east, the Port Authority Trans Hudson (PATH) commuter rail lines and Pulaski Skyway on the south, and Route 17, the Pascack Valley rail line and the Kingsland rail line on the west.

Residential uses occupy approximately 291 acres, or 1.5 percent of the District’s land area. The following is an overview of characteristics of housing and housing occupants within the District.

- An in-District population of 10,635 in 2000, only a 2 percent increase from 1990. The population grew by approximately 21 percent between 1980 and 2000.
- Total of 4,649 housing units within the district with a vacancy rate of 3.4 percent.
- Average household size of 2.68 in 2000, a decline from 2.97 in 1970. This is the result of fewer married couples and families with children and more female-headed households, persons living on their own, and elderly households.
- Median household income in 2000 of \$61,925 for Bergen and \$37,189 for Hudson counties. The state average is \$54,226.
- Most housing located in Jersey City, Little Ferry, Moonachie, and Secaucus.
- A variety of housing types. The existing stock includes older neighborhoods of row-houses and single-family units on small lot sizes in Jersey City, detached single-family units in Little Ferry, mobile home parks in Moonachie, and mixed housing opportunities including high-rise development in Secaucus.
- Vast majority of housing built prior to 1950.

There is little transitional or vacant land available and suitable for the development of additional housing—less than 2 percent of the District is vacant. In particular, the NJMC Master Plan

¹ Unless otherwise noted, facts and figures are drawn from the New Jersey Meadowlands Commission Master Plan, as adopted January 2004.

recognizes the regional need for increased *affordable* housing in the district and the benefits associated with a more balanced mix of housing types and price levels. NJMC recommends that the Commission work with its municipalities to create additional housing opportunities.

According to the Plan, this can be accomplished by focusing new residential development in existing residential areas, rehabilitating existing substandard housing, working with constituent municipalities to implement COAH obligations, and promoting active adult housing.

The NJMC approach to residential and other development is grounded in a Smart Growth framework and principles of sustainability. The new land-use plan and redevelopment plans seek to preserve existing “green infrastructure”—the interconnected network of wetlands and water that protect the wildlife habitat and the overall integrity of the Hackensack River. Significant new residential development is to be sited in areas where there is existing development and accessible transportation, such as the Secaucus Transit Center.

Figure 1, appearing on the following page, is the Hackensack Meadowlands District Official Zoning Map, which depicts existing zoning designations that include residential development opportunities in the Meadowlands District. As noted above, this zoning is subject to change through appropriate zoning amendment processes.

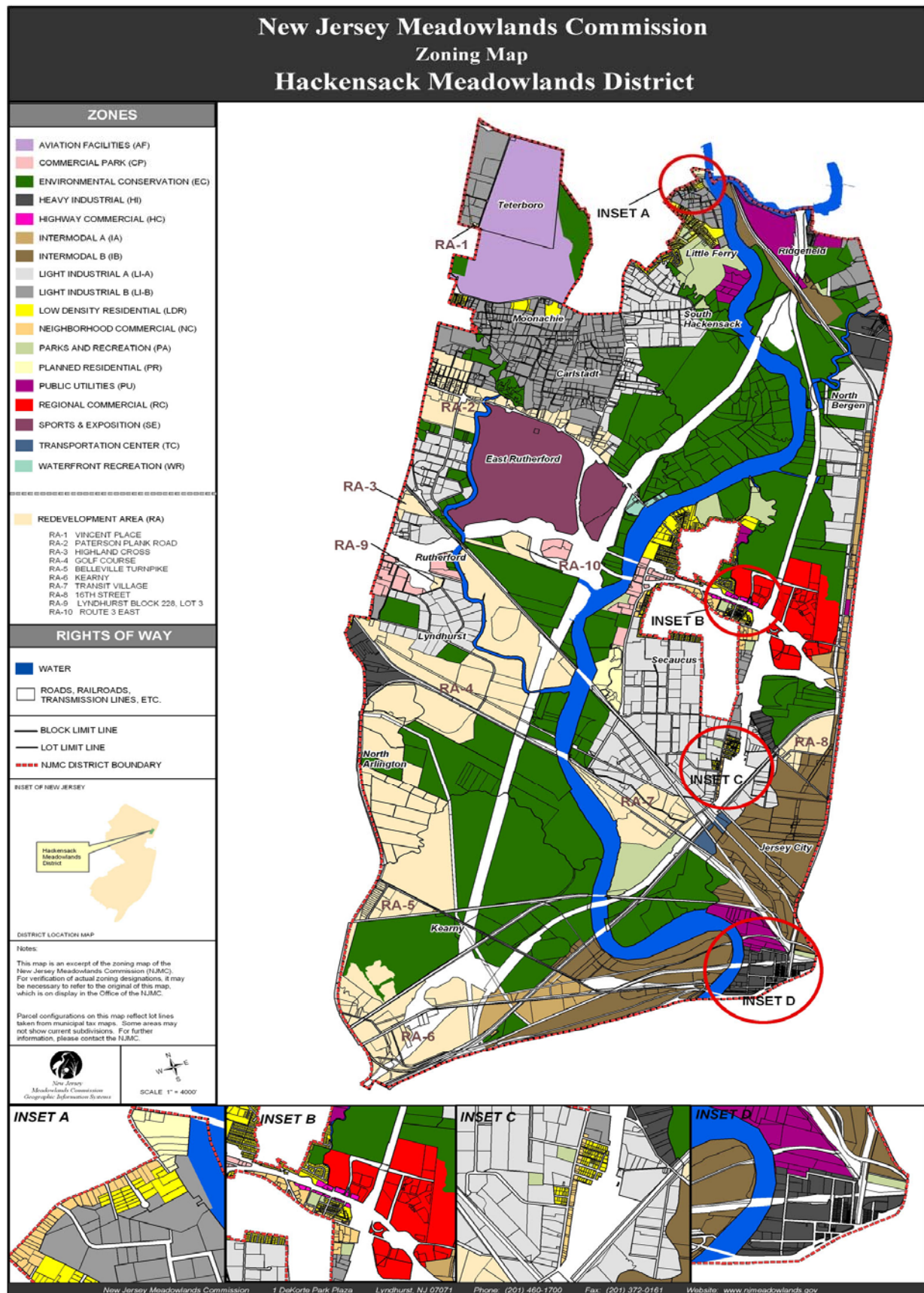


Figure 1. Hackensack Meadowlands District Zoning Map

PART TWO—GREEN BUILDING AND INFRASTRUCTURE IMPROVEMENTS FOR RESIDENTIAL DEVELOPMENT

2.1 Introduction

Buildings—residential and commercial—have a significant impact on global resources.² In the United States, buildings account for nearly 35 percent of total energy consumed and 65 percent of U.S. consumption of electricity on a per annum basis. Buildings intensify climate change by releasing carbon dioxide into the atmosphere, through the use of electricity generated by the burning of non-renewable fossil fuels, or by burning carbon-based fuels within the building. As such, buildings account for 30 percent of greenhouse gas emissions. Buildings, throughout their construction, operation, and removal, further account for 30 percent of raw materials use, 12 percent of potable water consumption, 30 percent of waste output, and 28 percent of landfill material.

The introduction of energy- and water-efficient equipment, implementation of energy- and water-saving procedures, and renewable energy generation, offer considerable environmental and public health advantages and help conserve natural resources. Green buildings can decrease demand for conventional power plants while improving the overall reliability (and national security) of energy supply by contributing to it from distributed renewable generation systems such as rooftop solar photovoltaic (PV) panels. Decreased waste output and use of raw materials similarly have positive economic and environmental effects, as does improved internal air quality in buildings. It is thought that Sick Building Syndrome—the result of poor indoor air quality caused by a combination of toxic construction materials, toxic cleaning agents, and energy efficient, yet problematic, air-tight construction—may affect as many as 30 percent of new and renovated buildings.³ This constitutes a significant, if mostly invisible, health risk as the average American spends 90 percent of his or her time indoors.⁴

Green building is not only one of the most significant developments in home building in recent years, it is revolutionary. By 2025, homes are envisioned as net energy producers, not consumers. Evolving technologies that may characterize these homes include micro-turbines, fuel cells, and photovoltaics for generating energy; electro-chromic and thermo-chromic windows; greywater and rainwater irrigation systems and recycled water products; vacuum insulation; and factory-built components for modular housing systems.⁵ Other areas in which there are opportunities for environmental improvement include lot design, preparation and construction, deconstruction/adaptive reuse and materials recycling, and community infrastructure systems.

Yet, green building is neither new in concept nor execution. Renewed interest in green building coincided with the discourse surrounding the 1987 United Nations Bruntland Commission Report and its emphasis on sustainable development. The promulgation of green building rating

² Wilson and Yost, *Environmental Building News*. These statistics exclude industrial buildings. See, also, U.S. Green Building Council website, www.usgbc.org; Hayter et al 2000, 1.

³ Yeang, *The Green Skyscraper*.

⁴ American College of Allergy, Asthma and Immunology in *Environmental Building News*, op cit. More than 17 million Americans suffer from asthma, and 4.8 million of them are children. Ten million school days are missed by children each year because of asthma, which is exacerbated by poor IAQ. (USGBC Introductory PowerPoint presentation, www.usgbc.org).

⁵ U.S. Department of Housing and Urban Development (HUD), *Partnership for Advancing Technology in Housing program (PATH)* 2001.

systems such as the U.K.'s BREEAM (Building Research Establishment Environmental Assessment Method) and, in the United States, LEED (Leadership in Energy and Environmental Design) dates to this same period of growing, more vocal, concern over the linkage between the built environment, on the one hand, and the depletion of natural resources, environmental degradation, and declining health, on the other.

In varying measure, green building programs provide guidelines for moving from “conventional” building and site design to a more integrated design approach. At its best, the green building development paradigm is a comprehensive one, factoring in site location (including proximity to existing infrastructure such as mass transit), water and energy conservation and efficiency (including the ability of a building to meet most or all of its energy needs), sustainability of construction materials (including their embodied energy), conservation and recycling of construction materials, and indoor environmental quality, referred to both as IEQ and IA(air)Q. Other sustainable development prerogatives that are associated with green building include the acceleration of green technologies and the creation of so-called “green jobs.”

The initial focus of the green building resurgence, in the early 1990s, was on single-family homes and, to a lesser extent, office buildings. Early examples of green building from this phase tended to be drawn from the high-end of the market and from organizations with environmental mission statements or concerns about their public image. The emphasis then gravitated toward larger, more intensive building uses such as skyscrapers, apartment buildings, convention centers, shopping malls, as well as university complexes and government buildings. Within the last six to nine months, the emphasis has shifted back to the residential sector.

As is the case in commercial and institutional green building, organizational activity currently outweighs actual green home building. For example, on a cumulative basis, approximately 62,000 certified green homes had been completed between 1990 and 2004 and, in 2004, 360,000 homes had earned the Energy Star seal of approval. In 2004 alone, 1.6 million single-family homes were constructed.⁶ While there is some evidence that residential green building activity may be increasing—approximately 25 percent of these homes (14,000) were certified by various green home building programs in 2004 compared to cumulative totals of 61,338 in 2004, 47,338 in 2003, 33,669 in 2002, and 20,881 in 2000—these homes are mostly up-market.⁷ Approximately 40 local or regional green home building programs operate throughout the United States, most of which are affiliated with the National Association of Home Builders (NAHB) and its green building guidelines released in 2003.⁸ At the national level, the LEED-H (homes) program, expected to be released in 2007 by the USGBC, has a stated goal of capturing the top 25 percent of the green home building market for market-rate, affordable, and up to 3-story multifamily residences. At the same time, the evolving LEED-ND (Neighborhood Development) standard extends well beyond the building envelope to incorporate Smart Growth and New Urbanism principles, thereby combining residential and commercial uses.

Exactly what these forthcoming releases by the USGBC will mean to the leadership position of the NAHB is unclear, although concurrent research suggests that it could prove challenging for

⁶ Tassos, *A Greener Plan for Affordable Housing*. With attached housing, approximately 2 million units were constructed in 2004, a record-breaking year.

⁷ NAHB Research Center May 11, 2005 update by email to author.

⁸ There are between 30 and 60 programs depending on whose qualifying criteria are used. For example, the Green Affordable Housing Coalition lists close to 60 “green building programs and resources,” most of which probably address residential building in some fashion or another. The USGBC lists 40. The NAHB qualifies 30.

the USGBC to penetrate states that do not have strong land-use zoning and other regulatory traditions.⁹

The two programs differ very little in content—they both seek to provide a standard for single-family market rate homes that incorporates environmental features including the efficient use of energy, water, and building construction resources, the efficient use of land resources, and enhanced indoor air quality for the home’s residents. The NAHB emphasizes that its green home guidelines are not meant to be adopted by municipalities, whereas local USGBC chapters may work with local government to incorporate LEED into development code and related regulations.¹⁰ The USGBC views the building code as a barrier to green building and, through the LEED standard, often finds itself in conflict with it. In contrast, NAHB guidelines have been designed to meet or exceed code. The NAHB program includes relatively more emphasis on Homeowner Education.

LEED-H is similar to the other rating systems promoted by the USGBC in that points are accumulated by fulfilling a number of environmental measures in each of key categories. The LEED-H standard has been developed to address a wide spectrum of dwelling types, including market-rate single-family homes, affordable single family homes, as well as multifamily houses up to three stories. As previously noted, the forthcoming LEED-ND standard also relates to housing. A “neighborhood” development may consist of a whole community or a smaller infill project of single use that complements the larger community.

As with sibling LEED programs, credits that a developer may obtain en route to becoming certified are distributed into categories. In the case of LEED-ND, these include Location Efficiency; Environmental Preservation; Compact, Complete, and Connected Neighborhoods; and Resource Efficiency.

The *Location Efficiency* category promotes the location of development within and near existing communities where there are a variety of transportation options. The rating system promotes the location of a development that contributes to a jobs-housing balance in a community, and where schools and public space are located within walking distance.

The *Environmental Preservation* category discourages the location of development that imperils ecological communities, destroys parkland and wetlands, and eliminates farmland. Credits are given for site design that protects and restores natural habitat, preserves wetlands, and minimizes site impacts related to stormwater runoff.

The *Compact, Complete, and Connected Neighborhoods* category promotes neighborhood developments that provide a diversity of uses and that are located within walking distance of commercial and civic uses. Modestly dense residential development accommodating a variety of income levels is also promoted in the rating system. Credits are given for

⁹ There is evidence of two emergent green building movements — one in LEED certified commercial and institutional building in states with stronger traditions of land use zoning and code regulation and one adhering to largely NAHB residential guidelines in states without these attributes. For more on this see Senick, *Green Building in the U.S.: Why it May Fail*.

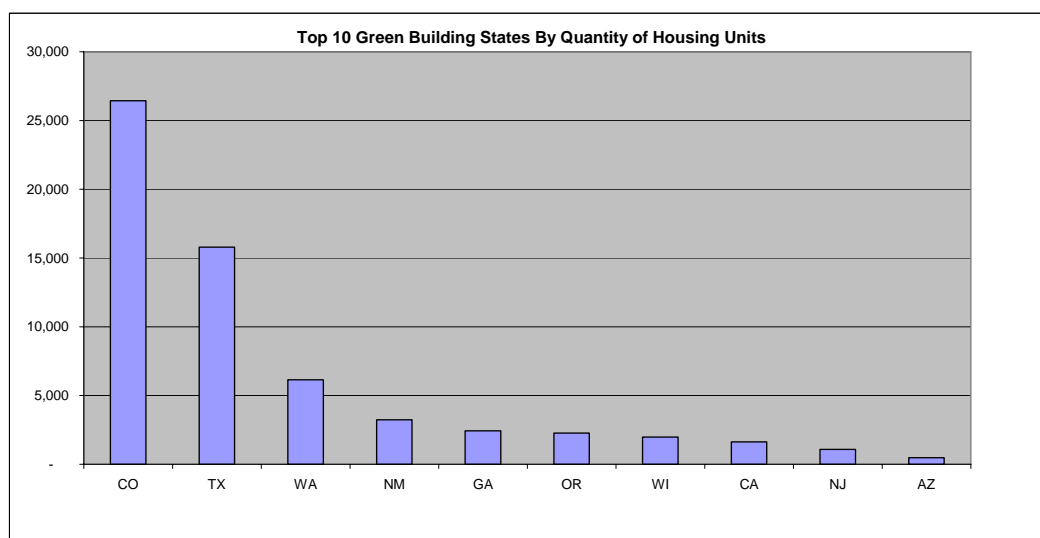
¹⁰ For example, the New Jersey Chapter of the USGBC has consulted to the Township of Cranford which in November 2005 adopted ordinance No 2005-46 incorporating the USGBC’s LEED rating system into its public buildings program and for all project utilizing public funds. A LEED checklist is required for private redevelopment projects and incentives will be offered pursuant to registration and building certification with the USGBC. Other such governmental initiatives are discussed in Part 2.3 below.

community outreach and involvement during the design and planning of a LEED-ND development.

Finally, the *Resource Efficiency* category of LEED-ND promotes the resource-efficient construction of developments, including energy-efficient and water-efficient design, and the use of recycled or salvaged materials.

Figure 2 depicts the number of certified green home units built by the top 10 states between 1990 and 2004. Note that the State of New Jersey ranks ninth nationally. As of December 2005, the New Jersey Green Homes Office, which offers financial incentives to affordable home developers willing to adhere to its program, has certified approximately 2,400 affordable green homes. The development of a green homes program for market-rate residential development in New Jersey is forthcoming.

Figure 2. Number of Certified Green Homes Built 1990-2004, Cumulative Totals



Source: National Association of Home Builders June 2005 data and author's calculations.

2.2 Analysis of Green Home Building Programs

The Center for Energy, Economic and Environmental Policy at the Edward J. Bloustein School of Planning and Public Policy, Rutgers University, recently interviewed between 25 and 30 percent of the principals of the nation's most prominent green home building programs.¹¹ A summary of findings appears in Figure 3, below, and the complete matrix of green home building programs from which the interview sample was drawn appears in Appendix A. In addition to the acquisition of organizational data about these programs, a key purpose of these interviews was to gain an understanding of the roles of information and incentive and other policy tools that are employed in promoting green home building. The numbers of homes

¹¹ This work has been made possible with funding from the NJ HMFA. A second round of more focused interviews is being conducted now in order to provide additional data and recommendations to both the NJ HMFA and the NJMC. Program directors, municipal officials and both participating and non participating developers of three (3) programs are being interviewed. Resulting data is anticipated to be available 1st Quarter 2006.

certified in 2004 was sometimes provided by these organizations, but it is the author's belief that the data provided by these same organizations to the NAHB (as earlier referenced) is more accurate. The interview guide and transcripts of the interviews are included in Appendix B.

While there are instances of incentive and regulation in these programs—for example, the City of Boulder, Colorado requires builder participation in the *Green Points Program* in order to receive a building permit¹²—information is clearly the policy tool of choice. A good example is *Built Green Colorado*, the nation's leading program. This program was created in 1995 through the joint efforts of the Home Builders Association of Metropolitan Denver, the Governor's Office of Energy Management and Conservation (OEMC), Xcel Energy and E-Star Colorado.¹³ Over the years, Built Green Colorado has become the largest green building program in the nation, with more than 100 builder members across the state (NAHB). Built Green has successfully used a “green parade of homes” (at Lowry Air Force Base, now being adaptively re-used as homes), an outdoor education center, model homes, and an extensive \$1 million one-year public education and advertising campaign to erect some 13,500 homes.

Based on the interview findings, a prototypical green building program progresses through the following informational sequence.

1. Program publicizes benefits of owning a high performance or “green” building through newsletters, booklets, or the Web with the intent to generate interest from the building industry.
2. Interested parties can join their local green organization. Membership usually requires attending a seminar followed by a written exam. Certification to individual organizations is granted upon passing exam. Participating builders must then attend a given number of seminars annually to maintain their certification.
3. Upon being granted certification, participating builders use their local green building program to obtain technical and marketing assistance to reduce the energy use and environmental impact of the buildings they construct. Local programs typically establish green guidelines and verify compliance on a project-by-project basis.
4. If participating builder complies with green building guidelines, s/he may display signage with recognizable logos in front of new building letting potential buyers know this particular builder is committed to offering a superior product.

A complementary summary of direct and indirect program incentives, including those based on informational strategies, has been produced by the research center of the NAHB. Note that the first set of incentives impacts the price and operating costs of the developer, whereas the second set provides benefits to both the developer and the consumer.

¹² www.ci.boulder.co.us/environmentalaffairs/green_points/

¹³ www.builtgreen.org/about/overview.html and author's interview(s). The interesting situation wherein Boulder has enacted green building regulation, but other cities in Colorado have not, is being examined in the author's doctoral research, previously cited. In short, there is little evidence that green building measures adopted in relatively progressive cities and states spread to less progressive areas.

Direct incentives for the developer include:

- *Recognition*—free promotion on Web sites, events, press releases and publications, free case study fliers, etc.
- *Reduced inspection and permitting fees*—fee reductions or subsidies for projects in compliance with green building or energy/water efficiency standards.
- *Expedited plan and field check*—projects given administrative priority, reducing processing time from 20 percent to 50 percent.
- *Code/zoning variances*—such as density bonuses for cluster development and other smart growth strategies.
- *Tax credits/exemptions*—tax relief on all or part of allowable costs of developments that meet green and smart growth standards, often in alignment with comprehensive plan goals.
- *Monetary awards and rebates*—competitive grant programs to fund innovative projects that meet energy and water conservation, waste minimization, or smart growth goals.
- *Below-market capital*—revolving, low-interest loan funds and extended payment options often used as an incentive for developers who make efficient use of existing utility or building infrastructure (i.e., infill and existing structure development).
- *Free or reduced-rate products and services*—compact fluorescents, low-flow showerheads, etc.; training and free design support to project design teams, construction site management teams, and so on.

Indirect incentives that offer benefit to the consumer, but which may enhance the marketability and competitiveness of the developer's homes:

- *Special Mortgage Products*—below-market financing for homes built to green building or smart growth standards.
- *Tax incentives*—property tax relief for improvements (including new construction) that meet green building/smart growth standards.
- *Free or reduced-rate products and services*—compact fluorescents, low-flow showerheads, etc. Training and free design support to project design teams, construction site management teams, and the like.

Often, but not always, incentives play a large role during the start-up and initial phases of green building programs. Most green building programs target developers over homeowners/buyers, and the incentives they offer reflect this. The dissemination of information plays a continuous role throughout the various stages of these programs, although its nature may change as the program matures. Whereas initial communications tend to be more general and extol the benefits of green building, as well as their real or perceived costs, later communications are more technical and targeted toward project implementation.

Figure 3. Green Home Building Organizations

Organization	Founded	# of Builders Affiliated	Rating System	Membership Fee	Number of Homes Certified in 2004	Funding	Financial Incentives	Unique to This Organization
Vermont Builds Greener	2005	4	Follows Energy Star guidelines with additional standards for indoor air quality and lighting	\$450	394	Membership fee, a state grant, state also contributes small labor force.	Incentives in the range of \$160-\$1,300 are available through the organization. The local gas utility company offers a \$500 incentive, local electric also offers a small incentive	Program compares number of bedrooms to number of occupants in the home
Wisconsin Green Built Home Madison, WI	1999	50	Builders must achieve 60 of the 300 total points offered	\$200 + \$50 per home added	1000	Membership fee and fee per home	None	The "Efficiency of space" category encourages homeowners to build "up" rather than "out"
Ecobuild Memphis, TN	2003	7-10	Builders must meet all criteria outlined on checklist. Must pass a duct leakage test of 10% or less	\$300	12	Membership fee	If entire subdivision qualifies for Ecobuild, utility company will waive \$865 unit connection fee	In the process of certifying the "uptown" community in Memphis. This will be one of the 10 largest green communities in the country
Built Green Kitsap County WA	1997	15-20	Rating system based upon 2 levels—1, 2 or 3 stars. There are 4 categories for ratings depending on type of building	\$100 + \$50 per project	Figure not known	Membership fee and subsidies from solid wastes department	Some small grants are subsidized by the HBA	The state of Washington has 8 separate built green programs. One of the highest in any state
Built Green Colorado—metro Denver area	1996	All Buildings	*The Green Points program is part of code compliance in Boulder. Without meeting the requirements, permit is not issued	-	All Homes	Building permit fees, trash tax, waste diversion program	*Compliance with Greenpoints is mandatory through the city of Boulder	Number of points needed for permit increases as the size of home increases. As the home grows in size, one must comply with a greater percentage of options

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Organization	Founded	# of Builders Affiliated	Rating System	Membership Fee	Number of Homes Certified in 2004	Funding	Financial Incentives	Unique to This Organization
Green Built, Inc. Grand Rapids, MN	2001	14 Builders 13 Associate Members	Based on the Energy Star 5 Star program plus an additional 120 points. Builder must reach 86 of these 120 points.	\$175	25-30	Membership fee and \$10,000 grant from state	None currently; Green Built is looking into incentives with lenders for home loans for green buildings	
Green Roundtable Cambridge, MA	2001	-	LEED rating system most common in Massachusetts	Separate Fee structure for individuals, students, corporations, and public-sector groups	-	Membership fee, and small grants	Does not work directly with builders and homeowners	-
Green Home Pilot Program Schenectady, NY	2005	-	Rating system in draft phase. Will be calibrated on a point system	Fee structure to be determined	-	Funding yet to be determined	-	-
North Carolina Healthy Built Home Program	2001	6	Point rating system yields four levels of classification: certified, bronze, silver and gold	\$900 per home; includes Energy Star Certification; HVAC testing, framing inspection	-	Funding primarily through a grant from the Dept. of Affordable Housing	None	Program guidelines cover entire state of North Carolina rather than being regionally based. Program hopes to lower certification fee as demand rises
GreenHOME Washington, DC	1999 with new initiatives for 2005	6-10	Works directly with developers and Habitat for Humanity; does not implement a certification system	No Fee	Not yet determined	Funding through donations and sale of book <i>Green and Lean</i>	Exploring more immediate incentives for developers since they will not benefit from building's long-term payback	GreenHOME has targeted 60 neighborhoods in DC, VA, and MD. This advanced planning is to avoid any potential NIMBY issues from existing neighborhoods

Source: Author's interviews and research.

Another noteworthy finding is that many local programs have taken on the sacred cow issue in green home building—supersized homes. For example, *Vermont Builds Greener* compares the number of bedrooms to the number of occupants in the home in its rating system, and awards points according to the House Size Point chart. Fewer bedrooms merit more points. *Wisconsin Green Built Home* has an “efficiency of space” category that encourages homeowners to build “up” rather than “out”—appealing to both green building and smart growth rationale.

Almost all green home building programs are performance-based. Some programs include only one performance level (EarthCraft in Georgia). Others go up to five levels (Austin, Texas program). Some call for self-certification (Built Green Kitsap, Washington State). Others require third-party certification (Scottsdale, Arizona).

Moreover, green home building programs tend to be organized around similar principles and processes, although they differ in how they reflect local/regional economic and environmental imperatives. This ultimately affects the benefits and costs they imply for builders, consumers, and the general public.

For example, *Built Green Colorado*—reflecting an environment often referred to as a water rights attorney’s heaven—extols the merits of water efficiency. By installing water-efficient faucets and showerheads, a typical family can save \$60–\$120 per year. That translates into roughly 17,000 gallons of water saved. Typical showerheads use 3.5–6 gal./min. According to this organization, a water-efficient showerhead reduces the flow to less than 2.5 gal./min. without sacrificing water pressure.¹⁴

The *EarthCraft House* program in Georgia awards half of its points to energy efficiency and half to other green building techniques. As such, it considers itself a “southeast” program. According to its principals, the program adds 1–3 percent to the base price of a house, but these costs are recovered through decreased utility costs for the owner—second to a mortgage the largest ongoing expense associated with home ownership.¹⁵ On a related note, the NAHB claims, specifying Energy Star light fixtures for a newly constructed home costs, on average, \$30 more than a comparable standard fixture. Placing 20 Energy Star light fixtures in a home where energy costs are 10.5 kw/h will save \$100 per year in energy and bulb replacement costs after accounting for the increase in mortgage costs for these more expensive fixtures. For homes built between 1990 and 2001, total energy expenditures per year averaged \$1,600, and this was prior to dramatic increases in energy prices. The NAHB believes that such energy-efficient improvements can make the home 20 percent more energy efficient.¹⁶ In the near future, the EarthCraft program intends to require Energy Star standards.¹⁷

¹⁴ www.builtgreencolorado.org

¹⁵ This data is from the author’s tour of Earthcraft Homes with the program’s principals in Atlanta during the National Green Building Conference of the NAHB March 13-15, 2005.

¹⁶ NAHB.org NAHB Model Green Home Building Guidelines, Dec 13, 2004.

¹⁷ www.southface.org and author’s interview(s).

The Southface organization, a parent organization of EarthCraft Home, also focuses on home energy consumption, extending this focus to existing homes. Noting that refrigerators and freezers consume about one-sixth of all the electricity used in American households and that units that are 10-20 years old are 60 percent as efficient as current models, the organization suggests replacing older refrigerators to save as much as \$15 per month or \$180 per year.

A recent study of the costs and benefits of green affordable housing meeting the United States Department Housing and Urban Development (HUD) definition for affordable housing—rental or mortgage cost does not exceed 30 percent of gross monthly income—summarizes some of these economic relationships. Using a life-cycle approach, this study finds that green affordable housing is more cost-effective in net present value (NPV) terms than conventional affordable housing.¹⁸ Total development costs for sixteen green projects ranged from 18 percent below to 9 percent above the costs for comparable conventional projects. An average premium of 2.42 percent in total development costs was derived from this same data. Nevertheless, developers and residents (owners and tenants) each experience variable life-cycle costs and benefits.

For instance, the cost to developers of greening ranged from \$9,700 more (per unit) to \$34,800 less (per unit) NPV.¹⁹

- In 9 cases, developers experienced net losses
- In 5 of 16 projects, developers realized net benefits
- In 2 of 16 projects, developers experienced neither net benefits nor net losses

In general, whether a developer experiences a net gain or loss depends on the length of time the developer holds an ownership interest in a property and on whom—developer, owner, or tenant—the responsibility for utility costs or savings falls.

For owners, the life-cycle outcome in this study was nearly always positive; the NPV ranged from -\$140 to \$59,861 per unit.²⁰ Owners/residents do not pay the incremental first costs of greening, but they do receive its benefits through lower utility costs, and improved air quality (not quantified here). Because residents of low-income housing have been found to suffer disproportionately from asthma and other respiratory conditions, this benefit could prove substantial.²¹

- In 14 of 16 cases, owners/residents received a net benefit
- In 1 case, no net impact was found
- In 1 case, a net loss was recorded

¹⁸ Bradshaw et al., *The Costs and Benefits of Affordable Housing*.

¹⁹ Op. cit., 10.

²⁰ Op. cit., 10.

²¹ See www.asthmaregionalcouncil.org and www.buac.org, the Web sites of the New England Asthma Regional Council and the Boston Urban Asthma Coalition, respectively.

Although the sample size of this study is small and there are various other limiting factors in this research,²² these NPV calculations offer some insight into both total benefits and costs of green housing (in this case, affordable) and the distribution across market participants.

A second study of the costs and benefits of green buildings was completed in October 2003 as a report to California's Sustainable Building Task Force, a group of more than 40 state agencies. This study drew on cost data from 33 *commercial* LEED certified green projects (25 office buildings and 8 schools) and benefits data from over 100. Its overall finding was that an upfront investment of approximately 2 percent of construction costs (\$3–5/ft.²) yielded life-cycle benefits of more than 10 times the initial investment.²³ Monetized benefits included lower energy, emissions, water and waste disposal costs, lower building operations and maintenance costs, and savings from higher productivity and health.

For example, assuming a 20-year term, a 5 percent real interest rate, and \$150–250/ft.² in building costs, NPV calculations concluded savings in:

Energy	= \$5.80/ft. ²
Emissions	= \$1.20
Water	= \$0.50
Operations & Maintenance	= \$8.50
Productivity & Health	= \$36.90 to \$55.30
Subtotal	= \$52.90 to \$71.30

Less the average extra cost of green building of \$3.00 to \$5.00/ft.²,

Total 20-year Net Benefit = \$49.90 to \$66.30/ft.²²⁴

Additional research is needed to ascertain how applicable these calculations may be to green housing and, ideally, the study on affordable green housing could be restated in square feet so as to facilitate ready comparison. Also, the applicability and transferability to other locations nationally needs to be further assessed. While the California study most likely overstates the net benefits—many projects in the sample are of a type wherein the disconnection between who bears the incremental first costs and who realizes the life-cycle benefits either does not exist (e.g., a school) or is less great (e.g., a build-to-own office), the basic conclusion that the private and public life-cycle benefits of green building outweigh its costs is likely to hold.

The 2004 Annual Report of the Energy Star program provides additional assurance. The more than 360,000 Energy Star-qualified homes that have been constructed to date have locked in savings of over \$200 million annually for these homeowners alone. These private savings simultaneously represent considerable public benefits in energy and

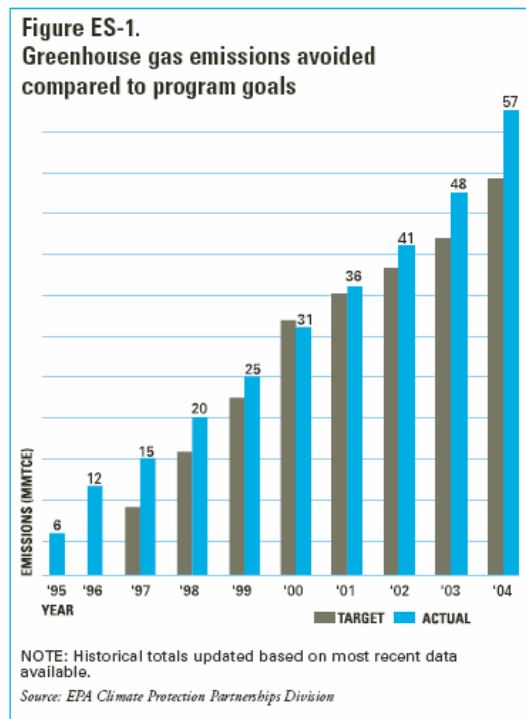
²² Op. cit., 10-11; 27-34.

²³ Katz, *The Costs and Financial Benefits of Green Buildings*, p.v.

²⁴ Katz, an update to the 2003 study as presented December 1, 2005 in Trenton, New Jersey.

emissions categories. For example, just in 2004, Energy Star product compliance prevented greenhouse gas emissions equivalent to those that would be produced by 20 million vehicles. As previously discussed, such emissions are a leading cause of asthma and other respiratory disease and can lead to other social costs, such as lost tourist revenue and decreased property values.

Figure 4. Select Public and Private Benefits of Energy Star (all applications)



HIGHLIGHTS OF 2004

- Americans, with the help of ENERGY STAR, prevented the greenhouse gas emissions equivalent to those from 20 million vehicles and saved around \$10 billion on their energy bills.
- Since 2000, utility bill and greenhouse gas savings have doubled with the help of ENERGY STAR. Annual emissions reductions are on track to more than double again in 10 years from 20 to 40 million vehicle equivalents.
- The domestic methane programs exceeded their emissions reduction goals in 2004 and kept national methane emissions to well below 1990 levels.
- Renewable energy purchases grew to more than 2 billion kilowatt hours (kWh) among major companies, universities, government agencies, and other organizations as a strategy for demonstrating environmental leadership.
- The Administration's corporate leadership program, Climate Leaders, grew to 66 companies from many different industries, and about one-third of the companies completed sufficient work to announce aggressive greenhouse gas reduction targets for the future.
- Energy savings were about 125 billion kWh, or about 4 percent of the total 2004 U.S. electricity demand.

Additional environmental and economic achievements of EPA's climate partnerships¹ as of 2004 are summarized on the next page.

Moreover, the Energy Star program, as with green building programs generally, leads to positive spillover effects in terms of revenues from green technologies and green jobs. Figure 5 displays the cumulative benefits through 2014 (in 2004 dollars) of green technologies introduced as a result of the Energy Star program and in comparison to other energy initiatives.

Figure 5. Green Technology Benefits of Energy Star (2004 dollars)

Table ES-1. Summary of the benefits for 2004 and cumulative benefits through 2014 from the actions taken by partners through 2004 (in billions of 2004 dollars)						
Program	BENEFITS FOR 2004		CUMULATIVE BENEFITS 1993–2014			
	Net Savings	MMTCE	NPV of Bill Savings	NPV of Technology Expenditures	NPV of Net Savings	MMTCE
ENERGY STAR						
Qualified Products	\$5.1	13.0	\$66.4	\$4.6	\$59.8	161
Buildings	\$4.2	13.2	\$63.5	\$12.6	\$50.9	170
Industry	—	4.1	—	—	—	69
Clean Energy Programs	—	1.7	—	na	—	19
Methane Programs	\$0.3	12.9	\$8.7	\$4.5	\$4.2	191
High GWP Gas Programs	—	11.7	—	na	—	181
TOTAL	\$9.7	56.6	\$136.7	\$21.7	\$115	791
NPV: Net Present Value NOTES: Technology Expenditures include O&M expenses for Methane Programs. Bill Savings and Net Savings include revenue from sales of methane and electricity. ENERGY STAR qualified homes are included in the Qualified Products totals. Totals may not equal sum of components due to independent rounding. For details on cumulative benefits, see page 49. —: Not applicable na: Not available						

¹ This report provides results for the climate protection partnership programs operated by the Office of Atmospheric Programs at EPA. It does not include emissions reductions attributable to WasteWise, transportation programs, the Significant New Alternatives Program, or the landfill rule, which are the remaining actions in EPA's comprehensive climate program. EPA estimates the reduction in greenhouse gas emissions across the entire set of climate programs to be more than 80 MMTCE in 2004.

² Reductions in annual greenhouse gas emissions for EPA's climate programs, including non-CO₂ gases, are based on "carbon equivalents," which are determined by weighting the reductions in emissions of a gas by its global warming potential for a 100-year time period.

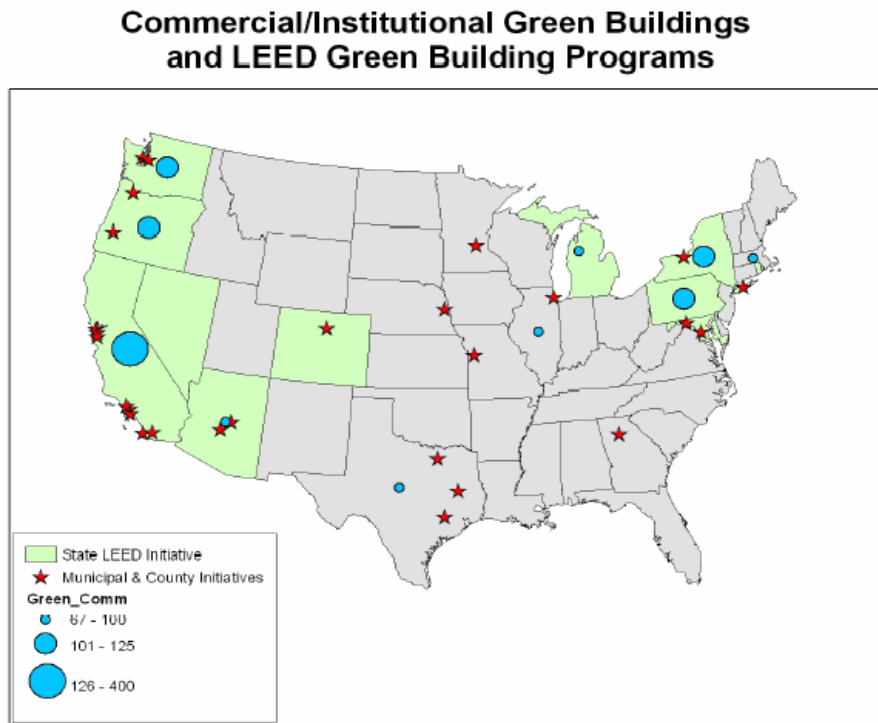
2.3 Relationship of Green Home Building Programs to Government Initiatives

To further the discussion on public policy, this section considers how activities of state and local governments to encourage green building interact with green home building programs or plan to do so in the future. Local and state governments have at their disposal a variety of policy tools for influencing the adoption rates and distribution of green building. Regulatory tools of green building may include code and performance ordinances and also contract specifications and procurement policies. Development incentives and tax credit/abatement programs can be utilized to encourage green building, in addition to use of state tax credit programs where they exist. Local and regional governments can also implement disincentives for non-green building—e.g., through the imposition of a “green tax” on conventional polluting technologies and methods. A recent example of this is found in the Central Valley of California, among 7 counties that plan to assess builders an air pollution fee as a means to encourage them to cut emissions during construction and to reduce other pollutants by using energy-saving and traffic-reducing features in the developments.²⁵

²⁵ Marshall, *Builders in Central Valley of California May Face Air Pollution Fees*.

As of April 2005, there were 35 local LEED-based green building initiatives (municipal and county) in effect in the United States and a handful of others not based on LEED. There were also about a dozen pending some formal action (not included in this count). Figure 6 illustrates the correspondence of local LEED programs, state LEED programs, and commercial (e.g., LEED) green building. Figure 7 illustrates the correspondence of green home building (non LEED) and states with LEED initiatives.

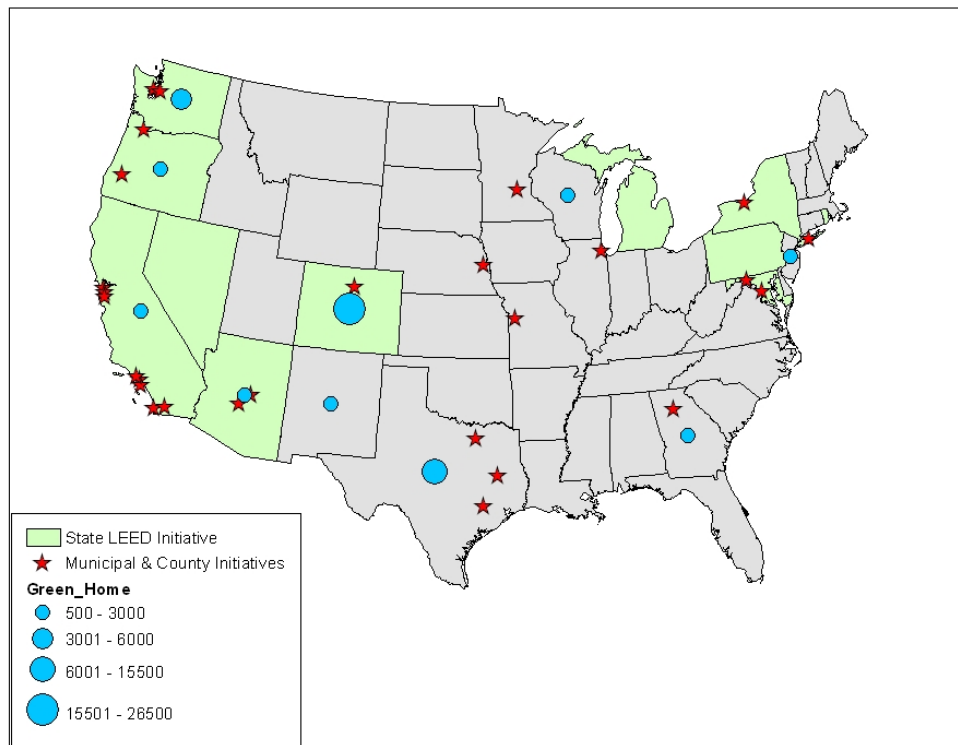
Figure 6. Commercial Green Buildings and Green Building Programs/Policies



Source: USGBC and author's interpretative mapping.

Figure 7. Green Homes and State LEED Programs

Residential Green Buildings & Green Building Programs



Source: USGBC and author's data collection and interpretative mapping.

Referring to Figure 6, 24 local initiatives are located in states with LEED programs, of which 13 are in California, 4 are in Washington State, 2 are in New York, and 2 are in Oregon. A total of 19 local initiatives are clustered on the West Coast, known as the “home of green building.” These states—except Washington, which has very strong green building legislation—additionally offer incentive programs.²⁶ Further, there is a close, if imperfect, correspondence between these initiatives and those states that lead in certified/registered green buildings. New York and Oregon both have tax credit programs, which originate in energy efficiency considerations, and which require LEED certification.²⁷ California makes available cash incentives to promote the construction of high-performance buildings and especially emphasizes the role of renewable solar

²⁶This, admittedly, is a tough category. Included in this count herein are only statewide incentive programs, run by the state, that target green building and which include market-rate building activity. Many more states have separate Smart Growth, Energy Smart, and/or affordable green housing incentives. Also, many community investment funds and not-for-profits now support green building. Sources: USGBC, *Users Summary*.

²⁷NY State Green Building Tax Incentive Program <http://www.dec.state.ny.us/website/grnbldg/index.html>; Oregon Business Energy Tax Credit Program: <http://www.energy.state.or.us/bus/tax/sustain.htm>

energy. There are smaller clusters of initiatives in states without LEED programs—4 in Texas and 2 each in Illinois, Massachusetts, and Missouri.

In addition, many municipalities in the LEED states provide in-kind incentives or combinations of regulations and incentives for private-sector green building. These include:

- *Arlington County (Virginia)* and *Acton (Massachusetts)*, which have initiatives whereby density bonuses are used as incentives to builders. In Acton, LEED certification is required. In Arlington County, it is used as a benchmark, or guide.
- *Santa Barbara (California)*, which has incentives including expedited plan review and free design guidance for energy efficiency. The County Planning and Development agency also has established an Innovative Building Review Committee to eliminate obstacles to energy-efficient green building techniques.
- *Issaquah (Washington State)*, where projects achieving LEED certification are placed at the head of the building permit review line.

Many local governments in non-LEED states encourage green building through the provision of incentives that are essentially informational tools, such as technical assistance and marketing support. Austin (Texas) and Scottsdale (Arizona) have particularly strong reputations in this area, and both of these cities host very strong green home building programs.²⁸ Few local governments in non-LEED states mandate green building although, as previously discussed, Boulder (Colorado) is an exception.

In Figure 7, the relationship between LEED state policy and green home building is much less convincing. As the USGBC has not yet released LEED-Homes and as state LEED policies therefore refer to commercial and institutional building, this is not surprising. However, this difference in pattern also suggests that there are in reality two emergent green building movements, not one. As is shown, commercial green building, especially by not-for-profit institutions and governments, is more common in states with stronger traditions of land use, zoning and code regulation. These states additionally may provide financial incentives for green building. Residential-sector green building is more common in states without these attributes. Commercial green building mostly follows a program that is advanced by an advocacy organization, the U.S. Green Building Council (USGBC). Residential green building mainly adheres to a program of a trade organization, the National Association of Home Builders (NAHB).

2.4 Affordable Green Home Building and Government Initiatives

This final section addresses the relationship between affordable green home building programs and government initiatives. Increasingly, states are leveraging existing

²⁸ Popeck, *Green Building*. Author's interviews; see next page.

affordable housing programs to include green building provisions. For example, for many states, the federal Housing Credit program is an important and successful program. A recent work on affordable green housing assigns as its signature strength the “Qualified Allocation Plan” (QAP). The QAP sets the criteria for allocating Housing Credits, basing them on a variety of factors which, for many states, has come to include sustainable building and/or its components.²⁹ Specifically, the referred work analyzes elements in states’ 2005 Housing Credit allocation plans that support three areas of green building: site location, energy and resource use, and environmental/indoor air quality.³⁰

Many states originate incentives for green affordable housing. In Georgia, the Department of Community Affairs, Housing Finance Division, offers enhanced down-payment assistance for low- to moderate-income homebuyers who purchase homes built to the Earth Craft standard or for Energy Star Homes. This consists of a \$7,500 deferred repayment, interest-free second mortgage, to be repaid upon the sale or refinancing of the home. This amount can be used for closing costs, prepaids, down-payment or principal reduction, but must be used with a complementary low-income mortgage offered by the Georgia Department of Community Affairs.³¹

Another opportunity for affordable green housing resides in a plethora of potential partnerships between state agencies and not-for-profit organizations. For example, Metro-Dade County, Florida, like Green Homes DC, is working with Habitat for Humanity and other partners to plan and develop an energy-efficient, environmentally sound low-cost housing development. Global Green USA, through its Greening Affordable Housing Initiative (GAHI), also collaborates with Habitat for Humanity, in California. In the areas of information and incentive, GAHI has held a design charrette for Los Angeles affordable housing developers, provides technical assistance to non-profit developers, conducts a national workshop series, and develops and advocates for various policy initiatives that would include green criteria in them—e.g., the California Tax Credit Allocation Committee Guidelines and the Los Angeles Trust Fund.³²

GreenHOME in the District of Columbia, which works closely with Habitat for Humanity, has developed a target set of 60 neighborhoods in the District of Columbia, Virginia, and Maryland, for its program. There is a natural alliance between not-for-profit organizations that build affordable housing and green building advocates, especially as concerns the promotion of energy efficiency and the accompanying lower utility bills.

Finally, New Jersey Green Homes provides financial incentive of up to \$7,500 per unit for compliance with its affordable green housing program and will shortly provide up to \$10,000 per unit. The New Jersey program requires Energy Star and plans to offer 2 points—1 for solar, 1 for other green—toward the QAP in the 2006 premium version.

²⁹ Tassos, op. cit.

³⁰ Unfortunately, the report misrepresents New Jersey in two areas, missing: 1) its requirement for Energy Star and 2) other requirements of the Green Homes program (Kasabach, NJHMFA, April 29, 2005, electronic communication).

³¹ May 10, 2005 interview with Jane Massey, Georgia Department of Community Affairs, Housing and Finance Division.

³² Globalgreen.org

Specifically, the New Jersey Affordable Green (NJAG) Program offers technical and financial assistance, as well as advocacy and education programs to encourage the use of green technologies in New Jersey's homes. The only statewide affordable housing program in the country, the program is a national model for green affordable housing and has worked to increase the use of innovative green materials and design and building technologies in over 2,000 affordable homeownership and rental units in the state. Its success has led to rules that will require developers of all affordable housing units within New Jersey to meet minimum green requirements, with the option to receive additional funding to develop a higher threshold of green affordable housing units.

In an attempt to continue to raise building standards and create a consumer demand for efficient, healthy, and environmentally responsible homes, the Green Homes Office (GHO) is developing the New Jersey High Performance Homes Plus Program (NJHPH) for market and production-rate builders (non-affordable). NJHPH is a comprehensive and voluntary residential construction rating program that will advance high-performance home building and renovation in New Jersey. The program will establish a state green building standard and promote whole system, energy-efficient building practices among builders and educate consumers about the advantages of these features in their homes. The program will coordinate with other national green building programs to address and emphasize bioregional issues and provide New Jersey builders and residents with a one-of-a-kind program tailored to the specific needs of the state.

Additional policy initiatives are itemized below.

New Jersey offers additional point on the 2006 Tax Credit QAP for Green/Solar technologies

The Green Homes Office coordinates with various groups, including state agencies, municipalities, public/private and non-profit organizations to develop green policies and facilitate the construction of exceptional national examples of green housing. One such initiative includes working with New Jersey's Home and Mortgage Financing Agency to offer an additional point for green building and/or solar technologies on the 2006 Low Income Housing Tax Credit Qualifying Allocation Plan. This extra point provides valuable incentive for affordable housing developers to build to "premium" green standards.

New Jersey Green Building Primer

The GHO has taken an active and aggressive role in green building education directed to design professionals, builders, developers, schools, and municipal officials. The GHO has developed a *Green Building Primer* for New Jersey municipalities that will illustrate the benefits of green building practices and offer resources to municipal officials on how to implement sustainable, green development principles and policies into their localities.

PART THREE—CHALLENGES AND SOLUTIONS OF GREEN HOME BUILDING PROGRAMS: BEST PRACTICE IMPLEMENTATION RECOMMENDATIONS FOR THE NJMC

In the United States today, buildings account for nearly 35 percent of total energy consumed, and 65 percent of U.S. consumption of electricity overall.³³ Buildings intensify global warming by releasing carbon dioxide into the atmosphere through the use of electricity generated by the burning of non-renewable fossil fuels, or by burning carbon-based fuels within the building. In this manner, buildings account for 30 percent of greenhouse gas emissions.³⁴ Building construction further accounts for 30 percent of raw materials use, while 28 percent of landfill material is made up of construction debris.³⁵ A combination of inefficient construction techniques and infrastructure systems, on the one hand, and the lifestyles of occupants, on the other, buildings account for 12 percent of potable water consumption and 30 percent of waste output.³⁶ Sick Building Syndrome—the result of poor indoor air quality caused by a combination of toxic construction materials, toxic cleaning agents and energy-efficient yet problematic air-tight construction—may affect as many as 30 percent of new and renovated buildings.³⁷ Such resource and health challenges form the rationale for green building and are defined as follows: “. . . the practice of 1) increasing the efficiency with which buildings and their sites use energy, water, and materials, and 2) reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal.”³⁸

Since the 1990s, green building in the United States has been increasing rapidly. Indeed, some proponents of green building claim that it is on the cusp of becoming mainstreamed. The U.S. Green Building Council, through its green building rating system, has received green building registrations and/or issued green building certifications in each of 50 states. There is growing awareness of green building techniques among building professionals—including residential builders who participate in the green building program and networking opportunities of the NAHB. Billions of dollars are being invested in green buildings every year.³⁹ There is a recent onslaught of mainstream press articles about green building technology.⁴⁰ Thousands of people are attending green building conferences or green building tracts.⁴¹ Finally, in a field that

³³ *Environmental Building News*, Volume 10, Number 5. These statistics exclude industrial buildings.

³⁴ *EBN*, op. cit.

³⁵ *EBN*, op. cit.

³⁶ *EBN*, op. cit.

³⁷ Yeang, *The Green Skyscraper*.

³⁸ The Office of the Federal Environmental Executive, *The Federal Commitment to Green Building: Experiences and Expectations*.

³⁹ According to the July 2004 edition of *Environmental Design Construction*, today's market in green building products and services is worth in excess of \$5.76 billion on an annual basis.

⁴⁰ For example, a recent *Newsweek* article featured houses using 90 percent less energy than the typical home and future buildings that have the potential not only to be (net) zero energy, but to actually contribute to the energy needs of the geography in which they are located.

⁴¹ Attendees include not only those long committed to the green building movement but also interested parties such as Ray Tonjes, chairman of the National Association of Home Builders (NAHB). Rick Fedrizzi, op. cit.

offers more informal Web-based information than it does academic or policy collections, a Google search on “green building” nets more than 10 million hits!⁴²

Yet, as a percentage of total units built each year, the number of green certified homes remains small. While the trend is upward—more green homes are certified each year—there are several features of the housing industry that can negatively affect adoption rates in green home building. These include: 1) its highly competitive nature; 2) boom-and-bust cycles; 3) dominance by a few large firms on the one hand, and small and medium-sized firms, on the other (the former may be unwilling to champion a comprehensive green building typology, and the latter do not have resources to innovate); 4) the fragmented nature of the industry, which slows down information flows; and 5) lack of protection of intellectual property.⁴³

Moreover, imperfect information, regulatory contradictions, and a misalignment of who pays for and who benefits from green building further characterize an emergent green building market. Most problematically, for the housing market, there is a demonstrated disconnection between incremental first costs and life-cycle benefits of green building. In the home-building industry, green building is more prevalent in higher-priced custom homes than in market-rate production housing, as up-market consumers are evidently willing to compensate for additional first costs. The incidence of affordable green housing is increasing very noticeably, but this is a special case that is the result of either an additional subsidy or an additional requirement to qualify for low-income tax credits.

A study by the Center for Housing Research at the Virginia Polytechnic Institute identifies the characteristics of home-building firms more likely to be associated with an increased propensity to adopt new products, materials, and/or practices in home building.⁴⁴

“The types of home building firms most likely to be early adopters were:

- *Modular builders and multifamily builders.*
- *Single-family custom home builders.*
- *National and regional builders.*

These more innovative firms were also more likely to:

- *Have a technology advocate within the building firm.*
- *Stress the importance of being creative and the first to use new products.*
- *Use technology transfer programs like the Partnership for Advancing Technology in Housing (PATH) and universities.*
- *Use union labor at least sometimes.*

⁴² Rob Bennett, “The Next Big Thing in Green Building: Sustainability Flows into the Mainstream,” *Northwest Construction* Vol. 7, No. 10 (October 1, 2004), Green Column, p. 33.

⁴³ Rand, op. cit.

⁴⁴ Center for Housing Research, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, and NAHB Research Center, *The Diffusion of Innovation in the Residential Building Industry*.

These firms also stressed the importance of:

- *Homebuyers who are aware of and want new products and materials.*
- *Reliance on established manufacturers standing behind their building and construction products.*

The types of home-building firms that wait until new products, materials, and practices have been around much longer were more likely to be local firms and single-family production builders.

These later adopters also were more likely to:

- *Emphasize marketability and profit.*
- *Associate the firm's success with land development.*
- *Emphasize the "tried and true" and the risks of new materials and products."*

The above findings, first, comport with the empirical evidence of green building in the residential sector and, second, suggest something of an uphill battle for the mainstreaming of single-family green homes, especially among smaller local firms. On the other hand, they suggest that the more immediate opportunity lies with modular and multifamily builders, especially national and regional ones. In either case, it seems logical to expect that the diffusion of key information to targeted builders, along with financial and in-kind incentives, would help to increase adoption rates.

A best-practices analysis of a sample of green home building programs and government initiatives in the United States indicates that financial and non-financial incentives and the supply of quality, timely information are critical to success. In addition, several states and fewer municipalities have begun to require green building in certain circumstances. Most often, green building is required when the project falls into the public sector (e.g., a municipal, state, federal building, a school) or when government funds are used or contributed toward a project. However, as has been presented above, Boulder, Colorado, requires green building compliance in order to issue a residential construction permit. Other cities have changed their building codes to accommodate green building methods—e.g, Chicago in the case of green roofs. The State of New Jersey is currently evaluating a model code or ordinance to accommodate the use of fuel cell technologies in both residential and commercial buildings.⁴⁵

Through its regional planning powers—e.g., zoning, code enforcement, intermunicipal tax sharing—the NJMC is well positioned to implement a comprehensive green building

⁴⁵ This research is being conducted at the Center for Energy, Economic and Environmental Policy within the Edward J. Bloustein School of Planning and Public Policy at Rutgers University. Additional evidence that the State of New Jersey is serious about green building would include the December 1, 2005, Green Building Summit in Trenton (attended by the author representing Mayor Meryl Frank of Highland Park) and Senate Bill No. 2744, introduced September 26, 2005 and co-sponsored by Senators Robert Smith and Andrew Ciesla, calling for the creation of a Green Building Technology Task Force.

program for residential uses. Green building is consistent with the Chapter 10 System Plans of the NJMC 2004 Master Plan.⁴⁶

The USGBC State and Local Committee recommends initial steps for implementing a green building program:⁴⁷

- Find smaller projects through which to break down barriers
- Bring together various programs (state or local level) or ordinances (local level) and place under one umbrella/coordinator
- Look for pressure points—pressing environmental issues to solve. Use this to piggyback a larger solution.
- Use these same issues to lobby for incentives—e.g., if water efficiency, incentives could come from the water company, if energy . . . and so on. Money creates interest.
- Hire a change agent
- Provide cost/benefit studies and technical information, especially how-to process models and demonstration projects

In many aspects, the NJMC is already effectuating these. For example, the NJMC recently announced a joint Green Building Resource Center with Ramapo College. The Center will serve as a resource for developers who are interested in building green. Also, the NJMC continues to work with the Bloustein School through the Institute for Meadowlands Studies and the newly formed Rutgers Center for Green Building to develop policy research reports such as this one.

Additional programs that the NJMC could initiate might include: 1) case study of green building projects in the district, as they come on line, so that data can be extracted for the benefit of future projects/developers; 2) mixed-use green redevelopment of a brownfield site—there is currently much interest in how to combine these two environmental management methods from both a technical and policy perspective; 3) applying to be a pilot community for the forthcoming LEED-Neighborhood Development (LEED-ND) standard; and 4) applying the LEED-ND rating system to evaluate whether future development within the Meadowlands District and among the constituent municipalities meets the Commission's smart growth and sustainability goals.

Whereas movement from green houses to green suburbs is a step up in scale, requiring a comprehensive look at community resources and systems, there are a number of categories in the LEED-ND rating system that are consistent with the goals and objectives of the NJMC Master Plan and Redevelopment Plan. The Secaucus Transit Village redevelopment project could be a good choice for taking advantage of the LEED-ND rating system. The Secaucus Junction train station is a major transit hub, located adjacent to the New Jersey Turnpike. The Urban Land Institute (ULI), in an evaluation of the proposed transit village and plan, made a number of planning recommendations,

⁴⁶ As is delineated in the Executive Summary, the objectives of this research correspond to and support a number of strategies outlined in Chapter 10: System Plans of the NJMC's January 2004 Master Plan.

⁴⁷ Author's notes from conference, November 2004.

among them a mixed-use community including residential, retail, and small offices; pedestrian-friendly design to promote walking and biking; and designing short streets with lengths between 200 and 400 feet and avoiding superblocks (the joining of several previously separate blocks prevalent during the period of “urban renewal” in the 1970s, which created larger projects that tended to be friendlier to the automobile than to the pedestrian, and which were not conceived to be human scale).⁴⁸ The Meadowlands Commission is also exploring the creation of a framework for tracking the sustainability of the district. To that end, potential sustainability indicators have been proposed and are currently being refined. The LEED-ND rating system supports a number of the potential indicators. Figure 8 illustrates how the LEED-ND rating system categories support the potential sustainability indicators.

Figure 8. LEED-ND and NJMC Sustainability Indicators

System	Potential Indicators	LEED-ND
Natural Environment	<p>Acres of land permanently dedicated for open space</p> <p>Abundance of natural animal and plant species</p> <p>Introduction of invasive animal or plant species</p> <p>Ambient concentrations of air pollutants/days per year</p> <p>River health/dissolved oxygen</p> <p>Persons reached through programs promoting environmental education</p>	<p>Location Efficiency</p> <p>Environmental Preservation</p> <p>Environmental Preservation</p> <p>Environmental Preservation</p> <p>Resource Efficiency</p> <p>Environmental Preservation</p> <p>Compact, Complete, and Connected Neighborhoods</p>
Economic Development	<p>New development and employment growth taking place in designated planning areas</p> <p>Brownfield and grayfield sites redeveloped</p> <p>Average disposable income</p> <p>Jobs created</p> <p>Average salary</p> <p>Unemployment rate</p> <p>Percentage of population within each census tract living under the poverty level</p>	<p>Location Efficiency</p> <p>Location Efficiency</p> <p>Environmental Preservation</p> <p>N/A</p> <p>Compact, Complete, and Connected Neighborhoods</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>
Transportation	<p>Vehicle miles traveled per person</p> <p>Change in transit ridership</p> <p>Average commuting time/distance for Meadowlands employees</p>	<p>Location Efficiency</p> <p>Compact, Complete, and Connected Neighborhoods</p> <p>Location Efficiency</p> <p>Compact, Complete, and Connected Neighborhoods</p> <p>Location Efficiency</p> <p>Compact, Complete, and Connected Neighborhoods</p>

⁴⁸ A ULI Advisory Services Program Report, “Secaucus Transit Village: Secaucus, New Jersey,” February 8-10, 2004.

Figure 8. LEED-ND and NJMC Sustainability Indicators (continued)

System	Potential Indicators	LEED-ND
Transportation (continued)	Proportion of new development that is transit friendly	Location Efficiency Compact, Complete, and Connected Neighborhoods
	Traffic fatalities involving motorists or pedestrians	Location Efficiency Compact, Complete, and Connected Neighborhoods
Housing	Resident population growth taking place in designated planning areas	Location Efficiency Compact, Complete, and Connected Neighborhoods
	Relative rates of change for median income and sales of existing single-family houses	Compact, Complete, and Connected Neighborhoods
Community Facilities	Utility demand levels under capacity	Compact, Complete, and Connected Neighborhoods
	Increase in park and recreation facilities	Compact, Complete, and Connected Neighborhoods
	Average classroom size	N/A
	Public opinion ratings of district as a good place to live, work, and visit	Compact, Complete, and Connected Neighborhoods

Source: NJMC Master Plan and author's analysis of the intersection of NJMC indicators and LEED-ND.

In addition, the LEED-Homes rating system may have applications to specific redevelopment projects and may serve as a vehicle to promote “green” home building in the Meadowlands District. More promising, however, is the direction of the New Jersey Green Homes office in evolving a market-rate production green home standard from its successful affordable green housing platform. The current policy to be adopted will combine the best attributes of LEED-H with specific environmental and economic exigencies of New Jersey. In this manner, the resulting standard is likely to emphasize utilization of renewable energy and energy efficiency more than LEED does alone.

It is also likely to address the critical area of existing homes and of how to retrofit these to greener standards. The stock of existing homes in New Jersey far outweighs the flow of new homes created each year. Green development techniques that take a community-wide approach to infrastructure should be adapted to existing neighborhoods. In some instances, this may mean being prepared to unplug (from the grid) and disconnect (from storm sewers). In others, it will require an unconventional look at shared infrastructure systems such as smaller-scale cogeneration facilities that tie together different uses.

In summary, there are Informational, Incentive-based and Regulatory Strategies that the NJMC can adopt to further green building.

Informational Strategies

- Provide cost-benefit analyses and case-study information to developers
- Consider offering training courses in green building or working with New Jersey Green Homes or another entity to do so
- Educate homeowners on the benefits of green housing⁴⁹
- Establish quantifiable targets for the District and monitor them

Incentive-based Strategies

- Offer density awards and/or expedited plan review in exchange for green building (whether LEED-ND, LEED-H, or New Jersey Green Homes)
- Leverage the existing financial incentives of the State for energy efficiency and renewable energy generation
- Work with the State to explore whether these incentives should be expanded to other areas of green building (e.g., indoor air quality)

Regulatory Strategies

- Make green building a part of any environmental assessment or project impact assessment required for a project; compliance can entail filling out a green building checklist, LEED-based or otherwise
- Join with a coalition of state and not-for-profit agencies in New Jersey who are pursuing changes to building code—especially to energy code, as is consistent with the campaign platform of Governor Corzine

As has been presented earlier, there are significant net benefits of green residential building. Many of these relate to energy and emissions, and therefore human productivity and health. In a New Jersey context, the argument favoring energy efficiency and renewable green building measures is likely to find strong resonance. Green building, as such, has the potential to contribute to the State's goals in:

⁴⁹ The New Jersey Housing and Mortgage Finance Agency and New Jersey Green Homes are pursuing the development of brand images and content for housing, such that the energy efficiency, water efficiency, indoor air quality, and so on, can be easily compared across product.

- Achieving a Renewable Portfolio Standard of 20 percent by 2020
- Reducing Grid Load, Providing Less-Expensive Energy
- Lowering Operating Costs for New Jersey Businesses
- Reducing Risk for Insurers
- Reducing Emissions, Trading in Emissions Credits
- Creating Significant Jobs—R&D, Manufacturing, Installation, Maintenance

Additional green benefits in terms of State or NJMC policy exist in the areas of adaptive reuse, waste reduction, water efficiency/safe drinking water supply, and indoor air quality.

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- November 2004 USGBC conference in Portland, OR
- State and Local Government Committee, USGBC.
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Appendix A. Green Home Building Programs

Alameda County Waste Management Program San Leandro, CA (510) 614-1699 www.stopwaste.org/multigreen	GreenHOME, Inc. Washington, DC (202) 544-5356 www.greenhome.org
Alliance for Green Development Albuquerque, NM (505) 269-2969 www.greenalliancenm.org	Green Home Program Hudson Valley, NY (800)-638-8556 www.hvbuilder.com/Hudson_Valley_Green_Builder.asp
Arlington County Green Home Choice Program Arlington, VA (703) 228-4792 www.arlingtonva.us	Green Home Program New York City, NY
Bay Area Build It Green Oakland, CA www.build-green.org	Green Home Program Schenectady, NY (518) 355-0055 www.cbra.com/index.html
Building America Nationwide (202) 586-9472 www.eere.energy.gov/buildings/building_america/	Green Points Program Boulder, CO (303) 441-3090 www.ci.boulder.co.us/environmentalaffairs
Build San Antonio Green San Antonio, TX 210-224-7278 www.buildsagreen.org	Hawaii Built Green Honolulu, HI (808) 847-4666 x210 www.hawaiibuiltgreen.com
Built Green Colorado Denver, CO (303) 778-1400 www.builtgreen.org	I-Built Arizona (928) 779-3071 www.nazba.org
Built Green King & Snohomish Co King and Snohomish Counties, WA (425) 460-8230 www.builtgreen.net	North Carolina Healthy Built Homes Program Raleigh, NC 919-513-0307 www.ncsc.ncsu.edu/programs/North_Carolina_HealthyBuilt_Homes_Program.cfm
Built Green Kitsap Kitsap County, WA (360) 479-5778 www.kitsaphba.com/bbk.html	NJ Green Homes Trenton, NJ (609) 292-3931 www.nj.gov/dca/dhcr/hsg_prog/njgreenhomes.shtml
Built Green of SW WA Clark County, WA (360) 694-0933 www.builtgreennw.com	Portland Green Rated Portland, OR (503) 823-7725 www.green-rated.org
Build Green Program Kansas City, MO (816) 942-8800 www.kchba.org/buildgreenkc	San Jose Green Building San Jose, CA (408) 277-4111 www.ci.san-jose.ca.us/esd/GB-HOME.HTM
California Green Builder Program Sacramento, CA (916) 443-7933 www.thebii.org/cgbp.asp	Santa Barbara County Planning and Development Santa Barbara County, CA www.countyofsb.org/plandev

Earth AdvantageTM Portland, OR (888) 327-8433 www.earthadvantage.com	Southern Green Building Alliance Tucson, AZ (520) 624-6628
EarthCraft House Atlanta, GA (404) 872-3549 www.earthcrafthouse.com	Sustainable City Cambridge, MA
EcoBuild Memphis, TN (901) 528-4748 www.mlgw.com/SubView.php?key=about_ecobuild	Sustainable City Maryland
Florida Green Building Coalition (239) 263-6819 www.floridagreenbuilding.org	Sustainable Design Hennipin County, MN www.sustainabledesignguide.umn.edu
Green Building Program Frisco, TX (972) 335-5555 www.ci.frisco.tx.us/developmentsvcs/greenbuilding/greenbuilding_home.htm	Tacoma Built Green Tacoma, Pierce County, WA (253) 272-2112 www.mbapierce.com
Green Building Program Austin, TX (512) 505-3700 www.ci.austin.tx.us/greenbuilder	Vermont Builds Greener Vermont (800) 893-1997 www.bsr-vt.org
Green Building Program Scottsdale, AZ (480) 312-7080 www.scottsdaleaz.gov/greenbuilding	Western NC GBP Asheville, NC (828) 232-5080 www.wncgbc.org
Green Built, Inc. Grand Rapids, MI (616) 281-2021 www.hbaggr.com	WI Green Built Home Madison, WI (608) 280-0360 www.greenbuilthome.org

Appendix B. Interview Questions and Responses

1. Is program affiliated with a broader municipal, county, or regional green building or sustainability initiative? If so, what is it?
2. Are there financial incentives available for green building? Any non-financial ones? (e.g., density awards, expedited permitting process, etc.)
3. What works well about the green building development process relating to these incentives? What works poorly? What would you change?
4. How often are these incentives used?
5. What about the provision of information and/or technical advice? Does it happen/how/through whom?
6. Used often?
7. What has been the development community's reaction to this green building program and/or green building in general? Builders? Others?
8. Are you familiar with other green building programs and local initiatives? Which ones? Anything very special about them that you would hope to incorporate? Do you interact with other programs at conferences, etc? Which ones?
9. How did this program get started? Did it require strong elected official leadership? Did a not-for-profit provide the leadership?
10. What do you see for the future of green building in ____ (place name)?
11. Does the program have specific target numbers, or other goals?
12. How many homes have been certified by your organization? How is this measured? (Ex. Annual, monthly, by project)
13. What size developers are affiliated or sponsored by your organization? Is there reasoning behind working with a certain size of developers?
14. How is compliance within your organization measured? Is some form of "rating system" in place?
15. If your certification process is governed by a rating system, what would motivate a participant to strive for the highest level of compliance rather than just meeting the minimum requirements?

Vermont Builds Greener

(800) 890-1997

Contact:

Jeff Gephart, Vermont Builds Greener (VBG), Vermont Energy Star

Program Affiliations:

Program affiliated with Energy Star program, looking into affiliation with LEED

Target Market:

Participants work mostly with market-rate single family homes and town homes. Multifamily housing and affordable housing are not part of the program.

History:

VBG is a new all-volunteer organization started in October 2004. It currently has 3 or 4 registered participants in the building industry

Information/Technical Assistance:

Yes, it is available. All participants receive scorecard upon enrolling.

Rating System:

Builders can qualify homes for the Energy Star Rating system. They can take this certification further by meeting VBG's criteria which go beyond energy efficiency by addressing lighting and indoor air quality. Ratings are achieved through a scorecard. Rating system is not broken down into levels of compliance.

One unique component for this scoring is that the program compares the number of bedrooms to number of occupants in the home. For example, if a home meets all criteria but has 5 bedrooms and only 2 occupants, it will count negatively.

Financial Incentives:

Incentives in the range of \$160-\$1,300 are available through the organization. The local gas utility company offers a \$500 incentive. The local electric company also offers a small incentive.

Community Reaction:

Builders fear the term "green." However, they are more comfortable with making a home "energy efficient."

Funding:

Builders must pay a \$450 fee to participate. VGB also received a grant from the state. In addition, the state contributes a small labor force to help start the program.

Noteworthy Building Programs:

Austin, Texas

Success Metrics:

For the year 2005, VBG has certified 394 homes.

Wisconsin Green Built Home

(608) 890-1997

Contact:

Ashley Ellingson, Program Assistant, Outreach, Public Education

Program Affiliations:

Program affiliated with Madison Area Builders Association

Target Market:

Private homeowners; all sizes of builders are affiliated. Meridian Homes, Wisconsin's largest home builder, is a member. All of Meridian Homes are certified, meeting 93 of the 300 total points.

History:

Wisconsin Green Built is an office of three, formed in 1999. Wisconsin Green Built currently has about 50 builders affiliated with their organization.

Information/Technical Assistance:

Yes, it is available. Other than the scoring criteria, a written source is currently in production.

Rating System:

Builders receive a checklist totaling 300 points; 60 points are needed for certification.

"Efficiency of space": A new category offered in 2005; encourages homeowners to build "up" rather than "out." Points are earned if homeowner chooses to add square footage within the existing footprint of home rather than make the footprint larger.

Financial Incentives:

No financial incentives are in place.

Community Reaction:

Homeowners usually feel as if using green building practices will equate to a higher cost and sacrifice aesthetic appeal. Wisconsin Green Built would like to work on this misconception.

Funding:

Builders must pay a \$200 fee to participate and a \$50 fee per home.

Noteworthy Building Programs:

Austin, Texas, for its extensive online offerings; Denver, Colorado; and Earthcraft in Georgia.

Success Metrics:

For the year 2004, 800 homes have been certified; goal is 1,000 homes for 2005.

Ecobuild

(901) 528-4748

Contact:

Becky Williamson, Administrator

Program Affiliations:

Program affiliated with Memphis Light, Gas & Water (MLGW)

Target Market:

Open to any builder or contractor. All types of housing are targeted.

History:

Ecobuild was founded two years ago by the MLGW.

Information/Technical Assistance:

Yes, it is available. Ecobuild offers technical assistance in the field in addition to online assistance.

Rating System:

Builders must comply with 100 percent of a checklist given prior to construction. Additionally, after construction they must pass a duct leakage test of 10 percent or less.

Program plans on initiating a modified fee structure that penalizes re-inspections of homes. Program will be updated soon to require AC units to have a SEER rating of 12.

A redevelopment area north of downtown known as “Uptown” will be entirely certified by Ecobuild. This can make it one of the 10 largest green communities in the country.

Financial Incentives:

An incentive is open to developers who create an entire neighborhood of Ecobuild homes. The utility and connection fee of \$865 per unit will be waved.

Community Reaction:

This program deals directly with builders and developers rather than homeowners. They have difficulty with builders properly installing cooling systems per their trade manual. Working to alleviate this simple issue would save on cooling costs.

Funding:

Builders must pay a \$300 fee to participate.

Success Metrics:

Although only 12 homes have been certified, this newer program hopes to certify 150 homes per year.

Built Green Kitsap

(360) 479-5778

Contact:

Art Caspla, Executive VP and Becky Williamson, Administrator

Program Affiliations:

Home Builders Association, Kitsap County, Washington State

Target Market:

New homes, remodeling and commercial buildings. All builders are very small. The largest builder may build 25 homes per year.

History:

Built Green is one of the oldest local green organizations in the United States, founded in 1997.

Information/Technical Assistance:

Participates in “Parade of Homes,” publicity articles to educate consumers.

Rating System:

Rating system of 1, 2, or 3 stars. Home builders strive to earn higher ratings to make their product more marketable. There are 4 separate lists—one for new homes, one for remodeled homes, one for light commercial, and another for subdivisions.

Financial Incentives:

Kitsap County has a very small population that has suffered a downturn in the economy since the closing of various military bases. Some small financial grants are subsidized by the HBA.

Community Reaction:

Mr. Caspla is confident that more builders are complying with the rating system within Kitsap County but that they are not filling out the paperwork to become certified. He feels that the paperwork required is an obstacle holding builders back from participating.

Funding:

Funding achieved through membership fee and through the solid wastes department. According to the organization’s Web site, funding has also been provided by the Home Builders Association of Kitsap County, the Kitsap County Public Works, and Washington Department of Ecology.

Green Points Program

(303) 441-3090

Contact:

Elizabeth Vasetka, Environmental Coordinator

Program Affiliations:

City of Boulder, Colorado Office of Environmental Affairs

Target Market:

All homes and all builders

History:

Originated in 1996 this municipal ordinance mandates participation in the Green Points Building Program in order to receive a building permit. Prior to 1996, this program was limited to new construction. Now, it applies to all construction.

Information/Technical Assistance:

A 4-hour training session and a test are mandatory for all area builders. The Boulder Green Building Guild also offers information sessions once a month.

Rating System:

No rating system in place. Green Points are part of the code in Boulder. The number of points needed rises with the total square footage of the home.

Community Reaction:

Community is meeting current guidelines. These guidelines will be renewed in 2006 to include aspects beyond home building including water, energy, and waste management.

One of the biggest difficulties is getting people to realize that the standards are in a constant state of change; therefore, labor practices will change too.

Funding:

Funding achieved through building permit fees and a trash tax.

Green Roundtable, Cambridge, MA

(617) 374-3740

Contact:

Dawn Graichen, Office Manager

Mission:

To encourage a dialogue between home builder associations and policy makers to promote healthy and efficient building through policy initiatives and educational assistance.

Three types of membership exist: individual, corporate, and public-sector groups.

History:

Program is approximately 5 years old; may perhaps be replicated by other cities, such as Seattle and Portland.

Green Roundtable, Cambridge, MA (continued)

Rating System:

No rating system in place. Green Roundtable supplies education to make healthier buildings but does not certify buildings.

Services:

A resource center is open to municipalities and construction companies providing policy, education, and technical assistance.

Funding:

Funding achieved through membership contributions and grants.

Green Built, Inc., Grand Rapids, MN

(616) 281-2021

Contact:

Anne Dykema, Staff Liaison

Program Affiliations:

Affiliated with the local home builders association

Target Market:

All homes and all builders

History:

Program formed in 2001, modeled after Austin, Texas, program. Program now consists of 14 builders and 13 remodelers.

Information/Technical Assistance:

All builders are required to take a 3-hour class prior to receiving certification. Many educational opportunities are open to the general public throughout the year. Additionally, there is an annual "Parade of Homes."

Rating System:

The first 86 points of the system are based on the Energy Star program. An additional 120 points are available in a variety of categories. Builders can pick which categories to focus on.

Community Reaction:

Builders who participate in this organization have not found it difficult to comply with green design. The general public is more of a challenge. They must have interest in the product first, before the builder can deliver it.

Funding:

Funding achieved through building permit fees and a trash tax.

Financial Incentives:

No financial incentives are in place; however, an option is being explored to give incentives through mortgage companies.

Success Metrics:

Currently has 8 certified homes; goal is 25-30 annually.

Green Home Pilot Program

Schenectady, NY

Contact:

Margo Thompson, NAHB Research Center (301) 430-6242
Rita Sickley, Exec Officer Schenectady HBA (845) 562-0002

Program Affiliations:

Program will be affiliated with a local homebuilders association; to date, a local HBA has not taken this responsibility.

Status:

Program is still in draft phase as submitted by the NAHB research center. A point system will be in place. Whether there will be levels of qualification is still to be determined. At this point, generating interest among builders and architects. Five builders have become involved and are willing to participate if organization is created. Funding has yet to be determined.

Financial Incentives:

No financial incentives are in place.

Funding:

Buildings must pay a \$200 fee to participate and a \$50 fee per home.

Noteworthy Building Programs:

Austin, Texas, for its extensive online offerings; Denver, Colorado; and Earthcraft in Georgia.

North Carolina Healthy Built Homes Program

(828) 232-5080

Contact:

Matt Siegel, Green Building Coordinator

Program Affiliations:

Program is affiliated with the NC Solar Center, part of the State Energy Office. Grants are also received through the NC Department of Housing.

Target Market:

Affordable housing

History:

North Carolina Healthy Built Homes has been in existence for four years.

Information/Technical Assistance:

Yes, it is available. Other than the scoring criteria, a written source is currently in production.

Rating System:

Rating system is similar to LEED. Homes can achieve one of 4 levels—certified, bronze, silver, or gold.

Financial Incentives:

No financial incentives are in place.

Community Reaction:

Biggest deterrent at the moment is the \$900 fee per home. Since this organization works mostly with low-income housing, this cost is a substantial percentage of the overall cost of a home.

Funding:

Builders must pay a \$900 fee per home. This includes Energy Star certification costs, in addition to HVAC testing, and framing inspection.

Noteworthy Building Programs:

Program remains in close contact with Earthcraft in Georgia.

Success Metrics:

For the year 2004, 6 homes have been certified; goal is 30-35 homes for 2005. A large subdivision is in the process of certification, making this goal attainable.

GreenHOME, Washington, DC

(202) 544-5336

Contact:

Patty Rose, Executive Director

Program Affiliations:

Works with Habitat for Humanity

Target Market:

Affordable housing

History:

Started in 1999 as an all-volunteer organization focused on constructing demonstration projects to educate developers on affordable, sustainable design.

More recently their goal has been to:

1. Continue to construct and demonstrate sustainable, affordable housing
2. Focus on education and outreach in the building industry
3. Have an influence in policy making

Information/Technical Assistance:

Yes, it is available. Other than the scoring criteria, a written source is currently in production.

Rating System:

Rating system is not in place. GreenHOME works directly with developers, not homeowners.

Financial Incentives:

Looking into financial incentives for developers. Currently, a developer may not benefit from green building since payoff may be long-term. GreenHOME would like to implement a financial tool for developers during construction.

GreenHOME, Washington, DC (continued)

Community Reaction:

GreenHOME has targeted approximately 60 areas in Maryland, the District of Columbia, and Virginia for affordable sustainable housing. The community is a major concern. GreenHOME would like to avoid a potential NIMBY issue by establishing these 60 areas.

Program has encountered resistance by builders who would like to see immediate financial incentives. Even if new materials/technology do not require an additional cost, education of labor force does.

Funding:

Funding primarily through donations and purchase of their book, *Green & Lean*.

Noteworthy Building Programs:

New Ecology, Boston; Global Green, CA; Center for Sustainable Building Research, Minnesota; Virginia Sustainability Development Network.

Success Metrics/Future Goals:

In 15-20 years, GreenHOME would like to see affordable, sustainable housing commonplace, eliminating the need for this organization.