

Chapter 4 – Housing

The “greening” of Highland Park housing is the focus of this chapter. There is a focus on detailed technologies and procedures directed at homeowners and apartment landlords. The term “Green Building” is typically applied to efforts that seek to satisfy three main objectives -- resource conservation, environmental health, and quality of life. Both resource conservation and environmental health have been discussed in detail in previous chapters. The quality of life objective focuses on issues of pedestrian safety, crime reduction, community building and knowledge of environmentally friendly practices.

4.1 – Green Building at the National Level

Several pioneer cities throughout the country have integrated green building concepts into their visions for a sustainable community. These communities realize that a focus on the greening of new and existing residential homes can improve the quality of life and health of their citizens. They recognize that conventional design and construction methods may involve practices that can negatively impact the environment as well as occupant health. The following municipalities stand out as leaders for advancing sustainable development.

Portland, Oregon

Portland’s history of sustainable development dates back nearly 30 years. The city’s current green building “G/Rating” program, a division of the Office of Sustainable Development, aims at increasing market demand for green buildings, encouraging energy efficiency in existing homes, and recycling or reusing up to 80 percent of construction and demolition waste. The program uses several different voluntary strategies to achieve these goals, encouraging builders and homeowners to think and act in a greener way.

Seattle, Washington

Seattle’s green building program involves reducing total annual water consumption by one percent a year over the next ten years. The municipal government uses a strategic approach that emphasizes voluntary cooperation from homeowners. These strategies include rebates on installations of energy and water saving clothes washers. The city also offers free green home remodeling classes as well as a conservation help line to help answer residents’ questions concerning home resource conservation.

Austin, Texas

The country’s first green building program began in 1991 as an extension of Austin’s well-established energy conservation program. The program seeks to increase the use of green products through a green rating system. The system, based on the city’s *Sustainable Building Sourcebook* (The Austin Energy Greenbuilding Program (2003)) is used to rate residences based on levels of resource efficiency, health, safety and impacts on the community. Austin’s strategies include rebates up to \$1,400 on energy conserving products, such as Energy Star appliances, duct repair and sealing, and solar screens. The city also employs an aggressive marketing campaign to publicize homeowners that have had their homes green rated.

4.2 – LEED for Homes (LEED–H)

An accepted set of standards for what defines a building as green did not exist until recently. Over the past five years, the United States Green Building Council (USGBC) has created the LEED (Leadership in Energy and Environmental Design) guidelines for the certification of green buildings for new and existing non-residential buildings. Many of the green communities across the nation have integrated a form of these LEED principles for their own programs. (USGBC (2004))

The USGBC is currently working on a new set of LEED standards which will establish guidelines and indicators for the residential housing market. These standards, the LEED Rating System for Homes (LEED-H), are released for public commentary as of December 1, 2004 for public review.

The purpose of LEED-H involves the promotion of efficient use of resources during home upgrades as well as during the construction process. This includes energy, water, land and building construction resources. The USGBC's main goal for LEED-H is to establish a national green rating system for the homebuilding industry. Their strategies to achieve that goal include:

- Using existing LEED resources to train homebuilders and consumers
- Creating a peer review process comprised of green building professionals
- Developing an effective marketing strategy

4.3 – Housing and Land Use in Highland Park

The Borough is an older, mainly residential community. Residential land use accounts for fully 55 percent of all land use in Highland Park, with a total of 6,071 housing units (see Appendix A.3). Fifty-four percent of all residential structures were built before 1939. Consider the fact that the first official building code was developed in 1905 for fire safety reasons, and that further codes were only developed in the 1930's and 40's (Neenah, WI (2004)). Therefore there is no certainty of uniformity in the construction of the earlier Highland Park residences. It is therefore reasonable to assume that any upgrades in insulation, electrical, or plumbing systems will produce higher resource efficiency (of course, take into account any upgrades that have been done in previous years and how thorough they were). Fifty-six percent of all housing is occupied by renters. Yet because renters do not own their properties, they often do not—or cannot—invest in these efficiency improvements.

Exhibit 4.1 – Land Use in Highland Park

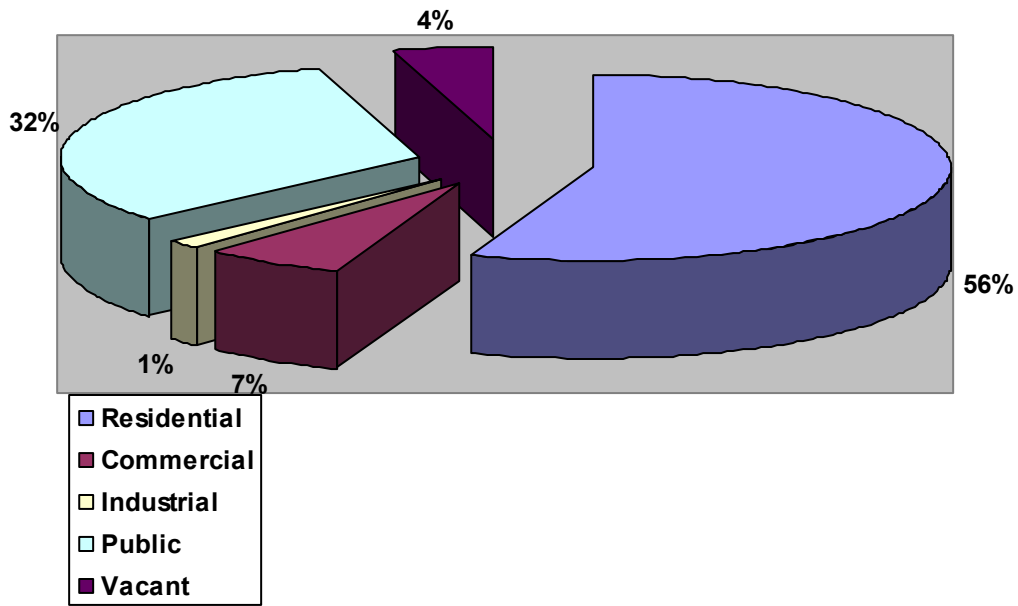
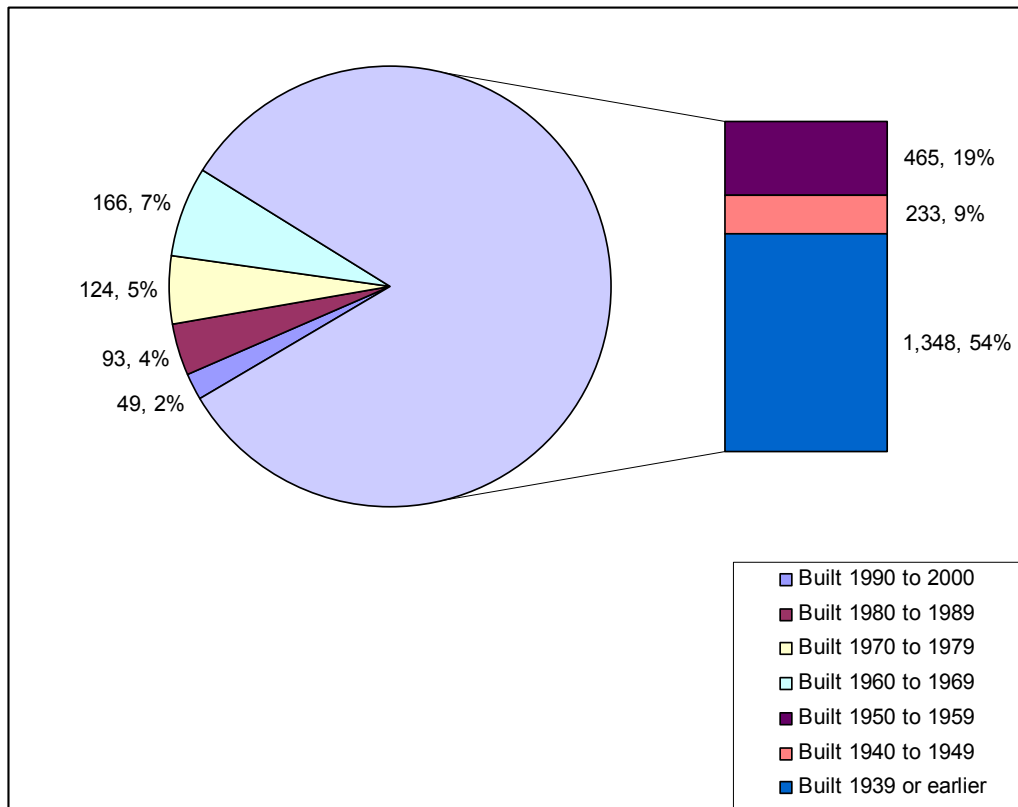
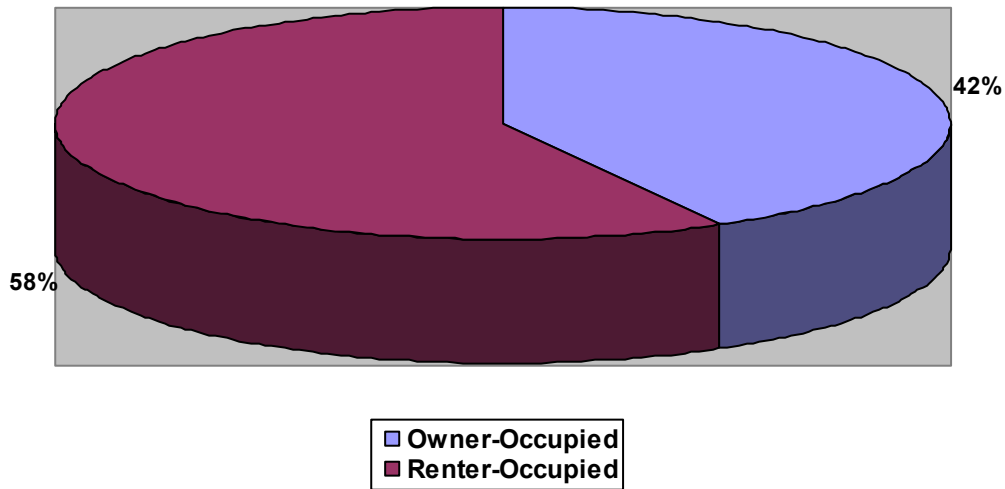


Exhibit 4.2 – Residential Construction Date Breakdown



Source: Borough of Highland Park, 2003 Master Plan (p. VIII-1)

Exhibit 4.3 – Renters vs. Owners in Highland Park



Source: Borough of Highland Park, 2003 Master Plan (p. VIII-1)

The greening of residences in the Borough would have a significant effect on resource consumption, waste disposal, and overall environmental health. The following chapter explores options for upgrading building practices, as well as identifying indicators for establishing goals and monitoring success.

4.4 – A Framework for Green Building in Highland Park

The implementation of green building goals strongly relies on the increased use of green technologies through consumer choice and policy changes. Highland Park is a mature community that is nearly fully built out, hence, most greening opportunities will appear during rehabilitations of existing structures. Homeowners, contractors, and building inspectors can all benefit from increased knowledge of greener technologies and practices.

At the municipal level, policy changes can affect housing demand by subsidizing certain types of “green” renovations and encouraging denser downtown development. A change in building code requirements would affect the products specified in the design stage and the techniques used during the construction phase. Incentives and rebates would encourage residents to think green when making their daily decisions.

Deterrents to Going Green

One reason that green practices have not caught on very quickly is the lack of knowledge of green technologies and techniques and their corresponding costs and benefits. This deterrent can be overcome by organized educational programs that reach out to both adults and school age children within the community. A centralized place for environmental education such as the new Environmental Learning Center in Highland Park can also play a large role in the education process. Municipal web sites, street fairs and telephone information lines are some of the other means that green building knowledge can be spread to members of the community.

Another deterrent to the use of green products has been their initial cost. Residents who follow green practices need to be able to reap the long term economic benefits that will result from the initial green investment. Highland Park, which has a large percentage of rental units (56%), needs to create economic incentives for landlords to invest in green practices. Typically, tenants would reap the benefits of lower utility bills while the landlord is bearing the cost of the green investment. The long term benefits of green investments, especially with additional assistance through subsidies and tax credits, should encourage landlords to make the foray into the green home improvement market. Renters will desire homes that are energy efficient, healthier and more comfortable to live in. This may translate into higher rental rates for the landlords.

Measuring Success

Progress toward “green” goals for housing in Highland Park can be measured. By developing indicators that measure success toward achieving goals, the Borough can assess how well municipal programs and individual actions are succeeding. The following areas provide opportunities for the development of measurable indicators:

- Energy consumption
- Water usage
- Waste generation
- Building materials

Energy Consumption. This can be measured at the residential meter and through the energy bill. This indicator can be directly affected by the use patterns of the resident or owner. The builder can effect energy consumption during the design and construction phase by specifying efficient heating, cooling, and lighting units. During construction the building can be redone with higher r-value and properly sealed walls, windows, doors, and insulation.

Water Usage. This can be measured at the residential meter, on the water bill, and at the water treatment plant. The reduction in the use of water is possible through the change of use pattern of the resident, by the builder’s selection of appliances at the design and construction phase, and through the proper upkeep of utility lines by the municipal government.

Waste Generation. The measurement is comprised of recycled waste, compost, and waste sent to landfill. Waste generation can be reduced through the combination of residential and builder awareness of recycling and materials use reduction. At the municipal level, measurement can occur at recycling, composting and dumping stations.

Building Materials. This measurement should be done with the aid of a materials checklist. Each type of building system would be broken down into several parts. The homeowner, builder, or municipal official could check these items during the design, approval, construction, use and end stages. The best time to review the checklist would be during the design/redesign stage in order to begin construction with the greenest materials available. Materials would be rated according to safety, environmentally friendly and health standards.

Achieving Green

Three tracks need to be addressed simultaneously: technology, policies that support new technologies, and the education of citizens as to the available technologies and programs.

Technologies. Useful technologies for green building include both products and building techniques. There is a broad range of technology-based solutions that offer options to residents, builders and contractors. **Appendix B** is a chart of three degrees of rehabilitation that range in order of low cost to higher costs, from do-it-yourself projects to contractor required projects, and from basic green rehabilitation to greenest options.

One of the first things to consider when doing home renovations is the building's envelope. The shell acts as a protective layer that works in conjunction with the home's mechanical systems to provide a comfortable and energy efficient interior atmosphere. Because these two systems are dependent on one another for optimum efficiency, they must be considered simultaneously when performing a green retrofit. Note: Always optimize the thermal envelope before relying on complicated mechanical systems to control environmental atmosphere.

After maximizing the envelope efficiency, the amount of heating and cooling energy needed to provide occupant thermal comfort is greatly reduced. A tight envelope with a continuous thermal barrier must always be the prerequisite to choosing any mechanical unit. Once that is achieved, better decisions can be made about proper sizing, and less money spent, both short and long term.

A tight envelope is best balanced by a controlled ventilation system to achieve energy efficiency and healthy air quality. If installing new windows, locate them to take advantage of prevailing winds to induce cross ventilation. An exhaust fan in addition to a bathroom or kitchen fan should be installed and run continuously to exchange stale indoor air with fresh outside air. Products and practices that help in the greening of a home include: a blower door test, formaldehyde-free fiberglass batt, high performance windows, long-lasting siding, light colored and recycled content roofing, high efficient heating and cooling equipment, solar thermal water heating, insulated heating equipment and piping, and low or zero-VOC materials. New green technologies are constantly being developed. For a larger list of green products and their contact information see **Appendix C**.

Appendix B provides a range on responses to common rehabilitation projects. It is divided into three levels so that the homeowner can choose the most cost-effective solution for their project. For the owner that wants to rebuild green, but is not ready for a complete green overhaul, there is a wonderful example in Baltimore, MD. TerraLogos ECO Architecture did a series of projects on several rowhouses. They repaired one with the most common construction techniques and materials and then repaired three more at three ascending amounts/levels of green. Each house was built in the early 1900's and has a floor area of about 600 square feet. The three levels are defined in terms of Light, Medium, and Deep Green. The Light Green renovation package is to have an increase of 0 – 2% increase in first cost with energy performances well above the typical older rowhouse in the neighborhood. For Medium Green houses the target initial cost increase is between 2 – 5% with a 30% increase in energy efficiency above 1992 standards in Maryland. The Deep Green renovation aims for an increase in first cost between 7 – 10% with a 50% increase in energy efficiency. It also includes more 'green' products beyond just new equipment and exterior weatherproofing. (TerraLogos (2002))

Exhibit 4.4 – Case Study of Comparable Efficiency Rates					
	Cost	Percent of Total Rehab Cost	Efficiency Rating (HERS)	Annual \$ Savings	% Annual Energy Savings
Base Case	\$0.00	0%	74.8	\$0	0%
Light Green	\$2,235.40	4.62%	80	\$89	21.6%
Medium Green	\$8,031.60	16%	88	\$255	44.7%
Deep Green	\$21,740.90	43%	90.4	\$650	77.2%

Source: *Green Building Template: A Guide to Sustainable Design Renovating for Baltimore Rowhouses*. TerraLogos: ECO Architecture. 2001 (part 4).

In the chart above approximately 73% of the added costs are for re-insulation, re-illumination, and resizing of heating and cooling equipment. It goes to show that the most profitable changes within a home come from those three areas of rehabilitation. If only those three things had been addressed then it would only have cost \$1,551.40 for the Light Green, \$6199.60 for the Medium Green, and \$15,766.40 for the Deep Green renovation. The following exhibit illustrates the breakdown costs for the areas of rehabilitation mentioned above within the three levels.

Exhibit 4.5 – Case Study Breakdown Costs				
	Light Green	Medium Green	Deep Green	Totals
Exterior Walls	\$156.60	\$1,148.60	\$1,534.40	\$2,839.60
Party Walls	\$28.80	\$0	\$3,030.00	\$3,058.80
Roof Assembly	\$666.00	\$2,796.00	\$5,772.00	\$9,234.00
HVAC Systems	\$375.00	\$1,730.00	\$4,830.00	\$6,935.00
Lighting & Electrical	\$325.00	\$525.00	\$600.00	\$1,450.00
Totals	\$1,551.40	\$6,199.60	\$15,766.40	

Source: *Green Building Template: A Guide to Sustainable Design Renovating for Baltimore Rowhouses*. TerraLogos: ECO Architecture. 2001 (part 4).

It seems that re-insulation, re-illumination, and the resizing of HVAC equipment are the three initial steps that will result in the most amount of energy savings per project. Remember that Appendix B has more options within the areas listed here and will assist in determining the best-price scenario. The cost sheet breakdowns for this case study are a good reference as to how to break down a green building project and can be found in **Appendix D**.

Policies. The recent history of green building programs throughout the country emphasizes the strong role for a market driven and voluntary program. Green building programs that place an emphasis on compliance through ordinances and fees can become unpopular if homeowners and homebuilders feel they have limited options in complying with green regulations.

The municipal government can help motivate the homeowner to think and act green through various tools at their disposal. In cooperation with public utility, state and national home greening programs, the local government can reward the homeowner by offering tax breaks, utility bill discounts, etc.. This will demand a pro-active approach by the town's policy makers to search out funding sources to support these monetary incentive programs. These types of policy actions sets a more positive tone than forcing green modifications through ordinances and fees.

Education. Informed consumers make for more environmentally conscious purchases. As mentioned above, there are several types of educational resources that should be mobilized in order to educate the residents of a community. When residents are transformed into more knowledgeable consumers through education, much of the uncertainty of investing in green products is alleviated.

4.5 – Recommendations

To encourage a green residential program the following general recommendations are proposed for consideration:

- Establish a clear vision for residential home Green Building goals, based on *Highland Park 2020 – A Sustainable Community*.
- Promote an environment that will allow market forces to create a demand for green construction, design and resource conservation within the home.

- Establish incentive and rebate programs for resource conservation. Expand existing contacts with utilities, regional and state environmental divisions as well as green product suppliers to help with the funding of these programs.
- Offer free home energy audits that will help homeowners establish ways to reduce their energy bills through energy conservation strategies.

More specifically:

- Reward homeowner initiated home repairs that follow recommendations made in Appendix B
- Encourage residents to properly re-insulate their homes with green materials and resize their heating/cooling equipment
- Consider requiring more stringent environmental codes
- Establish mandatory environmental standard for construction practices
- Green Product store – to encourage community purchasing in order to reduce initial costs and to educate citizens to a wider range of available technologies.
- Green Product library – to be a reference of new green products available.
- Webpage
- Develop a cost/benefits worksheet.

4.6 – Useful Links

New Jersey State Programs

- NJ Green Homes Office – Created to promote green residential building construction, rebuilding and remodeling throughout the state, this government department states that homes must be at least 30 % more energy efficient than those that follow the 1993 Model Energy Code – the current standard for residential home builders in New Jersey.
 - http://www.nj.gov/dca/dhcr/hsg_prog/njgreenhomes.shtml
- NJ Energy Star Homes – Energy Star Homes are certified by the EPA if they are at least 30 percent more efficient than an average home. The owners of homes with this classification are entitled to mortgage programs that offer lower interest rates and closing costs as well as other incentives.
 - <http://njenergystarhomes.com/>

Nationwide Programs

- Boulder, CO
 - http://www.ci.boulder.co.us/environmentalaffairs/green_points/
- Santa Monica, CA
 - <http://greenbuildings.santa-monica.org/>
- San Jose, CA
 - <http://www.ci.san-jose.ca.us/esd/GB-HOME.HTM>
- State of Colorado:
 - <http://www.builtgreen.org/about/overview.htm>

- State of New York:
 - <http://www.dec.state.ny.us/website/ppu/grnbldg/>
- State of Maryland:
 - <http://www.dnr.state.md.us/programs/greenbuilding>

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The United States Green Building Council. (2004). *LEED for Homes (LEED-H).* LEED Leadership in Energy & Environmental Design. Retrieved November 15, 2004, from http://www.usgbc.org/Docs/LEEDdocs/LEED_H_Update_July_2004.pdf

The City of Neenah, Wisconsin. (2004). *History of Building Codes.* Department of Community Development. Retrieved December 5, 2004, from <http://www.ci.neenah.wi.us/CommDev/PDFs/BuildingCodeHistory.pdf>