Enhancing Energy Efficiency and Green Building Design in

Section 202 and Section 811 Programs

U.S. Department of Housing and Urban Development | Office of Policy Development and Research

Visit PD&R's website

www.hud.gov/policy or www.huduser.org

to find this report and others sponsored by HUD's Office of Policy Development and Research (PD&R). Other services of HUD USER, PD&R's Research and Information Service include listservs, special interest and bimonthly publications (best practices, significant studies from other sources), access to public use databases, and a hotline (1-800-245-2691) for help with accessing the information you need.

Enhancing Energy Efficiency and Green Building Design in

Section 202 and Section 811 Programs

Prepared for:
U.S. Department of Housing
and Urban Development
Washington, D.C.

Prepared by:
Kimberly Gugino Wollos
Kristen Mui
Janet Pershing
Eric Oetjen
ICF International
Washington, D.C.

February 2011

DISCLAIMER

The statements and conclusions contained in this report are those of the authors and do not necessarily reflect the views or policies of the U.S. Department of Housing and Urban Development or the U.S. government. The authors have made every effort to verify the accuracy and appropriateness of this report's content. However, no guarantee of the accuracy or completeness of the information or acceptability for compliance with any industry standard or mandatory requirement of any code, law or regulation is either offered or implied. The products and systems described in the report are included only as examples of some available choices. No endorsement, recommendation, or evaluation of these products or their use is given or implied.

ACKNOWLEDGMENTS

This *Enhancing Energy Efficiency and Green Building Design in Section 202 and Section 811 Programs* report benefited from the generous contributions of many individuals. The development of this report received funding from the U.S. Department of Housing and Urban Development (HUD), Office of Policy Development and Research, Affordable Housing Research and Technology Division and from the Environmental Protection Agency (EPA), Office of Air and Radiation. We especially appreciate the thoughtful project leadership of Brian Ng from EPA and Mike Blanford from HUD. We thank Ben Metcalf of the HUD Office of Multifamily Housing for his leadership, insight, and guidance, as well as Stockton Williams and Michael Freedberg of the HUD Office of Sustainable Housing and Communities for their support and advice. We also thank the HUD program staff, especially Aretha Williams, Alicia Anderson, and Harry Messner, for their guidance throughout the project. We are grateful for the case study contributors—Dana Frankenburg of the Hudson Companies, Steve Bodkin of National Church Residences, Edward Connelly of New Ecology, Inc., Diane Clark of Nuestra Comunidad Development Corporation, and Brian Bieler of REACH Community Development—who generously gave their time and willingly shared their experiences. Melissa Knott and Amy Rowland of Mercy Housing were also instrumental in informing this report, sharing their challenges and experiences with us. We also thank all those who participated in the roundtable meeting in May 2010, including the facilitator, Leslie Warner, of ICF International. Without the effort of all those listed, this report would not have been possible.

FOREWORD

Over the past 50 years, the U.S. Department of Housing and Urban Development's (HUD) Section 202 and Section 811 programs have produced almost 400,000 affordable rental homes for the elderly and 30,000 affordable homes for people with disabilities. These distinguished programs, however, have not always reached their potential—project development is slow, limited resources have been spread too thin, operating costs have continued to go up, and inadequate emphasis has been paid to ensuring broader benefits of program dollars. Generally speaking, programs that were conceived in a very different time have now come due for an update into the world of 21st century housing finance. Starting in early 2010, HUD initiated a comprehensive review of the two programs. After conducting internal analysis, participating in stakeholder listening sessions, and reading several hundred pages of written comment, HUD prepared legislative proposals to Congress and is pursuing a number of administrative changes to make the programs more sustainable, streamlined, and efficient.

One key theme that emerged throughout the review is the need for a greater emphasis on sustainability and energy efficiency. Not only did this theme reflect tenants' and owners' desires for a healthier environment, but it also reflected the challenge associated with a continued growth of operating expenses across the 202 and 811 portfolios, which diverts resources away from the development and operation of new affordable homes. Accordingly, HUD's Office of Multifamily Housing Programs has collaborated with HUD's Office of Policy Development and Research and the Environmental Protection Agency (EPA) to prepare ideas to help owners and sponsors increase energy efficiency in Section 202 and Section 811 housing. ICF International created the roadmap, presented in this *Enhancing Energy Efficiency and Green Building Design in Section 202 and Section 811 Programs* report, based on current best practices, with input from EPA and HUD staff and outside stakeholders. It sets forth a coordinated series of actions to increase energy efficiency in new and existing Section 202 and Section 811 projects. To illustrate these actions, the roadmap follows the experiences of five diverse organizations that have successfully incorporated energy efficiency and green concepts in new and existing Section 202 and Section 811 activities. Case studies included in section III of this report paint a picture of these organizations' strategies for overcoming the challenges involved in "going green."

Long-term sustainability requires continued partnership between HUD and the sponsors and owners of federally supported affordable housing. We encourage continued efforts to make these projects greener, healthier, and more energy efficient, and we hope owners and sponsors find this roadmap helpful. Through efforts like these, we can benefit America's low-income elderly and people with disabilities, improve communities, and have a greater impact with our federal investment.

Raphael W. Bostic, Ph.D.
Assistant Secretary for Policy
Development and Research

Carol J. Galante
Deputy Assistant Secretary
Multifamily Housing Programs

EXECUTIVE SUMMARY

The U.S. Department of Housing and Urban Development (HUD) *FY 2010–2015 Strategic Plan* calls for an overall reduction in energy costs through improved design and operation of HUD-supported projects. Energy conservation and green building techniques are becoming mainstream practice for market-rate projects, and many sponsors and owners of HUD-subsidized housing have already started following suit, both in maintaining and upgrading existing units and in constructing new units. To ensure that this momentum continues in its Section 202 and Section 811 portfolio, HUD moved in 2011 to require energy efficiency and water conservation measures and to encourage the use of green building design and features in new Section 202 and Section 811 projects. This *Enhancing Energy Efficiency and Green Building Design in Section 202 and Section 811 Programs* report was developed as the result of an Interagency Agreement between HUD and the U.S. Environmental Protection Agency (EPA), with the help of stakeholders who participated in roundtable discussions with HUD and EPA. It was developed to aid sponsors and owners in working with HUD to advance these goals and, specifically, to assist in responding to the new requirements and incentives.

The Section 202 and Section 811 Housing Stock

The Section 202 and Section 811 housing stock consists of a range of unit types in geographically diverse areas of the country. In addition, this stock ranges from units that have been in use for decades to others recently approved for occupancy. The physical needs of these units, as well as the specific program requirements that affect them, differ widely. This diversity means that there is no one-size-fits-all approach to implementing energy conservation and green building techniques in Section 202 and Section 811 housing.

Resource Conservation and Green Building Design—Requirements and Incentives for New Projects

In 2011, HUD began requiring applicants seeking Section 202 and Section 811 funding to increase energy and water conservation, and the Department offered incentives to applicants who incorporate green building features into their projects. Although some of the specifics of these new requirements and incentives may evolve over time, conservation and sustainability are expected to remain core elements of all future construction requirements. Specific requirements and incentives depend on the type of development proposed by applicants and include the following:

- **For new construction and substantial (gut) rehabilitation projects**, sponsors and owners are required to incorporate energy efficiency and water conservation strategies.
- **For acquisition and moderate or modest rehabilitation projects**, pre- and post-construction energy audits and incorporation of conservation techniques are required.
- **For all applicants**, incentives in the form of additional scoring points are available to applications that meet key criteria concerning green development, sustainable design, solar orientation principles, and operations and maintenance manuals that address key features affecting "green" operations.
- Section II provides a more thorough overview of these requirements and incentives, while section IV goes into more detail about each element.

Existing Section 202 and Section 811 Housing

HUD has not established specific conservation or green design requirements for existing Section 202 and Section 811 projects. At the same time, HUD strongly encourages sponsors and owners of existing Section 202 or Section 811 projects to look for ways to incorporate green building components and practices as they operate, maintain, and make capital improvements to their projects.

Moving Forward

The changes involved in incorporating energy efficiency and green features pose practical challenges for all sponsors and owners, and tight budget constraints in the Section 202 and Section 811 environment add to these challenges. However, the experiences of sponsors and owners who have already incorporated such features in their new and existing projects demonstrate that it is possible to meet these challenges.

This report highlights the experiences of five diverse organizations that have successfully incorporated energy efficiency and green concepts in new and existing Section 202 and Section 811 activities. Case studies included in section III of this report paint a picture of these organizations' strategies for overcoming the challenges involved in "going green." They include the following:

- **Hudson Companies,** a sponsor of Section 202 projects in Pennsylvania and Ohio.
- **National Church Residence,** a nonprofit owner and sponsor of Section 202 projects across the United States.
- **New Ecology, Inc.,** a nonprofit energy efficiency and green building technical advisory group that assists Section 202 sponsors and owners.
- **Nuestra Comunidad Development Corporation,** a nonprofit sponsor of a Section 202 project in the Boston area.
- **REACH Community Development,** a nonprofit sponsor of Section 202 and Section 811 projects in the Portland, Oregon area.

Although these five organizations have demonstrated that energy conservation and "going green" are possible in the Section 202 and Section 811 environment, for sponsors and owners who have not yet attempted to incorporate energy efficiency and green features, the prospect may be daunting. Section IV of this report is devoted to showing how sponsors and owners can approach the tasks of implementing energy and water conservation measures and of making the operation and maintenance of their projects more sustainable. Although the report is not a full-fledged "how to" manual, it includes a range of useful ideas, tips, and tools, including the following:

- An explanation of the program requirements.
- Suggestions about steps to take in meeting those requirements.
- Explanations of how various tools and resources support achievement of each required or voluntary activity.
- Stand-alone listings of resources, including the following:
  - Financing sources.
  - Technical assistance sources.
  - Green building standards.

This information is expected to serve as a valuable starting point for those sponsors and owners who are working to invest in the conservation and green features that will make the Section 202 and Section 811 portfolios more efficient and sustainable over time.

TABLE OF CONTENTS

I. INTRODUCTION 1

The Need for Energy Savings in the Section 202 and Section 811 Programs 1

Process of Developing This Report 1

Structure of This Report 2

II. THE OPERATING ENVIRONMENT FOR SECTION 202 AND SECTION 811 PROJECTS 2

Program Overview 2

Historic Overview of Capital Funding and Operating Expenses 3

Characteristics of Section 202 and Section 811 Portfolio 4

Age of Projects 4

Building Types 4

Geography of Units 5

Financial Components of Section 202 and Section 811 Programs 6

Development Cost Limits 6

Operating Costs 6

Replacement Reserves 7

Residual Receipts 7

Secondary Financing 7

Low-Income Housing Tax Credit 7

Improving Energy and Water Conservation and Promoting Green Design in Section 202 and Section 811 Projects 7

Requirements for Energy and Water Conservation in Section 202 and Section 811 Projects 7

Incentive for Incorporating Green Design in Section 202 and Section 811 Projects 8

Federal Initiatives To Support Energy Efficiency and Green Building 8

HUD's Multifamily Energy Efficiency Initiative 8

HUD's Green Retrofit Program 9

ENERGY STAR® 9

ENERGY STAR Qualified Homes 9

EPA's Indoor airPLUS Program 9

ENERGY STAR Qualified Multifamily High-Rise Program 10

ENERGY STAR Quantity Quotes 10

EPA's WaterSense® Program 10

National and Regional Green Building Criteria 10

Enterprise Green Communities Criteria 10

NAHB Green Building Standard *11*

LEED Green Building Rating System *11*

EarthCraft House *11*

Built Green *12*

Strategies From the Field 12

Strategy 1. Analyze the Data *12*

A. New Construction or Substantial Rehabilitation: Energy Modeling 12

B. Existing Housing: Energy Audits 13

C. Existing Housing: Energy Benchmarking 13

D. Existing Housing: Utility Bill Management 13

Strategy 2. Choose an Implementation Approach *14*

A. Component-by-Component Approach 14

B. Project-by-Project Approach 14

C. One Energy Efficiency or Green Building Standard Across the Portfolio 14

Strategy 3. Select an Energy Efficiency or Green Building Standard *14*

Strategy 4. Leverage Additional Funding *15*

Strategy 5. Educate Occupants and Influence Their Behavior *15*

III. MAKING ENERGY EFFICIENCY, WATER CONSERVATION, AND SUSTAINABILITY WORK IN SECTION 202 AND SECTION 811 PROJECTS: FIVE CASE STUDIES 17

A. Combining Energy Efficiency and Green Building Features in Section 202 New Construction Projects: The Hudson Companies 18

Strategies for Combining Energy Efficiency and Green Building Features 18

Strategy 1. Use Energy Modeling for New Buildings *18*

Strategy 2. Obtain Leadership in Energy and Environmental Design (LEED) Certification *18*

Looking Ahead 19

Lessons Learned 20

Useful Resources 20

More Information 20

B. Working Smart To Save Energy and Lower Costs When Retrofitting Existing Section 202 Housing: National Church Residences 21

Strategies for Achieving Energy Efficiency and Cost Savings 21

Strategy 1. Utility Data Management *21*

Strategy 2. Component-by-Component Approach *22*

Strategy 3. Energy Management Systems *23*

Strategy 4. Tenant Training *23*

Looking Ahead 23

Lessons Learned 23

Useful Resources 24

More Information 24

C. Analyzing Energy Usage Before Implementing Energy Savings Strategies in New and Existing Section 202 Housing: New Ecology 25

Strategies for Increasing Energy Efficiency in Existing Projects and New Construction 25

Strategy 1. For Existing Projects, Gather Information by Conducting a Front-End Utility Analysis and an Energy Audit 25

Strategy 2. For New Construction or Substantial Rehabilitation, Select From Available Energy Efficiency and Green Building Standards 26

Looking Ahead 26

Lessons Learned 26

Useful Resources 27

More Information 27

D. Combining Funding Sources and Educating Property Management Staff for New Construction Section 202 Housing: Nuestra CDC 28

Strategies for Selecting, Funding, and Maintaining Green Upgrades 28

Strategy 1. Enterprise Green Communities Criteria and Energy Modeling 28

Strategy 2. Combining Funding Sources 29

Strategy 3. Educating Property Managers and Maintenance Staff 29

Looking Ahead 29

Lessons Learned 29

Useful Resources 30

More Information 30

E. Maximizing Energy-Efficient Upgrades in Existing Section 811 Housing: REACH Community Development 31

Strategies for Funding, Planning, and Building Support for Energy Efficiency 31

Strategy 1. Combining Funding Sources To Make a Minor Investment in Energy Efficiency and Major Investment in Renewable Energy 31

Strategy 2. Using In-House and Professional Expertise To Develop a Plan for Energy Efficiency 32

Strategy 3. Engaging Tenants in the Project 32

Looking Ahead 32

Lessons Learned 33

Useful Resources 33

More Information 33

IV. ENERGY EFFICIENCY, WATER CONSERVATION, AND SUSTAINABILITY IN NEW AND EXISTING SECTION 202 AND SECTION 811 PROJECTS 34

Addressing Requirements for Energy Efficiency and Water Conservation in New Section 202 and Section 811 Projects 34

New Construction and Substantial Rehabilitation Projects 34

Energy Conservation 34

Water Conservation 34

Acquisition and Moderate or Modest Rehabilitation 34

Tools To Help With Energy and Water Conservation Efforts 35

Tools for New Construction and Substantial Rehabilitation Projects 35

Tools for Acquisition and Moderate or Modest Rehabilitation Projects 35

Addressing Section 202 and Section 811 Incentive Points for Green Design and Development 36

Selecting the Green Standard To Use 36

Use an Integrated Design Process to the Greatest Extent Feasible 36

What Is an Integrated Design Process? 36

Why Is an Integrated Design Process Important? 37

How Integrated Design Can Actually Work 38

Incorporating Passive Solar Orientation to the Extent Feasible 38

Basic Principles of Passive Solar Orientation 38

Benefits of Passive Solar Orientation 39

Obstacles and Challenges to Passive Solar Orientation 39

Resources 39

Developing an Operations and Maintenance Manual 40

Routine Maintenance Plan 40

Operations and Maintenance Guidance 40

Tenant Education 40

Operations Staff Training 40

Addressing Energy Efficiency, Water Conservation, and Sustainability in Existing Section 202 and Section 811 Projects 42

Meeting the Challenges 42

Finding Technical Information and Expertise 43

Development Cost Limits and Financing Improvements 43

Replacement Reserves May Not Cover Cost of Energy Efficiency Improvements in Existing Housing 43

Attachment 4-1. Potential Funding Sources 44

Attachment 4-2. Technical Assistance and Resources 47

Appendix **50**

Building Energy Codes 50

Energy Efficiency and Green Building Standards — Additional Resources 51

LIST OF EXHIBITS

Exhibit 1. Year of Construction of Section 202 and 811 Projects 4

Exhibit 2. Year of Construction of Section 202 and 811 Projects Funded by Capital Advances or Direct Loans 4

Exhibit 3. Number of Section 202 and 811 Projects and Units by Building Types From 1961 to 2010 4

Exhibit 4. Number of Section 202 and 811 Units by Census Region From 1961 to 2010 5

Exhibit 5. Number of Section 202 and 811 Projects Funded Through Capital Advances or Direct Loans by Field Office and HUD Region From 1961 to 2010 5

Exhibit 6. Development Cost Limits for Fiscal Year 2009 for Section 202 and Section 811 6

Exhibit 7. Summary of Potential Funding Sources 15

Exhibit 8. Annual Savings Breakdown 21

Exhibit 9. NCR Master Metered Property Benchmark 22

Exhibit 10. Bright Power Energy Scorecard 22

Exhibit 11. Cost and Annual Savings of NCR's Initiatives 23

Exhibit 12. Sample Detail and Summary View Produced by WegoWise 26

Exhibit 13. Addressing Integrated Design During the Design Process 37

Exhibit 14. Two Approaches to the Integrated Design Process 38

Exhibit 15. Sample Operations and Maintenance Manual Outline 41

I. | INTRODUCTION

The Need for Energy Savings in the Section 202 and Section 811 Programs

During fiscal year 2011, the U.S. Department of Housing and Urban Development (HUD) will be undertaking comprehensive reforms of two of its signature programs, the Section 202 Supportive Housing for the Elderly program and the Section 811 Supportive Housing for Persons with Disabilities program. At the same time, the *FY 2010-2015 HUD Strategic Plan* calls for an overall reduction in energy costs through improved design and operation of HUD-supported projects. Currently, HUD spends an estimated $5 billion annually to pay for utilities in its public and assisted housing and for utility allowances to voucher holders.[1] To support HUD's strategic goal of reducing energy consumption, reforms of the Section 202 and Section 811 programs will include a focus on energy efficiency.

Policy Vision Statement

To build and retrofit all Section 202 and 811 units to a practical, attainable standard of energy efficiency that generates cost savings over the long term and ultimately ensures a sustainable portfolio.

As it does with its other programs, HUD provides an ongoing rental subsidy to Section 202 and Section 811 projects to support affordability. As a general rule, tenants pay rent equal to 30 percent of their adjusted income, and HUD contributes rental assistance to make up the difference between rental income and operating costs. As a consequence, rising energy costs, which increase operating costs, lead to increased rental subsidies.

Improved energy efficiency can decrease energy usage in the Section 202 and Section 811 housing portfolio, lead to the reduction in the overall operating costs, and achieve substantial housing subsidy savings. These housing subsidy savings would accrue year after year and could be used to support development of new units for the two vulnerable populations served by the Section 202 and Section 811 programs—seniors and people with disabilities.

These populations are in need of many more subsidized units than the Section 202 and Section 811 programs currently provide. A 2006 American Association of Retired Persons (AARP) study estimated that, for every Section 202 unit that becomes available, 10 elderly households could benefit from that unit.[2]

- A 2008 study by the Housing Task Force of the Consortium for Citizens with Disabilities estimated that at least 1.3 million very low-income nonelderly disabled households without children were paying more than 50 percent of their income toward housing.[3]
- HUD is committed to addressing the rising energy costs that are driving increasing operating costs and limiting HUD's ability to meet the growing need for Section 202 and Section 811 housing. The following policy vision statement articulates this dual commitment.

Since the implementation of the Energy Policy Act of 2005, HUD and the U.S. Environmental Protection Agency (EPA) have been collaborating to achieve this vision by encouraging the incorporation of energy efficiency measures in the design, construction, rehabilitation, and refinancing of Section 202 and Section 811 projects. HUD and EPA have entered into an interagency agreement to "support Section 202 and Section 811 housing units in improving their energy efficiency, including the construction of ENERGY STAR® qualified units" and to "investigate other green attributes that may be relevant to these programs."

Although intergovernmental collaboration has been an important step to achieving this policy vision, HUD will require collaboration and commitment from those who actually conceive, construct, and operate Section 202 and Section 811 projects. This report is designed to help sponsors and owners effectively participate in activities that promote energy efficiency and reduce operating costs across the Section 202 and Section 811 portfolios.

Process of Developing This Report

To identify effective ways for sponsors, owners, and development team members to support energy efficiency in their Section 202 and Section 811 projects, HUD and EPA convened a roundtable discussion with key stakeholders on May 17, 2010. During the meeting, participants shared energy efficiency and green construction practices currently being implemented in new and existing Section 202 and Section 811 projects, discussed

1 Sims, Ron (2009) *H.R. 2336, the Green Resources for Energy Efficient Neighborhoods Act of 2009.* Written Statement Ron Sims, Deputy Secretary U.S. Department of Housing and Urban Development Hearing before the Subcommittee on Housing and Community Opportunity Committee on Financial Services United States House of Representatives, Washington, District of Columbia, June 11. Available at http://portal.hud.gov/hudportal/HUD?src=/press/testimonies/2009.

2 Kochera, Andrew (2006) *Developing appropriate rental housing for low-income older persons: A survey of Section 202 and LIHTC property managers.* AARP Public Policy Institute. Available at http://www.aarp.org/home-garden/housing/info-2006/dd149_lihtc.html.

3 Nelson, Kathryn P. (2008) *The Hidden Housing Crisis: Worst Case Housing Needs Among Adults with Disabilities. Housing Task Force of the Consortium for Citizens with Disabilities.* Available at http://www.tacinc.org/downloads/HiddenHousCrisis.pdf.

barriers to adopting these practices, and identified strategies for overcoming such barriers.

This report is based in part on feedback obtained during the roundtable meeting, including concerns raised by stakeholders and potential actions identified to address those concerns. It also highlights approaches taken by five organizations that have planned or implemented energy efficiency practices in Section 202 and Section 811 projects. The experiences of these five organizations are highlighted in the case studies provided in section III.

Structure of This Report

This report articulates concrete strategies for achieving HUD's policy vision for the Section 202 and Section 811 programs by supporting owners', developers', and sponsors' efforts to enhance energy efficiency in Section 202 and Section 811 projects.

The remainder of this report is arranged as follows:

Section II describes the state of the Section 202 and Section 811 housing portfolio and the current initiatives that HUD is undertaking. It also highlights what some housing sponsors are already doing to improve the energy efficiency of their Section 202 and Section 811 projects and describes strategies that other housing sponsors can implement.

- **Section III** provides five case studies representing the experiences of a range of organizations that have successfully implemented green design features in Section 202 and Section 811 housing. The selected organizations represent a range of experience, portfolio size, and geographic coverage.
- **Section IV** discusses HUD's requirements for energy efficiency and water conservation in Section 202 and Section 811 housing, the sustainability features that can earn policy priority points for Section 202 and Section 811 applicants, and tools and resources that sponsors and owners can use to implement green design features in their Section 202 and Section 811 projects.
- This report is designed to support owners and sponsors of Section 202 and Section 811 projects in their efforts to take actions that enhance energy efficiency and that lead to the policy vision that HUD has set forth. The tools and resources it provides will help sponsors and owners as they seek to implement energy efficiency measures in both new construction and existing Section 202 and Section 811 projects.

II. THE OPERATING ENVIRONMENT FOR SECTION 202 AND SECTION 811 PROJECTS

In recent years, the federal government has provided more than $600 million annually in funding to support the construction and operation of housing for the elderly and people with disabilities through the Section 202 and Section 811 programs. This section of the report describes the key historic changes in these programs and how those changes affect today's operating environment. It then provides a picture of some key characteristics of the nation's Section 202 and Section 811 portfolios. The initiatives that the U.S. Department of Housing and Urban Development (HUD) and the U.S. Environmental Protection Agency (EPA) are currently undertaking to support incorporation of energy efficiency and green measures into construction, rehabilitation, and operations of Section 202 and Section 811 projects are outlined next. The section concludes by identifying promising practices identified by sponsors and owners who are actively engaged in energy efficiency and green development for Section 202 and Section 811 projects.

Program Overview

The Section 202 program was enacted in 1959 to provide affordable housing for moderate-income elderly households and later began serving people with disabilities. Since then, more than a quarter million affordable housing units have been produced under the program. The Section 202 program serves very low-income people in households where at least one person is 62 years of age or older at time of initial occupancy. The program provides tenants with affordable rental housing that may incorporate supportive services or access to community-based services, which help elderly tenants remain independent and age in place. Because eligibility requirements have changed over time, Section 202 projects also house some tenants with higher incomes, and some younger tenants with disabilities.

In 1990, the Section 811 program was established to provide supportive housing for people with disabilities, and the Section 202 program was modified to focus on serving elderly households. The Section 811 program serves very low-income people with physical disabilities, developmental disabilities, or chronic mental illness who are 18 years of age or older. The program provides tenants with affordable rental housing that incorporates supportive services. Since its inception, Section 811 has funded 30,244 affordable units.

In fiscal year 2009, annual appropriations provided $454.5 million for Section 202 capital advances and $95.7 million for Section 811 capital advances. These amounts funded 169 projects in 46 states. Over time, it is expected that fewer new units will be funded because the increasing cost of subsidizing the existing portfolio of assisted housing will consume an ever-larger portion of the annual appropriation.

Historic Overview of Capital Funding and Operating Expenses

Over the years, there have been significant changes in the Section 202 and Section 811 programs. This section highlights those changes, with a focus on the aspects of the programs that affect how energy efficiency and green features can be incorporated into new or existing Section 202 or Section 811 projects.

The key aspects of the programs that are relevant to implementing energy efficiency and green features involve how capital is provided to the projects and how operating subsidies are handled. Although there are other variations, the key combinations of financing features for new construction, acquisition, and rehabilitation projects have included the following:

Direct loans, no operating subsidy. In the early days of the program, the Section 202 program offered direct loans at below market interest rates to nonprofit sponsors. Section 202 projects that applied for HUD funds prior to 1962 are not subjected to income eligibility restrictions and tend to serve moderate-income elderly households and people with disabilities. Operating costs are paid out of tenant rents.

- **Direct loans, Section 8.** Over time,[4] program requirements evolved, limiting tenant incomes, revising loan terms and interest rates, and adding the concept of providing services to assist frail tenants. Tenant incomes were first required to be at or below 80 percent of area median income, and later at or below 50 percent of area median income. To make the units affordable to tenants with incomes that met these requirements, a rental subsidy was provided in the form of Section 8 project-based rental assistance. Under Section 8, households generally pay 30 percent of adjusted monthly income toward rent. The Section 8 subsidy makes up the difference between the tenant contribution and the full rent amount. The Section 8 program subsidies increase regularly over time to keep operating income in line with rising costs, based on an operating cost adjustment factor (OCAF), annual adjustment factor (AAF), or an approved budget.
- **Direct loans, PAC, and PRAC.** For a limited time, from 1989 to 1992, project assistance contracts (PACs) were introduced to provide assistance to nonelderly disabled households residing in Section 202 projects funded through direct loans. After the program shifted to capital advances with project rental assistance contracts (PRACs) in lieu of Section 8 in the 1990s (see Capital Advance, PRAC discussion below), a sizeable percentage of projects that formerly received operating subsidies through Section 8 were converted to PRACs.
- **Capital Advance, PRAC.** In the early 1990s, the approach to providing construction capital was shifted from providing direct loans to providing capital advances.[5] Capital advances do not accrue interest and do not need to be repaid as long as the housing remains available for occupancy by very low-income elderly people or people with disabilities for at least 40 years. At the same time, operating cost subsidies were shifted from Section 8 to PRACs. Like Section 8, PRACs make up the difference between tenant contributions and approved rents. However, under PRACs, rents are determined by the operating budget. Beginning in 1991, the Section 811 program was established as a separate program, but using the same capital advance and PRAC mechanisms to support the development of supportive housing for people with disabilities.[6]
- **Mixed Finance, PRAC.** In 2000, the capital advance program was adjusted to allow use of low-income housing tax credits (LIHTCs). This additional capital has been critical in high cost areas or with projects with specialized designs. In mixed-finance projects, PRAC funds are limited to only those units funded by capital advances. The sponsor of a mixed-finance development must obtain the necessary funds from a source other than PRAC to cover operating costs related to non-Section 202 or Section 811 units.

In addition to these sources of funding for new construction activities and for operating costs, the Section 202 and Section 811 programs provide options for repairs and rehabilitation/retrofits that may include energy-efficient components. Sources include the following:

- **Reserves for Replacement.** Project budgets include regular deposits to a reserve for replacement account. With HUD approval, these funds can be used for repairs, replacements, and capital improvements to the property.
- **Residual Receipts.** All surplus cash for a project in a given year is to be placed in a residual receipts account. With HUD approval, these funds can be used to make repairs to the project when reserves for replacements funds are insufficient, and can be used to make improvements to the project.

4 Key legislation included the Housing and Community Development Act of 1974 (P.L. 93-383), and the Omnibus Budget reconciliation Act of 1981 (P.L.97-35).

5 Cranston-Gonzalez National Affordable Housing Act (P.L. 101-625). Available at http://www.ssa.gov/OP_Home/comp2/F101-625.html.

6 Cranston-Gonzalez National Affordable Housing Act (P.L. 101-625). Available at http://www.ssa.gov/OP_Home/comp2/F101-625.html.

- **Emergency Capital Repair Program.** Certain Section 202 projects owned by private, nonprofit owners are eligible for this program, which provides grants to address repairs that present an immediate threat to the tenants' health, safety, and quality of life and cannot be funded with the project's replacement reserves.

Section 202 and Section 811 capital funding for new construction or energy efficiency improvements can be supplemented in a variety of ways. These include contributions from other federal programs, state and local programs, foundations, nonprofit organizations, utility companies, and LIHTCs. These options are discussed further in section IV. In addition, Section 202 projects with direct loans may be able to acquire the resources needed to make energy efficiency improvements, along with other needed rehabilitation, through refinancing. Refinancing is permitted when use controls are continued through the original term of the direct loan, and result in lower interest rate and debt service. Direct loans may be refinanced using any third party source, including financing by state or local housing finance agencies, use of tax-exempt bonds, multifamily mortgage insurance under the National Housing Act, reinsurance, or other credit enhancements.

Characteristics of Section 202 and Section 811 Portfolio

As of 2009, the Section 202 program provided affordable housing to approximately 263,000 units in more than 8,000 developments, while the much smaller Section 811 program has supported the development of some 25,060 units in approximately 2,222 developments. The following statistics provide a flavor of the diversity of the Section 202 and Section 811 housing portfolio in terms of characteristics such as project age, building type, and location. For additional detail, see *Section 202 Supportive Housing for the Elderly: Program Status and Performance Measurement.*[7]

Age of Projects

The largest portion of Section 202 and Section 811 projects were constructed between 1991 and 2000, accounting for 36 percent of the total projects. Almost 450 projects are 30 or more years in age. Unit size has decreased over the years, which reduces the energy demand for more recently built units.

Two-thirds (67 percent) of the Section 202 and Section 811 projects are funded through capital advances, and three-fourths are 20 years old or less.

7 Haley, Barbara A., and Robert W. Gray (2008) *Section 202 Supportive Housing for the Elderly: Program Status and Performance Measurement.* U.S. Department of Housing and Urban Development, Office of Policy Development and Research. Available at http://www.huduser.org/portal/publications/hsgspec/sec_202.html.

Exhibit 1. **Year of Construction of Section 202 and 811 Projects**

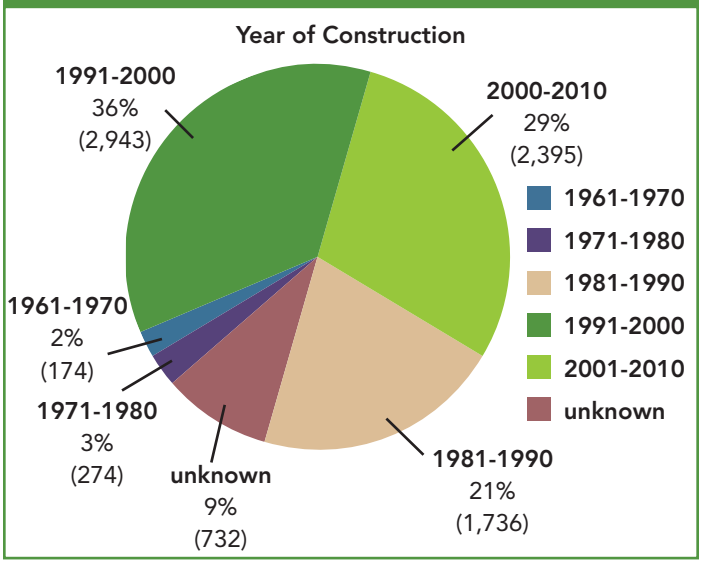


Exhibit 2. **Year of Construction of Section 202 and 811 Projects Funded by Capital Advances or Direct Loans**

Year of Construction	Capital Advance	Direct Loan	Total
1961–1970	0	174	174
1971–1980	1	273	274
1981–1990	7	1,729	1,736
1991–2000	2,441	502	2,943
2001–2010	2,395	0	2,395
Unknown	694	38	732
TOTAL	**5,538**	**2,716**	**8,254**

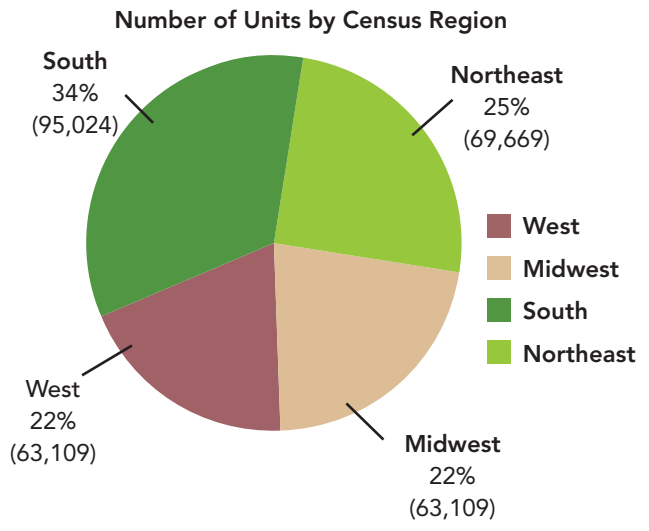
Building Types

Mid-rise and high-rise apartments are the most common type of property.

Exhibit 3. **Number of Section 202 and 811 Projects and Units by Building Types From 1961 to 2010**

Building Type	# of Properties	% of Properties	# of Units	% of Units
Common building	5	.06%	328	.12%
Duplex	297	3.6%	8,492	3.0%
Single-family	923	11.2%	10,353	3.7%
Row/townhouses	927	11.2%	23,380	8.4%
Low-rise/garden apartments	1,844	22.3%	47,002	16.8%
Unknown	2,099	25.4%	39,449	14.1%
Mid-/high-rise apartments	2,159	26.2%	150,877	53.9%
TOTAL	**8,254**		**279,881**	

Exhibit 4. **Number of Section 202 and 811 Units by Census Region from 1961-2010**



Geography of Units

Units are distributed across all geographic areas of the United States.

Section 202 and Section 811 projects have been developed in every HUD region.

Exhibit 5. **Number of Section 202 and 811 Projects Funded Through Capital Advances or Direct Loans by Field Office and HUD Region From 1961 to 2010**

Location of Projects		Capital Advance		Direct Loan		TOTAL	
Region	Field Office	Count of Property	Number of Units	Count of Property	Number of Units	Count of Property	Number of Units
1	Boston	464	9,558	197	7,657	661	17,215
2	Buffalo	158	3,839	101	4,308	259	8,147
2	New York	214	8,753	124	9,154	338	17,907
3	Baltimore	320	7,089	132	6,538	452	13,627
3	Philadelphia	525	12,053	195	14,347	720	26,400
4	Atlanta	442	9,183	250	11,468	692	20,651
4	Greensboro	393	6,837	101	3,082	494	9,919
4	Jacksonville	346	11,700	242	15,450	588	27,150
5	Chicago	302	8,783	107	5,639	409	14,422
5	Columbus	311	7,152	149	8,386	460	15,538
5	Detroit	92	3,203	59	3,541	151	6,744
5	Minneapolis	225	4,723	104	4,271	329	8,994
6	Fort Worth	500	12,515	236	11,162	736	23,677
7	Kansas City	347	8,153	223	9,258	570	17,411
8	Denver	141	3,353	96	3,555	237	6,908
9	Los Angeles	231	8,047	124	9,062	355	17,109
9	San Francisco	306	9,069	171	9,431	477	18,500
10	Seattle	221	5,253	105	4,309	326	9,562

Financial Components of Section 202 and Section 811 Programs

Program regulations have implications for how owners and sponsors can pay for energy efficiency and green building measures and upgrades. The regulations set standards for development cost limits, operating costs, and use of replacement reserve and residual receipt accounts.

Development Cost Limits

The annual Notice of Funding Availability (NOFA) for the Section 202 and Section 811 program announces the development cost limits for new construction, acquisition, and rehabilitation. Development cost limits are expected to cover the reasonable and necessary costs of developing a project of modest design that complies with HUD's minimum property standards, accessibility requirements, and project design and cost standards. HUD can increase the published development cost limits by up to 140 percent in any geographic area where the cost levels warrant it, and may increase the development cost limits by up to 160 percent on a project-by-project basis. The cost of energy efficiency upgrades to be paid for with Section 202 or Section 811 funds must fall within the development cost limits. Exhibit 6 presents the 2009 development cost limits, showing both the development cost limit, and 140 percent of development cost limit. Total development costs may exceed these limits if owners and sponsors are able to supplement HUD's Section 202 or Section 811 funds with outside funds.

Exhibit 6. Development Cost Limits for Fiscal Year 2009 for Section 202 and Section 811

100 Percent and 140 Percent of Development Cost Limits (FY 2009)		
	Non-Elevator Structures	Elevator Structures
No bedrooms	$50,232/70,325	$52,862/74,007
One bedroom	$57,917/81,084	$60,597/84,836
Two bedrooms	$69,849/97,789	$73,686/103,160

Operating Costs

Operating costs are paid for through tenant contributions (in general, 30 percent of adjusted monthly income) supplemented by either Section 8 or PRAC rental assistance.

- **Under Section 8,** OCAF, AAF, or a budget-based method is used to determine how much rental assistance subsidy will be provided to the project.

Median Operating Costs

Median per-unit-month operating costs for Section 202 and Section 811 units from 2002 to 2004 were $378.
- $274 for non-utility operating costs.
- $63 for utility expenses.
- $23 for deposits to replacement reserves.
- $18 for service expenses.

- **Under PRAC,** rental assistance is budget based and is calculated based on actual operating expenses. These expenses include non-utility operating expenses, utility expenses, contributions to replacement reserves, and services and service coordination in those projects serving frail elderly or at-risk residents.

Incentives to address energy efficiency improvements are different, depending on whether rental assistance is determined based on the project's budget or based on an adjustment factor.

- **Under budget-based adjustments to PRAC or Section 8,** reductions in utility costs will result in a reduction in the amount of rental assistance provided at the next renewal. The reduction is commensurate with the utility cost savings, so the owner will not be harmed by the change. However, none of the benefits of the savings go to the owner or the property; instead, it is the Section 202 program as a whole that benefits.
- **Under adjustments to Section 8 based on OCAF or an AAF,** reductions in utility costs will not result in a reduction in the amount of rental assistance. In these projects, utility cost savings are available to the project to meet other needs. Because rental assistance is not reduced commensurate with utility cost savings, the benefits of any utility cost savings will go to the project, not to the Section 202 program as a whole.
- The way utilities are metered also affects operating costs in some situations, and can therefore influence the incentive to engage in energy efficiency measures. For projects in which units are metered individually and tenants pay for utilities, tenants themselves have an economic incentive to conserve on utilities. Owners of projects with Section 8 rental assistance, whose financial responsibility would be limited to utilities serving common areas, would have a reduced financial incentive to take action. In projects that are not metered individually, on the other hand, tenants have little financial incentive to conserve on utilities, while owners of projects with Section 8 rental assistance do have such an incentive. Under PRAC, the owner has no incentive to

conserve on utilities, because either tenants pay for utilities or PRAC's budget-based approach pays for the full cost of the owner's utility bill.

Replacement Reserves

Each Section 202 and Section 811 project has a reserve for replacement funds. The replacement reserve fund is expected to grow over time, through monthly contributions from the project budget. Replacement reserve funds may be used, with HUD field office approval, for repairs, replacements or capital improvements to the project. Replacement reserves can be used to cover the cost of energy efficiency upgrades. Projects reported an average reserve balance of $153,154 in 2009, with a median figure of $72,452.

Capital needs assessments are used to determine the size of the replacement reserve fund needed and to help ensure that monthly contributions will be sufficient to meet the major capital needs of the property when the need arises. However, capital needs assessments do not systematically include an analysis of the costs of energy efficiency and green upgrades. For cases in which the replacement reserves are scant or the building has significant deferred maintenance or capital needs, it may not be prudent to use the funds to support energy efficiency upgrades.

Residual Receipts

The residual receipts account is a holding account for the amount of any net earnings that exceed the amount needed to fund the project's operations and make reserve account deposits in a given fiscal year. Of 65,536 projects that reported some residual receipts in 2009, the average balance was $106,917, with a median of $18,888.

Residual receipts may be used to reduce operating deficits when cash flow deficiencies exist, make mortgage payments when a mortgage default is actual or imminent, make repairs to the property not covered by the replacement reserves account, and provide project amenities that conform to cost containment provisions. The release of funds from a residual receipts account for energy efficiency upgrades is determined on a case-by-case basis by the appropriate HUD field office.

Secondary Financing

Secondary financing available from public bodies (for example, HOME or Community Development Block Grant (CDBG) funding) or private sources may be used to supplement Section 202 or Section 811 funding. Secondary financing cannot be used for ineligible activities (as identified in the annual NOFA) that would change the character of the project. Such financing can, however, be used to fund the costs of energy efficiency upgrades or green features, whether as part of new construction, acquisition or rehabilitation, or as part of planned maintenance or rehabilitation for existing units. Secondary financing by nonpublic bodies can be used but must be reviewed and approved by HUD Headquarters on a case-by-case basis.

Low-Income Housing Tax Credit

Program changes to allow use of the LIHTCs with Section 202 and Section 811 projects has provided another avenue for obtaining additional financing. In 2000, the definition of "project owner" was adjusted to include limited partnerships. These provisions allow for-profit limited partnerships to own Section 202 projects if the sole general partner is a private nonprofit organization, or a corporation wholly owned and controlled by a private nonprofit organization. With this ownership structure, tax credits can be used to develop new mixed-finance projects or recapitalize and rehabilitate aging Section 202 housing portfolio.

Bringing in additional financing during new construction may allow some projects that otherwise might have been constrained by development cost limits to include green building design features.

Improving Energy and Water Conservation and Promoting Green Design in Section 202 and Section 811 Projects

Requirements for Energy and Water Conservation in Section 202 and Section 811 Projects

Beginning in 2011, HUD established specific requirements for increasing energy and water conservation in new construction and substantial rehabilitation, as well as acquisition and moderate or modest rehabilitation Section 202 and Section 811 project applications. At a minimum, energy efficiency strategies and water conservation appliances and fixtures must be incorporated in the design, construction, and operation of all projects. HUD has also established an incentive to encourage sponsors and owners to develop their projects using a green building design.

Additional information about strategies for addressing these new requirements and incentives is in section IV.

- **Requirements for Section 202 and Section 811 New Construction and Substantial Rehabilitation Projects.**
  - **Energy Conservation.** Owners of new construction and substantial rehabilitation low-rise (up to three stories) multifamily developments must meet EPA's ENERGY STAR qualified homes requirements. In addition, mid-rise and high-rise developments (four or more stories) must meet the ASHRAE 90.1-2007 Appendix G Plus 15% standard for energy efficiency. Any state energy code requirements will take precedence over ENERGY STAR or ASHRAE specifications when the state code approximates or exceeds that standard. More information concerning ENERGY STAR qualified homes is available at *http://www.energystar.gov/*homes. Information concerning ASHRAE standards is accessible at *http://www.ashrae.org/*.

- **Water Conservation.** Installation of water-conserving fixtures is required in all new and substantially rehabilitated developments (that is, resource-efficient plumbing and appliances, such as low-flow showerheads and faucet and high efficiency toilets). The materials used should be the most current WaterSense-labeled or a greater water efficiency product. More information is available at *http://www.epa.gov/watersense/*.

- **Requirements for Acquisition and Moderate or Modest Rehabilitation Section 202 and Section 811 Projects.** Sponsors and owners of acquisition and moderate or modest rehabilitation projects must perform pre- and post-construction energy audits and incorporate conservation techniques in their projects.

Incentive for Incorporating Green Design in Section 202 and Section 811 Projects

HUD recognizes the fundamental role that its investments play in defining the physical form of communities and quality of life for residents. HUD encourages applicants for Section 202 and Section 811 funding to take steps to incorporate green building design features into their projects. Under the Section 202 and Section 811 Notices of Funding Availability, HUD offers incentive points to applicants that undertake green development in the design, construction, rehabilitation, and operation of their proposed Section 202 or Section 811 development. Applicants must meet the following requirements to receive policy priority points.

- **Green Development Standard.** To receive the policy priority points for green development, applicants must certify and demonstrate that their project will implement green development strategies in the design, construction, rehabilitation and operation of the proposed project. These points are available to applicants that commit to the full incorporation of a green standard and describe how they will fulfill the requirements of the recognized green rating programs.
  - **Integrated Design Process and Green Design Expertise.** To the maximum extent possible, applicants should assemble a development team that has a strong understanding of sustainable design principles and green building standards. HUD strongly encourages the use of an integrated design process that ensures a commitment to continued communication throughout the development process. The integrated design process insures that every aspect of the building works as a whole to produce the best possible product, with the best possible energy and cost savings. A professional that has a strong understanding of the green building design principles should be included throughout all phases of the development process.
  - **Passive Solar Orientation.** To the greatest extent possible, project designs should incorporate passive solar orientation principles.

- **Operations and Maintenance (O&M) Plan.** All applicants must develop an O&M manual that will address the following:
  - A routine maintenance plan.
  - Operations and maintenance guidance for all appliances, HVAC operation, lighting equipment, paving materials and landscaping, pest control, and other systems that are part of each occupancy unit.
  - An occupancy turnover plan that describes in detail the process of educating the tenant about proper use and maintenance of all building systems.
  - Staff training needed to maintain the energy improvements and continue green building practices for the future.
  - In addition, all operations and maintenance plans must commit to future installation of water-conserving fixtures and ENERGY STAR appliances.

Federal Initiatives To Support Energy Efficiency and Green Building

In addition to the incentives provided in the Section 202 and Section 811 NOFAs, HUD, EPA, and the U.S. Department of Energy (DOE) have other programs and tools to promote energy efficiency and green building practices.

HUD's Multifamily Energy Efficiency Initiative

HUD has initiated a pilot program in California for Section 202 senior housing that provides energy audits for projects seeking refinancing. HUD's Region 9 office (California, Nevada, Arizona, and Hawaii) launched a Multifamily Energy Efficiency Initiative, in partnership with Pacific Gas and Electric. Property owners applying for renewal of federal rental assistance contracts must obtain an energy audit conducted by the local utility and then incorporate energy efficiency measures in the project refinancing and reserve for replacement plans. HUD is also assisting sponsors of Section 202 housing in Region 9 by identifying cost-effective energy efficiency improvements that can reasonably be included in their refinancing plans. HUD has asked project sponsors to prioritize energy investments with payback periods of 5 years or less, as part of the project's refinancing transactions, or, alternatively, in conjunction with project operating or reserve for replacement plans. These transactions have the necessary financing capacity and contract administration processes in place to accomplish energy retrofits capable of reducing energy consumption by 20 percent or more.[8]

8 For more details on the Multifamily Energy Efficiency Initiative, visit http://www.h-m-g.com/multifamily/aheea/default.htm.

HUD's Green Retrofit Program

HUD's Green Retrofit Program (GRP), funded by the American Recovery and Reinvestment Act (ARRA), is a $250 million program that provides grants and loans to eligible property owners to make energy efficiency and green retrofit investments in the property. Funds can be used to ensure the maintenance and preservation of the property and the continued operation and maintenance of energy efficiency technologies. Eligible projects may receive up to $15,000 per residential unit (with an expected average of $10,000/unit) to reduce energy costs (for example, more efficient heating and cooling systems), reduce water use (for example, low-flow faucets and toilets), improve indoor environmental quality (for example, low-VOC products), and provide other environmental benefits (for example, materials with recycled content and reflective roofing to reduce heat-island effects). To be eligible to participate in the program, projects must receive HUD Section 8 project-based assistance or Section 202 or Section 811 PRAC.

HUD received 775 applications for GRP. Those included 343 Section 202 and 91 Section 811 projects. No new funding is available for this program in FY 2010 or has been proposed for FY 2011.

For more information, visit HUD's GRP website: http://portal.hud.gov/portal/page/portal/HUD/recovery/programs/green.

ENERGY STAR®

ENERGY STAR is the U.S. government-backed label for energy efficiency. The ENERGY STAR label identifies homes, buildings, and consumer products that meet specific standards for energy efficiency and performance. A joint program of the Environmental Protection Agency (EPA) and the Department of Energy (DOE), ENERGY STAR is designed to help individuals and organizations nationally and internationally adopt cost-effective, energy-efficient technologies and practices, and better manage their energy costs.

EPA introduced ENERGY STAR as a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions in 1992. Today, the ENERGY STAR label is on more than 60 types of consumer products, new homes, and commercial and industrial buildings. Products with the ENERGY STAR label deliver the same or better performance as comparable models while using less energy and saving money.

ENERGY STAR is a voluntary partnership between the government and more than 9,000 organizations, including 4,500 of the nation's homebuilders. These public and private organizations have joined forces with EPA and DOE through ENERGY STAR to promote energy efficiency. The voluntary partnership program provides technical information and tools for organizations and consumers about energy-efficient solutions and best practices for managing energy consumption.

ENERGY STAR Qualified Homes

ENERGY STAR qualified homes are the result of a process by which the entire home is planned and then built for improved energy efficiency. The developer must design and construct the project to standards that ensure both energy and cost savings will be delivered to the property owner and the tenant. ENERGY STAR qualified homes are significantly more energy efficient than traditional homes because they use more effective insulation; higher performing windows; tighter construction and ducts; and more efficient heating and cooling equipment, lighting, and appliances. A family that lives in an ENERGY STAR qualified home benefits because the home is made of high quality materials, and the energy-efficient features result in lower utility bills, better air quality, improved comfort, and lower maintenance demands.

The developer is responsible for following the process to ensure a home is certified as an ENERGY STAR qualified home. The developer must contract with an independent third-party, known as the Home Energy Rater, or HERS rater. HERS raters inspect, test, and qualify all homes seeking the ENERGY STAR label. HERS raters follow the Home Energy Rating System (HERS) Index to determine the energy efficiency of a home.

For more information, visit the ENERGY STAR qualified homes website at http://www.energystar.gov/homes or e-mail ENERGY STAR at energystarhomes@energystar.gov.

EPA's Indoor airPLUS Program

EPA developed the Indoor airPLUS Program to help builders meet the growing consumer preference for homes with improved indoor air quality and energy efficiency. By constructing homes that meet EPA's stringent specifications, forward-thinking builders can distinguish themselves by being among the first to offer homes designed to deliver lower utility costs, greater comfort, better durability, and reduced risk of indoor air problems.

A home must first be designed and built to earn the ENERGY STAR label to be eligible for the Indoor airPLUS label. A home built to Indoor airPLUS specifications includes more than 70 additional home design and construction features to help protect qualified homes from moisture and mold, pests, combustion gases, and other airborne pollutants. The home's Indoor airPLUS features are third-party verified. This verification can be completed as part of the inspection process for the ENERGY STAR qualified homes label. A completed and signed Indoor airPLUS Verification Checklist may be substituted in lieu of the Water Management System Checklist that is required for the ENERGY STAR qualified homes label.

For more information, visit the EPA's Indoor airPLUS website at http://www.epa.gov/indoorairplus.

ENERGY STAR Qualified Multifamily High-Rise Program

Buildings earning the ENERGY STAR qualification meet strict energy performance standards set by the EPA. Building owners benefit from earning this label in the form of lower operating expenses and the opportunity to use the ENERGY STAR brand in marketing their building to tenants as well as their status as an environmental leader. At the time this report was written, ENERGY STAR was finalizing requirements for its Multifamily High-Rise (MFHR) program with the intention of releasing final requirements sometime in 2011. After the program is finalized, ENERGY STAR MFHR will be applicable to new construction (or substantially rehabilitated) multifamily building projects consisting of four or more stories, which are not currently covered under the requirements for ENERGY STAR qualified homes. Other eligibility requirements are likely to include the following:

- The intended use of the building must be for residential purposes. Commercial facilities such as motels and hotels, group homes, assisted-living facilities, and dormitories are not eligible for the program.
- If the building is located on top of nonresidential commercial space, the residential space must—
  - Consist of more than 50 percent of the gross heated square footage of the entire building.
  - Be separately metered from the commercial space.

A Performance and Prescriptive Path will be available for multifamily high-rise buildings to earn the ENERGY STAR qualification. Under the Performance Path, a building will have to achieve 15 percent energy cost savings over the ASHRAE 90.1-2007 baseline using the Appendix G protocols and ENERGY STAR's MFHR Simulation Guidelines and be verified and field-tested in accordance with ENERGY STAR's Testing and Verification Protocols. The Simulation Guidelines is a companion document to ASHRAE 90.1-2007 and ASHRAE 90.1Appendix G and contains program requirements to assist energy consultants in developing the Baseline Building Design and Proposed Building Design models for each project. The Testing and Verification Protocols are mandatory requirements for the inspection, testing, and verification of components related to the building's energy performance.

Under the Prescriptive Path, a building will need to meet specific requirements covering elements such as building envelope, ventilation and infiltration, lighting, and water heating, and be verified and field-tested in accordance with the ENERGY STAR Testing and Verification Protocols. Under both the Prescriptive and Performance Paths, after achieving ENERGY STAR qualification for the project, the developer/manager must commit to benchmarking their building's energy use in ENERGY STAR's Portfolio Manager, a free online energy benchmarking tool, for a period of 2 years.[9]

For more information about ENERGY STAR qualified multifamily high-rises, visit *http://www.energystar.gov/homes or e-mail ENERGY STAR at energystarhomes@energystar.gov*.

ENERGY STAR Quantity Quotes

The DOE developed ENERGY STAR Quantity Quotes, a tool designed to help owners and sponsors take advantage of economies of scale in making bulk purchases of ENERGY STAR qualified products. This online tool helps multifamily building owners, public housing authorities, state and local governments, universities, and others to efficiently contact suppliers and negotiate discounted prices. ENERGY STAR products, such as light bulbs, light fixtures, clothes washers, dehumidifiers, dishwashers, refrigerators, and room air conditioners, are available through Quantity Quotes.

For more information, visit the ENERGY STAR Quantity Quotes website at http://www.quantityquotes.net.

EPA's WaterSense® Program

The EPA developed WaterSense to promote water efficiency through the use of water-efficient products. WaterSense labeled products deliver exceptional performance, help save money, and encourage innovation in manufacturing. All WaterSense products are third-party verified and tested for conformance to specifications, efficiency, and performance and are 20 percent more water efficient than average products in that category. A database of WaterSense products, such as bathroom sink faucets and accessories, toilets, urinals, and showerheads, and rebate information are available through WaterSense's website.

In 2009 WaterSense released a specification for single-family new homes. This specification establishes criteria for new homes labeled under the WaterSense program and is applicable to newly constructed single-family homes and townhomes of three or fewer stories. EPA's goal is that WaterSense labeled homes will use approximately 20 percent less water than a standard new home by using a combination of prescriptive and performance-based approaches to reduce indoor and outdoor water usage.

For more information, visit the WaterSense website at http://www.epa.gov/WaterSense.

National and Regional Green Building Criteria

Enterprise Green Communities Criteria

Enterprise Green Communities homes are built according to the Enterprise Green Communities Criteria (Green Criteria) the first national framework for healthy, efficient, environmentally smart affordable homes. The Green Criteria provide a clear, cost-effective framework for all kinds of affordable housing: new construction and rehabilitation in multifamily as well as single-

9 For details on the ENERGY STAR Portfolio Manager, visit https://www.energystar.gov/istar/pmpam/.

family buildings. The Green Criteria are aligned with the U.S. Green Building Council's LEED Green Building Rating System. In addition, the Green Criteria reflect and are compatible with leading state and local green building programs. They contain detailed information that addresses aspects of design, development and operations, such as: integrated design; site, location and neighborhood fabric; site improvements; water conservation; energy efficiency; materials beneficial to the environment; healthy living environment; and operations and maintenance.

A project must comply with all the mandatory provisions of the Green Criteria. In addition, to be eligible for funding opportunities available under Enterprise Green Communities, new construction projects must earn 35 points from the Optional Criteria, while moderate rehabilitation projects must earn 30 points from the Optional Criteria.

For more information, visit the Enterprise Green Communities website at http://www.greencommunitiesonline.org.

NAHB Green Building Standard

The National Green Building Standard (the Standard) is the first residential green building rating system to undergo the full consensus process and receive American National Standards Institute (ANSI) approval. The four threshold levels—Bronze, Silver, Gold, and Emerald—allow builders to achieve entry-level green building, or the highest level of sustainable "green" building incorporating energy savings of 60 percent or more. Single-family and multiunit homes, residential remodeling projects, and site developments are all covered in the Standard.

The Standard offers green building practices in six categories: lot design, preparation and development; resource efficiency; energy efficiency; water efficiency, indoor environmental quality; and operation, maintenance, and building owner education. For a project to become certified, a minimum score must be achieved in each category, with the point total requirements increasing for successively higher levels of green certification. The Standard requires that a qualified third-party inspect the project and verify that all green design or construction practices that the builder claims toward green certification have been incorporated into the project.

For more information, visit the NAHB Green Building Standard website at http://www.nahbgreen.org/NGBS/default.aspx

LEED Green Building Rating System

The U.S. Green Building Council's LEED green building rating systems are designed for rating new and existing commercial, institutional, and residential buildings and provides third-party verification that a building or community was designed and built to the highest green building and performance measures. They are based on accepted energy and environmental principles and strike a balance between known, established practices and emerging concepts. Each rating system is organized into five environmental categories: sustainable sites; water efficiency; energy and atmosphere; materials and resources; and indoor environmental quality. An additional category, innovation in design, addresses sustainable building expertise as well as design measures not covered under the five environmental categories. Regional bonus points are another feature of LEED and acknowledge the importance of local conditions in determining best environmental design and construction practices.

LEED points are awarded on a 100-point scale, and credits are weighted to reflect their potential environmental impacts. A project must satisfy all prerequisites and earn a minimum number of points to be certified, with different thresholds to earn Certified, Silver, Gold, and Platinum level certification. LEED rating systems include: New Construction, Existing Buildings: Operations and Maintenance; Commercial Interiors; Core and Shell; Schools; Retail; Healthcare; Homes; and Neighborhood Development.

- **LEED for New Construction Rating System** is designed to guide and distinguish high-performance commercial and institutional projects, including office buildings, high-rise residential buildings, government buildings, recreational facilities, manufacturing plants and laboratories. *For more information, visit the U.S. Green Building Council's LEED for New Construction website at: http://www.usgbc.org/leed/nc/.*
- **LEED for Homes Rating System** is designed to guide the construction of single-family homes in accordance with the rigorous guidelines of the LEED for Homes green building certification program. *For more information, visit the U.S. Green Building Council's LEED for Homes website at http://www.usgbc.org/leed/homes/.*

For more information about LEED systems, visit the U.S. Green Building Council's LEED website at http://www.usgbc.org/LEED/.

EarthCraft House

EarthCraft House is a green building program that serves as a blueprint for healthy comfortable homes that reduce utility bills and protect the environment. The aim of the program is to help home builders be leaders in smart growth management and environmental stewardship. Building an EarthCraft House is about constructing a healthy, more valuable home while minimizing environmental impacts. EarthCraft House follows a systems approach to home building that stresses an understanding of how the different components of a home work together. This approach results in a home that performs better, is more economical for the homeowner and costs little more to build than a comparable home built with standard construction practices.

Any size or style of home at any price point can achieve EarthCraft House certification by meeting the guidelines. These guidelines are flexible to allow for a variety of approaches to environmental construction. EarthCraft House guidelines address energy efficiency, durability, indoor air quality, resource efficiency, waste management, and water conservation. To achieve EarthCraft House certification, homes must meet ENERGY STAR guidelines. In addition, each house must achieve a minimum of 150 points from a scoring sheet. Select and Premium status are awarded to homes that meet additional criteria and achieve 200 and 230 points, respectively. All EarthCraft certified homes will also be awarded the ENERGY STAR qualification.

For more information, visit EarthCraft House's website at http://www.EarthCrafthouse.com/.

Built Green

Built Green is an environmentally friendly, nonprofit, residential building program of the Master Builders Association (MBA) of King and Snohomish Counties, developed in partnership with King County, Snohomish County, and other agencies in Washington State. Built Green homes are designed to provide homeowners with comfortable, durable, environmentally friendly homes that are cost-effective to own and operate. These resource-efficient homes are crafted to exceed building codes and provide homeowners with years of healthy, quality living, while protecting the precious Northwest environment.

Building and development projects are qualified using one of four Built Green checklists, depending on the type of project (Single-Family New Construction, Renovations, Multifamily, and Community), organized into environmentally friendly action categories. Builders, remodelers, architects and sponsors use the checklists prior to construction to determine which features to include in the home. When construction is complete, builders send a signed copy of the checklist to the MBA, certifying that the home identified in the application contains the identified features. Based on the builder's submission, and after reviewing the application, the MBA will award the appropriate Certificate of Merit indicating that the home has received a 1-, 2-, 3-, 4- or 5-Star rating.

For more information, visit Built Green's website at http://www.builtgreen.net.

Strategies From the Field

Owners and sponsors of Section 202 and Section 811 projects are at a variety of stages when it comes to implementing energy efficiency and green measures into their projects.

- **New Construction.** Beginning with the 2010 NOFA, sponsors and owners must ensure that low-rise multifamily developments (up to three stories) meet or exceed the requirements of EPA's ENERGY STAR qualified homes. Projects funded prior to the 2010 NOFA were required to meet the 2006 IECC. For mid-rise and high-rise multifamily developments (four or more stories), sponsors must continue to ensure projects meet or exceed the ASHRAE 90.1-2007 Appendix G Plus 15% Standard for Energy Efficiency. All multifamily developments are required to install ENERGY STAR-labeled appliances and WaterSense-labeled fixtures beginning with the 2010 NOFA. Some sponsors have chosen to go well beyond these standards, and a few have even made the business decision only to build projects that achieve a recognized green building standard, such as the Enterprise Green Communities Criteria or LEED for Homes/LEED for New Construction.
- **Existing Housing.** Beginning with the 2010 NOFA, sponsors and owners must install ENERGY STAR-labeled appliances, perform pre- and post-construction energy audits, and incorporate conservation techniques in their projects. No energy efficiency requirements were previously imposed on owners of existing Section 202 or Section 811 projects. Prior to the 2010 NOFA, some owners of existing projects had not begun to consider implementing energy efficiency and green features into the rehabilitation or maintenance of their projects. Others are considering adding these components but are unsure how to get started and need guidance and support. Still others have begun incorporating energy efficiency and green features into their rehabilitation and maintenance activities.

The remainder of this section summarizes key strategies employed by five sponsors/owners of Section 202 and Section 811 projects to implement energy efficiency and green building techniques in their portfolios. Case studies describing their experiences are provided in section III.

All five organizations agreed that energy efficiency measures benefit the property and the program. Although the amount of time it took to earn back the cost of the investments vary by the type of measures taken, the owners found that energy efficiency measures do pay for themselves—in general, within a few years. In addition, energy efficiency measures help strengthen the financial position of the property by reducing the growth in utility costs, and they benefit the program by lowering the operating subsidy needed compared to similar projects without these features.

Strategy 1. Analyze the Data

A. New Construction or Substantial Rehabilitation: Energy Modeling

Sponsors and owners involved in new construction or substantial (gut) rehabilitation can use energy modeling to determine what energy efficiency features to incorporate in their new construction projects. Energy modeling uses computer-based tools to predict energy use over the course of a year for a base design, and to compare that

figure with predicted usage given different energy-saving design features. Modeling inputs usually include factors such as building location, envelope, systems, loads, and schedules. A skilled energy modeler can work with a project team to provide input from the model throughout the design process. The project team can use the resulting data to identify which energy efficiency measures have the most potential to reduce costs associated with energy usage, and to determine whether the savings in utility costs would justify the required capital expenditures. Some certification programs encourage the use of energy modeling. For example, LEED requires the use of energy modeling to receive points in the Energy and Atmosphere category.

B. Existing Housing: Energy Audits

In contrast with energy modeling, which is typically used for new construction, energy audits are used to evaluate the projected effects of rehabilitation activities. Energy audits assess how much energy is actually being used in an existing building and evaluates what measures can be taken to improve efficiency. The property manager, a professional energy auditor, or an engineer can conduct an energy audit. It is meant to identify areas of the building where energy may be lost or used inefficiently and to propose specific improvements. Thorough energy audits often use equipment such as blower doors, which measure the extent of leaks in the building envelope, and infrared cameras, which reveal hard-to-detect areas of air infiltration and missing insulation. Basing his or her analysis on this information, the energy auditor or engineer estimates energy usage changes and utility cost savings using different rehabilitation scenarios. This information helps owners prioritize which energy efficiency measures to implement immediately and which to implement over time, if it is not feasible to make all improvements at once.

Local utilities sometimes offer free or discounted energy audits to their customers. Alternatively, property owners can hire a certified Home Energy Rater to evaluate the property's energy efficiency. The ENERGY STAR website has a searchable database of certified Home Energy Raters.[10]

The sponsors and owners interviewed for this report indicated that the costs of conducting an energy audit and implementing the energy efficiency upgrades identified generally pay for themselves quickly through the energy savings realized.

C. Existing Housing: Energy Benchmarking

Energy benchmarking uses an online database to facilitate energy accounting and compare an existing property's energy use with other projects that have similar characteristics. Comparisons may be done either within a portfolio or with other projects across the country. Benchmarking tools typically enable owners to assess opportunities for improvement, as well as to quantify and verify energy savings. A variety of benchmarking tools is available, including HUD's PIH Benchmarking Tool and EPA's ENERGY STAR Portfolio Manager. For many of these tools, users enter basic information about their projects and utility accounts. The tool then tracks monthly energy consumption and charts the property's performance to identify areas of poor performance.

Sample Benchmarking Tools

- **HUD's PIH Energy Benchmarking Tool**
  A free Excel-based tool to compare utility usage against use in a typical HUD property. Located on HUD's website: http://www.hud.gov/offices/pih/programs/ph/phecc/econserve.cfm.
- **ENERGY STAR Portfolio Manager**
  A free interactive energy management tool that enables property owners to measure and track energy and water usage, identify investment priorities, and verify improvements over time. Located on ENERGY STAR's website: https://www.energystar.gov/istar/pmpam/

Benchmarking tools enable property owners and managers to make informed decisions about measures that will have the greatest effect on energy efficiency and costs. If owners continue to track utility performance after making the energy efficiency improvements, it will help them identify opportunities for savings in their operations, and assess the actual savings achieved.

D. Existing Housing: Utility Bill Management

Owners can reduce utility costs substantially by reviewing and managing utility bills carefully. Although owners can conduct such analyses themselves, those with larger portfolios often find it cost-effective to use a utility management company to centralize billing and run reports across an entire portfolio. In this approach, all utility bills are sent to a central location for data processing, where information on consumption, late fees, tariffs, and rates is extracted into a database. This type of centralized system allows for streamlined payments, invoice auditing, and rate analysis. Savings are generated by identifying inappropriate rates, meter inaccuracies, probable water leaks, and meter-reading errors, as well as ensuring timely payments and reducing late fee expenses. Owners have found that the savings realized from utility bill

10 ENERGY STAR's database of certified Home Energy Raters is available at http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.locator.

management and review can easily pay for the costs of data management and analysis. This information also can be used to assess the effectiveness of energy conservation efforts by providing baseline data and information about consumption after energy efficiency measures are put into place.

Strategy 2. Choose an Implementation Approach

Property owners and sponsors take a variety of approaches to incorporating energy efficiency and green building into their housing portfolios. Preferred approaches are selected based on factors such as the nature of the portfolio, level of experience, and organizational preferences. Those interviewed followed three different approaches.

A. Component-by-Component Approach

Sponsors and owners can take a component-by-component approach to incorporating energy efficiency and green features into their existing Section 202 and Section 811 housing. This approach involves identifying the areas of greatest opportunity for cost savings not only for each property, but also for the portfolio as a whole. An example would be a lighting retrofit in which energy-efficient lighting is installed in all common areas and units. That approach can be refined even further by using energy consumption data to determine which units are most in need of greater efficiency. Decisions about what components to address are determined by estimating the cost and potential annual savings of implementing various possible energy efficiency measures. Taking a component-by-component approach across a portfolio can reduce costs by taking advantage of efficiencies in planning, purchasing, and installing energy efficiency features.

B. Project-by-Project Approach

Sponsors and owners may choose to take a project-by-project approach for new construction or rehabilitation of Section 202 and Section 811 projects. This approach involves examining the specific needs of each property through energy auditing, modeling, or benchmarking and then addressing that property's specific needs. Owners with multiple projects may choose very different upgrades for different projects, depending on individual circumstances. For rehabilitation, owners may consider identifying possible energy efficiency measures and then prioritizing them for each project. Having a short- and long-term plan for implementing energy efficiency can be an effective way to start achieving utility savings immediately while reducing the amount needed for funding today. For new construction, sponsors have the option of using energy modeling and selecting those upgrades that can be financed, given the development cost limits and other funding sources available.

C. One Energy Efficiency or Green Building Standard Across the Portfolio

Sponsors and owners may choose to follow one energy efficiency or green building standard for their entire portfolio. For example, an owner may determine that all appliance replacements in existing projects will be ENERGY STAR qualified, or a developer may decide that future new construction projects will be LEED certified. This approach enables the organization to become experts on the process, requirements, and timelines that are unique to a particular certification program. This can save the organization time and money. In this scenario, owners do not have to select individual energy conservation measures, but may instead implement a given suite of measures as required by the chosen standard. However, other standards, such as LEED, allow the owner to select those measures that make most sense in the context of a particular project. For these types of programs, pursuit of certification particular set of standards would be mixed with a project-by-project analysis of the most sensible steps to take for the project in question.

Strategy 3. Select an Energy Efficiency or Green Building Standard

Sponsors and owners have a range of certification programs to choose from if they decide to use one. When selecting a certification program, sponsors and owners often consider how it fits with their organization's philosophy, whether they have the financial resources needed, and whether they have the level of staff experience required to build the project to the certification standards.

Energy Efficiency and Green Building Standards Recognized in the 2011 NOFA

National
- EPA's Indoor airPLUS
- ENERGY STAR Qualified Homes
- Enterprise Green Communities Criteria
- LEED New Construction
- National Association of Home Builders (NAHB) Green Building Guidelines

Regional/Local
- Built Green
- EarthCraft
- State and local certification programs

See the appendix for more information about each program.

Organizations will want to examine the costs and benefits for the certification program they are considering. When determining the costs, organizations may want to consider not only the capital investment required, but also the amount of staff time needed to plan and oversee implementation of the required steps to

achieve certification. These costs should be weighed against potential utility savings, as well as less easily quantified benefits such as improved indoor air quality, tenant comfort and health, improved marketability of the property, and environmental benefits. After a cost-benefit analysis is completed, the organization can select an appropriate certification program.

Having someone familiar with the certification program's requirements on the project team makes the implementation process easier. The project team will need to understand the certification process for the program, including application submission and certification timelines and requirements. Some certification programs, such as LEED New Construction, have requirements for subcontractors and vendors. Getting team members with energy efficiency and green expertise involved in the project from the very beginning can greatly enhance the ease with which these features are integrated into the project.

Many of the certification programs have a verification process, either third-party verification or self-verification, to ensure that the property meets the required green building and performance measures. Project managers will need to ensure that the construction team follows the program requirements so certification can be achieved and savings can be realized.

Some of the certification programs have resources, such as guidance, tools, or technical assistance, available to help sponsors and owners implement their certification programs. See the appendix for more information about available resources.

Strategy 4. Leverage Additional Funding

To finance energy efficiency and green building measures, sponsors and owners may need to leverage additional funding from sources other than Section 202 or Section 811. If a gap analysis identifies a discrepancy between the development costs and available funding sources, additional funding will be needed to close the gap. Potential funding sources available for leveraging with Section 202 and Section 811 are discussed in detail in section IV. Exhibit 7 summarizes the kinds of sources that may provide needed financing for new construction or rehabilitation activities.

Each funding source has different requirements, restrictions, and timing for applying and using funds. Sponsors and owners will need to become familiar with these rules. Obtaining additional funding from other sources can add to the development time of the project and the level of effort needed for reporting. If an organization has experience combining Section 202 or Section 811 funds with other funding sources, it may save the project time and money.

Strategy 5. Educate Occupants and Influence Their Behavior

Utility costs are not only affected by the efficiency of the construction, fixtures, and appliances in a home but also by the behavior of the occupants and those who maintain the home. It is important for tenants, maintenance staff, property managers, and owners to understand the role that people play in reducing energy consumption.

Common Tenant Behaviors Affecting Energy Consumption

- Blocking heat system due to possessions in front of vents or dust in systems.
- Using hot water unnecessarily.
- Having thermostats too high or too low.
- Being unfamiliar with how to properly use the thermostat or heating system.
- Leaving lights on when no one is in the room.
- Having air conditioners or heating on when windows are open or occupants are away.

Tenant behavior change is crucial for effective utility management. Some tenants may be unaware of ways in which their habits can conserve energy or of the benefits associated with greater residential energy efficiency, such as greater comfort and better indoor air quality. Others may not be familiar with how to properly use some of the energy-efficient features of the appliances and fixtures in their home. In addition, tenants may not report maintenance problems that affect energy use.

Exhibit 7. **Summary of Potential Funding Sources**

New Construction	Rehabilitation
Federal: Low-Income Housing Tax Credit Program (LIHTC), Community Development Block Grant (CDBG), HOME Investment Partnerships Program, Energy Efficiency and Conservation Block Grant (EECBG), State Energy Program (SEP)	**Federal:** Community Development Block Grant (CDBG), HOME Investment Partnerships Program, Weatherization Assistance Program (WAP), Energy Efficiency and Conservation Block Grant (EECBG), State Energy Program (SEP)
Nonprofit and Foundation: Enterprise Community Loan Fund, LEED Affordable Housing Grant Program, LEED Affordable Green Neighborhoods Grant Program	**Nonprofit and Foundation:** Enterprise Community Green Mini Loans, LEED Affordable Green Neighborhoods Grant Program
Private: Utility Incentive Programs	**Private:** Utility Incentive Programs

Moreover, because in many cases tenant payments are not affected by their energy usage, there may be no financial incentive to reduce utility use. For all these reasons, tenant education is an important component of changing any of these types of behaviors.

Property managers and maintenance staff also can greatly influence energy consumption through system and equipment maintenance and in making decisions about when and how to make replacements and address defects. Property managers have a role in ensuring that tenants are well informed about efficient energy usage through education, signs, labels, or guides. In addition, property managers can help identify high-use areas or units and take appropriate corrective action.

Owners also have the option of installing energy management systems (EMSs) to help automate management of energy use. Typical features of EMSs include motion detectors to set the thermostat back when no one is present, window sensors to shut off heating/cooling when windows are open, and real-time price signals that adjust the thermostat based on the price of energy. EMSs are easily implemented in projects that use packaged terminal air conditioners (PTACs) to control the climate in individual units, but their use is more difficult in projects with centralized HVAC systems. If projects have EMSs, tenants will need guidance on how they work.

III. MAKING ENERGY EFFICIENCY, WATER CONSERVATION, AND SUSTAINABILITY WORK IN SECTION 202 AND SECTION 811 PROJECTS: FIVE CASE STUDIES

This section presents case studies of the following five organizations that are actively involved in increasing the use of energy efficiency, water conservation, and green building features in Section 202 or Section 811 developments.

Hudson Companies**,** a developer of Section 202 projects in Pennsylvania and Ohio.

- ***National Church Residences,*** a nonprofit owner and developer of Section 202 projects across the United States.
- ***New Ecology, Inc.,*** a nonprofit energy efficiency and green building technical advisory group that assists Section 202 sponsors and owners.
- ***Nuestra Comunidad Development Corporation,*** a nonprofit developer of a Section 202 property in the Boston area.
- ***REACH Community Development,*** a nonprofit developer of Section 202 and Section 811 projects in the Portland, Oregon area.

The experiences of these five organizations offer a window into the variety of approaches that sponsors and owners have used to incorporate green and energy-efficient features to Section 202 and Section 811 housing. Some have focused on new construction, while others have worked with existing Section 202 or Section 811 units. Some have large subsidized housing portfolios, while others are relative newcomers. Some specialize in energy efficiency and green building, while others are just finding their way to incorporating such features. But, despite their differences, all have succeeded in incorporating energy efficiency and green features in the design, construction, and/or operation of Section 202 or Section 811 housing units.

This section highlights key elements of each organization's efforts to implement energy-efficient and green housing strategies. The specific situations faced by other sponsors and owners will be different in their details; however, the fundamental challenges these organizations have confronted—and successfully overcome—are the same as the challenges that many other organizations across the country face. The highlights presented here demonstrate that, with commitment and creativity, sponsors and owners can, indeed, build and maintain efficient and green Section 202 and Section 811 housing.

A. Combining Energy Efficiency and Green Building Features in Section 202 New Construction Projects: The Hudson Companies

Located in Hermitage, Pennsylvania, the Hudson Companies is a multitiered operation consisting of general construction, real estate development, and property acquisition and management. Their portfolio covers a range of projects including commercial, medical, institutional, governmental, and multifamily residential projects. Most of their work is focused in Pennsylvania and Ohio, with other holdings in Texas. The Hudson Companies has decided that incorporating features that increase the sustainability of their buildings will help advance their business goals and strengthen their position in the marketplace. As part of this choice, they are committed to incorporating energy efficiency and green building features into all the multifamily projects that they develop, including their Section 202 projects.

Their Section 202 projects are located in western and eastern Pennsylvania, with approximately 13 Section 202 projects completed or under development. The projects range in size from 1 to 3 stories and from 12 to 40 units. Of the 13 Section 202 projects, 3 are being developed with the projected goal of achieving Leadership in Energy and Environmental Design (LEED) Silver certification from the U.S. Green Building Council.

Hudson Companies' first LEED Project under construction in North East, PA.

The Hudson Companies is currently working on three Section 202 new construction projects located in North East, Erie County; Hopewell Township, Beaver County; and Hempfield Township in Mercer County, Pennsylvania. Key partners involved in the development of these projects include the architectural firm of John N. Gruitza & Associates, the engineering firm of McIlvried, DiDiano & Mox, LLC, and the Community Action Partnership of Mercer County who serves as the sponsor agency for the projects.

Strategies for Combining Energy Efficiency and Green Building Features

The Hudson Companies has used two strategies for combining energy efficiency and green building features into their Section 202 projects. For its new construction projects, the Hudson Companies works with a consultant to develop an energy model that informs decisions regarding building design features related to energy efficiency. It also uses LEED standards to implement building design and construction that are both energy efficient and provide other "green" benefits to the environment and future tenants.

Strategy 1. Use Energy Modeling for New Buildings

Energy modeling helps identify which energy efficiency features will yield the most cost savings for a given property design. The Hudson Companies hired a consultant with demonstrated experience in energy modeling and green building practices. The consultant developed an energy model based on blueprints of its "traditional" building envelope, design, and mechanical systems. Senior project staff and the architect used the results of this energy model to identify which measures had the most potential to reduce costs associated with energy usage. Prior to finalizing the design, the Hudson Companies used the energy model results to identify needed improvements to the HVAC systems, windows, building envelope, plumbing, lighting, and other water efficiency measures and upgrades, as well as the addition of motion sensors, as the measures with the most energy cost savings potential. This final energy model for the project served as the blueprint to finalize design and proceed with construction toward achieving the intended energy efficiency and LEED certification.

The Hudson Companies found that energy modeling cost them about $10,000 to $15,000 per project and has submitted a request to HUD to reimburse these expenses because this investment is expected to pay for itself easily within 12 to 24 months through reduced utility costs compared to a similar building without these energy efficiency features. The Hudson Companies and the project sponsor/owner will be tracking actual costs going forward. They will use energy modeling combined with actual performance data to select the energy efficiency features for future projects.

Strategy 2. Obtain Leadership in Energy and Environmental Design (LEED) Certification

The Hudson Companies made the business decision that they will incorporate green building designs, as well as energy efficiency features into their future projects. The company's leaders selected the LEED Green Building Rating System from among several possible approaches as the best way to address the company's business objectives, including increased energy efficiency and resource conservation. They valued LEED's comprehensive approach to energy efficiency, as well as its emphasis on "green building" features that provide healthier housing for tenants and reduce the property's impact on the surrounding environment.

Energy Efficiency Features Used by The Hudson Companies

- CFL light bulbs
- ENERGY STAR appliances
- Low-flow faucets
- Tankless water heaters
- Reflective shingles
- R30-rated walls
- R50-rated ceilings
- Occupancy sensors

LEED certification is achieved through points awarded to projects on a 100-point scale, with different thresholds required to achieve Certified, Silver, Gold, or Platinum certification levels. The Hudson Companies used their energy model to identify which of the energy efficiency measures that could be used to earn points toward LEED certification criteria would be most effective for each property. LEED requires ENERGY STAR as part of its Existing Building and Homes rating system. In addition to promoting energy savings, LEED also focuses on improvements to water efficiency, CO^2 emissions reduction, improved indoor environmental/air quality, and stewardship of resources and sensitivity to their impacts.

After reviewing the different levels of LEED certification available, the Hudson Companies chose LEED Silver as the certification that most effectively achieved the company's business objectives and was financially feasible given the anticipated financing for their Section 202 projects.

The LEED application process takes several months and involves project registration (which includes a registration fee), application preparation, application submission, application review, and certification. The Hudson Companies found that it was advisable to register the project early in the design phase. Once a project was registered, they were able to manage the application and documentation process via LEED-Online,[11] portal for submitting applications, uploading supporting files, and coordinating project details with team members. A third-party verification process was used to evaluate applications and inspect final built projects to ensure that they would meet the required green building and performance measures.

Basing their analysis on their experience to date, the Hudson Companies estimates that LEED Silver certification can be achieved at a 10 to 12 percent cost premium over projects with "traditional design." The total energy cost savings at this time has yet to be recorded.

In their early projects when they were gaining experience with the LEED process, the Hudson Companies encountered some challenges in pursuing LEED certification. For example, LEED requires specific documentation and regular submissions over the course of the project. Until staff members understood

Construction completed in Garden Way Apartments.

documentation and recordkeeping requirements, including requirements for subcontractors and vendors, the process took considerably more time and effort than a non-LEED project. Using LEED-Online and working with contractors and personnel who had experience with the LEED process and standards helped facilitate compliance. Also, when it was necessary to work with subcontractors with no LEED experience, explaining the reporting and recordkeeping requirements at the pre-construction conference, and providing examples of the types of documentation and records required helped the process go more smoothly. In addition, the Hudson Companies found that some LEED activities required earning non-energy efficiency points, such as using local materials and environmentally sound waste management facilities, posed a particular challenge and added costs to the project. Finding local suppliers and service facilities for these activities was important for establishing more efficient operations as well as achieving projected LEED credits in the applicable areas.

Looking Ahead

The Hudson Companies has been successful in incorporating energy efficiency measures by using a formal energy model and LEED certification program together and will continue to use this approach in future project development. They plan to maintain current sponsor relationships, as well as develop relationships with new sponsor agencies, in order to continue to collect data on utility costs to evaluate the effect of their energy efficiency investments and determine which have the greatest effect on cost savings. These lessons will also inform the future design and construction of LEED projects.

11 LEED-Online is available at https://leedonline.usgbc.org/Login.aspx.

Lessons Learned

- **Energy efficiency features can pay for themselves and benefit the property and the program.** Although payback periods vary by the type of features installed, the Hudson Companies found that energy efficiency features that they incorporated were financially feasible, will pay for themselves, strengthen the financial position of the property by controlling the growth in utility costs, and benefit the program by lowering the operating subsidy needed compared to a similar property without these features.
- **For new construction projects, energy modeling and performance data from existing buildings can help with the selection of the most cost-effective features for a planned building.** Energy modeling enables sponsors and architects to select the energy efficiency features that are most cost-effective. Over time, sponsors also can incorporate lessons learned from data on the actual performance of their buildings, and others of similar design and location.
- **Sponsors should plan for extra time and expertise while gaining experience with LEED.** Until a developer has completed several LEED projects, extra time should be incorporated into the project construction schedule, and someone with LEED experience should be included on the project team to help meet the LEED reporting and records requirements.

Useful Resources

- **USGBC LEED:** *http://www.usgbc.org/LEED/*
- **LEED-Online:** *https://leedonline.usgbc.org/Login.aspx*

More Information

For more information, please contact:
Dana Frankenburg
Director of Government Services
The Hudson Companies

E-mail: dfrankenburg@hudsoncompanies.net
Website: http://www.hudsoncompanies.net/

B. Working Smart To Save Energy and Lower Costs When Retrofitting Existing Section 202 Housing: National Church Residences

Established in 1961, National Church Residences (NCR) is a 501(c)(3) nonprofit corporation with 1,500 full time and 850 part time employees. Operating nationally, NCR has projects across the United States and in Puerto Rico. It generates approximately $190 million in revenue annually and holds more than $1 billion in assets. NCR currently owns or manages 304 properties with 21,000 units.

NCR's portfolio of Section 202 projects is diverse, with a mix of low-, mid-, and high-rise building types. The projects range in size from 14 to 202 units per property. In all, its portfolio includes 210 Section 202 projects totaling more than 12,200 residential units. NCR has established an in-house "Energy Team" of three staff tasked with identifying ways to save money and strengthen operations through energy efficiency improvements in its existing projects.

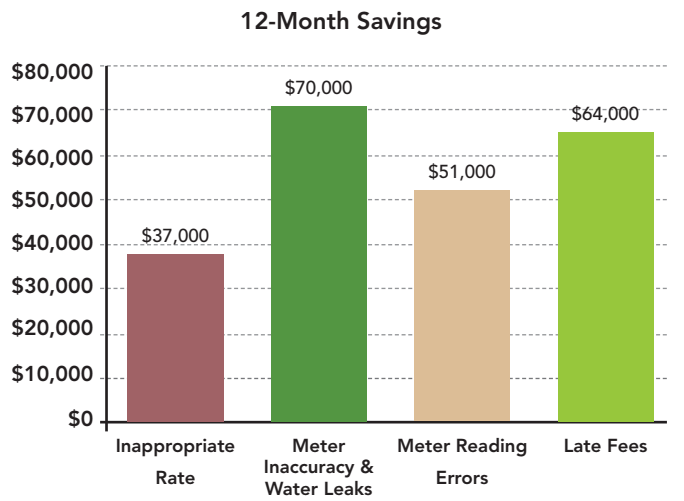
Strategies for Achieving Energy Efficiency and Cost Savings

NCR has used several strategies to enhance the energy efficiency of its Section 202 projects. Applied across its entire portfolio, NCR uses utility data management to create upfront savings and also identify which projects to target for energy efficiency and green upgrades. In some cases applying a component-by-component approach, targeting a specific feature throughout the portfolio, was selected as it was a cost-effective strategy to achieving energy efficiency. Paired with tenant education, energy management systems are currently being piloted in several of NCR's projects as means of reducing consumption. These four strategies complement each other to create an effective approach to energy efficiency in NCR's Section 202 portfolio.

Strategy 1. Utility Data Management

NCR found significant cost savings, even before implementing any energy efficiency measures, by centralizing all utility bills for all of its projects. Currently, NCR works with Advantage IQ, a data services and management provider, to centralize all their utility bills for data processing, where information on consumption, late fees, meter-reading dates, and rates is extracted into a database. The benefits of centralized utility bill processing include streamlined payments, invoice auditing, and rate analysis. These activities generate savings by identifying inappropriate rates, meter inaccuracies, water leaks, and meter-reading errors, as well as ensuring timely payment and reducing late fee expenses. Currently NCR processes 1,200 invoices (electric, gas, and water) for 258 properties as part of utility data management. The total cost of this service is approximately $75,000 annually and generates approximately $220,000 in annual utility savings or achieving a payback period of about 4 months. See Exhibit 8 for a breakdown of savings.

Exhibit 8. **Annual Savings Breakdown**



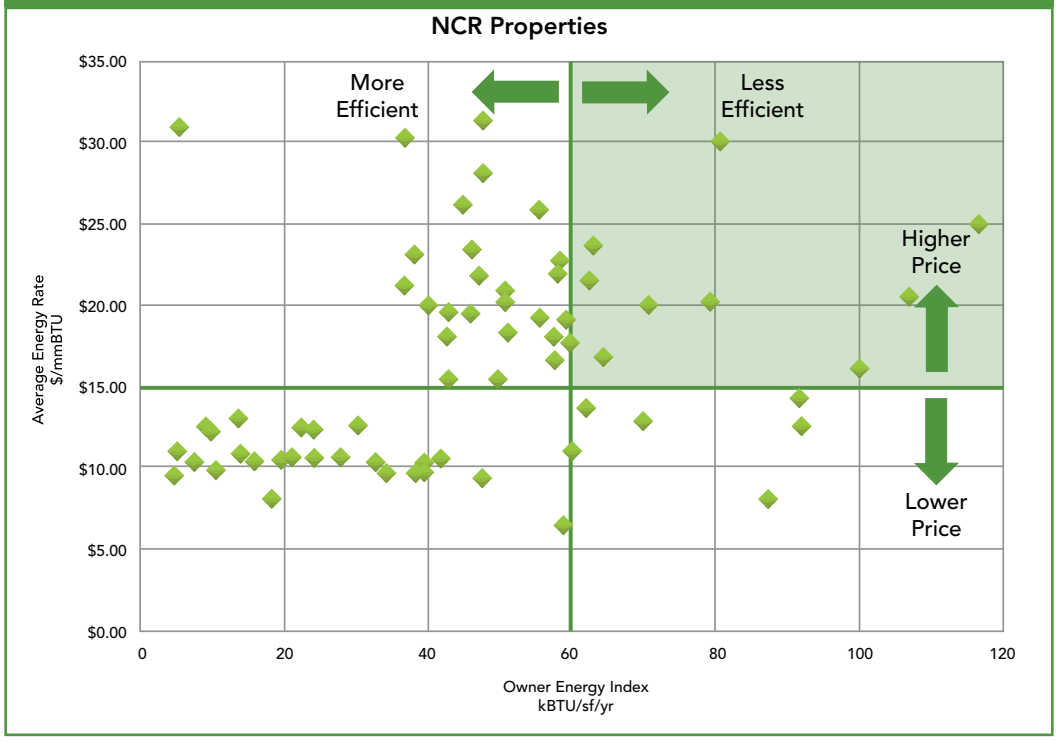
Even more important in the long run, the utility data gathered makes it possible to identify those projects that are most in need of energy retrofits by pinpointing and quantifying the particular improvements that would most likely have a high payoff in future utility savings, and verifying actual results. The annual savings generated by these improvements can be even greater than those gained through identifying and correcting leaks, meter malfunctions, suboptimal selection of billing rates, overcharges, and other problems routinely arising in the relationship between apartment projects and their utility suppliers.

NCR's projects have a variety of metering types for electric and natural gas, as well as HVAC and domestic water heating systems. NCR has created segments for each combination so property energy use can be benchmarked and compared. The benchmarking is typically accomplished by converting electric and natural gas usage to BTUs and dividing it by the total square footage. The higher the BTU/sq ft, the less efficient the property is.

To determine which projects are best to target for energy initiatives, NCR considers both BTU/sq ft as well as cost of energy. Exhibit 9 illustrates benchmarking for NCR's master metered projects in which NCR is responsible for all tenant loads. Each dot represents a property's kBTU/sq ft and $/mmBTU. The projects in shaded quadrant are those that are less efficient and pay a higher price for their energy. NCR is targeting those outliers to determine how best to reduce consumption through energy efficiency upgrades, commodity deals, or renewable energy systems.

After Advantage IQ collects the data, NCR makes it available to Bright Power, a provider of energy efficiency and green buildings solutions for multifamily, commercial, and industrial buildings. Specifically, NCR uses Bright Power's EnergyScoreCards (an

Exhibit 9. **NCR Master Metered Property Benchmark**



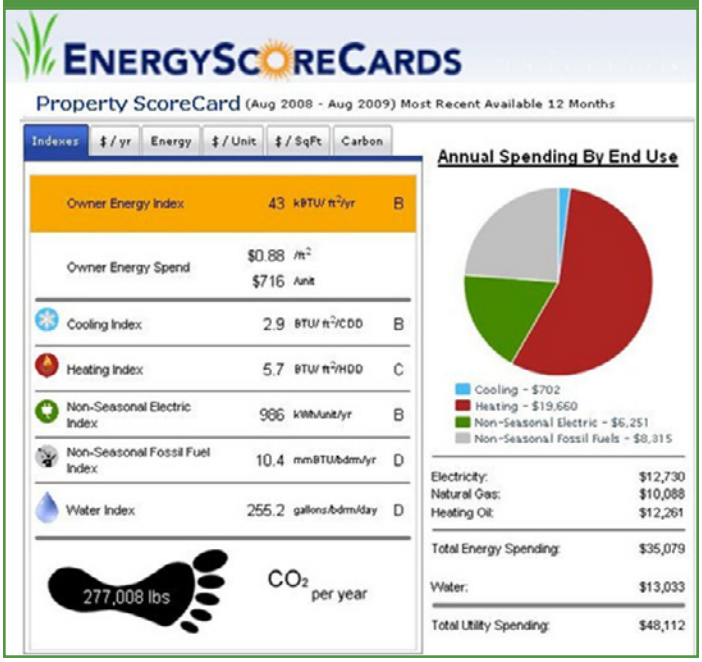
online energy benchmarking and management tool) to create a property scorecard that rates the building's performance. See Exhibit 10 to view a sample property scorecard. Specifically, it uses a complex regression analysis on the property's monthly energy consumption and weather data to break down energy usage by heating, cooling, and other general use. Bright Power uses this information to benchmark and grade the heating, cooling, and general use consumption against other projects. Bright Power was used at no cost to NCR through participation in a pilot program on behalf of Stewards for Affordable Housing for the Future (SAHF).

After NCR benchmarks its projects by segment (refer to Exhibit 9), it uses the property scorecard to help determine which initiatives (for example, heating, cooling, or lighting) are best to pursue for the property. The NCR Energy Team can evaluate outliers across specific loads to determine if measures can be implemented across projects.

Strategy 2. Component-by-Component Approach

NCR achieved a construction cost savings by taking a "component-by-component" approach to energy efficiency. The process began by benchmarking energy and water consumption to identify the greatest opportunities for cost savings, not only for each property, but also for the portfolio as a whole. The Energy Team then considered which measures could be applied

Exhibit 10. **Bright Power Energy Scorecard**



broadly across NCR's portfolio to take advantage of efficiencies in planning, purchasing, and installation. NCR has implemented two initiatives to date: lighting retrofit and water conservation. The Lighting Retrofit Initiative involved installation of ENERGY STAR qualified lighting in both common areas and units at 100 properties and was funded by property reserves. The Water Conservation Initiative involved installing features such as low-flow fixtures, sink aerators, and improved toilet flushing. This initiative was funded by a performance contract in which the provider installed the measures at no upfront cost and was paid out of savings. To date, the Water Conservation Initiative has been implemented in 30 properties, but there are another 30 identified.

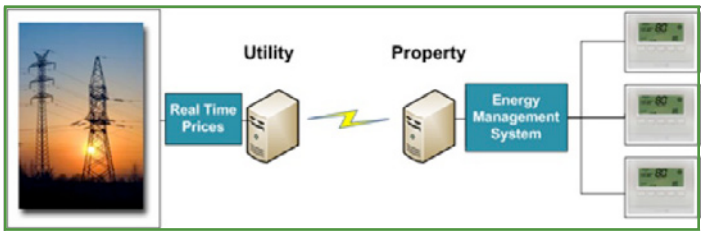
Exhibit 11: **Cost and Annual Savings of NCR's Initiatives**

	Cost	Annual Savings	Average Payback Period
Lighting retrofit initiative	$1.1M	$300,000	3.6 years
Water conservation initiative	$183,000 per property	$213,000 per property	10 months

Strategy 3. Energy Management Systems

NCR hopes to reduce "wasted" energy and costs by installing energy management systems (EMSs). NCR is currently using three pilot projects to test a variety of approaches to energy management. Some of the techniques being tested include motion detectors that set the thermostat back when no one is present, window sensors that shut off heating/cooling when open, and real-time price signals that adjust the thermostat based on the price of energy.

Tenant comfort is ensured by setting temperature thresholds within reasonable ranges and ensuring that individual unit thresholds can be adjusted based on particular tenant needs. Since these projects are still in development, NCR plans to monitor and manage tenant responses over time.



At a cost of $500 per unit to install the EMSs, NCR expects this to be a very cost-effective measure.[12] It projects the cost savings to be $80 per unit annually, with a payback period of 6.3 years. The EMSs in two of the three pilot projects were funded by the U.S. Department of Housing and Urban Development's (HUD) Green Retrofit Program (GRP), an American Recovery and Reinvestment Act (ARRA) funded program that provided $250 million in loans and grants for energy and green retrofits in the multifamily assisted housing stock. The other project is being funded as part of a tax credit conversion.

Strategy 4. Tenant Training

NCR has developed a brochure to help educate tenants on how to reduce their energy consumption. The NCR brochure is part of their campaign to Live SMART (Save Money And Resources Together), and is given to tenants as part of their formal leasing (new or renewal). The brochure contains energy saving and water conservation tips.

Looking Ahead

NCR plans to continue using utility data management to benchmark, track, and compare projects' energy usage and to target energy efficiency initiatives. As of this writing, the first of its pilot projects involving an energy management system was expected to have been completed in January 2011.

Lessons Learned

- **Utility bill management can generate significant savings.** Annual or ongoing review of utility bills can be labor intensive but is well worth the time it takes because of the savings that it can generate. Owners with larger portfolios may want to consider using a utility management company that can centralize billing and run reports across an entire portfolio.
- **Applying energy efficiency measures across a portfolio can reduce implementation costs.** Identifying which energy efficiency measures are appropriate for application to projects across a portfolio can reduce costs by achieving economies of scale.
- **Energy efficiency involves human behavior and choices.** Although upgrading with energy-efficient features and improving mechanical systems can make significant improvements to energy efficiency, human behavior can also have a big effect. To achieve optimal results, property managers and tenants must be educated about the importance of energy efficiency and the proper way to use specific features.

12 Energy management systems are most appropriate and easily implemented in projects that use Packaged Terminal Air Conditioners (PTACs) to control the climate in individual units, as opposed to centralized HVAC systems.

Useful Resources

- **Advantage IQ:** *http://www.advantageiq.com/*
- **Bright Power:** *http://www.brightpower.biz/*
- **EnergyScoreCards:** *http://www.energyscorecards.com/*
- **HUD's Green Retrofit Program:** *http://portal.hud.gov/portal/page/portal/HUD/recovery/programs/green*

More Information

For more information, please contact:
Steve Bodkin
Vice President of Engineering, Energy, and Procurement Services
National Church Residences

E-mail: sbodkin@ncr.org
Website: *http://www.ncr.org*

C. Analyzing Energy Usage Before Implementing Energy Savings Strategies in New and Existing Section 202 Housing: New Ecology

New Ecology, Inc. (NEI) is a nonprofit corporation that provides energy efficiency, green building and other consulting services to community-based organizations to promote sustainable development that supports economic, environmental, and social benefits. With an in-house staff of 11, they provide a variety of consulting services related to sustainable development, education, and training on new construction and existing projects. Most of their work is focused in the Northeast region of the United States, where energy costs are relatively high.

Over the last 6 years, NEI has helped owners and sponsors assess the potential for including improved energy efficiency and green building features in approximately 70 projects. Of these, 10 were low-rise and mid-rise Section 202 projects—4 new construction and 6 retrofit.

Solar array on a Section 202 property in Somerville, MA.

Strategies for Increasing Energy Efficiency in Existing Projects and New Construction

NEI has used different strategies to help owners and sponsors implement energy efficiency and green building features in existing and new construction Section 202 projects. For existing projects, a front-end utility analysis and energy audit helps NEI understand energy usage, benchmark projects, target underperformers, and identify which energy efficiency and green measures to undertake. For new construction projects, NEI selects appropriate green building and energy efficiency certification programs to guide building design and construction.

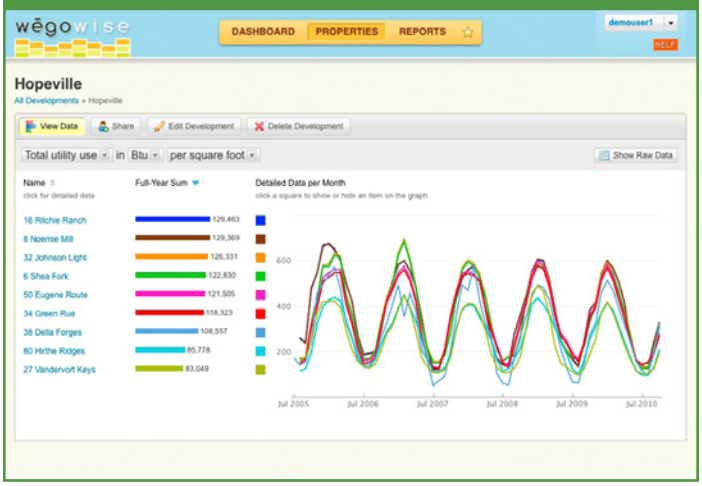
Strategy 1. For Existing Projects, Gather Information by Conducting a Front-End Utility Analysis and an Energy Audit

For existing projects, NEI first conducts a front-end utility analysis to assess current utility usage and costs. WegoWise is NEI's online benchmarking tool for monitoring and analyzing energy use in existing multifamily and single-family housing. It enables building owners and managers to compare their existing building's energy use with usage in other similar buildings. Users enter basic information about their building and its utility accounts into the tool. The tool then automatically downloads current energy usage information directly from the building's utility company, enabling the user to analyze these data and see trends in the property's energy usage. It generates a score to rate the property's energy efficiency, which makes it easy to compare the performance of projects with similar characteristics, both within a portfolio and with projects across the country. Users can generate customized reports to identify which projects are underperforming and flag specific problem areas, such as heating or water. See Exhibit 12 for a graphic depiction of WegoWise's customized report. The base cost is a modest $60 per building per year. A single Section 202 building with one or two electric meters, one or two gas meters, and a single water meter would pay only $60 per year. Buildings with individual unit meters would incur an additional cost of $1 per meter per month.

When the front-end analysis indicates that an existing project is underperforming, NEI follows up with an energy audit of the project to help the building owners make a decision about cost-effective approaches for increasing energy efficiency. Working with a qualified engineer, NEI evaluates the building envelope and mechanical systems to identify weaknesses and propose specific improvements. The engineer provides a preliminary estimate of anticipated changes in energy usage and utility cost savings to help owners prioritize which energy efficiency measures to implement immediately, and which to implement over time if it is not feasible to make all improvements at once. In NEI's experience, energy audits cost from $2,500 to $5,000 per building and can achieve a 20-30 percent reduction in energy usage after implementing energy efficiency measures. NEI has found that the cost savings realized from these efforts are sufficient to offset the combined costs of the front-end utility analysis, the energy audit, and the costs of energy efficiency upgrades over the life of the energy conservation measure. Further, if owners continue to track consumption using the benchmarking tool, information about trends over time can help identify subsequent changes in building operations that can point to opportunities for further savings.

Exhibit 12a. **Sample Detail and Summary View Produced by WegoWise**

Exhibit 12b. **Sample Detail and Summary View Produced by WegoWise**



Strategy 2, For New Construction or Substantial Rehabilitation, Select From Available Energy Efficiency and Green Building Standards

For new construction and substantial rehabilitation[13] projects, NEI helps sponsors and owners analyze their options for following various types of energy efficiency and green building standards. These typically include ENERGY STAR, Enterprise Green Communities, or LEED certifications. Both Enterprise Green Communities and LEED align with ENERGY STAR guidelines for the energy efficiency components of their respective green certification programs. The choice of which standard to follow (if any) typically depends on a range of factors. First, the approach must fit with the owner/developer's philosophy, be financially achievable, and be appropriate for the particular property under consideration. In addition, owners may consider benefits beyond utility savings such as improved indoor air quality, tenant comfort, and improved marketability of the property. Finally, if additional non-Section 202 or Section 811 resources such as local rebate and grant programs are used to finance proposed improvements, those other funding sources may impose specific requirements. Careful consideration of all these factors will help identify the appropriate certification for an owner to pursue for a given property.

Looking Ahead

NEI has helped owners and sponsors of 10 Section 202 projects effectively incorporate energy efficiency and green features into their projects. NEI is now using this experience to help others apply information gleaned from front-end utility analyses and energy audits, and to select and apply appropriate energy efficiency and green building standards. NEI intends to continue helping affordable housing owners and sponsors design and implement realistic energy efficiency and green building strategies.

Lessons Learned

- **For existing buildings, utility usage and costs help inform decisions about cost-effective improvements for existing buildings and identify savings from operations.** The information from a benchmarking analysis helps owners of existing building select the improvements that will yield the greatest utility savings for a given investment. Continuing to track utility performance over time helps identify additional opportunities for savings.

13 Gut rehabilitation refers to the renovation of a property, down to the shell, with the replacement of all HVAC and electrical components.

- **For new construction and gut rehabilitation projects, the type of energy efficiency or green building standard to be followed must be tailored based on property conditions, the business objectives for the property, and available resources.** For some projects, simply focusing on opportunities to increase a building's energy efficiency is the prudent strategy. For others, incorporating energy efficiency improvements and other green building features that achieve a higher standard, such as Enterprise Green Communities or LEED certification, can be done cost-effectively. The appropriate strategy will be one that enables the owner to access additional funding, and achieves other business objectives such as improving the marketability of the property.

Useful Resources

- **WegoWise:** *http://wegowise.com*
- **ENERGY STAR:** *http://www.energystar.gov/*
- **Enterprise Green Communities:** *http://www.greencommunitiesonline.org*
- **LEED:** *http://www.usgbc.org/LEED/*

More Information

For more information, please contact:
Edward Connelly
President
New Ecology, Inc.

Phone: 617–557–1700, ext. 22
E-mail: connelly@newecology.org
Website: *http://newecology.org*

D. Combining Funding Sources and Educating Property Management Staff for New Construction Section 202 Housing: Nuestra CDC

In operation since 1981, Nuestra Comunidad Development Corporation (CDC) is committed to promoting initiatives that support improvement to the physical, social, and economic health of underserved communities in greater Boston. Currently, they provide services related to real estate development, homeownership, community organizing, and tenant support. To date, Nuestra CDC has developed or preserved more than 600 affordable rental units and 132 affordable homeowner units.

With Section 202 funds, Nuestra CDC is in the pre-development and design stages of Quincy Commons, a 40-unit property with one-bedroom apartments in the Roxbury neighborhood of Boston. Quincy Commons will be a new construction mixed-use development that includes 5,807 square feet of retail at the ground level. Nuestra CDC has decided to incorporate green building features into their Section 202 units as a part of their larger strategy to make all their projects more energy efficient and reduce their impacts on the surrounding environment.

Rendering of Quincy Commons showing green roof and solar panel elements.

Strategies for Selecting, Funding, and Maintaining Green Upgrades

Nuestra CDC is using a number of strategies to make Quincy Commons "green." Using the Enterprise Green Communities Criteria and energy modeling to guide their decisions, Nuestra CDC has been creative in leveraging multiple funding sources to pay for pre-development costs. Looking to the future, they expect to combine funding sources for implementation of the green features and will be educating tenants, property managers, and maintenance staff to ensure that all features are being used and maintained properly so that cost savings are optimized.

Strategy 1. Enterprise Green Communities Criteria and Energy Modeling

Nuestra CDC relied on the Enterprise Green Communities Criteria (Green Criteria) when it designed Quincy Commons to be both green and affordable. Using the Green Criteria helped Nuestra CDC to identify and prioritize its green goals for Quincy Commons, while still ensuring affordability.

The Enterprise Green Communities Criteria is the first national green building program developed for affordable housing, and is purposely aligned with Leadership in Energy and Environmental Design (LEED) for Homes. Projects are scored in the following areas: integrated design; site, location and neighborhood fabric; site improvements; water conservation; energy efficiency; materials beneficial to the environment; healthy environment; and operations and maintenance. Similar to LEED, certain criteria in the Green Criteria are mandatory while others are optional, with varying thresholds for the number of points required for certification depending on the type of project.

Nuestra CDC found using the Green Criteria to plan Quincy Commons to be a smooth, streamlined process that effectively enabled it to achieve a green design. Since the Green Criteria are aligned with LEED, Nuestra CDC expects that the development will be equivalent to LEED Gold. Nuestra CDC was awarded a $50,000 Enterprise Green Communities grant for pre-development costs related to greening the design, including hiring a green design specialist, architects, and other consultants.

Green Features in Quincy Commons

- ENERGY STAR appliances
- Green roof by LiveRoof (http://www.liveroof.com)
- Water recycling and reuse system
- Solar panels

Nuestra also used a green design consultant to conduct energy modeling and prepare a cost-benefit analysis that was used to identify cost-effective opportunities for energy efficiency upgrades. By determining anticipated costs, savings, and payback periods, the energy modeling helped Nuestra CDC select the green features to include in the design, plan future operating budgets, and anticipate changes to costs over time.

In thinking about which energy efficiency measures to incorporate now and in the future, Nuestra CDC focused on the total life cycle payback of a feature. Since the building is expected to be in operation for 60+ years, these energy efficiency upgrades are considered a long-term investment. How quickly the features will pay for themselves through energy savings was not viewed as an essential consideration.

Quincy Commons will have a green roof by LiveRoof (www.liveroof.com) which eliminates air gaps between modules to prevent warm or cool air from escaping from the building below.

Strategy 2. Combining Funding Sources

Overall, Nuestra CDC estimates the additional design costs of "going green" in this project to be about $100,000 to $150,000 out of a total design cost of $750,000. Nuestra leveraged a number of funding sources to cover these costs, including their Enterprise Green Communities grant. Tapping into their network of partners, Nuestra CDC also won grants from the Farnsworth Trust and NeighborWorks America for pre-development costs, as well as a grant from the U.S. Department of Health and Human Services Office of Community Services to pay for the cost of hiring an architect. Remaining pre-development costs were financed through a loan. By leveraging funding sources beyond Section 202 funds, Nuestra expects to be able to achieve a greater impact in terms of energy efficiency and "greening" the property than if it had relied only on Section 202 funds.

Strategy 3. Educating Property Managers and Maintenance Staff

Nuestra CDC recognizes the important role of the property managers and maintenance staff in achieving energy efficiency improvements when Quincy Commons is in operation. Projected savings could be lost if staff are not familiar with the requirements for effectively maintaining and operating energy-efficient equipment such as the green roof or the solar panels. To maximize the effectiveness of the energy-efficient equipment, Nuestra CDC will train staff on proper operation, maintenance, and repair protocols. They will also set up an internal check system to ensure that scheduled maintenance is carried out as needed.

Property managers and maintenance staff will also play a role in educating tenants at planned tenant meetings and on a daily basis, answering any questions that they might have. Staff will help tenants gain a better understanding of why the features were implemented, how they work, and how they affect the tenants. Education about the property's green design is expected to raise tenant awareness of the importance of energy efficiency and green design, while specific education efforts will help ensure that tenants can use new features such as programmable thermostats effectively.

Looking Ahead

Based on its success in designing Quincy Commons to a green standard thus far, Nuestra CDC looks forward to breaking ground on the project in the fall of 2011. Funding sources to cover the construction of the housing component have been secured and, over the next few months, Nuestra CDC will work toward closing on those sources. They are also currently looking to secure the last piece of funding for the commercial component. As their first Section 202 property, Nuestra CDC hopes to learn from this experience and apply these lessons to future Section 202 projects.

Lessons Learned

- **Use certification programs to inform decisions about which energy efficiency and green measures to implement.** Although projects that are LEED certified or ENERGY STAR qualified can improve the marketability of the property, certification programs can offer property sponsors an established and vetted process and package of options for making decisions about energy efficiency and green building features.
- **Select energy efficiency and green features to maximize the benefits achieved.** When choosing energy efficiency and green measures to implement, sponsors should consider the long-term benefits and paybacks over the project's life cycle. Not only features that payback over the lifecycle of the project should be considered but also green features that have long term benefits to the tenants.
- **Identify and pursue other sources of funding for energy efficiency measures.** When Section 202 funding will not cover the total cost of energy efficiency or green building features consider securing additional funds. In many communities, various resources, including public, private, and nonprofit agency funds, can be harnessed and packaged together to design and implement an energy-efficient and green project.
- **Train property management and maintenance staff on energy efficiency and green features.** Since property management and maintenance staff will be responsible for operation and repair, it is critical that staff are fully trained on how to properly use and maintain these features to maximize savings and reduce future costs. Staff plays an important role in educating tenants and answering questions they might have about the features, so that they also use and maintain them correctly.

Useful Resources

- **Enterprise Green Communities:** *http://www.greencommunitiesonline.org*
- **LEED for Homes (LEED-H):** *http://www.usgbc.org/leed/homes/*

More Information

For more information, please contact:
Diane Clark
Project Manager, Real Estate Development
Nuestra Comunidad Development Corporation

E-mail: dclark@nuestracdc.org
Website: *http://nuestracdc.org*

E. Maximizing Energy-efficient Upgrades in Existing Section 811 Housing: REACH Community Development

Since 1982, REACH Community Development (REACH) has provided affordable housing and supportive services in Portland, Oregon. REACH has decided to incorporate sustainability practices into all their projects to reduce maintenance and utility costs and improve the quality of the units and the health of their tenants. REACH is a member of the U.S. Green Building Council and since 1994 has included green building features into all of its projects.

To date, REACH has developed more than 1,200 affordable housing units serving more than 1,500 tenants, including 6 Section 202 projects. REACH has acquired its first Section 811 property, Powell Boulevard Apartments, which provides 19 affordable units to individuals with mental health and substance abuse issues.

Strategies for Funding, Planning, and Building Support for Energy Efficiency

REACH used three primary strategies in approaching energy efficiency and green features at the Powell Boulevard Apartments. Taking advantage of small and large grants, REACH was able to secure funding to cover a variety of energy efficiency and green measures. Green upgrades to Powell Boulevard Apartments includes upgrades of water heaters, exterior doors, packaged terminal air conditioner (PTAC) units, lighting retrofits, counter top and floor covering replacements, as well as drip irrigation system installment throughout the grounds and a solar photovoltaic system (with roof replacement).

Working with in-house staff and professionals, REACH was able to develop a strategic plan for implementation, determining which needs were immediate and which could be addressed later on.

Throughout the process, REACH made it a priority to include tenants in meetings and conversations about energy efficiency and green upgrades, which has fostered a new sense of community and investment among tenants and staff.

Strategy 1. Combining Funding Sources To Make a Minor Investment in Energy Efficiency and Major Investment in Renewable Energy

Although REACH has been making efforts to "green" Powell Boulevard Apartments since assuming direct management of the project in 2007, only recently has it secured funding to make a significant capital investment in renewable energy technology. Prior to investing in renewable energy and other significant upgrades, REACH made Powell Boulevard Apartments more energy efficient through the replacement of all lighting with compact fluorescent light bulbs (CFLs) using funding from Multnomah County's Weatherization Assistance Program (WAP), a U.S. Department of Energy (DOE) administered program that provides funds to state and local governments to weatherize units for low-income households.

After making Powell Boulevard Apartments more energy efficient with WAP funds, REACH applied to HUD's Green Retrofit Program (GRP) for funding to make additional improvements, receiving a total of $258,566 for this project. The GRP is an American Recovery and Reinvestment Act (ARRA) funded program that provided $250 million in loans and grants for energy and green retrofits in the multifamily assisted housing stock. These funds were used to purchase and install new water heaters and exterior doors, countertops and floor coverings made of "greener" materials, a drip irrigation throughout the grounds, and a solar photovoltaic (PV) system, including roof replacement. A PV system generates electric power by using solar cells to convert solar energy into electricity. The cost of the PV system was $82,566 and the expected payback period is between 25 and 40 years, depending on rate increases. REACH recognized the importance of coordinating the installation of a renewable energy system with specific energy efficiency upgrades, to maximize benefits.

Green Retrofits underway at Powell Boulevard Apartments.

In addition to GRP, REACH has secured $10,000 from the Oregon Housing Acquisition Project to replace end-of-life PTAC units throughout the property with ENERGY STAR qualified units. At a total cost of $15,000, reserve funds were used to cover remaining costs. REACH is also in the process of applying for funds from the Portland Water Bureau to replace toilets with energy-efficient models. Going forward, REACH plans to secure additional funding to continue upgrading other features such as windows and appliances to maximize energy efficiency throughout the property.

In addition to the grant, the GRP also offered several owner incentives.

- The Efficiency Incentive, equal to 3 percent of costs, up to $30,000, paid upon completion of the rehabilitation work.

Green Improvements Under the Green Retrofit Program

- Efficient products and appliances, heating and cooling systems, water heaters, and lighting.
- Building envelope improvements, such as windows, doors, and insulation.
- Ventilation and indoor air quality improvements, including exhaust fans and low- or no-VOC paints, sealants, and cabinets.
- Green features, such as landscaping, changes to allow for integrated pest management, recycling, and hazardous waste disposal.

- The Incentive Performance Fee, equal to 3 percent of revenue, paid on an ongoing basis from surplus cash.
- Completion of all GRP activities is expected to be complete in February of 2011. REACH expects to use these incentives to cover some costs related to legal expenses and meeting HUD program requirements, and also to enhance property reserves. In addition, REACH's existing reserve funds have been used to cover costs such as legal fees and overhead costs.

Strategy 2. Using In-House and Professional Expertise To Develop a Plan for Energy Efficiency

REACH found it helpful to include an in-house staff member who was intimately familiar with the property's construction and maintenance history in all discussions related to green and energy-efficient upgrades to the property. Specifically, this individual worked closely with the energy auditor to develop a plan for green retrofits. His familiarity with the property enabled him to provide additional information to the energy auditor that otherwise may not have been readily available or obvious. For example, he provided records of when appliances and other features had been installed, as well as maintenance schedules. In conjunction with a sense of which appliances and systems were near end-of-useful-life, this information helped the energy auditor develop final recommendations. By accompanying the energy auditor during the audit, the staff member was readily available to answer specific questions about when systems were installed, how they have been maintained, and if there have been any performance issues.

The energy auditor produced a capital needs assessment (CNA) report that included several different options for improving energy efficiency, with associated costs and payback schedules. From this report, REACH was able to prioritize replacing systems and appliances that were closest to the end of their useful life and those that were most cost-effective. Also as part of the GRP, the energy auditor developed a related 20-year CNA, which detailed the steps needed for progressively increasing energy efficiency in the property in the long term. This report took into account projected income and reserve levels and made recommendations for adjustments to ensure that the future plan for energy efficiency was feasible. REACH and HUD will use this plan in discussions on the maintenance and improvement of this Section 811 property and necessary reserve funding.

Strategy 3. Engaging Tenants in the Project

The GRP required REACH to hold a meeting to gather feedback from tenants on their concerns, desires, and suggestions for improving the property. This information, along with input from the owner and energy auditor, was used to develop a Green Retrofit Plan for the property. In addition to the initial meeting, REACH held regular meetings with tenants throughout the process. These ongoing meetings provided a new opportunity for tenants to engage with each other and the building staff. REACH has found that these meetings have had significant effect on the tenants' sense of community at Powell Boulevard Apartments and fostered a positive perception of the green retrofit improvements. More specifically, the meetings have shown the tenants that the property managers are committed to making the tenants' homes healthy, clean, and safe. REACH believes that as a result, tenant excitement about the new green features has increased and tenants are taking better care of their units.

Although these benefits cannot easily be measured, REACH believes strongly that tenant involvement was an important component for the success of the retrofit. REACH leaders believe that financial paybacks will be realized more quickly now that the tenants are equally committed to energy conservation and "living green" and are more likely to use and maintain new features properly.

Looking Ahead

REACH began collecting utility bill data before the green retrofits were implemented and will continue to do so after they are installed so that actual cost savings and usage changes can be verified. Although the GRP requires that energy auditors have access only to utility records, REACH plans to use Bright Power's EnergyScoreCards, an online energy benchmarking and management tool, to benchmark and track each of its projects' energy usage.[14] Going forward, REACH also plans to continue to hold tenant meetings to inform ongoing plans to "green" the property. As the GRP and other grant dollars are expended, REACH will look to new ways to finance "greening" activities. REACH also has a large network of partners and plans to leverage new funding opportunities.

Lessons Learned

- **Identify a range of funding sources for making energy efficiency and renewable energy investments.** Some grants and loans have specific allowable costs, so be sure to understand and take advantage of the differences among funding opportunities. For example, energy efficiency improvements may be covered by WAP funds available in most communities, while renewable energy technologies like photovoltaic solar systems will likely require a significant capital investment from another funding source.
- **Strategically select energy efficiency upgrades that work together to maximize benefits.** Consider which energy efficiency improvements complement each other when deciding what to implement. Before installing renewable energy technology, consider low-cost energy efficiency upgrades with lower capital investments and shorter payback periods.
- **Drawing on a variety of existing resources can improve decisionmaking.** Especially for retrofit projects, take advantage of knowledge and expertise that you already have—consult with the building's general contractor, maintenance staff, and tenants. Consider what you already know about the property, its issues, and tenant needs to inform the decisionmaking process. The result can be better informed decisions and improvements that the community supports.

Useful Resources

- **Weatherization Assistance Program:** *http://www1.eere.*energy.gov/wip/wap.html
- **HUD's Green Retrofit Program:** *http://portal.hud.gov/portal/page/portal/HUD/recovery/programs/green*
- **EnergyScoreCards:** *http://www.energyscorecards.com/*

More Information

For more information, please contact:
Brian Bieler
Director of Asset Management
REACH Community Development Corporation

E-mail: bbieler@REACHCDC.org
Website: www.REACHCDC.org

IV. ENERGY EFFICIENCY, WATER CONSERVATION, AND SUSTAINABILITY IN NEW AND EXISTING SECTION 202 AND SECTION 811 PROJECTS

To help ensure that Section 202 and Section 811 housing is as efficient and green as possible, developments that receive funding from 2011 onward will be required to meet certain energy and water conservation standards. In addition, sponsors and owners will be encouraged, through the use of policy priority points, to make their developments as sustainable as possible. Sponsors and owners of existing projects are also encouraged to implement efficient and sustainable features, as feasible, throughout the life of the project. This section discusses the features that are required for new Section 202 or Section 811 funding, the activities that can earn incentive points, and the activities that existing project owners and sponsors can undertake to enhance energy efficiency and green building design.

Addressing Requirements for Energy Efficiency and Water Conservation in New Section 202 and Section 811 Projects

To receive Section 202 or Section 811 funding, sponsors and owners must ensure that their proposed projects meet certain energy and water conservation standards. The requirements are different, depending on whether the application is for new construction/substantial rehabilitation or for acquisition and moderate or modest rehabilitation.

New Construction and Substantial Rehabilitation Projects

To be considered for funding, new construction and substantial rehabilitation projects are required to address both energy conservation and water conservation.

Energy Conservation

Energy conservation standards to be followed depend on the type of property to be developed.

- Low-rise (up to three stories) multifamily developments must meet the requirements of EPA's ENERGY STAR qualified homes.
- Mid-rise and high-rise developments (four or more stories) must meet the ASHRAE 90.1-2007 Appendix G Plus 15% standard for Energy Efficiency.

Any state energy code requirements, however, take precedence over ENERGY STAR or ASHRAE specifications when the state code approximates or exceeds that standard.

Energy Conservation Information Resources

- ENERGY STAR Qualified Homes: http://www.energystar.gov/homes
- ASHRAE 90.1 Appendix G: http://www.ashrae.org
- ENERGY STAR Qualified Appliances: http://www.quantityquotes.net/

In addition, all projects must purchase and install ENERGY STAR qualified appliances. ENERGY STAR Quantity Quotes was developed by the U.S. Department of Energy (DOE) to make it easy to comparison shop for energy-efficient products. With this fast and simple tool, applicants can easily locate available ENERGY STAR qualified products, make contact with suppliers, and negotiate discounted prices.

Water Conservation

For all 202 and 811 new and substantially rehabilitated developments, owner/sponsors must install water-conserving fixtures. This would include resource-efficient plumbing and appliances such as low-flow showerheads and faucets, and high-efficiency toilets. The materials used should be the most current WaterSense labeled or a greater water efficiency product. These requirements apply regardless of whether the developments have low-, mid-, or high-rise buildings.

Water Conservation Information Resources
WaterSense: http://www.epa.gov/owm/water-efficiency

Acquisition and Moderate or Modest Rehabilitation

Section 202 and Section 811 projects that do not require new construction or substantial rehabilitation are required to take three steps toward energy efficiency:

1. Pre-construction energy audit.
2. Incorporation of conservation techniques in the project.
3. Post-construction energy audit.

The requirements for these types of projects recognize that the extent of physical improvements is less intensive than for new construction or substantial rehabilitation, and that many of the fundamental features of the building will not change. The audit process provides the sponsor/owner with information about the types of energy conservation improvements that can have the greatest impact. Sponsors and owners then can decide which improvements provide sufficient benefit given their cost and are feasible within the planned scope of work.

Tools To Help With Energy and Water Conservation Efforts

Sponsors and owners can take a number of steps to prepare and make sound choices to meet the Section 202 and Section 811 ENERGY STAR standards and water-efficient building requirements. The tools presented below are drawn from the experience of successful sponsors and owners. In addition to considering these tools, owners/sponsors—including those who are experienced with ENERGY STAR and water conservation activities in market-rate projects — can benefit from looking at successful ENERGY STAR projects locally to learn which design and building features work well in affordable projects in their geographic areas.

Tools for New Construction and Substantial Rehabilitation Projects

- **Learn about the requirements.** Begin by learning the energy conservation requirements that will apply to your project—either the ENERGY STAR qualified homes requirements or the ASHRAE 90.1 Appendix G standards.
  - A summary of ASHRAE and ENERGY STAR resources and requirements is provided in the appendix.
  - More detail about ENERGY STAR qualified homes is available at *http://www.energystar.gov/homes*.
  - More detail about ASHRAE 90.1 Appendix G is available at *http://www.ashrae.org/*.
- **Hire a knowledgeable technical advisor.** Talk to an experienced ENERGY STAR technical advisor who has helped other owners and sponsors successfully develop projects that meet the applicable standard. To find experienced advisors, talk to other owners, sponsors or builders in the area, ask the state housing finance agency or state energy office for names, reach out to EPA regional staff, or talk to local home energy raters to find out who has experience and a solid track record. The New Ecology case study in section III discusses the role that a specialized consulting firm can play in helping Section 202 sponsor/owners make decisions about their energy efficiency activities.
- **Identify builders and trades people who have experience with energy-efficient buildings.** Even if you stay with your current building contractor, talking to builders and trades people in your area who have experience with ENERGY STAR or the ASHRAE 90.1 Appendix G standard can yield valuable lessons about designs and building features that work well in your area. Local architects or builders' associations can be good resources for identifying experienced builders and trades people. Some of the technical assistance resources listed in Attachment 4-2 also may help you identify experienced local experts.
- **Look at the design and features of other ENERGY STAR buildings in your area.** The ENERGY STAR and ASHRAE 90.1 Appendix G standards are performance standards. To decide how to meet those standards most efficiently and effectively, learn what works in your geographic area from other successful projects.
- **Conduct energy modeling.** Modeling the likely outcomes of various energy efficiency scenarios can help sponsors and owners make wise choices about what features to include. The Hudson Companies and the Nuestra CDC case studies in section III discuss the value that these organizations found in conducting energy modeling and related benefit-cost analyses.
- **Identify additional financing sources that can be leveraged.** Attachment 4-1 provides ideas about possible sources of financing. However, talking to other sponsors, state or local housing finance agencies, and local utilities can provide additional insights.
- **Talk to your HUD field office.** If you have questions about program requirements or how to meet those requirements most effectively, check with your HUD field office. If your field office staff has experience with other ENERGY STAR projects, they can also help you identify knowledgeable people in your area.

Tools for Acquisition and Moderate or Modest Rehabilitation Projects

Many of the tools listed for new construction and substantial rehabilitation are also relevant for acquisition and moderate or modest rehabilitation projects. In addition, the following tools may be helpful.

- **Select an energy auditor with affordable-housing experience.** An auditor who brings experience with other affordable projects can help owners/sponsors choose the improvements that will have the greatest impact.
- **Consider using a tool that analyzes utility and other historical performance data to inform the choice of energy improvements.** This type of analysis uses data on actual building performance to help owners identify the components of the building where there is the greatest potential for reducing energy consumption. Section III provides information about two such tools: the New Ecology case study presents the WegoWise tool, while the National Church Residences case study illustrates use of the Bright Power tool.

Addressing Section 202 and Section 811 Incentive Points for Green Design and Development

To support sustainable project designs that take maximum advantage of energy efficiency, water conservation, and sustainability features, HUD is encouraging Section 202 and Section 811 applicants to undertake programs and projects that incorporate green design features. Policy Priority points are available to applicants that undertake green development in the design, construction, rehabilitation and operation of their proposed Section 202/811 developments. This section provides background information to help sponsors and owners who choose to undertake the sustainability activities required to earn these incentive points.

Selecting the Green Standard To Use

To receive policy priority incentive points, Section 202 and Section 811 applicants must certify and demonstrate that green development strategies will be followed in the design, construction, rehabilitation and operation of the proposed project. These points are available to applicants that commit to the full incorporation of a green standard and describe how they will fulfill the requirements of the recognized green rating programs.

Acceptable Green Standards

- Enterprise Green Communities Criteria
- National Association of Home Builders (NAHB) Green Building Guidelines
- Leadership in Energy and Environmental Design (LEED) for Homes
  (for single-family homes)
- LEED New Construction
  (for multifamily homes)
- EPA's Indoor airPLUS
- A regionally or locally recognized green standard such as, but not limited to, EarthCraft or Build It Green: Green Point Rated

See the appendix for links to the requirements for each standard.

The choice of which certification to pursue typically depends on a range of factors, including the following:

- Fit with the sponsor's philosophy.
- Financial feasibility.
- Appropriateness for the proposed property.
- Benefits beyond utility savings, such as improved indoor air quality and resident comfort.

Careful consideration of all these factors can help identify the appropriate certification for an owner to pursue for a given property. It is not always easy, however, to balance the four factors. Particularly for sponsors and owners who do not have past experience with green standards, it can be extremely valuable to enlist the support of a technical advisor who has experience with several of the standards. This expertise can be invaluable when attempting to evaluate the financial feasibility and appropriateness of specific measures for a proposed project.

Case studies in section III illustrate how several different organizations came to different conclusions about the appropriate measures to adopt after balancing the four considerations in their unique situations.

- The Hudson Companies followed LEED Silver.
- Nuestra CDC chose Enterprise Green Communities Criteria.
- REACH developed ENERGY STAR qualified units.

Use an Integrated Design Process to the Greatest Extent Feasible[15]

Section 202 and Section 811 sponsors and owners are encouraged to assemble a development team that has a strong understanding of sustainable design principles and green building standards. Using an integrated design process is expected to ensure effective communication throughout the development process, and to encourage all members of the development team to look at the project's objectives, building materials, systems, and assemblies from many different perspectives at the earliest stage of project planning. The integrated design process is meant to ensure that every aspect of the building will work as a whole to produce the best possible product, with the best possible energy and cost savings.

What Is an Integrated Design Process?

An integrated design process is a whole-building approach to building design in which the full design team and key stakeholders work together from the outset to achieve high building performance that achieves environmental and social goals while staying within budgetary and scheduling constraints. The process relies on a collaborative and multidisciplinary team—architects, landscape architects, engineers, energy modelers, cost consultants, construction managers, and owners—who make decisions together based on a shared vision and holistic understanding on the project. The process lasts the entire project

15 For more information on the integrated design process, see *Engage the Integrated Design Process*, available at http://www.wbdg.org/design/engage_process.php and the Green Building Advisor website at http://www.greenbuildingadvisor.com/green-basics/integrated-design.

life, beginning at pre-design and lasting through occupancy and into operations.

According to *Roadmap for the Integrated Design Process,*[16] an integrated design process differs from a conventional design process in the following ways:

- An integrated design process involves many or all team members from the outset, and the broad team influences decisions, whereas a conventional design process involves team members only when essential, and fewer team members make more decisions.
- An integrated design process involves whole system thinking, whereas a conventional design process often considers systems in isolation.
- An integrated design process is iterative and continues through post-occupancy, whereas a conventional design process is linear and is typically finished when construction is complete.
- An integrated design process emphasizes life-cycle costing, whereas a conventional design process emphasizes upfront costs.

When an integrated design process is considered from the outset, the entire project team is able to contribute to the sustainability of the project. An effective integrated design process also helps sponsors and owners make decisions about the elements of green design that best support improved energy efficiency and water conservation. Exhibit 13 highlights key ways in which the integrated design process contributes to effective design, construction, and operation of a project

Why Is an Integrated Design Process Important?

An integrated design process is important because factoring green design issues into the overall design for the building maximizes the benefits, ensures sound building performance, and reduces costs. It also helps ensure that improvements to one building system do not create unanticipated problems for other systems. For example, greater energy efficiency through increased building insulation and air sealing reduces heating and cooling loss, which can reduce the size of the HVAC system needed to achieve the desired performance. However, it also may require special attention to building ventilation to ensure adequate indoor air quality. An integrated design process enables the design team to collectively identify opportunities to enhance green features and reduce the cost of the design without creating negative effects in other systems.

Exhibit 13. Addressing Integrated Design During the Design Process

Enterprise Green Communities

- **Pre-Design.** The surrounding environment is assessed to identify optimum choices for the site, the users, and the owner. Members of the design team work together at the outset to develop a vision statement, goals for the project, and a preliminary budget, which includes the cost of energy modeling and other activities. If a green standard is to be used, it is identified.
- **Conceptual and Schematic Design.** Innovative technologies, new ideas, and fresh application methods are sought to meet the project's goals. Experts from multiple disciplines analyze opportunities and constraints of the building site and explore synergies between disciplines and with neighboring sites. A preliminary energy analysis and preliminary financial estimate are completed during this phase.
- **Design Development.** All architectural, mechanical, and electrical systems are assessed for their expected performance and effect on all other systems. The design development report includes energy simulation results, a detailed financial report (using life-cycle costing, if possible), an outline of specifications with performance criteria, a preliminary commissioning report, a roles and responsibilities matrix, and a matrix comparing the design with the project's goals.
- **Construction Documents.** The design development documents and final calculations and specifications are translated into formats suitable for pricing, permitting, and construction. To ensure that the green features agreed upon by the design team are implemented effectively, the project specifications should include embedded performance criteria, material substitution policy, and contractor responsibilities for green building documentation, training, and supervision of subcontractors.
- **Construction.** The full integrated design team must remain fully involved during the construction phase to ensure that the goals of the project are carried through to completion. Decisions may require clarification, compliance with contract documents must be monitored, and the effect of any substitutions must be evaluated.
- **Operations.** Responsibility for and knowledge of the building is transferred to the building's new stewards: the owner, occupants, and operations staff. The project team finalizes drawings of the project, operation and maintenance manuals, training and education materials, measurement and verification methods, and commissioning documentation.
- **Performance Evaluation.** After the building is fully operational, ongoing building performance evaluation and continuous monitoring may identify opportunities for small-scale improvements in operations that can bring significant benefits. An environmental management program further contributes to ongoing green operations.

16 For more detail, see Roadmap to the *Integrated Design Process*, available at http://cascadiapublic.s3.amazonaws.com/Large%20Cascadia%20Files/RoadmaptotheIDP.pdf

How Integrated Design Can Actually Work

Like any other design process, an integrated design process can take many forms, depending on the needs of the project and the preferences of the sponsor or owner and other team members involved. Certain key elements, however, can help ensure that the design team collaborates effectively. Both Enterprise Green Communities and Leadership in Energy and Environmental Design (LEED) for Homes require an integrated design process as part of their certification processes. Key elements of these two approaches are summarized in Exhibit 14.

The Nuestra CDC case study provided in section III describes that organization's efforts to use an integrated design approach to ensure that all aspects of its Section 202 project will be both energy efficient and green to the maximum extent feasible.

Incorporating Passive Solar Orientation to the Extent Feasible

Applicants must incorporate passive solar orientation principles to the greatest extent possible. The physical characteristics of some sites will limit the feasibility of incorporating passive solar design features. If the use of passive solar orientation is not feasible, the constraints (including the orientation of an existing structure) can be explained in the application.

Basic Principles of Passive Solar Orientation

Passive solar orientation of a building takes advantage of the sun's natural heat to capture solar heat in the winter and block solar gain in the summer, reducing heating and cooling costs throughout the year.

Because the sun rises in the east and sets in the west, and hangs lower in the sky during winter months, a rectangular building should be oriented with its long sides facing the north and south, and the shorter sides facing east and west (in the northern hemisphere). In winter months, windows on the south facing side of the building absorb the (lower hanging) sun's heat energy and distribute it through the building's thermal mass, so increasing the area of the south facing windows enhances solar performance/heat gain. In summer months, windows on the

Exhibit 14. **Two Approaches to the Integrated Design Process**

Enterprise Green Communities[17]	LEED for Homes[18]
Sponsors/owners assemble a green development plan that outlines the integrated design approach and demonstrates involvement of the entire development team. It must include: • The name and role of each member of the professional design and development team. • A statement of the overall green development goals of the project and the expected/intended outcomes from addressing those goals. • A description of the process that was used to select the green building strategies, systems, and materials that will be incorporated into the project. • A description of how each mandatory and optional item will be included in the project. • Identification of which members of the design and development team are responsible for implementing the green features. • A description of followup measures to be taken through the completion of design, permitting, construction, and operation to ensure that the green features are included and correctly installed, and that the owners or tenants receive information about the function and operation of the features.	Projects receive points for integrated project planning to maximize opportunities for integrated, cost-effective adoption of green design and construction strategies. Possible activities include: • Involve an integrated project team in at least three phases, including conceptual or schematic design; LEED planning; preliminary design; energy and envelope systems analysis or design; design development; final design, working drawings, or specifications; and construction. • Conduct meetings with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems encountered, formulate solutions, review responsibilities, and identify new steps. • Include at least one principal member of the project team who is credentialed with respect to LEED for Homes. • No later than the design development phase (and preferably during schematic design), conduct at least one full-day integrated design workshop or charrette with the project team. Use the workshop to integrate green strategies across all aspects of the building design, drawing on the expertise of all participants. • Consider building orientation for solar design.

17 For more detail on the Enterprise Green Communities Criteria, visit http://www.greencommunitiesonline.org/tools/criteria/

18 For more detail on LEED, visit http://www.usgbc.org/ShowFile.aspx?DocumentID=3638

south facing side of the building absorb less of the sun's heat energy as the sun travels higher in the sky. This can be further enhanced through inclusion of design features such as overhangs that block out additional sunlight, or planting trees whose foliage will shade the building.

East and west facing windows can be responsible for overheating in spring and fall months as the low angle sun rises and sets. So reducing window area on the east and west facing sides of the building further maximize the solar orientation of a building.

Proper solar orientation of a building should be enhanced by installing energy-efficient windows with better insulation than standard windows, as well as careful selection of building materials that affect thermal storage and distribution. Consideration should also be given to the ratio of south facing glazing to floor area. A building is considered "sun-tempered" when the glazing area is 8 to 10 percent of the floor area, and fully "passive solar" when the glazing area is 15 to 20 percent of the floor area.[19]

It is optimal for a building to face due south to maximize solar orientation. However it may be oriented up to 5 degrees away from due south before solar performance is affected.[20] A building may be oriented up to 30 degrees away from due south with only a 5 percent loss in potential savings.[21]

Benefits of Passive Solar Orientation

A building that takes advantage of passive solar orientation reduces energy costs. Savings achieved will vary based on a variety of factors, including the extent to which the home is both solar oriented and additional design features that enhance energy efficiency. Two studies, that included homes that were only reoriented to the sun and did not include additional design features, showed 10- to 20-percent heating savings and 10- to 40-percent cooling savings.[22] Buildings that also include other "solar home" features are estimated to cut energy use by 30 to 40 percent.[23]

In addition to lower energy costs during the building's lifecycle, immediate cost savings can be achieved through the need for smaller heating and cooling systems.

In addition, the south facing windows allow natural sunlight to illuminate the interior of the building during the day, reducing the need for artificial lighting and consequently energy costs. The natural day-lighting is also considered an appealing feature of a home that may be attractive to renters and contribute to tenant comfort in the home.

Obstacles and Challenges to Passive Solar Orientation

When determining the feasibility of passive solar orientation for a building, a builder may face a number of challenges. When considered early in the design process, the cost of orienting a building to the south, in general, is minimal; however, site features such as steep slopes, preservation of views or other natural features, or an existing street grid may be issues. Although, in most cases, lots are adaptable to include passive solar orientation and other passive solar features, a builder should carefully consider the costs and benefits of solar orientation for a particular project.

Passive solar orientation alone is usually low-cost for new construction (site constraints could make changes of orientation high-cost), because it simply involves reorienting a building to the south. Even when more glazing is added, these windows can be "taken" from the other sides of the building, such as the east and west sides, to avoid additional construction costs. Careful consideration should be given, however, to other design features that enhance the solar performance and energy efficiency of a building, such as building material selections, overhangs, interior floor plans, and shading devices, which have additional associated costs but may maximize benefits in energy savings.

For cases in which passive solar orientation is not feasible due to factors such as the ones described above, applicants should explain how feasibility was determined and describe the constraints present.

Resources

- U.S. Department of Energy, Energy Efficiency and Renewable Energy: *http://www.energysavers.gov/your_home/designing_remodeling/index.cfm/mytopic=10250*
- National Institute of Building Sciences, Whole Building Design Guide: *http://www.wbdg.org/resources/psheating.php*
- California Energy Commission, Consumer Energy Center: http://www.consumerenergycenter.org/home/construction/solardesign/

19 http://oikos.com/esb/42/solar.html

20 http://greenpassivesolar.com/passive-solar/building-characteristics/orientation-south-facing-windows/

21 http://oikos.com/esb/42/solar.html; http://www.nmsea.org/Passive_Solar/Passive_Solar_Design.htm

22 http://oikos.com/esb/42/solar.html

23 http://www.smartenergyliving.org/cm/Solar/Passive%20Solar%20Design.html

Developing an Operations and Maintenance Manual

Successful implementation of green design does not end when construction is completed; it continues through initial occupancy and ongoing operation of the building. Therefore, HUD requires property managers to develop an O&M manual that includes the following elements:

- A routine maintenance plan.
- Operations and maintenance guidance.
- Tenant education.
- Operations staff training.
- To ensure that the O&M manual guides project staff as effectively as possible, the contents of the manual should be pilot tested for a limited time period and evaluated. The manual should then be revised based on the results. After an O&M manual with a green focus has been developed, it can be readily adapted for use in other green developments by tailoring the content to reflect differences in particular features, systems, and appliances.
- An O&M manual should be a living document. As maintenance staff work with the project, new research provides improved green approaches, and ongoing recordkeeping reveals how effective the energy efficiency and green features have been, the manual should be adjusted to maximize efficiency and effectiveness. Reviewing the contents of the manual every 2 years, updating and needed, and educating staff about the changes is an important element of maximizing the property's green and energy efficiency qualities over time.

Operations and Maintenance (O&M) manual templates are available for use and customization on the Enterprise Green Communities' website at *http://www.enterprisecommunity.org/* [24]. Exhibit 15 below provides a sample outline of an O&M manual.

Routine Maintenance Plan

The O&M manual should provide evidence that a plan is in place to ensure that routine maintenance activities will be conducted frequently enough to ensure that green equipment and features will operate at peak efficiency and remain viable through their anticipated useful lives. The plan also should demonstrate that routine maintenance activities will follow green principles. The routine maintenance plan should, at a minimum, address the following types of activities:

- Indoor air quality management.
- Green and healthy housekeeping.
- Indoor pest prevention and control.
- Waste reduction and recycling.
- Energy and water conservation.
- Green groundskeeping.

Operations and Maintenance Guidance

Operations and maintenance guidance should covers a range of issues, including but not limited to information about the proper use and maintenance of all appliances, HVAC operation, lighting equipment, paving materials and landscaping, pest control, and other systems that are part of each occupancy unit. To ensure that the project continues to conserve energy and water over time, the O&M manual should specify that future capital replacements will use water-conserving fixtures and ENERGY STAR appliances.

Tenant Education

Tenant education is key to ensuring that green design features are used in ways that maximize their effectiveness. One key element of a high-quality occupancy turnover plan is a detailed description of the process of educating the tenants about proper use and maintenance of all building systems. Educating tenants about how to use and care for the components affecting energy consumption inside and outside their unit is crucial for reducing energy and maintenance costs. Some key components to explain to tenants are appliances, plumbing, lighting, mechanical systems, windows, doors, insulation, paint, flooring, landscaping, recycling, and cleaning. Tenants may not be aware of what is normal and what is not for each component of their unit and therefore tenants may not report maintenance problems that affect energy use. Some tenants may be unaware of how their actions can make the home healthier, more comfortable, or more energy efficient.

Tenant education is particularly important for maintaining projects and conserving energy. Sponsors and owners should strive to educate tenants via training and a tenant's manual for easy reference. A number of samples are available, including *Community Housing Partner's Resident Guide to Green for Wellesley Commons*.[25] See the Consumer Green Living Guidelines chart in the Technical Assistance and Resources section below for additional resources on tenant education.

Operations Staff Training

Operations staff training is needed to maintain green design features and to ensure green operations and maintenance practices for the future. Property managers and maintenance staff have a significant impact on energy and maintenance costs due

24 Navigate to the information resources section; search for *Template for Green Operations and Maintenance Manual*.

25 *Community Housing Partner's Resident Guide to Green for Wellesley Commons* is available at http://www.communityhousingpartners.org/development/architectural_design/documents/WellesleyResidentGuidetoGreen.pdf

to the decisions they make about when and how replacements are made and defects are addressed. Property managers have a role in educating maintenance staff about standards and priorities for product replacement and repair. Maintenance staff will replace some building products on a frequent basis, such as paint, clean supplies, light bulbs and fixtures, flooring, carpeting, and paper products, and will need to know the green or energy-efficient requirements for these products. The property manager should determine if and how available technologies can be used to enhance energy efficiency and when those technologies can be implemented. This should be documented in an Operations and Maintenance Plan and distributed to the maintenance staff.

Property managers can help identify energy saving measures for common areas such as using thermostat settings. Property managers also have a role in educating tenants about efficient energy usage and proper maintenance of their units through education, signs, labels, or guides. Sample operations and maintenance guides are available, including LISC's *Green Operations and Maintenance Toolkit and Buyer's Guide*.[26]

Exhibit 15. **Sample Operations and Maintenance Manual Outline**

I. Green Operations and Maintenance Guidelines

A. Indoor Air Quality Management

B. Green and Healthy Housekeeping
- Cleaning Procedures
- Low-Toxic Cleaning Products
- Storing and Disposing of Cleaning Products
- Disposable Janitorial Supplies
- Housekeeping Equipment

C. Indoor Pest Prevention and Control
- Integrated Pest Management
- Pest Prevention Tips
- Pest Management Protocols
- Bed Bug Prevention and Control

D. Waste Reduction and Recycling
- Waste Prevention
- Weekly Recycling Program
- Building Rehabilitation/Renovation Waste Management
- Hazardous Waste Disposal

E. Energy and Water Conservation
- Energy Efficiency Strategies
  - Mechanical Equipment Operations and Maintenance
  - Duct and Filter Maintenance
  - Cooling Tower Operation
  - Heating System Maintenance
  - Electrical Equipment Operations and Maintenance
  - Photovoltaics
  - Lighting: Purchasing New Lamps
  - Lighting Maintenance
  - Lighting Disposal/Recycling
- Water-Saving Strategies
  - Reading Water Meters Monthly
  - Checking for Leaks
  - Installing Faucet Aerators
  - Operating Cooling Towers and Boilers According to Manufacturers' Specifications
  - Discontinuing or Minimizing Water Use To Clean Paved Areas
  - Reviewing Landscaping Practices

F. Green Groundskeeping
- Irrigation
- Plantings
- Integrated Pest Management
- Stormwater Filtration
- Exterior Lighting
- Garage/Parking Lot

II. Green Materials and Systems

A. List of Green Components
- Systems and Equipment
- Exterior Materials
- Interior Materials, Finishes, and Furnishings

B. Green Product Summaries With Maintenance Guidelines

III. Other Activities

A. Onsite Trainings

B. Signage

C. Green Procurement and Purchasing

D. Ongoing Monitoring and Commissioning of all Building Systems

E. Adjustment of Settings and Controls To Optimize Efficiency

26 LISC's Green Operations and Maintenance Toolkit and Buyer's Guide is available at www.lisc.org/content/publications/detail/8209.

Addressing Energy Efficiency, Water Conservation, and Sustainability in Existing Section 202 and Section 811 Projects

Most existing Section 202 and Section 811 projects were developed prior to the availability of information about current practices for energy and water conservation in residential buildings. HUD encourages owners of existing Section 202 and Section 811 projects to take steps to incorporate energy and water conservation improvements into their projects in the course of regular maintenance and capital improvements. For example, when replacing appliances, sponsors and owners can replace standard appliances with ENERGY STAR qualified appliances, and can replace standard water fixtures with water-conserving fixtures. The case studies in section III describe several different strategies that owners of Section 202 and Section 811 projects have used to increase energy efficiency and water conservation in their projects.

Sponsors and owners of existing projects can take many of the same types of actions and can access many of the same resources described above for owners who are building or rehabilitating projects. For example, owners of existing projects can—

- **Implement utility data management processes.** Careful tracking of utility data can help conserve both energy and water, and in the process can lead to significant financial savings. The National Church Residences case study in section III provides details about how one organization has used intensive data analysis to help save water and energy.
- **Conduct energy audits.** The New Ecology case study in section III describes the benefits of making good use of energy audit information. That case also illustrates that when resources are tight, an owner of multiple projects may find that it makes sense to begin with a front-end analysis of utility usage to spot poorly performing buildings. This can help identify the projects for which an investment in a full-fledged energy audit is most likely to yield substantial savings.
- **Consider strategies for involving residents in the planning for making green improvements.** Several of the organizations highlighted in the section III case studies found it extremely valuable to work with residents when designing and implementing green measures. These included National Church Residences, Nuestra CDC, and REACH.
- **Use technology.** Although tenant education is vital to effective conservation programs, technology can also support conservation efforts. The National Church Residences case study in section III highlights some of the technological solutions available to help conserve energy.
- **Develop an enhanced operations and maintenance plan.** Even without physical improvements, sponsors and owners can improve conservation efforts through better operations and maintenance. These activities could include anything from educating residents to improving regular maintenance efforts such as rapidly addressing leaky faucets or regularly changing air filters.
- **Take advantage of flexibility in scale and timing.** Sponsors and owners with existing projects can make strategic choices about when and how to implement various conservation-related measures to make gradual progress, despite tight budgets. The National Church Residences case study in section III illustrates how that organization went about targeting certain elements, reducing the scale of the improvements undertaken at any given time.
- **Take advantage of available funding sources.** Explore outside funding sources, such as weatherization funds, that can support incorporating energy conservation and green building features in existing projects. The REACH CDC case study illustrates how sponsors and owners of existing projects can gradually make improvements to correspond with funding availability, implementing a series of different rehabilitation activities as funding for particular activities becomes available. The funding resources listed in Attachment 4-1 can be a starting point to help with this approach.
- **Seek technical expertise from conservation and green design experts.** Green design expertise is not valuable only during major construction. Sponsors and owners of existing projects can benefit from green design expertise as well. Attachment 4-2 provides ideas about places to begin seeking such expertise.

Meeting the Challenges

As described in section II, sponsors and owners who have worked to incorporate energy efficiency, water conservation and green building design have encountered important challenges when seeking to incorporate these elements into their buildings. Many of these challenges stem from the fact that many of the building practices and components involved changes in areas in which there was limited experience within the industry. Although the challenges remain, innovative sponsors and owners and funders of affordable housing have now "broken the ground" and made strides in overcoming these challenges. Their experiences can help other affordable housing sponsors. Below are three common challenges that Section 202 and Section 811 sponsors and owners identified and some approaches for addressing them.

Finding Technical Information and Expertise

Sponsors and owners need information and tools to help them understand what green and energy efficiency measures are available, what they involve, what resources are available to support such activities, and how best to integrate them into their projects. Currently, some resources identifying and supporting energy efficiency and green building techniques exist, but are decentralized. This makes it challenging for property owners and sponsors to locate the resources they need.

Incorporating energy efficiency and green measures into new and existing projects effectively often requires professional experience. For example, energy modeling to assess a building's anticipated energy use and to quantify the savings that would be attributable to a proposed design improvement requires a skilled energy modeler. Energy audits usually require a professional energy auditor or an engineer who can use specialized equipment such as blower doors and infrared cameras to identify areas of energy loss and propose specific improvements. Certification programs such as ENERGY STAR, Enterprise Green Communities, or LEED require expertise in areas such as application submission, certification timelines, program requirements, and recordkeeping. Hiring an experienced green consultant may be more cost-effective than having staff attempt to master and manager these processes.

Finding the right professional to support these efforts, and finding the funds to pay for that support, can be challenging. Attachment 4-2 lists several resources for sponsors and owners to begin finding additional information and expertise. Beyond these sources, HUD encourages sponsors and owners to contact affordable housing organizations and sponsors in their area who have experience with energy efficiency, water conservation, and green design to learn from their experience and identify other sources of information in their area.

Development Cost Limits and Financing Improvements

Financial investments are always required to achieve energy efficiency or green standards such as ENERGY STAR, Enterprise Green Communities, or Leadership in Energy and Environmental Design (LEED) certification. Although such investments may pay for themselves in the long run through reduced utility costs, sponsors and owners must find sources of capital to make the initial investment.

Development cost limits put a ceiling on the amount of Section 202 or Section 811 funding that can be made available. These development cost limits vary by geographic location. In locations where they are more generous, it may be possible for sponsors and owners to pay for energy efficiency and green investments with Section 202 or Section 811 funds. When development cost limits are not generous enough to cover the cost of energy efficiency and green investments, however, project sponsors and owners must either seek other funding sources to cover the costs or choose not to pursue energy efficiency and green options.

HUD understands the challenges that sponsors and owners face on this front and will continue to work with stakeholders to address these. In the interim, one action that sponsors and owners can take is to identify additional sources of financing and grants that can be leveraged with Section 202 and Section 811 funding to help cover these costs. A range of potential sources, including housing tax credits, energy tax credits, weatherization funding, and utility-supported financial assistance for energy-related improvements, are available. The case studies presented in section III show several approaches and sources that have been used by Section 202 and Section 811 sponsors and owners. See Attachment 4-1 for a list of resources sponsors and owners should consider for helping to meet the need for additional capital.

Replacement Reserves May Not Cover Cost of Energy Efficiency Improvements in Existing Housing

As existing Section 202 and Section 811 projects age, replacement reserve funds are used to cover the costs of nonroutine repairs, replacements, and major capital improvements. Sponsors and owners of existing projects have the option of selecting energy-efficient components for these replacements. However, energy-efficient replacements can be more expensive than traditional building component replacements. Owners and sponsors interviewed for this report indicated that the additional cost of substituting energy-efficient components averages about 10 percent.

If a project has ample replacement reserves, it may be possible to fund not only energy-efficient appliance replacements but also some major capital improvements that incorporate energy efficiency and green technologies. If, however, the project has limited replacement reserves, the extent of energy and green building improvements that can be covered out of replacement reserves will be very limited.

HUD understands the challenge facing sponsors and owners on this front and will continue to work with stakeholders to address this challenge. Similar to the development cost limit challenge discussed previously, one action that sponsors and owners can take is to identify additional sources of financing and grants that can be leveraged with Section 202 and Section 811 funding to help cover these costs. Potential sources of financial support include energy tax credits, weatherization funding, and utility-support financial assistance for energy-related improvements.

The case studies presented in section III show several approaches and sources that have been used by Section 202 and Section 811 sponsors. See Attachment 4-1 for a list of resources a sponsor or owner should consider to help finance improvements in existing buildings.

ATTACHMENT 4-1. POTENTIAL FUNDING SOURCES

Obtaining sufficient funding for incorporating energy efficiency and green building into new and existing Section 202 and Section 811 projects often poses an important challenge for sponsors and owners. When researching and identifying supplemental funding, sponsors and owners should consider the following:

- Each funding source has different requirements, restrictions, and timing for applying and using funds.
- Other funding sources can add to the development time of the project and the level of effort needed for reporting.
- If an organization has experience combining Section 202 or Section 811 funds with other funding sources, it may save the project time and money.

The following chart provides basic information about several types of available funding sources. The list offers a starting point for sponsors and owners. Additional sources may be available locally. The key features of each funding source are noted in the chart, specifically the purpose and use of the type of funding and how to access the funding source.

Source/Description	Allowable Activities				Development Type		How To Access
	Design/ Planning	Data Analytics	Green/EE Features	Occupant Training	New Construction	Minor to Moderate Rehab	
Federal Funding Sources							
Low-Income Housing Tax Credit Program (LIHTC) http://www.huduser.org/portal/datasets/lihtc.html State and local LIHTC-allocating agencies have annual budget authority to issue tax credits for the acquisition, rehabilitation, or new construction of rental housing targeted to serve lower income households.			X		X	X	Check HUD's website for a list of state and local LIHTC-allocating agencies: http://www.huduser.org/portal/datasets/lihtc.html.
Community Development Block Grant (CDBG) http://www.hud.gov/cdbg HUD allocates annual funding awards to larger cities and urban counties to provide decent affordable housing and community services and to create jobs.	X	X	X	X	X	X	Check HUD's website to see if your local city or urban county is a recipient of CDBG funds: http://www.comcon.org/programs/contact_cdbg.html.
Weatherization Assistance Program (WAP) http://www.eere.energy.gov/weatherization/ DOE provides funding to states to fund a network of local community action agencies, nonprofit organizations, and local governments that provide weatherization services to low-income households.			X			X	Check DOE's website to find contact information for agencies providing weatherization services: http://www1.eere.energy.gov/wip/project_map/.

Source/Description	Allowable Activities				Development Type		How To Access
	Design/ Planning	Data Analytics	Green/EE Features	Occupant Training	New Construction	Minor to Moderate Rehab	
Federal Funding Sources							
HOME Investment Partnerships Program http://www.hud.gov/offices/cpd/affordable-housing/programs/home/ HUD allocates annual funding awards to state and local governments to create affordable housing for low-income households.	X		X	X	X	X	Check HUD's website to see if your state or local government is a recipient of HOME funds: http://www.hud.gov/offices/cpd/affordablehousing/programs/home/contacts/.
Energy Efficiency and Conservation Block Grant (EECBG) http://www1.eere.energy.gov/wip/eecbg.html DOE offers formula and competitive grants to states, local governments, and tribal governments to conduct energy efficiency activities, including energy audits, strategies, and weatherization.	X	X	X	X	X	X	Check HUD's website to see if your state or local government is a recipient of EECBG funds: http://www1.eere.energy.gov/wip/eecbg_state_allocations.html. http://www1.eere.energy.gov/wip/eecbg_tribal_allocations.html.
State Energy Program http://www1.eere.energy.gov/wip/sep.html DOE provides formula and competitive grants to develop state strategies and goals to address their energy priorities and to adopt energy efficiency/renewable energy products and technologies.	X	X	X	X	X	X	Check DOE's website to find contact information for your state: http://www1.eere.energy.gov/wip/project_map/.
Nonprofit and Foundation Funding Sources							
Enterprise Community Loan Fund http://www.greencommunitiesonline.org/tools/funding/loans/ Enterprise Community Loan Fund offers lending products to support the development of affordable rental and homeownership housing that adheres to Green Communities Criteria.	X	X	X	X	X		Apply for the Green Community Loans on line at http://www.greencommunitiesonline.org/tools/funding/loans/.

Source/Description	Allowable Activities				Development Type		How To Access
	Design/ Planning	Data Analytics	Green/EE Features	Occupant Training	New Construction	Minor to Moderate Rehab	
Federal Funding Sources							
Green Mini Loans http://www.enterprisecommunity.org/programs/documents/green_mini_loans_410.pdf Enterprise and the National Housing Trust Community Development Fund provide nonprofit owners and developers with capital to jumpstart green retrofits of older affordable rental communities.	X	X	X	X		X	Contact the National Housing Trust Community Development Fund at http://www.nhtinc.org.
Affordable Housing Grant Program http://www.usgbc.org/affordable/ USGBC offers grants to cover registration, verification, and certification fees associated with LEED certification for LEED projects that have at least 75 percent of units affordable to households at or below 80 percent of Area Median Income.			X		X		Apply for the USGBC Affordable Housing Grant Program on line at http://www.usgbc.org/affordable/.
Affordable Green Neighborhoods Grant Program http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2184 USGBC offers grants to developers and related public agencies that choose to pursue LEED for Neighborhood Development certification and demonstrate a commitment toward strengthening existing communities by providing affordable green housing to citizens with a range of income levels.			X		X	X	Apply for the USGBC Affordable Green Neighborhoods Grant Program on line at http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2184.
Private Funding Sources							
Utility Incentive Programs Offer financial incentives for installation of energy-efficient systems and equipment. These rebates, which are provided by utility companies, are available for a variety of energy-efficient products, including lighting, HVAC equipment, appliances, and energy management controls.		X	X		X	X	Contact your local utility to find out what programs are available/what measures they cover. The website, http://www.dsireusa.org, lists available energy efficiency and renewable energy incentive programs by state.

ATTACHMENT 4-2. TECHNICAL ASSISTANCE AND RESOURCES

Resources and technical assistance are available to the sponsors and owners of Section 202 and Section 811 projects. For those new to the process, these resources will help sponsors and owners make effective decisions about implementing energy efficiency and green building design into their projects. In addition to the value available in online resources, technical assistance from organizations, such as Enterprise Community Partners, or a consultant may be valuable in getting started.

Technical Assistance

A range of technical assistance options is available to sponsors and owners.

- Enterprise Green Communities provides a database of technical assistance (TA) providers by geography and area of experience, including integrated design, design review, energy services, healthy living environment, construction review, and green operations and maintenance. Learn more about the available TA providers by visiting http://tasearch.greencommunitiesonline.org/TASearch.aspx.
- The National Association of Home Builders (NAHB) Research Center has partnered with local Home Builder Associations to help their members develop green communities, build green residences, and remodel existing homes. Find participating builders, certified homes, accredited verifiers, and Certified Green Professionals by visiting http://www.nahbgreen.org/Certification/findlocalgreenprogram.aspx.

Resources

A variety of resources are available to assist sponsors and owners of Section 202 and Section 811 projects. The charts below describe a sample of resources related to energy efficiency and green standards, energy efficiency and green implementation guidance, and consumer green living guidelines.

Energy Efficiency and Green Standards[27]	
Resource	**Description**
EarthCraft House Guidelines and Support Documents http://www.EarthCrafthouse.com/resources/builder-guidelines.htm	Provides EarthCraft guidelines and worksheets for single-family residential house renovation, multifamily new construction and renovation, and communities.
Enterprise Green Communities Criteria and Criteria Checklist http://www.greencommunitiesonline.org/tools/criteria/index.asp	Contains the 2008 full criteria and requirements for Green Communities Criteria and a checklist for assisting in achieving the full criteria.
Enterprise Green Communities Single-Family Rehabilitation Specifications http://www.greencommunitiesonline.org/tools/resources/green_rehab_specs_gci_2008_criteria_final.pdf	Compiles model specifications used to integrate green building strategies in single-family rehabilitation projects. The specifications are designed to meet the 2008 Green Communities Criteria.
ENERGY STAR Qualified Homes http://www.energystar.gov/homes	Contains guidelines for ENERGY STAR qualified homes, the ENERGY STAR Partner Locator, and features and benefits of ENERGY STAR qualified homes.
EPA's Indoor airPLUS Program http://www.epa.gov/indoorairplus/	Provides technical guidance, web tools, verifier information, checklists, agreement forms, builder information, and construction specifications on EPA's Indoor airPLUS Program.
EPA's WaterSense Program http://www.epa.gov/WaterSense/	Includes product search, certification providers and builders, FAQs, savings calculator, and technical resources.
National Association of Homebuilders: Green Home Building Guidelines http://www.nahbgreen.org/NGBS/default.aspx	Includes the building guidelines, a Green Scoring Tool, Find a Verifier, Find a Participating Builder, and resources for building professionals, homeowners, verifiers, manufacturers, and for education and training.
U.S. Green Building Council: LEED for Homes http://www.usgbc.org/DisplayPage.aspx?CMSPageID=147	Contains the LEED for Homes rating system, project checklist, scope and eligibility guidelines, registration fees, certified project lists, multifamily mid-rise guidance, affordable housing, builder resources, green rater program, and green home guide.

27 See Appendix A: Recognized Energy Efficiency and Green Building Standards for more detailed information on each standard.

Energy Efficiency and Green Implementation Guidance	
Resource	**Description**
AIA Affordable Green Guidelines http://www.designadvisor.org/green_critera.html	Provides guidelines for including green building design into housing.
Build It Green: Guidelines and Checklists http://www.builditgreen.org/guidelines--checklists/	Includes guidelines, checklists, and manuals for green building in single-family and multifamily renovations and new construction. Also contains a green product directory, certified professional directory, and industry research and factsheets.
Green Capital Needs Assessments http://on-site-insight.com/files/Brochure-GCNA.pdf	Includes a protocol for a Green Capital Needs Assessment (GCNA), which combines a conventional 20-year Capital Needs Assessment with a comprehensive energy audit and detailed financial analysis of retrofit options.
Whole Building Design Guide: Federal Green Construction Guide for Specifiers http://www.wbdg.org/design/greenspec.php	Contains an index on the Construction Criteria Base and a guide with sample specification language.
Global Green: 2010 Green Building Criteria in Low-Income Housing Tax Credit Programs http://www.globalgreen.org/docs/publication-164-1.pdf	Includes a ranking and summary of green building trends in state Qualified Allocation Plans across four categories—smart growth, energy efficiency, resource conservation, and health protection.
LISC: Green Rehabilitation of Multifamily Properties http://www.lisc.org/content/publications/detail/7383	Contains advice on incorporating the green building principles of energy efficiency, water conservation, resource conservation, and healthy indoor environments into multifamily properties upgrades.
Southface Energy Institute http://www.southface.org	Contains a library of resources on building energy codes, commissioning, cost of green building, financial incentives, green building certifications, green building guides and manuals, green home resources, podcasts, white papers, and presentations.
American Society of Heating, Refrigerating, & Air Conditioning Engineers (ASHRAE) http://www.ashrae.org	A membership organization for heating and cooling contractors and engineers offering publications, continuing education, technical standards, and research.
Residential Energy Services Network (RESNET) http://www.natresnet.org	Contains a Certified Rater Directory of certified home energy raters by state.
NAHB Research Center http://www.nahbrc.com	Provides expertise in housing technology and residential construction.
Smart Communities Network http://www.smartcommunities.ncat.org	Includes information on building principles, building programs, rating systems, greening affordable housing, success stories, educational materials, publications, and resources.
Energy Efficiency and Renewable Energy http://www.eere.energy.gov	Contains information on home energy, building energy consumption data, high-performance building case studies, publications, and resources.
Building Green: Greenspec Directory http://www.buildinggreen.com	Provides information on more than 2,000 screened green building materials listed by CSI number within 250 categories.
The PATH Guide to Green Building http://www.pathnet.org/sp.asp?id=24934	Includes resources for low-impact green development, indoor air quality, resource-efficient plumbing, resource and waste management, and energy-efficient system integration.

Consumer Green Living Guidelines	
Resource	**Description**
Community Housing Partners: A Homeowner's Guide to Green http://www.communityhousingpartners.org/development/architectural_design/documents/604CedarHillDriveManual.pdf	A sample homeowner's manual providing information about the indoor and outdoor features of their home.
Community Housing Partners: Multifamily Resident Guide to Green http://www.communityhousingpartners.org/development/architectural_design/documents/WellesleyResidentGuidetoGreen.pdf	A sample resident's manual providing information about the indoor and outdoor features of their residence.
Consumer's Guide to Energy Efficiency and Renewable Energy http://www.energysavers.org	Provides homeowners information, resources, and tips for saving energy in their home, vehicle, and workplace.
ACEEE: Consumer's Guide to Home Energy Savings http://www.aceee.org/consumer	Contains a home energy checklist; FAQs; and resources on HVAC, lighting, refrigeration, electronics, laundry, cooking, and dishwashing.
USGBC: Green Home Guide http://greenhomeguide.com/	Includes Ask a Pro, Know How, Find a Pro Near You, directory listing, newsletter, blogs, and local activity.
National Center for Healthy Housing: Healthy Homes Maintenance Checklist http://www.hud.gov/offices/lead/library/hhi/Healthy_Housing_CheckList.pdf	Provides a checklist for when and how to maintain a healthy home.
National Geographic: Green Guide for Everyday Living http://www.thegreenguide.com/	Contains buying guides, calculators, resources, and tips for consumers.
LISC: Green Operations and Maintenance: Toolkit and Buyer's Guide http://www.lisc.org/content/publications/detail/8209	Provides an overview of why operations and maintenance staff should care about greening their facilities, as well as a green toolkit of products that could be incorporated into operations.
Living Efficiently http://livingefficiently.org	Contains resources and tips for consumers on how to save energy and money at home, work, school, and on the go.

APPENDIX

Building Energy Codes

IECC and ASHRAE 90.1

Building Energy Code Development

Building energy codes are minimum requirements for energy-efficient design and construction for new and renovated residential and commercial buildings. A component of a complete set of building regulations that govern all aspects of the design and construction of buildings, building energy codes set an energy-efficiency baseline for the building envelope, systems, and equipment. Improving these minimum requirements or broadening the scope of energy codes softens the environmental impact of buildings as well as generates additional energy and cost savings over the decades-long, or even centuries-long, life cycle of a building.

Baseline Codes: IECC and ASHRAE 90.1

Two primary baseline building energy codes may be adopted by states and local jurisdictions to regulate the design and construction of new buildings: the International Energy Conservation Code® (IECC), and the ANSI/ASHRAE/IESNA Standard 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings. The IECC addresses all residential and commercial buildings. ASHRAE 90.1 covers commercial buildings, defined as buildings other than single-family dwellings and multifamily buildings three or fewer stories above grade. The IECC adopted, by reference, ASHRAE 90.1; that is, compliance with ASHRAE 90.1 qualifies as compliance with IECC for commercial buildings.

- The IECC is developed under the auspices of the ICC. The IECC is 1 of 14 model codes developed under the auspices of the ICC that combined provide the foundation for a complete set of building construction regulations. The ICC codes are updated every 3 years, providing a model the jurisdiction can adopt as is, or modify. Because the IECC is written in mandatory, enforceable language, state and local jurisdictions can easily adopt, implement, and enforce the IECC as their energy code. Before adopting the IECC, state and local governments often make changes to reflect regional building practices, or state-specific energy-efficiency goals.
- ASHRAE 90.1 is developed under the auspices of the American Society of Heating, Refrigerating & Air Conditioning Engineers. Revisions in the development and maintenance of the standard occur on an ongoing basis and are not approved without achieving balanced consensus, or substantial agreement reached by directly and materially affected interest categories. Before adopting ASHRAE 90.1, state and local governments often make changes to reflect regional building practices, or state-specific energy-efficiency goals.

Code Collaboration

Both the IECC and ASHRAE 90.1 are developed, revised, and adopted in open public forums. The openness and transparency of these processes are critical to widespread acceptance of the end result. Stakeholders representing a cross-section of interests are involved in maintaining these documents; they include the following:

- The design community, including architects, lighting designers, and mechanical and electrical engineers.
- The code enforcement community, including building code officials, representatives of code organizations, and state and local regulatory agencies.
- Builders and contractors.
- Building owners and operators.
- Manufacturers for the building industry.
- Utility companies.
- Energy advocacy groups.
- The academic community.
- Federal agency staff, including the Building Energy Codes Program.

Code maintenance relies on collaboration for a successful outcome. Collaboration keeps these documents current with technological, economic, and policy concerns, giving each stakeholder an opportunity to participate in updating and maintaining the codes. This focus of building industry resources at the national voluntary level is critical to a balanced and fair process, addressing such issues as market viability, industry fairness, and construction costs, to name just a few. Without the ICC, ASHRAE, or other organizations, each federal agency, state agency, or local government agency would need to conduct the development of similar provisions themselves. Aside from the countless resources required, the uniformity of codes across jurisdictions—so critical for the building industry—would be sacrificed. Building science and building energy efficiency are just two considerations in designing code changes. Energy codes and standards are compromise documents forged from a wide range of issues and concerns.

Beyond-Code Programs

Progressive states and local jurisdictions with a focus on energy efficiency and/or sustainability are increasingly building on the baseline building energy codes and adopting beyond-code programs, either as their minimum codes or as a component of a program that provides incentives to those that comply. The programs are referred to in various terms–beyond-code programs, green building programs or codes, stretch codes, and above-code programs. What they have in common as a key component is building energy efficiency; they may have more

rigorous requirements than minimum energy codes and/or address additional issues not covered in the energy codes.

Designers, builders, plan reviewers, inspection staff, and all interested parties still need to thoroughly understand the underlying baseline energy code when working with a beyond-code program. Most beyond-code programs use the IECC and/or ASHRAE 90.1 as a baseline, with additional requirements beyond that. Some of these beyond-code programs are discussed below.

Energy Efficiency and Green Building Standards — Additional Resources

ENERGY STAR®

Single-family homes and units in multifamily buildings with three or fewer stories are eligible to earn the ENERGY STAR label. In 2010 ENERGY STAR released a revised set of program requirements called Version 3. Version 3 includes additional requirements for high-efficiency equipment and products to ensure these elements are more consistently included in all ENERGY STAR qualified homes. It includes the use of a size adjustment factor to reduce the carbon emissions of larger homes. Version 3 also requires the completion of new inspection checklists for thermal enclosure systems, HVAC system quality installation, and water management systems. These new checklists enhance the quality control of the verification process and ensure a comprehensive building science approach to cost effective energy efficiency.

ENERGY STAR Qualified Homes

- Resources for ENERGY STAR Partners—New Homes

  http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_partner_resources

  Find marketing, technical, and educational resources

- New Homes Partner Locator:

  http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.locator

  Search for ENERGY STAR builders, available incentives, raters, and lenders in your state.

- ENERGY STAR Partner List:

  http://www.energystar.gov/index.cfm?fuseaction=estar_partner_list.showPartnerSearch

  Search for ENERGY STAR partners by name, location, and/or partner type.

- ENERGY STAR Training Center:

  http://www.energystar.gov/index.cfm?c=pt_univ.pt_univ

  Find tools and information to help you convey to your staff, customers, or business partners how ENERGY STAR can help them protect the environment while saving energy and money.

- ENERGY STAR Partner Resource:

  http://www.energystar.gov/index.cfm?c=partners.pt_index

  Find resources on all aspects of the ENERGY STAR program.

- Products and Program Requirements:

  http://www.energystar.gov/index.cfm?c=partners.pt_products_and_program_reqs

  Review ENERGY STAR product and program requirements reference guides, which also direct you to related trainings and resources.

EPA's WaterSense® Program

- WaterSense Product Search:

  http://www.epa.gov/WaterSense/product_search.html

  Search by category, brand, model name, and/or model number for WaterSense products

- WaterSense Rebate Finder:

  http://www.epa.gov/WaterSense/rebate_finder_saving_money_water.html

  Search for money saving rebates for WaterSense labeled products and services from WaterSense partners in your area.

Enterprise Green Communities Initiative

Enterprise Green Communities provides funds and expertise to enable developers to build and rehabilitate homes that are healthier, more energy efficient and better for the environment -- without compromising affordability. Enterprise Green Communities also assists state and local governments to ensure their housing and economic development policies are smart and sustainable.

- Funding and Financing:

  http://www.greencommunitiesonline.org/tools/funding/

  Learn more about Enterprise's comprehensive array of funding options for interested developers, including grants, loans, low-income housing tax credit equity, and green "mini" loans.

- Technical Assistance Providers Database:

  http://tasearch.greencommunitiesonline.org/

  Search for technical assistance providers by area of experience and geography.

- Training and Events:

  http://www.greencommunitiesonline.org/tools/training/

  Register for events, conferences, and trainings (both on line and in person) to learn more about "greening" affordable housing and related issues.

- Online Discussion Forum:

  http://forum.greencommunitiesonline.org/.

  Share with and learn from others who are working on green affordable housing projects.

National Association of Home Builders (NAHB) Green Building Standard and Certification

Find resources for building professionals, homeowners, verifiers, manufacturers, and education and training. *http://www.nahbgreen.org/Overview/default.aspx*

- NAHB Green Scoring Tool:

  http://www.nahbgreen.org/ScoringTool.aspx

  Use this free online tool for a step-by-step interactive guide through the NAHB Model Green Home Building Guidelines and the ICC 700-2008 National Green Building Standard. Score your project with an easy to use "wizard" and generate summaries and reports to assess your progress.

- Green Approved Products:

  http://www.greenapprovedproducts.com/

  Find products that the NAHB Research Center has approved as being eligible to contribute points toward certification of a building under the National Green Building Standard.

- Local Green Building Program Locator:

  http://www.nahbgreen.org/Certification/findlocalgreenprogram.aspx

  Search for a local Home Builder Association that has partnered with the NAHB Research Center to help their members develop green communities, build green residences, and remodel existing homes. Find participating builders, certified homes, accredited verifiers, and Certified Green Professionals at *http://www.nahbgreen.org/Certification/findparticipatingbuilder.aspx*

Leadership in Energy and Environmental Design (LEED)

Find green building research, LEED project profiles, LEED project case studies, and presentations from webcasts, conferences, and other events. Also find resources related to K-12 and higher education, commercial real estate, and neighborhood development. *http://www.usgbc.org/Resources/*

- LEED-Online:

  http://www.gbci.org/main-nav/building-certification/leed-online/about-leed-online.aspx

  Use this online tool to manage project details, complete documentation requirements for LEED credits and prerequisites, upload supporting files, submit applications for review, receive reviewer feedback, and ultimately earn LEED certification.

- Affordable Housing Grant Program:

  http://www.usgbc.org/affordable/

  Apply for a grant to cover registration, verification, and certification fees associated with LEED certification for LEED projects that have at least 75 percent of units affordable to households at or below 80 percent of area median income (AMI). The Home Depot Foundation funds this grant.

- Affordable Green Neighborhoods Grant Program:

  http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2184

  Apply for financial and educational resources to help remove barriers toward the pursuit of LEED for Neighborhood Development projects, which include affordable green housing components in their neighborhood plans. The grant program is open to developers and related public agencies that choose to pursue LEED for Neighborhood Development certification and demonstrate a commitment toward strengthening existing communities by providing affordable green housing to citizens with a range of income levels. Bank of America funds this grant.

- LEEDuser:

  http://www.leeduser.com/

  Get advice and tips written by professionals in the field on applying LEED credits and the LEED certification process. LEEDuser is a third-party resource not affiliated with USGBC or the Green Building Certification Institute (GBCI).

EarthCraft House

- Builder's Corner Resources:

  http://www.EarthCrafthouse.com/builderscorner/builderscorner.htm

  Find training events and materials, builder listings, guides, forms, and other resources for EarthCraft House builders and renovators.

- Trainings:

  http://www.earthcrafthouse.com/About/communities.htm#Services

  Each development participating in the EarthCraft Communities program is to host the following trainings provided to them within the EarthCraft Communities program as part of the certification process. Trainings for three different audiences help integrate sustainability more holistically into the development and surrounding community:

  – EarthCraft Communities and EarthCraft House Realtors.

  – EarthCraft Builders.

  – EarthCraft Post-Occupancy Home Owners

- Fact Sheets and Technical Bulletins:

  http://www.EarthCrafthouse.com/resources/factsheets.htm

  Access fact sheets on energy and building science topics and technical bulletins co-authored by the U.S. Department of Energy (DOE).

Build It Green: GreenPoint Rated

GreenPoint Rated is a program of Build It Green, a membership supported nonprofit organization whose mission is to promote healthy, energy- and resource-efficient homes in California. Build It Green offers a comprehensive package of local government support, professional training, collaboration forums, consumer education, and green product marketing to a range of stakeholders.

GreenPoint Rated offers two rating systems, one for new homes and one for existing homes. A developer works with a Certified GreenPoint Rater—a third party verifier—to evaluate a home's green features, allowing a home to be compared with similar homes. Bringing in a Certified GreenPoint Rater into the design process early, for new or existing homes, can help to determine which green measures to incorporate. A home is rated in the following five categories: Resource Conservation, Indoor Air Quality, Water Conservation, Community, and Energy Efficiency.

For new homes, to receive the GreenPoint Rated label, the minimum score in each category must be met, in addition to scoring at least 50 points on the Single-family or Multifamily GreenPoint Rated Checklist. The existing homes program is based on the new homes program point-based system, with differences for single-family and multifamily buildings. An existing building may receive the GreenPoint Rated Elements or Whole Building label, depending on specific factors of the project and the extent of the renovation.

For more information, visit Build It Green's GreenPoint Rated website at http://www.builditgreen.org/greenpoint-rated/.

- Certified GreenPoint Rated Advisor or Rater Directory:

  http://www.builditgreen.org/greenpoint-rated/find-rater/

  Contact a local Certified GreenPoint Rated Advisor or Rater to learn more about rating a project.

- Green Building Guidelines, Manuals, and Checklists:

  http://www.builditgreen.org/guidelines--checklists/

  Access resources related to green building and the GreenPoint Rated program.

- Local Government Resources:

  http://www.builditgreen.org/local-government/

  Find information for local governments seeking to develop, promote, and implement green building policies and programs, including GreenPoint Rated.

Built Green

- Case Studies and Virtual Tours:

  http://www.builtgreen.net/studies.html

  Learn about other builders and communities that have implemented features chose from hundreds of items on the Built Green checklists.

- Built Green Links:

  http://www.builtgreen.net/links.html

  View Built Green's list of websites that provide information on building "green."

U.S. Department of Housing and Urban Development
Office of Policy Development and Research
Washington, DC 20410-6000

February 2011