

**U.S. Department of Housing
and Urban Development**

**PROGRESS REPORT AND
ENERGY ACTION PLAN
REPORT TO CONGRESS**

**Section 154
Energy Policy Act of 2005**

December 2012



**Affordable Green:
Renewing the Federal Commitment to Energy-Efficient, Healthy Housing**





U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

WASHINGTON, DC 20410-0001

I am pleased to submit this progress report on the Department of Housing and Urban Development's energy plan, as required under Section 154 of the Energy Policy Act of 2005. This report provides an update on HUD's progress in addressing energy costs in federally assisted housing.

Energy efficiency, and more broadly green building, continues to be a top priority at HUD. We know that energy-efficient homes can be more affordable, durable, comfortable, and in many cases healthier than less efficient homes, and I am especially concerned about the burden of energy costs on low- and moderate-income renters and homeowners.

That is why I am proud to highlight the work this Department has done to reduce energy costs in its housing portfolio since 2009, both with American Recovery and Reinvestment Act dollars and through ongoing HUD programs. Working closely with the Department of Energy, HUD has taken unprecedented steps to both strengthen cost-effective successes and implement new initiatives throughout the Department's portfolio of public and assisted housing.

HUD's work in public and assisted housing continues. HUD's updated energy action plan, as outlined in this report, details 18 separate actions the Department will take to lower energy use – and costs – in federally assisted housing. Recognizing the challenges that our Nation's continuing economic recovery presents, HUD will support energy efficiency and green building approaches that our partners can take to scale.

I look forward to continuing implementation of HUD's energy strategy as discussed in this report, continued compliance with congressional requirements, and strengthening interagency partnerships with our federal partners to address the key energy challenges facing our Nation.

A handwritten signature in black ink, appearing to read "Shaun Donovan", is written over a horizontal line.

Shaun Donovan

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High Point Green HOPE VI Project, Seattle Housing Authority, Seattle, Washington

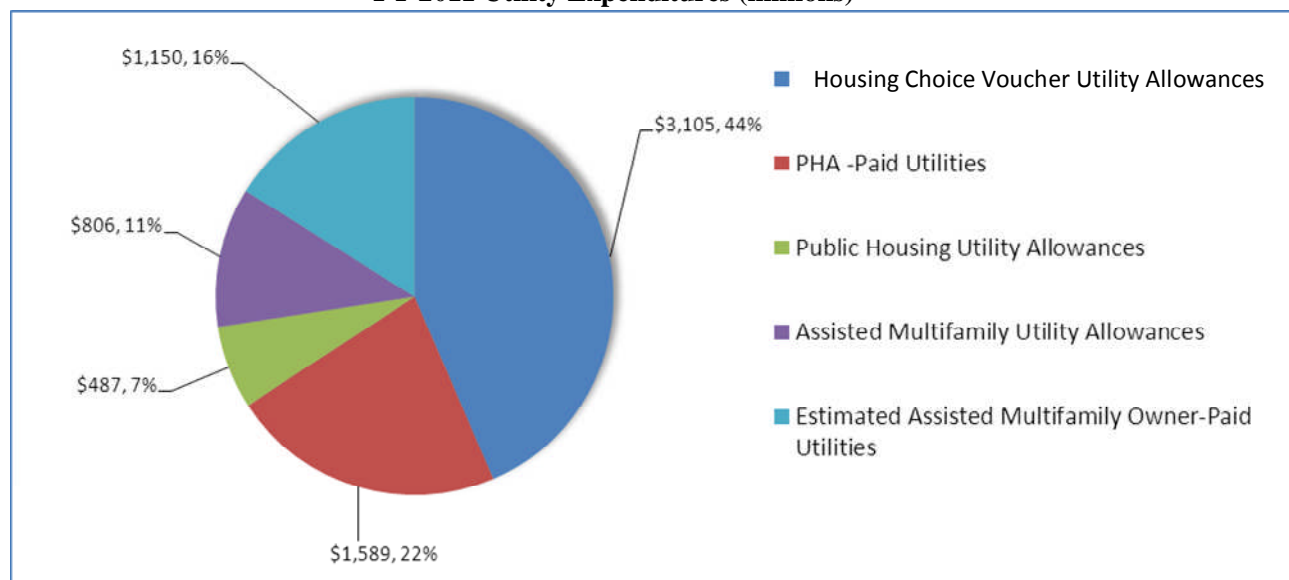
EXECUTIVE SUMMARY

As required by the Energy Policy Act of 2005, this report outlines actions HUD has taken to promote energy efficiency in its housing stock, and a strategy for increasing the energy efficiency of affordable housing through the programs and policies that HUD administers. The strategy outlined in this report defines HUD's energy efficiency agenda in 2012 and 2013, which is also described in HUD's Fiscal Year (FY) 2012-13 Annual Performance Goal for energy efficiency and green building.

Energy efficiency is central to HUD's mission because more energy-efficient homes, when combined with green building practices, are also likely to be more durable, comfortable, affordable, and healthy. Energy-efficient homes also have important environmental benefits: they require less energy use and generate fewer greenhouse gas emissions.

Overall, utility costs in HUD-assisted and public housing increased by 4.9 percent since 2009. Reducing these rising costs – generating savings for residents and owners, as well as for taxpayers – is a key HUD priority. Total expenditures on utilities – both energy and water – in public and assisted housing are estimated at \$7.1 billion in FY 2011, with HUD's share of the total estimated at \$6.4 billion. Of these expenditures, an estimated \$3.1 billion (44 percent), were in the form of Housing Choice Voucher utility allowances; \$1.59 billion (22 percent), were through public housing operating grants; \$1.15 billion were estimated expenditures in assisted multifamily housing; and another \$1.29 billion (18 percent) were through utility allowances for tenant-paid utilities in public and assisted housing.¹

FY 2011 Utility Expenditures (millions)²



¹ In no case does HUD pay utilities directly; these funds are expended by HUD through grants to public housing authorities (PHAs) or through payments to property owners or renters, who utilize these funds to pay for tenant- or owner-paid utilities. Note that of the \$3.1 billion reported in utility allowances for Housing Choice Vouchers, we estimate HUD subsidizes some 76% of the total.

² See Tables 1-6 in the body of this report for the source of these data; the data are drawn from a variety of HUD databases, as specified in these tables.

In the period between the start of FY 2009 and the end of FY 2011, HUD took the following actions to increase the energy efficiency and health of affordable housing:

Annual Performance Goal and Recovery Act Investments

- Established a 2-year Annual Performance Goal to conduct energy-efficient, healthy retrofits and new construction of 159,000 affordable units for FYs 2010-11 as well as FYs 2012-13.
- For the FY 2010-11 period, the Department exceeded this goal with more than 201,000 units reported. Of these, 161,000 units were retrofits of existing HUD-assisted or new green units, and another 40,000 units received lead hazard abatements or healthy homes improvements.
- Counted the energy retrofits accomplished in the FY 2010-11 period (161,000 units) toward a joint HUD-Department of Energy (DOE) retrofit goal. Through FY 2011, HUD and DOE reported completing 944,500 energy retrofits. As of the first quarter of FY 2012, retrofits completed by the two agencies exceeded 1 million (1.09 million) units.
- Leveraged the American Recovery and Reinvestment Act (Recovery Act) to invest in improving the energy performance of another 221,000 public and Indian housing units with at least one energy efficiency or green measure.³

Incentives for Energy-Efficient, Healthy Housing

- Expanded financing, increased technical assistance, and strengthened incentives or basic energy requirements to advance greater energy efficiency in HUD's core programs, including HUD's ongoing formula and grant programs, mortgage loan insurance, and public housing investments.

Streamlined Partnerships with DOE

- Partnered with DOE to streamline the eligibility process for HUD-assisted multifamily housing, which resulted in increased access to funding under DOE's Weatherization Assistance Program, which received an unprecedented \$5 billion appropriation under the Recovery Act.

Innovative Financing Tools

- Launched the PowerSaver pilot program to provide Federal Housing Administration (FHA) insured loans for homeowners to invest in home energy improvements and solar energy.
- Created the multifamily Energy Innovation Fund to spur innovation in financing or overcoming barriers to energy efficiency in the multifamily sector.

New Office of Sustainable Housing and Communities

- Created a new Office of Sustainable Housing and Communities to assist in supporting the Department's energy efficiency, green building, and sustainable development activities across program and field offices.

³ Through 4th Quarter, FY 2011. These additional units were units reported by PHAs through the Recovery Act Management and Performance System (RAMPS) as receiving at least one energy or green measure, but did not qualify as energy "retrofits" for the purpose of HUD and DOE's joint energy retrofit goal.

Building on this progress, HUD has established an updated energy efficiency strategy, encompassing water and sewer efficiency, which relies on the use of HUD's existing authorities and does not require additional taxpayer funding. In FY 2013, HUD will:

- ***Create Incentives for Private Investment:*** New forms of financing will be made available through FHA to provide low-cost loans for retrofits of single-family homes (through the new FHA PowerSaver pilot program) and multifamily apartments (such as Green Refinance Plus), along with expanded use of Energy Performance Contracts (EPCs) in public housing.
- ***Develop Tools to Support Smarter Decisions:*** Includes expanded approaches for integrating cost-effective utility improvement recommendations as part of refinance and rehabilitation transactions, and for more accurate benchmarking of utility costs and consumption in public housing.
- ***Expand Training and Technical Assistance to Key Stakeholders:*** Implements a comprehensive new program to provide training in energy efficiency and green building through HUD's "core curriculum," as well as support for PHAs and multifamily apartment owners and other HUD partners to receive certification as leading sustainable organizations, and to receive project-based technical assistance.
- ***Strengthen Data Collection and Reporting to Support Market-Based Action:*** Includes rigorous analysis of program performance, market impacts, and utility savings, as well as better tracking methodologies and systems extended through longer-term research to achieve an efficient allocation of HUD's finite resources across its investment portfolio.
- ***Implement Federal Statutes and Provide Regulatory Flexibility:*** HUD will implement federal statutes on energy standards and codes for HUD-assisted properties, while providing HUD partners with the flexibility they need to ensure they can meet these standards, in order to accelerate market acceptance and help ensure that policy goals are achieved.
- ***Strengthen Interagency and Private Sector Partnerships:*** HUD will continue to partner with DOE and the Environmental Protection Agency (EPA) to coordinate access to federal resources, and establish uniform approaches to energy efficiency and green building in the residential sector. HUD will also explore partnerships with investor-owned, municipal, and rural electric utilities to identify resources that can be leveraged for HUD-assisted housing.

Energy Savings in the Robert C. Weaver Building

In addition to its work supporting energy efficiency in affordable housing, HUD awarded an Energy Savings Performance Contract (ESPC) for the Robert C. Weaver Building, HUD Headquarters. Through this alternative financing mechanism, the Department will achieve approximately \$34 million worth of energy and water conservation improvements without having to provide its own upfront capital. The energy services company, Honeywell, provides this outlay and recoups its investment over time through energy savings.

Features of the ESPC project will consist of major building system and equipment upgrades. This will include items such as: window replacement; building wide lighting upgrades; plumbing fixture retrofits and replacements; a new Energy Management Control System (EMCS), installation of a new highly efficient hot water heating plant and major HVAC improvements

Key benefits of the project include: meeting energy reduction goals as mandated by Executive Orders 13423 and 13514; improved indoor air quality; achieving Leadership in Energy and Environmental Design (LEED) certification; and reducing the building's carbon footprint by nearly 50%. Project implementation began in mid-November 2010 with lighting and water upgrades which are complete. Currently, the project is nearing 50% completion for the major HVAC improvement work being completed within the Weaver Building office spaces. The entire project is expected to be complete in 2014.

Note on Utility Data

Water and Energy Expenditures. Throughout this report, the term “utilities” is used to indicate combined energy, water, and sewer expenses, as these expenses are often reported together in HUD programs. Where separate water and sewer data are available (public and Indian housing, and owner-paid utilities in assisted multifamily housing), we show energy expenditures separately, often by fuel source (electricity, natural gas, heating oil).⁴ HUD does not have a separate breakout for water expenditures through utility allowances for tenant-paid utilities.

Water and sewer charges represent a significant area of utility expenditure – and potential savings – in HUD-assisted properties. In public housing, \$500 million expended on water represents almost one third of the \$1.6 billion in outlays for utility expenditures; in multifamily assisted housing, the reported expenditures on water of \$348 million represent one-third of the total reported owner-paid utility expenditures of \$1.15 billion. The combined total of \$848 million reported in water and sewer charges in public and assisted housing represent an important cost-savings target, since reductions in water usage will yield cost savings both in water charges as well as in lower energy bills for reduced hot water consumption. High-efficiency showerheads and other water-savings equipment, including those labeled by the EPA WaterSense program, are typically relatively low-cost investments that yield rapid paybacks and returns on investment.

Reporting Period. The 2011 data presented in this report represents the most complete utility expenditure data reported and available to HUD in 2011. Appendix G describes the actual consumption periods covered in these reports. For Public and Indian Housing, the data reported is for the “Cycle 11” reporting period, which covers varying public housing fiscal years, ranging from FY 2009, Quarter 1 through FY 2010, Quarter 3.

⁴ Separate owner-paid water and sewer expenditures are available for public housing and for assisted multifamily housing.

1. INTRODUCTION

Section 154 of the Energy Policy Act of 2005 requires HUD to “develop and implement an integrated strategy to reduce utility expenses through cost-effective energy conservation and efficiency measures and energy-efficient design and construction of public and assisted housing [and] include the development of energy reduction goals and incentives for public housing agencies.” The Act also requires HUD to update Congress every 2 years.⁵ The Act further requires HUD to take other actions related to energy efficiency, which are referenced in this report and summarized in Appendix A.

1.1 Energy Efficiency as a Departmental Priority

Energy efficiency is a priority for HUD. As the nation’s affordable housing and community development agency, HUD has a strong interest in more energy-efficient homes, which are more affordable for residents, more cost effective for owners to operate, and, when combined with green building practices, are also likely to be more durable, more comfortable, and healthier. Energy-efficient homes also have important energy and environmental benefits: they result in less energy use, they reduce air pollution, and they lower greenhouse gas emissions. Finally, by increasing energy efficiency in HUD-assisted and public housing, HUD can reduce the energy bills for HUD-assisted and public housing, spending taxpayer funds more efficiently and effectively.

For these reasons, HUD’s Strategic Plan includes a new mission statement for the Department: “Create strong, sustainable, inclusive communities and quality, affordable homes for all.”⁶ The plan identifies energy efficiency as a key strategy in advancing HUD’s mission, committing the Department to supporting and promoting an energy-efficient, green, and healthy housing market by retrofitting existing housing, supporting energy-efficient new construction, improving home energy labeling, and promoting financing products that reduce the carbon footprint of non-HUD-supported residential buildings.

In addition, the Department for the first time has established a specific goal for energy efficiency. As one of four Departmental High Priority Performance Goals for FYs 2010-11, HUD committed to complete cost-effective energy retrofits of an estimated 126,000 HUD-assisted and public and Indian housing units and make broader green and healthy retrofits of an additional 33,000 housing units. As a share of the HUD portfolio, this accounts for more than 6 percent of HUD-assisted housing units.

HUD also has established a new Office of Sustainable Housing and Communities. One of the office’s principal functions is to support the development of policies that expand energy efficiency in HUD-assisted and public housing, as well as market-rate homes. Within HUD, the Office of Sustainable Housing and Communities is assigned overall responsibility for developing the Department’s energy strategy, in consultation with HUD’s program offices. The Office also supports the newly formed Partnership for Sustainable Communities with the Department of Transportation and the U.S. Environmental Protection Agency, which helps communities lower transportation energy costs.

⁵ The two prior reports can be located as follows: The 2006 report, *Promoting Energy Efficiency at HUD at a Time of Change*, is available at www.huduser.org/portal/publications/destech/energyefficiency.html. The 2008 report, *Implementing HUD’s Energy Strategy*, is available at www.huduser.org/portal/publications/destech/energyefficiency_08.html.

⁶ U.S. Department of Housing and Urban Development, *HUD Strategic Plan FY 2010 – FY 2015* is accessible at http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_4436.pdf.

1.2 The Opportunity for HUD Leadership

HUD's leadership responsibilities for increasing energy efficiency in the built environment are grounded in the sizable annual utility expenditures supported by HUD's programs – nearly 13 percent of the Department's current annual budget – and the significant role that HUD programs play in affordable housing residential financing markets and in our nation's communities.

HUD spends approximately \$6.4 billion annually on utility costs for affordable housing properties and households. This level of expenditure on utilities is substantial, and improving the energy performance of HUD assets is material to reducing these energy-related outlays.

HUD's public housing and assisted multifamily programs support nearly 5 million units of housing. Federal stewardship over these affordable housing resources establishes important obligations to support actions that ensure these assets do not pose undue energy burdens on low-income households or act as impediments to state and local efforts to reduce greenhouse gas emissions.

HUD also has a significant presence in residential financing markets. At the end of FY 2010, HUD had almost 6.3 million residential units in its insured single-family mortgage portfolio, valued at more than \$898 billion.⁷ In recent years, the share of homes purchased and refinanced with FHA mortgage insurance has substantially increased, reaching a high of more than 30 percent of home purchase transactions and 20 percent of all residential lending transactions in 2009.⁸

Federal leadership in improving energy efficiency is particularly important because new state and local building codes and green building standards, while providing an important means for reducing energy consumption and promoting sustainability in new buildings, generally do not address energy performance in existing buildings.

There is substantial evidence that no- and low-cost energy efficiency improvements can generate immediate financial and energy savings. There is also evidence that deeper energy savings are achievable from relatively modest investments with short payback periods. Research and a growing body of experience on the ground suggests that new construction, as well as rehabilitation of existing properties, can achieve significant reductions in energy use and cost for only marginally higher costs.⁹

The extent to which future energy savings can be reliably underwritten and lent against (without significant continuing subsidies) to pay for the cost of energy improvements remains unclear. Beyond the technical potential of building energy efficiency are a host of real-world implementation challenges that have been extensively documented over several decades. HUD believes that it is reasonable to assume at this stage that, for some borrowers and some properties, it should be possible to finance more energy-

⁷ U.S. Department of Housing and Urban Development, *FHA Business Activity, Monthly Report to the Commissioner*, September 2010

⁸ U.S. Department of Housing and Urban Development, *FHA-Insured Single-Family Mortgage Originations and Market Share Report 2011 – Q3*. Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=fhamktq3_11.pdf. Market shares for home purchases and refinancing declined in 2010 and 2011, to 15.6 percent in 2011, but remain at historically high levels compared to pre-2008 figures.

⁹ See, for example, HR&A Associates with Steven Winter Associates, *Recognizing the Benefits of Energy Efficiency in Multifamily Underwriting*, January 2012.

efficient homes with future projected energy savings. HUD is committed to working with stakeholders to explore what is practical and achievable in this area, starting with an analysis of data from pilot programs. The opportunity to increase energy efficiency in HUD-assisted, public and Indian housing, as well as in unsubsidized market-rate housing, is not limited by the extent to which savings can finance the entire cost. There are many opportunities that can be captured at various points in the life cycle of all residential buildings: when they are first built, as part of regular maintenance, at the time of significant capital investments, when an underlying mortgage is refinanced, and throughout the occupancy period as appliances and systems are replaced. Substantial private capital from lenders, investors, homebuilders, community developers, homeowners, and multifamily property operators, is invested in each of these phases – even in today’s difficult economic environment. HUD believes it is critical to harness all available opportunities to make every HUD-assisted residential building more energy-efficient.

HUD’s updated Energy Action Plan for 2012-13 described in Section IV of this report reflects the reality of a challenging fiscal environment at the federal, state, and local levels: HUD’s agenda does not require new congressional appropriations. In fact, HUD expects that its Energy Action Plan will save taxpayers money through more efficient and effective use of public funds. Instead of seeking new funding from Congress, HUD will utilize existing administrative authority, staff capacity, and public-private partnerships when feasible to advance energy efficiency in public and assisted housing. HUD’s priority will be to provide incentives and information to facilitate more energy-efficient housing.

1.3 This Report

This report is organized into four sections.

- **Section I:** Describes the importance of HUD’s leadership on energy efficiency, and the organization of this report.
- **Section II:** Summarizes utility costs in HUD-assisted and public housing.
- **Section III:** Summarizes HUD’s accomplishments in increasing energy efficiency in HUD-assisted and public housing, building on investments made possible by the Recovery Act as well as through HUD’s ongoing programs. It also includes program data and case study examples of how HUD programs and policies are achieving results.
- **Section IV:** Provides the strategic framework for HUD’s energy efficiency agenda for 2012 and beyond. It describes the strategies that will guide the Department’s efforts and signature initiatives that will be the focus of attention.

While this report’s primary audience is Congress, this report will also be a resource for HUD stakeholders working to increase energy efficiency in affordable housing. HUD welcomes public comment on the report from any interested party. Please direct comments to energyaction@hud.gov.

2. ADDRESSING UTILITY COSTS IN AFFORDABLE HOUSING

HUD's commitment to energy efficiency and green building is driven by three key factors: the cost to HUD and the federal taxpayer of utility costs in federally assisted housing;¹⁰ the energy burden borne by low-income households, who pay a disproportionate share of their incomes on utilities; and the environmental impact of energy use in the residential sector, which accounts for 20 percent of carbon emissions in the United States.

2.1 The Cost of Utilities in Public and Assisted Housing

HUD's programs support a diverse portfolio of multifamily and single-family housing. HUD's public housing and multifamily-assisted programs support nearly 5 million units of housing.¹¹ They include 1.1 million public housing units, 1.4 million units of privately owned assisted housing, and 2.2 million rental units supported with tenant-based Section 8 vouchers.

Table 1 – Combined Estimated Owner- and Renter-Paid Utility Expenditures – All Programs (Includes Water and Sewer Charges)				
Year Reported	2007 (\$ millions)	2009 (\$ millions)	2011 (\$ millions)	Increase over 2009 (percent)
Public Housing				
PHA-Paid Utilities	\$1,429	\$1,530	\$1,589	3.86%
Energy	\$1,011	\$1,090	\$1,055	- 3.21%
Water	\$309	\$315	\$348	10.47%
Utility Allowances	\$421	\$471	\$487	3.40%
Assisted Multifamily Housing				
Estimated Owner-paid Utilities	\$1,062	\$1,170	\$1,150	-1.71%
Energy	N/A	N/A	\$796	N/A
Water	N/A	N/A	\$283	N/A
Utility Allowances	\$662	\$735	\$806	9.66%
Section 8 Vouchers				
Utility Allowances	\$2,500	\$2,896	\$3,105	7.22%
TOTAL UTILITIES	\$5,012	\$6,802	\$7,137	4.93%
Total Energy (Without Water/Sewer)	NA	NA	\$6,289	NA

Sources: For Public Housing PHA-Paid Utilities, see Table 2, below. 2010-2011 PHA-paid utilities are from financial statements for the Cycle 11 reporting period, covering fiscal years ending 9/30/09 and subsequent quarters through 6/30/10; for Assisted Multifamily Housing, Owner-Paid Utilities, see Table 4, below. For Utility Allowances, see Table 7 below.

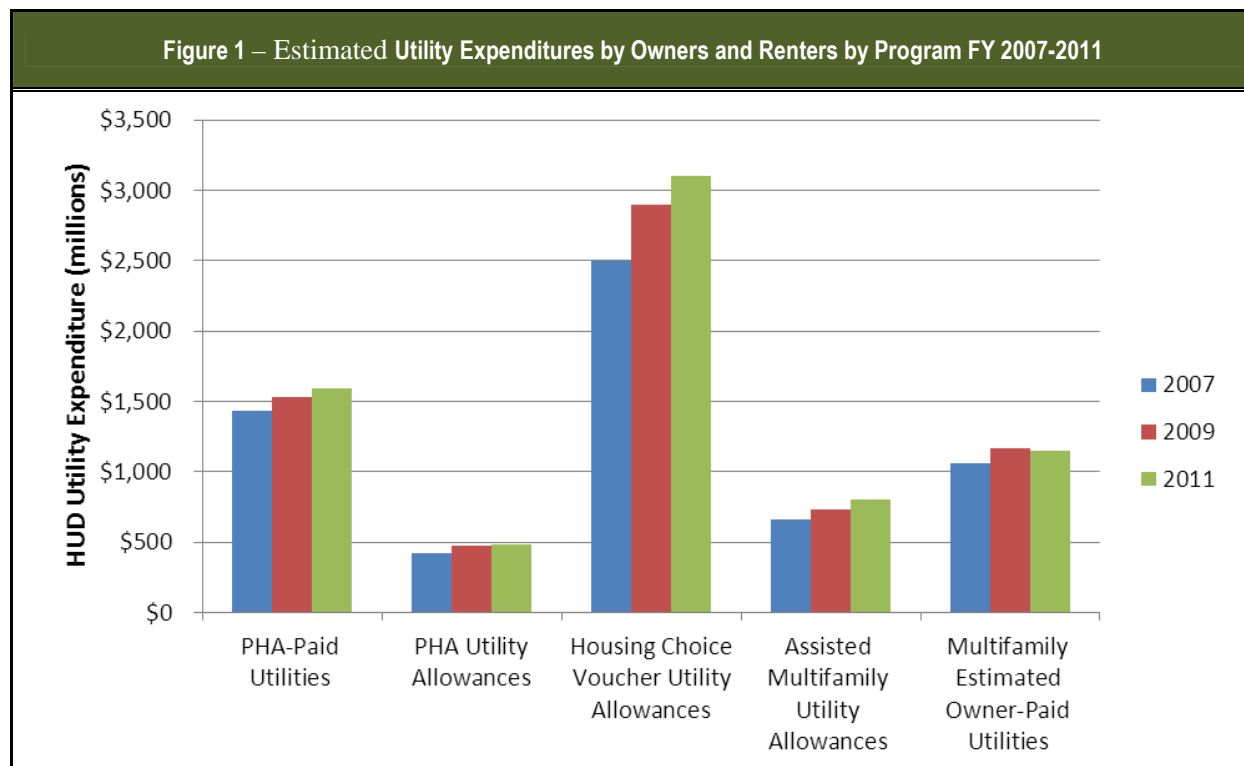
As summarized in Table 1, above, total annual utility expenditures in HUD-assisted and public housing

¹⁰ Utility expenditures include both water and energy costs.

¹¹ U.S. Department of Housing and Urban Development, Office of Policy Research and Development, *A Picture of Subsidized Households 2008*, February 2010.

exceed \$7.1 billion. We estimate that of this total, HUD outlays through operating grants or rental assistance are approximately \$6.4 billion.¹²

Overall, utility costs in HUD-assisted and public housing have increased by 4.93 percent since 2009.¹³ Changes in utility expenditures over time are shown in Figure 1 below, by program. (Utility costs included here encompass expenditures reported in 2011 for all program areas. HUD provides PHAs with flexibility in determining their fiscal years and data reporting, which leads to a lag in data collected for this report, as described in Appendix G.)



Discussion of each of these utility expenses follows below. The discussion is divided into three sections: master-metered (owner-paid) utility expenditures in public housing; master-metered utility expenditures in privately-owned assisted housing; and individually metered utilities that are paid for by renters who receive utility allowances financed through one of HUD's rental assistance programs.

¹² An analysis by HUD's Office of Policy Development and Research of 1.7 million housing vouchers administered by non-Moving to Work (MTW) agencies for which HUD has detailed data shows that HUD pays for an estimated 76% of utility allowance expenditures through the Housing Choice Voucher (HCV) program. Accordingly, of the \$3.1 billion shown in Tables 1 and 7 for HCV utility allowance expenditures for both MTW and non-MTW properties, 76 percent or \$2.36 billion is assumed to be paid for by HUD, with the remaining 24% (\$743 million) paid for by residents. Therefore of the \$7.1 billion in estimated expenditures on utilities in public and assisted housing, \$6.4 billion are estimated to be included in HUD's budget. (For utility allowances in public housing and project-based assisted multifamily housing, we assume the full cost of the utility allowance is subsidized by HUD.)

¹³ Note that the total for tenant-paid utilities is an estimate of tenant-paid utility expenditures. As discussed further in Section 2.1.3, for tenant-paid utilities, we use utility allowances as a proxy for actual tenant-paid utility expenditures, which are not reported to HUD. Note also that these figures do not include *owner-paid* utilities that may be paid for by HUD through Housing Assistance Payments to owners in the Housing Choice Voucher program, since information on owner-paid utilities in HCV properties is not reported to HUD.

2.1.1 Public Housing: Utility Expenditures Account for 22 Percent of Operating Costs

Master-metered utilities in public housing account for 22.3 percent of HUD's total utility expenditures. Approximately 1.1 million households live in public housing. HUD assistance is provided through 3,088 Public Housing Authorities (PHAs), primarily through annual grants for capital expenditures and operating costs. The most recent period covered by this report is Cycle 11, covering PHAs whose fiscal years ended between September 30, 2009, and June 30, 2010.¹⁴ As shown in Table 2, PHA-paid utility expenditures reported for public housing in 2011 were \$1.59 billion, up from \$1.53 billion reported in 2010 (Cycle 10), less than a 1 percent increase. After adjusting the total for occupied units, the per-unit-month expenditure (PUM) in 2011 was \$121.64, a decrease of less than 1 percent (0.24 percent), but a 4.66 percent increase over 2 years, and a 42.9 percent increase since 2000. At this spending level, utility costs consume nearly 22 percent (21.7 percent) of PHA operating expenses.

Table 2 – PHA-Paid Utility Expenditures (Including Water and Sewer Charges)								
Year Reported	2004 Cycle 4	2005 Cycle 5	2006 Cycle 6	2007 Cycle 7	2008 Cycle 8	2009 Cycle 9	2010 Cycle 10	2011 Cycle 11
Utility Expenses (\$ millions)	\$1,158	\$1,252	\$1,277	\$1,411	\$1,429	\$1,482	\$1,530	\$1,589
Operating Expenses (\$ millions)	\$5,754	\$5,891	\$5,885	\$6,043	\$6,161	\$6,225	\$6,435	\$7,315
Utilities (% of Operating Expenses)	20.1%	21.7%	22.0%	23.4%	23.2%	23.8%	23.8%	21.7%
Per Unit-Month (PUM)	\$84.09	\$93.02	\$97.78	\$108.97	\$111.66	\$116.21	\$121.93	\$121.64
Per Unit-Annualized	\$1,009	\$1,116	\$1,736	\$1,307	\$1,339	\$1,394	\$1,463	\$1,459
Percent Change	-4.3%	10.6%	5.1%	11.5%	2.5%	4.1%	4.9%	-0.2%
Percent Change since 2000	-1.2%	9.3%	14.9%	28.1%	31.2%	36.6%	43.3%	42.9%

Source: Financial Assessment Subsystem (FASS-PH) financial data. The following line items were used in totaling the data for utilities: water, electricity, gas, fuel, and other utility expenses ("Other" includes sewer and miscellaneous utility costs). PHA-paid utilities are from financial statements for the Cycle 11 reporting period, covering fiscal years ending 9/30/09 and subsequent quarters through 6/30/10).

Additional details on energy costs in public housing – electricity, gas, and fuel oil only, excluding water – are provided in Table 3. Total reported PHA costs for energy only reported in 2011 decreased by 3.1 percent (\$34 million) from 2010, to \$1.055 billion. Per Unit Month (PUM) costs decreased by 7 percent overall, reflecting decreases of 15 percent and 12 percent in the cost of natural gas and fuel oil, respectively, over this period.

¹⁴ See Appendix G for a detailed discussion of PHA reporting cycles.

Table 3 – PHA-Paid Energy Expenditures (Electricity, Gas, and Fuel Oil Only)						
Year Reported	2010 Cycle 10		2011 Cycle 11			
	Total Energy Costs (\$ millions)	Cost per unit-month (PUM)	Total Energy Costs (\$ millions)	Percent Change	Cost per unit-month (PUM)	Percent Change (PUM)
Total PHA-Paid Utilities	\$1,089	\$86.84	\$1,055	-3.1%	\$80.76	-7.0%
Electricity	\$505	NA	\$532	5.4%	NA	NA
Natural Gas	\$344	NA	\$302	-12.2%	NA	NA
Fuel Oil	\$241	NA	\$221	-8.3%	NA	NA

Source: Financial Assessment Subsystem-Public Housing (FASS-PH) financial data for Cycles 10 and 11.

2.1.2 Assisted Multifamily Housing: Master-Metered, Owner-Paid Utilities

The second major area of HUD's utility expenditures is that of master-metered or owner-paid utilities in privately owned assisted multifamily housing, which accounts for 16 percent of total expenditures. HUD's assisted multifamily housing stock includes 1.4 million units in approximately 23,000 properties. In 2009, HUD developed an Energy Dashboard Report to aggregate the amount of owner-paid utilities in HUD-assisted multifamily housing.¹⁵ Using this Dashboard, HUD estimates that during FY 2011, HUD's assisted properties paid a total of \$1.1 billion in owner-paid utilities (including water). A summary for each program area is shown in Table 4, below.

Table 4 – Owner-Paid Utility Estimates for Assisted Multifamily Properties (All Utilities Including Water)				
	Properties	Units	Total Utilities (millions)	Mean Per Unit/Yr
Assisted Only	9,450	664,121	\$526.1	\$792
Insured and Assisted	5,580	482,539	\$353.3	\$732
Capital Advance (Section 202)	2,921	117,616	\$94.8	\$806
Capital Advance (Section 811)	2,612	27,490	\$28.7	\$1,045
Direct Loan (Section 202)	2,499	106,283	\$98.6	\$928
Assisted Total	23,062	1,398,049	\$1,102.5	\$788

Source: Office of Multifamily Housing, Financial Assistance Subsystem for Multifamily Housing (FASS-MF). Values may not total due to rounding.

Table 5 shows changes in utility costs (including water) for assisted multifamily properties since 2000; these increased from \$748 million in 2000 to \$1.15 billion in 2011, a \$402 million or 54 percent increase during this period. Declines in natural gas prices likely contributed to the decrease in estimated energy expenditures between 2008 and 2011.

¹⁵ This report combines the amount spent on owner-paid utilities, as reported in each property's Annual Financial Statement (AFS), with utility allowances received by tenants who participate in HUD rental assistance programs.

Table 5 – Changes in Owner-Paid Utility Estimates for Assisted Multifamily Properties (\$ millions)										
<i>FY Reporting</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008*</i>	<i>2011</i>
Total Utility Estimate	\$747.7	\$833.1	\$860.8	\$871.1	\$935.8	\$987.8	\$1,104	\$1,135	\$1,171	\$1,150
Total Energy Estimate (Excludes Water and Sewer)	\$554.6	\$646.1	\$661.6	\$665.5	\$730.4	\$770.6	\$879.0	\$895.1	\$914.1	\$802.1

Source: Office of Multifamily Housing, Financial Assistance Subsystem for Multifamily Housing (FASS-MF). Figures are available for the years 2000-2008 and 2011.

* Data are not available for 2009 and 2010.

Additional details on owner-paid energy costs in assisted multifamily housing – electricity, gas, and fuel oil only – are provided in Table 6. Not all multifamily property owners submit audited financial statements to HUD, and these figures are only those reported by owners filing financial statements, who account for about 65 percent of all multifamily properties with owner-owner paid energy costs. Therefore, the totals do not equal the estimated total owner-paid utilities in Tables 1, 4, and 5.

Table 6 – Owner-Paid Multifamily Energy Expenditures FY 2011 (Electricity, Gas, and Fuel Oil Only)	
FY 2011 Total Energy Costs (millions)	
Total Owner-Paid Utilities	\$796.2
Electricity	\$500.3
Natural Gas	\$246.0
Fuel Oil	\$49.9

2.1.3 Utility Allowances: Three Million Residents Receive Utility Allowances For Tenant-Paid Utilities

The third area of utility expenditures is that of utility allowances for tenant-paid utilities, which account for 61 percent of all expenditures. Expenditures in the form of utility allowances for resident-paid utilities are shown in Table 7 below, both through project-based rental assistance in public and assisted housing, as well as through tenant-based rental assistance through the Housing Choice (Section 8) Voucher program. This assistance includes a utility allowance for individually-metered utilities that are not included in the rent but paid directly by the household. The utility allowance is generally set by the PHA administering the program; typically, this is based on utility consumption and costs for similar properties in the geographic area.

Utility allowances vary by unit size (number of bedrooms), building type, and by fuel source. The utilities for which allowances may be provided include electricity, natural gas, propane, fuel oil, wood or coal, and water and sewage service, as well as garbage collection. The functions, or end-uses, covered by an allowance may include space heating, water heating, cooling, refrigeration, lighting, or appliances. Allowances are not provided for telephone service. Utility allowances can be small or large, ranging from less than \$10 to more than \$200 for a resident household per month, depending on the PHA, the number of utilities and uses covered, and the dwelling unit and/or household size. Whether a household receives

an allowance for a given utility service depends on the way it is metered. Allowances are provided for check-metered or individually metered utilities, but not for master-metered utilities.

As shown in Table 7, a total of 3.3 million households received utility allowances in 2011, some 72 percent of all subsidized units. These allowances totaled \$4.4 billion. Approximately 45 percent of public housing residents (482,599 households) receive utility allowances, as do a much higher share - two-thirds (66.7 percent) of assisted-housing residents, and 90 percent of Housing Choice Voucher (HCV) recipients (1.9 million households).

Almost three quarters of all utility allowance expenditures – \$3.1 billion – are used by HCV recipients through the Tenant Based Rental Assistance (TBRA) program.¹⁶ HCV properties tend to be single-family or 1-to-4 unit properties which are typically larger than is the case for multifamily units in public and assisted housing.

Residents with Housing Choice Vouchers are also more likely to be responsible for all utilities – both space heating or cooling as well as lighting and appliances – than in public or assisted housing. As a result, the average HCV per household annual utility allowance (\$1,632) is significantly higher than the average utility allowance in public housing (\$1,008) or almost twice that in multifamily assisted housing (\$864), where a significant share of units are master-metered and utility allowances may only cover tenant-paid utilities for cooking, lighting, or appliances, with central heating or cooling paid for by the owner and included in the rent.

The \$4.4 billion in total utility allowance expenditures in 2011 represented a \$296 million or 7.2 percent increase over 2009. The increase was largely due to a 5.2 percent increase of 165,118 households in the number of households receiving utility allowances – roughly the same as the percent increase in the total number of assisted households. Most of the increase in households with utility allowances (133,377 households) came in the Housing Choice Voucher program, another 20,322 in multifamily assisted housing, and 11,419 in public housing. The 7.2 percent increase in total expenditures on utility allowances reflects a modest 1.9 percent increase in the average utility allowance over this period – an increase of \$25 from \$1,302 in 2008 to \$1,327 in 2011. During this period, the average utility allowance for Housing Choice Vouchers remained nearly flat at \$1,632.

Table 7 – Estimated Utility Allowance Expenditures (FY 2011)					
	Households/ Occupied Units	Percent Units with Utility Allowances	# Units with Utility Allowances (# units)	Average Annual Utility Allowance (\$/year)	Annual Spent (\$ millions)
Public Housing	1,072,465	45.0%	482,599	\$1,008	\$487.4
Assisted Housing	1,426,780	66.7%	928,477	\$864	\$806.2
Housing Choice Vouchers	2,121,908	90.0%	1,903,949	\$1,632	\$3,105.0
Total	4,621,153	71.7%	3,315,025	\$1,327	\$4,398.8
Change since 2008	253,350	-0.36%	165,118	\$25	\$296.7
Change since 2008 (%)	5.8%	0.3%	5.2%	1.9%	7.2%

Source: Data reported on HUD Forms 50058 and 50059 in the Tenant Rental Assistance Certification System (TRACS), Real Estate Management System (REMS), and Public Housing Information Center (PIC) — Resident Characteristics Report.

¹⁶ As described in Footnote 12 above, of the \$3.1 billion in Housing Choice Voucher utility allowance payments, we estimate that HUD is responsible for approximately 76 percent of this total through Housing Assistance Payments, or \$2.4 billion. The balance of \$743 million is paid for by residents.

2.2 The Energy Burden on Low-Income Households¹⁷

Energy costs are typically a significant burden for low-income families. For example, for unassisted households with incomes of less than 150 percent of the federal poverty level, the energy burden is 14.6 percent, more than four-and-a-half times the average energy burden for households with higher incomes.¹⁸ Table 8 below shows the energy burden across income ranges – as high as 24 percent for families earning less than \$10,000, and just 3 percent for families earning more than \$100,000.¹⁹ Families making between \$10,000 and \$20,000 show comparable annual expenditure (\$1,568-\$1,602) to the average utility allowance for HCV recipients (\$1,632), although in some cases utility allowances may include water charges. Many HCV recipients' incomes are significantly less than that, so the share of income spent on energy is likely to be much higher than the 9 percent shown in Table 8.

As shown in Table 9, almost two-thirds of public and assisted housing tenants earn less than \$15,000 per year. Residents typically pay no more than 30 percent of their incomes in rent and utilities combined, so they are protected from high energy costs that burden unassisted low-income households. Nevertheless, utility allowances do not always cover the full cost of utilities (especially during cold winters and hot summers or sudden spikes in energy prices), so HUD-assisted renters are also vulnerable to high energy costs.

In examining the reasons for disproportionately higher energy burdens for low-income households, an analysis completed by the Energy Programs Consortium found that units occupied by “(l)ower-income households tend to be older, less-well insulated and constructed with lower-quality windows than higher-income homes. Appliances in [units occupied by] lower-income households tend to be somewhat older as well and older appliances tend to be less energy-efficient. Space heating systems also tend to be somewhat older in lower-income households.”²⁰ Low-income households also tend to reside in multi-unit buildings, which have historically been underserved by traditional utility programs providing energy efficiency services to low-income households. The analysis concluded that the combination of older and less-well insulated homes, older appliances, and older and less-efficient furnaces together account for much of the higher per-square foot energy usage in lower-income households.²¹

¹⁷ The “energy burden” is the ratio of household energy expenditures to household income.

¹⁸ U.S. Department of Energy, *Building Energy Data Book*, 2011, <http://buildingsdatabook.eren.doe.gov/>.

¹⁹ Energy costs in this table are for energy only; they do not include water costs.

²⁰ Energy Programs Consortium, *Income, Energy Efficiency and Emissions: The Critical Relationship*, February 26, 2008.

²¹ Ibid.

Table 8 — Energy Burden by Income (2010)				
Income Level	Households (Millions)	Households (Percent)	Energy Expenditures	Energy Burden
Less than \$9,999	9.9	9%	\$1,497	24%
\$10,000 to \$14,999	8.5	8%	\$1,568	13%
\$15,000 to \$19,999	8.4	8%	\$1,602	9%
\$20,000 to \$29,999	15.1	14%	\$1,753	7%
\$30,000 to \$39,999	13.6	12%	\$1,852	5%
\$40,000 to \$49,999	11.0	10%	\$1,995	4%
\$50,000 to \$74,999	19.8	18%	\$2,129	3%
\$75,000 to \$99,999	10.6	10%	\$2,431	3%
\$100,000 or more	14.2	13%	\$2,774	3%
Total	111.1	100 percent		7 percent

Source: Department of Energy, Building Energy Data Book, 2011, Table 2.3.15.
Data are for energy costs only, and do not include water or sewer charges.

Table 9 — Percent of Public and Assisted Housing Tenants by Gross Annual Household Income							
Program	\$0	Under \$5,000	\$5,000 - \$10,000	\$10,000 - \$15,000	\$15,000 - \$20,000	\$20,000 - \$25,000	Over \$25,000
Tenant-Based Vouchers	4%	11%	32%	24%	14%	7%	8%
Project-Based Certificates/Vouchers	5%	13%	34%	20%	11%	11%	11%
Public Housing	5%	11%	34%	25%	13%	13%	6%

Source: U.S. Department of Housing and Urban Development, 2009 Resident Characteristics Report,

3. PROGRESS TO DATE

Since its last report to Congress, HUD has made an unprecedented commitment to increasing energy efficiency in HUD-assisted and public housing. This section summarizes these activities and their results.

3.1 Annual Performance Goal

Table 10 – Annual Performance Goal FY 2010 and FY 2011 (Number of Energy Efficient or Green Units)						
	FY 2010 Target	FY 2010 Actual	FY 2011 Target	FY 2011 Actual	Cumulative Target	Cumulative Actual
Public Housing Capital Fund*	-	35,772	-	24,644	-	60,416
Energy Performance Contracts	-	23,366	-	25,143	-	48,509
HOPE VI	-	1,593	-	1,765	-	3,358
Indian Housing Programs*	-	3,049	-	4,633	-	7,682
Total Public and Indian Housing	19,512	63,780	54,445	56,185	73,957	119,965
HOME	4,688	5,343	4,692	6,209	9,380	11,552
CDBG	248	369	252	281	500	650
Tax Credit Assistance Program*	1,140	287	1,142	2,859	2,282	3,146
Total Community Planning and Development	6,076	5,999	6,086	9,349	12,162	15,348
Section 202 and 811 Supportive Housing	3,000	3,743	2,500	4,901	5,500	8,644
Mark-to-Market Green	4,000	1,412	4,000	1,066	8,000	2,478
Green Retrofit Program*	1,500	0	18,500	15,517	20,000	15,517
Total Multifamily Housing	8,500	5,155	25,000	21,484	33,500	26,639
TOTAL Energy Retrofits	34,088	74,934	85,531	87,018	119,619	161,952
Office of Healthy Homes and Lead Hazard Control**	15,897	16,738	17,317	22,754	33,214	39,492
TOTAL ENERGY and GREEN RETROFITS	49,985	91,672	102,848	109,772	152,833	201,444

* Recovery Act programs

** Includes both Recovery Act and ongoing programs, as well as 6,082 HOME-funded units

HUD established a 2-year Annual Performance Goal of 159,000 energy and green retrofits, including 126,000 energy-efficient retrofits of HUD-assisted and public housing units, and green and healthy retrofits of an additional 33,000 housing units through the Office of Healthy Homes and Lead Hazard Control (OHHLHC). Both of these targets were met. As of the end of FY 2011, a total of 201,444 units were reported against the 159,000-unit goal, including 161,952 energy-efficient and green units, and

another 39,492 lead hazard abatements and healthy homes improvements.²² Table 10 above shows the targets and production totals for each program. The figures for the Public Housing Capital Fund (non-competitive formula funds) and Indian housing include the use of a “unit equivalent” factor approved by the Office of Management and Budget (OMB) to estimate the final number of cost-effective retrofits counting towards this goal.²³ Additional detail is provided in Appendix B on the methodology used for contributing programs. Many of these programs are described in greater detail in the following sections.

The Annual Performance Goal was a shared, joint goal with DOE of 1.3 million retrofits, to be completed by the end of FY 2013. Through FY 2011, the two agencies had combined to complete 944,500 units, with HUD contributing 161,952 units toward the goal. As of the end of the 1st quarter of FY 2012, the two agencies had completed more than a million units — a total of 1,086 million units through a variety of Recovery Act-supported and on-going programs.

3.2 Recovery Act Investments

This section provides additional information on HUD’s Recovery Act investments in energy-efficient housing. A central component of the Recovery Act was more than \$90 billion in government investment and tax incentives to lay the foundation for a clean energy future. All told, nearly a third of HUD’s \$13.6 billion in Recovery Act funds could be used for greening public and assisted housing stock.

3.2.1 Public Housing – Capital Fund

Congress appropriated \$4 billion in Recovery Act funds for the modernization and redevelopment of public housing. Of this, HUD distributed \$1 billion through competitive grants, of which \$600 million was specifically allocated for energy-related projects. The remaining \$3 billion was distributed via formula grants.

- *Competitive Grant Awards.* Under the competitive program, HUD allocated \$600 million for the *Creation of Energy-Efficient, Green Communities* initiative, which provided competitive grants for either comprehensive retrofits or new green developments that will generate energy savings and reduce greenhouse gas emissions.
 - For *new construction and substantial rehabilitation projects* (\$300 million), HUD adopted the Enterprise Green Communities criteria as a basis for evaluating competitive applications. All applicants were required to meet at least the mandatory green underwriting elements, and applications with green investments beyond the mandatory elements received additional rating points.²⁴
 - For *moderate rehabilitation projects* (\$300 million), HUD established rating factors that awarded competitive points for measurable improvements in energy performance and adoption of green building and operations practices, including the use of Integrated Pest Management Protocols, use of materials and products with low or no volatile organic compounds (VOCs), and use of salvaged and recycled materials and products certified in accordance with the Forest Stewardship Council.

²² In FY 2010, HUD completed 91,672 energy-efficient and green units, 64 percent above the 2010 target; another 109,772 units were completed in FY 2011.

²³ The top ten Energy Conservation Measures (ECMs) reported for these programs were counted and then adjusted by a unit equivalent factor of 6.

²⁴ See www.greencommunitiesonline.org/tools/criteria/index.asp.

Table 11 summarizes these competitive awards. A number of the projects included renewable energy systems – primarily photovoltaic solar systems and geothermal energy; the majority of geothermal systems were in the new construction portion of the competition.

Table 11 – Public Capital Fund – Competitive Awards				
	Grants Awarded	Amount Awarded	Number of Units	Includes These Renewable Energy Elements
New Construction/ Substantial Rehabilitation	36	\$299.7 million	2,700	<ul style="list-style-type: none"> • 18 projects proposed photovoltaic panels • 8 projects proposed geothermal heating/cooling • 1 project proposed on-site wind turbines
Energy Retrofits/ Moderate Rehabilitation	226	\$298.4 million	35,000	<ul style="list-style-type: none"> • 31 projects proposed photovoltaic panels • 13 projects proposed geothermal heating/cooling

- *Formula Funds.* PHAs also received \$3 billion in Capital Fund formula grants under the Recovery Act. These funds provided a significant opportunity to address deferred capital improvement needs, including investments in energy efficiency and renewable energy systems. Based on data received from PHAs, an estimated 221,000 units received one or more energy efficiency improvements through FY 2011, including, for example, 69,500 energy-efficient refrigerators.


The most common planned energy improvements were: appliance upgrades, window replacements, attic or roof insulation, heating system replacement, lighting and lighting fixture replacement, high-efficiency toilets and water fixtures, water heater replacements, air conditioning system replacements, and exterior door replacements

3.2.2 Indian Housing

The Recovery Act provided \$510 million in Native American Housing Block Grants, \$245 million of which was provided through competitive grants. Under this competition, 7 points were available to proposals that included Energy Star new construction or products and incorporated green development practices and techniques as specified by several recognized green rating programs. These green rating programs included Leadership in Energy and Environmental Design (LEED) for Homes (single-family), LEED New Construction (multifamily), Enterprise Green Communities, the National Green Building Standard (International Code Council ICC-700), or other recognized green rating programs. These factors were also included in the Indian Community Development Block Grant competitive program. All grant recipients responded to and received at least partial credit for the rating factor.

3.2.3 Multifamily Green Retrofit Program

The Recovery Act provided \$250 million for loans and grants for energy and other green retrofit investments in existing HUD-assisted multifamily housing. Building on the success of the earlier Mark-to-Market Green Initiative, the Green Retrofit Program (GRP) is the first federal whole-building multifamily energy program to reach a significant national scale.

MULTIFAMILY GREEN RETROFIT PROGRAM Canyon Pointe, Boulder, Colorado		
<p>Loan Amount: \$1,252,059 Grant Amount: \$40,000</p> <p>Assisted Units: 82 Total Units: 82 Bedrooms: 1 BR & 2 BR Occupancy Type: Elderly</p> <p>Description: HUD’s Multifamily Green Retrofit Program funds provided a portion of the overall costs to install a solar photovoltaic system. This system will reduce the electric costs for the entire property by more than 30 percent. In addition, the GRP-funded building envelope improvements, including windows, insulation, and exterior walls.</p>		<p>Projected Utility Savings</p> <p>Owner-Paid Utilities: 32 percent Tenant-Paid Utilities: Master-metered property Total Property: 32 percent</p>
Major Green Retrofits	Optional Green Power Alternatives	Owner Commitments
<ul style="list-style-type: none">• HVAC Systems 2 (Common Area)• HVAC Systems 1 (Interior)• Water Savers (Interior)• Sliding Glass Doors• Bathroom Counter Tops, Sinks• Interior Lighting 2 (Common Area)• Kitchen Cabinets• Exterior Walls• Other Interior Floor Coverings	<ul style="list-style-type: none">• 58.8 KW Solar Photovoltaic System	<ul style="list-style-type: none">• Provide at least an additional 15 years of affordability• Maintain an approved Green Retrofit Operations and Maintenance Plan• Adopt an Integrated Pest Management (IPM) Plan• Train Property Managers in green building principles

HUD dedicated GRP funds to provide nearly 20,000 homes around the United States with energy-efficient upgrades that will reduce utility consumption by more than 25 percent on average, saving these properties an estimated \$12 million annually on utility bills. Some of these savings are passed on to HUD in the form of lower rental assistance payments. The timing of these savings to HUD is a function of three factors at the property level: how rents are set (whether market-based or budget-based), who pays the utilities (tenant, owner, or some combination), and when the retrofit was completed. Budget-based rents and tenant utility allowances are adjusted annually based on the previous year's property performance, with a resulting lag before savings are realized by HUD through lower budget-based rents (or smaller increases), and/or lower tenant utility allowances (or smaller increases). Most rehabilitation under the program was completed in late FY 2011, so some of these savings are likely to be seen in 2012, with the full impact expected in FY 2013.

Under the Green Retrofit Program, HUD offered grants and loans repayable from a share of surplus cash and from sale and refinancing proceeds, of up to \$15,000 per unit. The average level of funding or financing was approximately \$13,000 per unit, for 19,000 units in 221 properties around the country.

The program defines green building as “an approach to sustainable development designed to reduce energy demand and property operating costs, improve the residents’ quality of life, and reduce the project’s impact on the environment.” The program uses a similar “one-stop” approach to assess green opportunities and define the project’s scope of work as used by the earlier HUD Mark-to-Market Green Initiative. The program also enhanced and extended the use of energy auditing and green assessment protocols, discussed further in the next section. For a list of minimum required green measures, see Appendix D.

3.2.4 Neighborhood Stabilization Program (NSP)

The Housing and Economic Recovery Act of 2008 (HERA) created the first Neighborhood Stabilization Program (NSP1), which provided \$3.92 billion in formula grants to states and certain local governments to mitigate the negative impact of foreclosures on communities. Under NSP1, rehabilitation included improvements to increase the energy efficiency of, or provide renewable energy systems for, eligible properties. HUD’s funding notice strongly encouraged grantees to use NSP funds not only to stabilize neighborhoods but also to “strategically incorporate modern, green building, and energy efficiency improvements in all NSP activities to provide for long-term affordability and increased sustainability.”

The Recovery Act of 2009 allocated an additional \$2 billion for a second round of Neighborhood Stabilization Program grants (NSP2), awarded through a competitive process to states, local governments, and nonprofit organizations. Recipients could use funds to buy foreclosed or abandoned homes to be rehabilitated, sold, or demolished in order to stabilize neighborhoods.

NSP2 projects are required to be energy-efficient and incorporate cost-effective sustainability features. Substantial (“gut”) rehabilitation must at a minimum meet the standard for Energy Star for New Homes or Energy Star for Multifamily High Rise buildings (previously piloted by EPA and DOE at ASHRAE 90.1–2004, Appendix G plus 20 percent, and now set at ASHRAE 90.1-2007 plus 15 percent). Other rehabilitation activities, to the extent applicable, must replace obsolete equipment and appliances with Energy Star-qualified products and use water conservation measures including WaterSense-labeled toilets, showerheads, and faucets. HUD also provided as many as 10 competitive preference points (out of 150 points) to NSP2 proposals that incorporated additional energy-efficient, environmentally friendly, or other sustainable or green elements, including transit accessibility, green building standards, and re-use of cleared sites, re-use of salvaged materials, as well as one or more recommended sustainable development practices as shown in Appendix C of this report.²⁵

In addition, to assist grantees in developing green rehabilitation guidelines, HUD created a Resource Exchange and model standards of specifications with assistance from Enterprise Community Partners. These models included Sample Single-Family Housing Rehabilitation and Standards and Sample Single-Family Housing Rehabilitation Specifications, including green standards and specifications, for use in the NSP2 program.²⁶ In January 2010, HUD funded 56 NSP2 programs nationwide, including 33 regional

²⁵ U.S. Department of Housing and Urban Development, NOFA for the Neighborhood Stabilization Program 2 under the American Recovery and Reinvestment Act, May 4, 2009. See Rating Factor 5. Retrieved from <http://www.hud.gov/offices/cpd/communitydevelopment/programs/neighborhoodspg/nsp2-nofa.pdf>.

²⁶ This guidance is available at <http://hudnsphelp.info/index.cfm>.

consortiums and 4 national consortiums. These programs will construct, redevelop, or rehabilitate more than 25,000 units to these higher energy efficiency and sustainability requirements. Local NSP2 programs will also provide financing mechanisms and incentives to support more energy-efficient housing.

The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 provided an additional \$1 billion for a third round of NSP funds (NSP3), which adopted the same recommended energy efficiency and green features developed for NSP2 – and through a joint notice extended these guidelines to NSP1.²⁷ (See Appendix C.)

3.3 HUD-DOE Multifamily Weatherization Partnership

The Recovery Act provided an unprecedented \$5 billion for DOE's Weatherization Assistance Program (WAP) to weatherize an estimated 600,000 low-income residential units. Recognizing that more than one-third of the approximately 34 million households eligible for weatherization live in multifamily properties, as part of their joint FY 2013 goal of 1.3 million energy retrofits, HUD worked with DOE to significantly expand the availability of WAP funds appropriated under the Recovery Act to those multifamily properties, with a focus on HUD-assisted multifamily properties.

In May 2009, HUD and DOE signed a memorandum of understanding (MOU) to increase access of public and assisted housing multifamily properties to the weatherization program. In January 2010, DOE published a regulation in the Federal Register that substantially streamlined the income verification process for households in HUD-assisted multifamily properties, reducing the data collection and verification burden on local weatherization and housing providers. The regulation also simplified the process for demonstrating compliance with requirements prohibiting undue property enhancements to multifamily property owners, rent increases to tenants as a result of weatherization improvements, and requirements that the benefits of the weatherization improvements accrue primarily to low-income households.²⁸

Under the regulation, states are able to accept HUD's annual verification procedures for resident incomes in public and assisted housing, as well as income verification procedures in properties assisted with the Low-Income Housing Tax Credit (LIHTC), as evidence of their eligibility for the weatherization program, and a listing of income eligible properties has been posted on DOE's website. The published lists include more than 10,500 HUD-assisted multifamily properties, 5,300 public housing properties, an additional 35,900 income-qualified public housing buildings, as well as eligible LIHTC properties in certain states.²⁹ These properties contain more than 1.5 million low-income units. The presence of a property on this list is evidence of its eligibility for weatherization assistance.

²⁷ U.S. Department of Housing and Urban Development, Unified NSP1 and NSP3 Notice, October 19, 2010, Attachment C.

²⁸ See http://www1.eere.energy.gov/wip/multifamily_guidance.html and www.hud.gov/recovery/weatherization.

²⁹ To be eligible, 66 percent of the residents in a building must have household incomes at or below 200 percent of the Federal Poverty Level.

3.4 HUD's Core Programs and Policies

3.4.1 Departmentwide Incentives

HUD awards approximately \$2.7 billion annually to support housing and community development projects through a wide range of competitive grant programs.³⁰ For the 2010 and 2011 funding cycles, HUD significantly increased incentives for energy efficiency through these programs. Energy and green building were included as a Policy Priority in HUD's annual Notices of Funds Availability (NOFAs) for these grant programs. As described in the General Section of the NOFA, applicants could now qualify for as many as 4 additional rating points (generally out of 100 or more rating points) if they addressed the sustainability Policy Priority with one or more of the following:³¹

- (a) *Neighborhood Sustainability Standards.* Adopt the LEED 2009 for Neighborhood Development (LEED-ND) Rating System or a similar neighborhood sustainability standard.
- (b) *Combined Housing and Transportation Cost Burden.* Prioritize the reduction of the proportion of residents in the affected project area or development who will face a combined housing and transportation cost burden of 45 percent of their average household income.
- (c) *Energy Efficiency and Green Development.* Adopt a recognized green building rating standard for new construction or substantial rehabilitation, including such programs as the Energy Star Plus Indoor Air Package or Energy Star Advanced New Home Construction, Enterprise Green Communities Initiative, the National Green Building Standard, LEED for Homes (for single-family), and LEED New Construction (for multifamily or commercial development), as well as regionally or locally recognized green standards such as Earthcraft or Built Green.
- (d) *Healthy Design.* Adopt healthy design features that meet or exceed the mandatory requirements identified in a green building standard such as the Enterprise Green Communities "Healthy Living Environment" criteria (Category 7) or similar requirements in other national or locally recognized green rating programs.
- (e) *Accessibility.* Incorporate universal design in proposed housing projects and/or community facilities to be created or rehabilitated.
- (f) *Measuring energy efficiency.* Collect and utilize data about energy load, usage, and costs in a systematic fashion to set energy reduction goals and manage energy use in applicant property/properties.³²

Several competitive grant programs accordingly established strong incentives and minimum requirements for energy efficiency in their FY 2010 or FY 2011 funding notices:

³⁰ Information on these programs is available at

http://portal.hud.gov/hudportal/HUD?src=/program_offices/administration/grants/fundsavail.

³¹ The sustainability Policy Priority is one of six Policy Priorities established by HUD.

³² See, for example, FR-5415-N-01, Notice of HUD's Fiscal Year (FY) 2010 Notice of Funding Availability (NOFA) Policy Requirements and General Section to HUD's FY 2010 NOFAs for Discretionary Programs. Similar requirements were described in the General Section of the FY 2011, as well as the FY 2012 NOFAs.

- *Choice Neighborhoods, Section 811 Supportive Housing for Persons with Disabilities, Section 202 Supportive Housing for the Elderly, the Self-Help Homeownership Opportunity Program (SHOP) program, and competitive awards through NSP2* set the minimum requirement for new construction and substantial single-family rehabilitation at Energy Star for New Homes; multifamily projects were required to be 15 percent more efficient than ASHRAE Standard 90.1-2004, Appendix G – the standard for the new Energy Star for Multifamily High Rise buildings. Each of these programs also offered substantial additional points for projects that exceeded these minimum requirements and incorporated a green building standard.³³
- *HOPE VI Revitalization Grants* included up to 3 competitive points for projects meeting the Energy Star for New Homes standard, and up to 6 points (out of 145 points) for projects meeting one of the green building standards referenced in the General Section, above.

3.4.2 Public Housing

Energy Performance Contracts

The 1987 Housing and Community Development Act added new provisions allowing financing incentives for energy- and water-efficient retrofits that are conducted with third-party financing. The contracts required to secure the retrofit work, financing, and related services necessary to take advantage of these incentives are called Energy Performance Contracts (EPCs). In a typical scenario, a PHA works with an Energy Services Company (ESCO), a lender, and HUD to design a package of improvements that will result in sufficient utility savings to cover the costs of the project. Alternatively, a PHA is permitted to carry out the tasks of an ESCO in-house, in a scenario referred to as a “self-developed EPC.”

When participating in the EPC program, PHAs are awarded financial incentives for the length of the contract (up to 20 years) through the annual Operating Subsidy calculation process. The two primary incentives provided to PHAs, depending on the structure of their project, are known as the Frozen Rolling Base and the Add-On Subsidy.

- *Frozen Rolling Base:* Through this incentive, a PHA receives the monetary savings resulting from an EPC retrofit throughout the contract term, since HUD does not lower its annual Operating Subsidy to reflect the PHA’s lower energy costs resulting from the retrofit. The PHA must utilize at least 75 percent of the savings to cover the costs of the project, and retains up to 25 percent for other operating expenses. Following the contract term, HUD receives any remaining financial benefit of the retrofit through reduced Operating Subsidy outlays.
- *Add-On Subsidy:* Through this incentive, HUD provides a PHA with additional Operating Subsidy funds throughout the contract term to cover the annual debt service on the costs of the EPC retrofit, and in turn HUD receives the monetary savings resulting from the project. The PHA is required to show that the monetary savings outweigh the project costs each year, or the Add-On Subsidy is reduced.

³³ Choice Neighborhoods offered an additional 3 points (out of 120) for green building; Section 202 and 811 Supportive Housing programs offered 4 points; NSP2 offered 3 points (out of 145) and SHOP 3 points (out of 100).

ENERGY PERFORMANCE CONTRACTING IN PUBLIC HOUSING San Bernardino, California

Total Units: 1,800

Leveraged Capital Investments: \$14.5 million

Description:

The Housing Authority of the County of San Bernardino contracted with the energy service firm NORESKO for \$14.5 million in water and energy conservation measures. The fiscal savings, guaranteed by NORESKO, funded infrastructure improvements to increase energy efficiency in homes, enhance the quality of life of residents, and free up funds from the agency's stretched capital budget.



Benefits:

- Energy Savings: \$2.4 million annually over the 20-year contract period
- Estimated Internal Rate of Return: 18.5 percent
- Water Savings: 300 million gallons annually
- Greenhouse Gas Emission Reductions: 3.8 million pounds each year

Major Retrofits

- Energy conservation measures include programmable thermostats, lighting, windows, water heaters, refrigerators, cooling systems, and attic insulation.
- Water conservation measures include: xeriscaping, centralized control system for irrigation, residential water submeters, and high-efficiency fixtures.
- Each site has a smart controller system connected to an Internet-based weather monitoring system that automatically adjusts to fit the local weather, reducing water use by approximately 50 percent.

Source: http://www.noresco.com/site/content/news_pr_365.asp.

Through FY 2011, the number of EPCs executed in public housing increased to 265 from 225 in 2008-2009 and 171 in 2006-2007, as shown in Table 12. Table 13 shows that these transactions have now leveraged more than \$1 billion in energy and water conservation investments. Of the 265 executed contracts, note that 244 EPCs (worth \$839 million) had completed construction through the end of FY 2011, and were reported against HUD's Annual Performance Goal for that year; 21 additional executed contracts were still under construction.

Table 12 – Number of Energy Performance Contracts Executed in Public Housing								
PHA Size		Before 2002	2002-2003	2004-2005	2006-2007	2008-2009	2010-2011	Total
Very small (Less Than 250)		6	3	3	2	6	7	27
Small (250-499)		20	3	7	9	20	13	72
Medium (500-1,249)		16	14	9	12	12	5	68
Large (1,250-6,599)		24	12	9	15	15	12	87
Very large (More than 6,599)		4	1	0	2	1	3	11
Total New		70	33	28	40	54	40	265
Total Cumulative		70	103	131	171	225	265	265

Source: Annual HUD EPC Inventory (2011). Note: Beginning with the 2009 inventory, the Office of Public and Indian Housing (PIH) utilized an improved data collection process that may produce minor discrepancies in the data across previous years. Dates reflect dates contracts executed between PHAs and ESCOs.

Table 13 – Total Investment in Energy Performance Contracts Executed in Public Housing (Millions of Dollars)							
PHA Size	Before 2002	2002-2003	2004-2005	2006-2007	2008-2009	2010-11	Total
Very small (Under 250)	\$2.6	\$1.1	\$2.5	\$2.2	\$9.0	\$6.6	\$24.0
Small (250-499)	\$9.6	\$1.3	\$7.5	\$8.6	\$38.6	\$27.8	\$93.3
Medium (500-1,249)	\$24.2	\$19.6	\$23.6	\$29.6	\$50.8	\$19.0	\$167.0
Large (1,250-6,599)	\$58.3	\$39.9	\$66.1	\$93.5	\$157.2	\$123.5	\$538.5
Very large (6,599+)	\$47.8	\$14.8	\$0	\$59.6	\$39.3	\$118.4	\$279.9
Total New	\$142.5	\$76.8	\$99.7	\$193.5	\$294.9	\$295.3	\$1,102.7
Total Cumulative	\$142.5	\$219.2	\$318.9	\$512.4	\$807.3	\$1,102.6	\$1,102.7

Source: Annual HUD EPC Inventory (2011). Beginning in 2009, PIH improved its data collection process, although this may produce discrepancies in comparisons with data reported in previous years. Changes in dollar amounts over those reported in previous years may reflect modifications to previously-awarded contracts.

HOPE VI

The HOPE VI program was designed to revitalize the nation's most severely distressed public housing. Since 2006, all successful HOPE VI applicants proposed implementing energy efficiency and green building practices. All told, 87 grantees designated at least one phase of their projects as Energy Star compliant, and 41 adopted a nationally recognized green building standard higher than Energy Star.

In FY 2009, HUD compiled an inventory of HOPE VI green or energy-efficient projects that had completed construction and had received official certification under a recognized green building rating system. Thirty-six HOPE VI projects were built and certified under LEED for New Construction, Energy Star for Homes, or other recognized green ratings systems (See Appendix E).

Beginning in 2010, all HOPE VI grantees have been required to report on the implementation of their proposals, including the implementation of the green building practices. This reporting by PHAs will provide PIH with invaluable data going forward.

HOPE VI Tremont Pointe, Cleveland, Ohio	
<p>Total Units: 190 planned family housing units</p> <p>Funding Sources – (Phase 1)</p> <ul style="list-style-type: none">• HUD HOPE VI - \$7.8 million• Enterprise LIHTC Equity Investment - \$5.7 million• City of Cleveland - \$2.5 million• Enterprise Multifamily Mortgage - \$2.1 million <p>Description:</p> <p>Tremont Pointe is the first multifamily green development in Ohio and was developed in partnership with the Enterprise Green Communities Initiative. Tremont Pointe is a mixed-income green HOPE VI redevelopment project on the site of a former public housing complex and combines green features with new streets and transit access that reconnect property with the Tremont neighborhood.</p> <p>Benefits:</p> <ul style="list-style-type: none">• Project meets Enterprise Green Communities Underwriting Criteria• Energy Star New Construction standard• Home energy rating system used to test the efficiency of each unit	
Major Green Features	
<p>Tremont Pointe exemplifies the range of ways in which HOPE VI projects can incorporate green amenities, which help foster healthier indoor and outdoor environments, benefiting both residents and nature. These include:</p> <ul style="list-style-type: none">• Energy Star appliances• High-efficiency heat pump systems• Low- or no-Volatile Organic Compounds (VOC) paints• Green label carpet• Formaldehyde-free composite wood materials• Walkable neighborhood, with access to transportation and services and new street patterns connecting Tremont Points with neighborhood• Community house, after-school program, basketball courts, day care, and public Montessori school• Cuyahoga Towpath Trail is located to the east of the site; the second phase of the project will connect the community with bike paths and trails	

Source: Enterprise Green Communities, at http://www.greencommunitiesonline.org/projects/profiles/tremont_pointe.pdf.

3.4.3 Indian Housing

The 2005 Energy Policy and Conservation Act directed HUD to promote energy conservation for assisted housing on Indian lands through energy-efficient appliances, technologies, and innovations, and the promotion of shared energy savings contracts. HUD's Office of Native American Programs (ONAP) has made an organizational commitment to incorporate green building principles in all aspects of program operations through its competitive programs awards and ongoing technical support to tribal communities and tribally designated housing entities.

- *Technical Assistance* – ONAP expanded its training and technical assistance efforts in Indian Country through the delivery of intertribal trainings workshops and on-site energy assessments. This initiative aims to build tribal capacity for developing energy-efficiency programs and to aid HUD in better understanding the many unique factors affecting energy consumption and costs for residential buildings in Indian Country.

Between 2008 and 2010, the initiative included an additional 24 energy-related on-site visits to provide hands-on technical support for 203 home energy assessments and recommendations for addressing tribal energy needs. In 2011, this initiative conducted an additional 12 energy-related on-site visits and 139 energy assessments in 15 communities.


- *Partnerships* – ONAP has also initiated partnerships to promote energy efficiency and green building in Indian Country. Between 2009 and 2011, ONAP joined EPA, DOE, the Department of Transportation, the U.S. Department of Agriculture (USDA) and the Indian Health Service (IHS) in convening various panels at Native American Conferences and workshops highlighting “Federal Partnerships for Green Building in Indian Country.” The panels offered tribal organizations and entities an opportunity to have interagency discussions to address barriers to green development and to coordinate and integrate green development and energy efficiency funding opportunities into Indian housing.

One of the most successful partnership activities was the *Greener Homes National Summit*, HUD's conference for American Indians and Alaska Native communities on energy efficiency and alternative energy. The 3rd annual Greener Homes National Summit, held in September 2011 in Denver, Colorado, brought together more than 250 participants for 25 sessions during the conference. Topics included determining the cost-effectiveness of residential energy efficiency and renewable energy; implementing energy efficient retrofits, and green building practices.

ONAP continued to partner with federal agencies in FY 2012. Through this partnership, ONAP is leading the effort to draft a Tribal Green Building Code in conjunction with EPA. Additional partnership activities include quarterly meetings, presentations and workshops, and the quarterly dissemination of tools and resources to tribal organizations and entities.

- *Energy-Efficient Construction and Rehabilitation* – The increased focus on energy efficiency and green building programs has given rise to tribal programs aimed at increasing the energy performance of housing in Indian Country.

Several examples of successful energy efficient Indian housing projects are described on the following pages.

INDIAN HOUSING Penobscot Nation Homes Indian Island, Maine	
<p>Total Units: 6 Affordable Single-Family Indian Homes</p> <p>Financing: First Penobscot Nation Rural Development One-Stop Mortgage Documents</p> <p>Grants: HUD (\$410,773 ARRA grant), USDA Rural Development, Penobscot Nation gap funding</p> <p>Description: The Penobscot Nation Homes on Indian Island, Maine, integrate the Tribe's values of healthy living and respect for nature and the environment with individual involvement and LEED standards to create community-oriented, energy-efficient, high-performance homes. This Recovery Act-funded project combines funding from USDA's Rural Development Direct Home Loan Program, HUD, and the Penobscot Nation. Penobscot Indian Nation received six U.S. Green Building Council (USGBC) LEED Gold Certifications for private, affordable housing. In addition to the LEED Gold rating, the homes were Home Energy Rated (HERS) to ensure that they were built to design.</p> <p>Benefits:</p> <ul style="list-style-type: none"> • 66 percent electricity consumption reduction • 50 percent fuel oil consumption reduction • \$1,614 projected utility savings/year • 6 new green, affordable homes built 	
Major Green Retrofits	
<ul style="list-style-type: none"> • High-efficiency toilets (1.28 GPF) and shower heads (1.5 GPM) provide up to 40 percent water savings • Domestic solar thermal water heating is 65 percent efficient; vacuum tube solar collectors provide up to 54 percent of annual domestic hot water load • Energy Star with "Advanced Lighting," LED • Oil-fired 86.5 percent efficient boiler and the market's most efficient, Energy Star programmable thermostats • Local and green products and Energy Star doors, windows, and appliances 	

Tribal Energy-Efficiency and Green Development Model Programs	
Bishop Paiute Tribe Bishop, CA	Manufactured Housing Pilot Project – The Bishop Paiute Tribe used a HUD Rural Housing and Economic Development (RHED) Grant to fund a manufactured housing pilot project for the tribe’s Community Development Department. The \$300,000 grant covered costs to design and engineer the assembly plant and integration of Structural Insulated Panels (SIPs) and Energy Star and water conservation appliances into tribal housing units.
Pueblo of Isleta Isleta Pueblo, NM	Lava Block House Construction Project – This project demonstrated lava block construction techniques in the construction and rehabilitation of tribal housing. Lava Block construction provides 50 percent cost savings over conventional construction techniques and provides fireproof and termite resistant surfaces. The rehabilitation and modernization activities also included Energy Star-rated appliances and fixtures.
Ohkay Owingeh Housing Authority San Juan Pueblo, NM	Traditional Adobe Home Rehabilitation Project – This project involved the rehabilitation of 22 homes and 49 old adobe homes that are 400 years old. The project incorporated green standards set by the New Mexico Mortgage Finance Authority, as well as universal design and historic preservation standards. The \$5.3 million project was funded through HUD Native American Housing Block Grant (NAHBG) (Competitive American Recovery and Reinvestment Act (ARRA)) funds, the Indian Community Development Block Grant (ICDBG), the Indian Housing Block Grant (IHGB), the Indian Health Service (IHS), Rural Housing and Economic Development (RHED) funds, the National Parks Service, as well as the State of New Mexico, and several nonprofit foundations.
Karuk Tribe Housing Authority Happy Camp, CA	Window and HVAC Rehabilitation Project – The project rehabilitated 100 housing units and 63 apartment units. Rehabilitation included the installation of low-emissivity (low-E) dual pane windows, energy-efficient heat pumps, metal roofs, and tankless water heaters.
Pyramid Lake Housing Authority Nixon, NV	New Housing Construction – This project involved new construction of 15 affordable housing units and related infrastructure. All homes were built to energy-efficient standards and include Energy Star-rated appliances.
Tunica Biloxi Tribe of Louisiana	Solar Panel Installation – The Tunica Biloxi Tribe of Louisiana developed a home with solar panels. IHGB funds were leveraged with funds from Enterprise Community Partners, Inc., to purchase and install solar panels, energy-efficient appliances, and a solar hot water heater. The goal was to reduce energy costs to the low-income tribal members.
San Carlos Apache Housing Authority Peridot, AZ	New Construction Project – This project involved the construction of 43 new single-family homes. The home construction utilized a Structural Insulated Panel system and sustainable materials, including stained concrete floors, formaldehyde-free casework, zero VOC paint, and fiber-cement board siding. All units were built with high-efficiency water fixtures, low-E windows, and Energy Star appliances.
Tlingit-Haida Regional Housing Juneau Alaska	Saxman Senior Center Project – The Tlingit-Haida Housing Authority developed a senior center with 17 housing units for low-income seniors. This complex was built to the 5-star energy rating standard and constructed with high-efficiency wall and ceiling insulation and insulated foundation. The Housing Authority leveraged funds from multiple sources, including \$4 million (66.4 percent) in ARRA NAHBG funds.

3.4.4 Assisted Multifamily Housing

Mark-to-Market Green Initiative

In November 2007, HUD's Office of Affordable Housing Preservation launched a Green Initiative through its Mark-to-Market program. The Mark-to-Market program authorizes Section 8 property owners with both HUD insured mortgages and expiring Section 8 contracts with above-market rents to restructure their financing and continue to provide affordable housing through the Section 8 program for at least a 30-year term. As part of this restructuring, the Mark-to-Market Green Initiative offers financial incentives for private owners to adopt green building practices in both the rehabilitation and operation of their HUD-subsidized, federally insured multifamily properties. Green measures include energy and water efficiency, use of recycled and local materials, improved indoor air quality, and the healthy housing approach developed by HUD's Healthy Homes Initiative. The Green Initiative focuses on immediate repairs, but also requires owners to maintain green building principles for the next 30 to 50 years.

The program provides incentives to property owners undertaking energy/green retrofits. Incorporating green measures qualifies the property for reduced equity requirements, from 20 percent for standard construction to just 3 percent for the qualified green construction. Participating owners may also capture an increased portion of the project's cash flow resulting from energy savings.

A groundbreaking element of this initiative was the development of a comprehensive energy audit and green assessment protocol, the Green Retrofit Physical Condition Assessment (Green Retrofit PCA), which was used for the Recovery Act-funded Green Retrofit Program, and which is serving as a cornerstone of future agency efforts in this area.

For a Green Retrofit PCA, professional engineers identify capital improvement and reserve requirements through a traditional Physical Needs Assessment, but also identify energy efficiency opportunities and green alternatives for each line item. Thereafter, they complete a cost-benefit analysis to determine the most cost-efficient recommendation.

HUD expects property owners or residents to realize energy and water savings by focusing on sealing the building envelope; increasing building insulation; ensuring that heating and cooling systems are appropriately sized and are of an energy-efficient design; installing Energy Star appliances and windows; using Energy Star compact fluorescent lighting; installing high-efficiency faucets, showerheads, and toilets; and installing water and energy monitoring equipment.

These components are not required of participating Mark-to-Market owners; however, owners must assess these components using the Green Retrofit Physical Condition Assessment (PCA) template, and if one or more of these measures demonstrates a payback, that or those measures must be completed. HUD relies on its contractors/underwriters (Participating Administrative Entities or PAEs) and the owner to highlight the opportunities, costs, and benefits of green alternatives on each subject property. HUD includes as many green alternatives as the property owner advocates, as the transaction can accommodate, as are appropriate for a specific property, and as HUD determines are within its statutory authority. For appliances, any appliances that need replacement at rehab or in out-years under the Reserve for Replacement account must be Energy Star or better.

3.4.5 Community Planning and Development

HUD's Office of Community Planning and Development (CPD) administers the HOME Investment Partnerships (HOME) and Community Development Block Grant (CDBG) formula grant programs, as

well as the Neighborhood Stabilization Program (NSP) and several competitive grant programs. HOME funds are used for new construction and rehabilitation of existing housing, while CDBG funds are used for a variety of purposes including home repair and rehabilitation. The NSP program is used for the acquisition and rehabilitation, demolition, redevelopment, and financing of abandoned and foreclosed properties. Investments in energy efficiency measures and renewable energy systems are eligible activities under these programs.

CDBG and HOME

HUD encourages state and local governmental entities administering HUD-funded CDBG and HOME programs to adopt Energy Star standards for new construction or substantial rehabilitation and to use Energy Star products in HUD-funded rehabilitation projects. The tables below summarize the scope of housing activities supported by the CDBG and HOME programs that can be readily linked with energy efficiency and green building actions.

Beginning in FY 2007, HUD has tracked the number of units built to Energy Star standards through the Integrated Disbursement and Information System (IDIS). This reporting requirement provides information on the extent to which CDBG and HOME funds support energy-efficient construction. In FY 2009, for example, 4,652 of the 16,041 newly constructed HOME-funded units met Energy Star qualifications – almost 30 percent of the total new homes built under HOME. In that year, California reported the largest number of HOME-funded Energy Star units (1,575), while Rhode Island had the highest overall percentage of Energy Star units (93 percent). The share of new HOME-funded units built to the Energy Star standard increased to more than one third in FYs 2010 and 2011.

The CDBG program directs fewer overall resources to housing construction and more to housing rehabilitation activities. Even so, in FY 2009, the CDBG program supported the construction of 376 units meeting Energy Star qualifications, approximately 20 percent of the total number of new units built under the program. That share increased to 32.9 percent in FY 2010 but declined to 16.5 percent in FY 2011.

Table 14 – HOME- and CDBG-Funded Units Meeting Energy Star Qualifications				
	FY 2008	FY 2009	FY 2010	FY 2011
HOME	4,259	4,652	5,343	6,209
HOME – All New Units	14,686	16,041	14,479	17,783
Percent Energy Star	29.0%	29.0%	36.9%	35.0%
CDBG	290	376	369	281
CDBG – All New Units	2,157	1,878	1,122	1,698
Percent Energy Star	13.4%	20.0%	32.9%	16.5%

Source: CPD Internal Report; Results – Energy Star for New Construction Assisted by HOME program (2008, 2009); Internal HUDStat reports (2010 and 2011).

These levels of Energy Star activities are likely to continue and increase in the future, as more grantees adopt Energy Star guidelines for their programs. A potentially larger energy efficiency opportunity for both the CDBG and HOME programs may also be realized as grantees update their energy efficiency standards and guidelines for housing rehabilitations activities. To assist these efforts, HUD developed

national guidance under its HOME Technical Assistance program for grantees on how to incorporate energy efficiency standards in HUD-funded activities.³⁴

Green CHDO Initiative

HOME Program – Green CHDO Grant Awards (2008-2009)	
<i>City of Anderson, IN</i>	The City of Anderson funded Rural Opportunities, Inc. , to construct 3 new Energy Star-certified homeownership units. The units were to be located in existing city neighborhoods on sites that have been cleared of substandard houses.
<i>City of Canton, OH</i>	The City of Canton funded the Freed Housing Corp. to construct 6 new Energy Star-certified homeownership units on a city-owned site. At least one home planned to incorporate accessible visibility standards and universal design.
<i>City of Columbus, OH</i>	The City of Columbus funded the Central Ohio Community Housing Development Organization to build 12 new Energy Star-certified homeownership units in collaboration with the Columbus Housing Partnership. The project used photovoltaic panels to provide at least 10 percent of the project's electricity demand and solar thermal technology to provide at least 50 percent of the project's domestic hot water needs, and to provide 10 percent of the project's space heating needs.
<i>City of Duluth, MN</i>	The City of Duluth funded the Northern Communities Land Trust to acquire and substantially rehabilitate 10 blighted, vacant, and/or foreclosed units for sale to low-income households into Energy Star-certified homeownership units. The project, "Greening City Homes," used solar thermal technology to provide at least 50 percent of the project's domestic hot water needs and 10 percent of the project's space heating needs.
<i>Franklin County, OH</i>	Franklin County funded the Homes on the Hill Community Development Corp. to substantially rehabilitate 8 units of Energy Star-certified housing in an infill development project.
<i>Lake County Consortium, IL</i>	The Lake County Consortium funded two local CHDOs to construct 14 new Energy Star-certified homeownership units. Youthbuild Lake County built four new single-family homes. Habitat for Humanity Lake County built ten new duplex units.
<i>City of Lincoln, NE</i>	The City of Lincoln funded Neighborworks Lincoln to construct 28 new Energy Star-certified homeownership units. Fifteen of the housing units were directly assisted with the grant award. The project used geothermal energy technology to provide at least 20 percent of the project's energy needs.
<i>City of Salinas, CA</i>	The City of Salinas funded the Community Housing Improvement Systems and Planning Association to build 10 new Energy Star-certified homeownership units. The project included photovoltaic panels to provide at least 10 percent of the project's electricity demand.
<i>Washtenaw County Consortium, MI</i>	The Washtenaw County HOME Consortium funded Avalon Housing, Inc. , for 30 new Energy Star-certified rental housing units in an established neighborhood in downtown Ann Arbor.
<i>State of Vermont</i>	The State of Vermont, through the Vermont Housing Conservation Board, funded a local CHDO to construct Energy Star-certified affordable housing.

³⁴ U.S. Department of Housing and Urban Development, *Building Energy Star Qualified Homes and Incorporating Energy Efficiency and Green Building Practices into HOME-funded Affordable Housing*, ICF International, 2008.

In 2008, HUD announced the competitive reallocation of de-obligated HOME Community Housing Development Organization (CHDO) set-aside funds to expand the supply of energy-efficient and environmentally friendly, green housing that is affordable to low-income families.³⁵ A CHDO is a community housing development organization that has been designated by a HOME Participating Jurisdiction (PJ). In 2009 and 2010, 10 HOME PJs were each awarded \$250,000 to produce energy-efficient and environmentally friendly housing units that are owned, developed, or sponsored by eligible CHDOs, using replicable design and technology models. All units were required to be Energy Star-certified by an independent Home Energy Rater upon completion. Each grantee was required to ensure that its CHDO used sustainable site designs; installed water conserving fixtures, and energy-efficient appliances and lighting; used materials from renewable sources or with recycled content; used low VOC paints and sealants and formaldehyde-free composite wood; used mold prevention techniques; and gave residents an instruction manual with information on how to maintain the green features of their homes.

Training and Technical Assistance

CPD developed several resources to provide residents and organizations with training or information on energy efficiency for building or rehabilitating affordable housing:

- *Energy-Efficient and Green HOME Housing Resource Webpage.* CPD added a webpage on its energy-efficient and green activities through HOME where HOME PJs and the general public can find information and guidance about HUD initiatives, as well as links to useful training, technical assistance, and other resources for building energy-efficient and green HOME housing.³⁶
- *Technical Assistance on Building Energy-efficient and Green HOME Housing.* CPD has issued a Model Guide that provides technical and operational guidance to HOME PJs, CHDOs, and subrecipients to help them develop Energy Star-qualified homes. The guide discusses the benefits of improved energy efficiency in housing, describes what the Energy Star home label means, describes what a PJ and its local development partners must do to meet the Energy Star standards, and identifies other actions that a PJ can take to improve building performance in affordable housing.³⁷
- *Training on Energy-Efficient HOME Housing.* CPD also developed both web-based and instructor-led training on how to promote energy efficiency in HOME housing.³⁸ The *HOME Front* web-based training provides information on the importance of energy efficiency in rehabilitation projects, strategic ways to increase energy efficiency, and the benefits of working with weatherization agencies when developing a rehabilitation program.³⁹ Instructor-led training course on energy efficiency describes how a PJ can incorporate energy efficiency measures into rehabilitation and new construction programs. The course discusses the Energy Star New Homes Program and Energy Star standards for appliances and products. The course also discusses other building performance issues such as water conservation, moisture control, and indoor air quality.⁴⁰

³⁵ See www.hud.gov/offices/cpd/affordablehousing/programs/home/greenhome/chdonofa.cfm.

³⁶ See <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/greenhome/>.

³⁷ See <http://www.icfi.com/markets/energy/energy-efficiency-implementation>.

³⁸ See <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/greenhome/resources.cfm>.

³⁹ See <http://www.hud.gov/offices/cpd/affordablehousing/training/web/energy/>.

⁴⁰ See <http://cpdtraininginstitute.com/energydescription.cfm>.

Neighborhood Stabilization Program Round 3 (NSP3)

As described in more detail under the Recovery Act programs above, HUD continues to implement a separately-appropriated third round of NSP funding (NSP3), distributed by formula. NSP3 adopted many of the green and energy features developed for the competitive grant NSP2 program funded under the Recovery Act.

3.4.6 Combined Heat and Power for Multifamily Housing

Combined Heat and Power (CHP) is a process in which the heat generated in the production of electricity is used and recycled, rather than being released and wasted, as normally occurs.⁴¹ In residential applications, the heat can be used for domestic hot water, space heating, absorption cooling, or dehumidifying at the building where it is produced. If all of the recoverable heat is used, the process can achieve overall efficiencies of about 80 percent. The efficiency of more typical central power systems is 30 to 50 percent.

Combined Heat and Power Sea Park West, Brooklyn, New York

Sea Park West is an affordable housing complex consisting of 362 units located overlooking the bay at Coney Island, in an urban renewal area of Brooklyn. The development was originally part of the Mitchell-Lama program created in the later 1950s to provide affordable housing to moderate- and middle-income families. The owner, The Arker Company, has maintained affordable status by investing nearly \$60,000 per unit between 2002 and 2004. HUD continues mortgage interest reduction payments under the Section 236 Rental Housing Assistance Program in order to allow for the much-needed rehabilitation of these aging properties.

Faced with rising energy costs and a goal to maintain affordable status, Sea Park West applied and was accepted into the New York State Energy Research and Development Authority's (NYSERDA) Multifamily Building Performance Program (MPP) in 2007. Steven Winter Associates, acting as NYSERDA's MPP Partner, developed a comprehensive cost-effective work scope designed to achieve a 26 percent reduction in energy consumption. In addition to the base incentives, an incentive of \$150,000 was included for the installation of a CHP system. The total NYSERDA construction incentive is estimated to be \$449,640, on a work scope of \$1,074,270. If the project meets performance targets, the project is eligible to receive a performance bonus and the New York Energy Smart label for their buildings.

Included in that work scope was the installation of two 75 kW CHP units. The system was designed to provide onsite generation of electricity with recovered thermal energy used for the production of domestic hot water, with additional heat contributing to the high temperature steam heating system through heat exchangers. The project owner decided to install two Tecogen model # CM-75, Low Emissions Internal Combustion Natural Gas Engine Induction Generators.

The CHP system is estimated to save approximately \$69,388 per year based upon estimated utility costs. The system has a calculated savings-to-investment ratio (SIR) of 1.8 and a simple payback period of 6.4 years, with a lifecycle savings estimated at \$388,849 based upon a 15-year lifecycle.

⁴¹ Robert Groberg, Mike MacDonald, and Patti Garland, "Promoting Combined Heat and Power (CHP) for Multifamily Properties," Presented at August 17-22, 2008, ACEEE Summer Study on Energy Efficiency in Buildings. http://www.eceee.org/conference_proceedings/ACEEE_buildings

According to the Combined Heat and Power Installation Database, there are 166 multifamily housing CHP installations (both HUD-assisted and market rate) in eight states: California, Connecticut, Hawaii, Massachusetts, New Jersey, New York, Pennsylvania, and Rhode Island.⁴² HUD identified an additional 35 installations from data provided by manufacturers of equipment and other sources, for a total of 201, compared with only 71 multifamily installations in 2004. More than one quarter (28 percent) of these installations are HUD-assisted; they include 10 local PHAs and 46 HUD-assisted housing developments.

In partnership with the Oak Ridge National Laboratory, HUD developed a Level 1 computerized screening tool for use by HUD's stakeholders to assess the energy savings and potential payback from CHP efficiency strategies.⁴³ DOE's Clean Energy Regional Application Centers assisted in reviewing this tool. HUD's San Francisco and Chicago regional offices piloted the CHP Assessment Tool, and HUD's Multifamily Green Retrofit Program (GRP) used it as part of the review of 20 Green Retrofit Property Condition Assessment Reports considering CHP alternatives.

Based on the field testing and challenges identified, HUD and Oak Ridge entered into a third Interagency Agreement to use the Federal Energy Management Program's more refined Building Cooling Heating Power Level 2 analysis software tool for use in multifamily buildings. The Level 2 Tool is more complex than Level 1 and can model hourly utility consumption and detailed building characteristics. The Level 2 tool will also provide a consistent methodology for analysis, instead of individually customized spreadsheets.

Following the review of a Beta version, the Level 2 CHP Analysis tool was posted on the Internet with user manual and training material. The Oak Ridge Lab delivered a webinar on the new tool to reviewers and others in June 2010. In September 2010, HUD also prepared and posted the *HUD CHP Guide #3, Introduction to the Level 2 Analysis Tool for Multifamily Buildings*.⁴⁴

3.4.7 Single Family Housing

By the end of FY 2010, FHA's Single Family programs had insured 6.3 million housing units with \$898 billion of mortgage insurance in force – an increase of 1.67 million insured mortgages and \$293 billion in mortgage insurance over FY 2009.⁴⁵

In FY 2011, 1,271,211 new FHA endorsements were completed, including 420,561 refinancing and 777,521 new purchase endorsements. In recent years, FHA's share of the housing market has significantly grown in response to the housing crisis and efforts to stabilize faltering real estate markets. Though FHA's position in the market has decreased slightly as markets stabilize, FHA's role in current residential markets provides both opportunities and challenges for advancing energy efficiency as part of home purchase and refinancing of existing housing. Table 15 below shows the rise in FHA's relative market share.

⁴² See Combined Heat and Power Installation Database at <http://www.eea-inc.com/chpdata/index.html>. The database is maintained by ICF International for DOE.

⁴³ HUD CHP Screening Tool, version 2.1, http://eber.ed.ornl.gov/HUD_CHP_Guide_version_2.1/.

⁴⁴ The guide is available at www.hud.gov/offices/cpd/library/energy/index.cfm. Profiles of CHP installations, including two affordable multifamily projects and one public housing project, are available at www1.eere.energy.gov/industry/distributedenergy/chp_projects.html. The EPA has also added a link to the HUD Level 1 screening tool on Page 16 of its website at www.epa.gov/statelocalclimate/documents/pdf/combinedheatpower.pdf.

⁴⁵ Federal Housing Administration, *Monthly Report to the FHA Commissioner*, September 2010.

Table 15 FHA Single-Family Activity in Home Purchase Market			
Market Share and New Insurance Volumes by Number of Households Served			
	All Homes	Existing Homes	New Homes
FY 2011	14.63%	14.02%	23.57%
FY 2010	19.13%	18.25%	30.03%
FY 2009	18.70%	17.98%	26.63%
FY 2008	12.64%	11.94%	17.61%
FY 2007	4.12%	3.80%	5.97%
FY 2006	3.77%	3.52%	5.03%

Source: *FHA Share of Home Purchase Activity*, September 2011 Report.

FHA has several programs that allow borrowers to make investments in energy efficiency measures as part of purchasing or refinancing. These programs include:

- Energy Efficient Mortgage.** The Energy Efficient Mortgage (EEM) for single-family borrowers permits a borrower to finance into the mortgage 100 percent of the cost of eligible energy-efficient improvements without a second appraisal and without further credit qualification of the borrower. Qualified energy improvements are determined with an energy audit by a qualified home energy rater and can be included in the transactions. The Housing and Economic Recovery Act of 2008 (HERA) increased the maximum amount of eligible energy improvements from the previous \$8,000 to the lesser of 5 percent of the value of the property or of 115 percent of the median area price of a single-family dwelling; or 150 percent of the conforming Freddie Mac limit.
- 203(k) and “Streamlined K” Rehabilitation Program.** FHA’s 203(k) program can be used to make home renovations and repairs, including energy conservation improvements. The “Streamlined K” program allows borrowers to finance an additional \$35,000 into their mortgage to make improvements and repairs identified by a home inspector or FHA appraiser. Energy-efficient improvements such as new double pane windows, steel insulated exterior doors, insulation, heating and cooling systems, solar domestic hot water systems, caulking, and weather-stripping can be included with other improvements or repairs. The 203(k) program can also be used with EEMs.
- Title I Property Improvement Program.** FHA’s Title I program can be used to improve the energy efficiency of a home. Title I loans are usually second loans and while their primary use is to make needed repairs or improvements to residential properties, they can also be used for weatherization or other energy conservation improvements. The maximum loan amount is \$25,000. The new PowerSaver pilot program, described further below, uses Title I authority.
- Weatherization.** FHA borrowers may include weatherization items in their loan amount. Weatherization items include thermostats, insulation, storm windows and doors, caulking and weather stripping, and similar items for improving the performance of the envelope of the property. These items may be added to both the sales price and the appraised value before determining the maximum mortgage amount. If weatherization items are added to the property

and paid for by the borrower, the mortgage amount may be increased by up to \$2,000 of the cost of those items without a separate value determination. Amounts above this must be supported by value determinations pursuant to HUD guidelines.

As noted in Table 16 below, new endorsements for FHA programs that can support these energy efficiency investments amounts to approximately 2 percent of FHA's overall transactions. Though there was a slight decline in the volume of EEM and 203(k) transactions between FYs 2010 and 2011, demand for FHA programs for energy-efficient investments overall continues to increase, even with a reduction in overall FHA endorsements by over 27 percent during that span.

Table 16 – Programs Supporting Energy Efficiency Investments - New Endorsements (FY 2010-2011)						
	FY 2010	Percent of Total	FY 2011	Percent of Total	Change (2010 to 2011)	Percent Change
Energy Efficient Mortgage	2,496	0.14%	1,067	0.08%	-1,426	-57%
203(K) Purchase Rehab	22,491	1.29%	21,297	1.67%	-1194	-5.3%
Title I - Property Improvement	4,200	0.24%	5,819	0.46%	1,619	39%
Weatherization	Data on Weatherization Transactions Not Available					
Combined Improvement Loans	29,187	1.67%	28,183	2.21%	-1,004	-3.4%
Total FHA Endorsements	1,746,997	100.00%	1,271,211	100.00%	-475,786	-27.2%

Source: Source: FHA Single-Family Outlook Report; HUD's Single Family Database, and Title I Insurance System – New Loans Insured Report, data as of September 30, 2011.

3.4.8 Healthy Homes and Lead Hazard Control

The Office of Healthy Homes and Lead Hazard Control (OHHLHC) administers several grant programs, enforces lead regulations, and provides technical assistance to communities around the country that wish to further integrate their health and energy programs.

Lead Hazard Control Grants. State and local governments use these competitive grant programs – Lead-Based Paint Hazard Control and the Lead Hazard Reduction Demonstration – to identify and control lead-based paint hazards in privately owned rental or owner-occupied pre-1978 housing. The Recovery Act provided approximately \$80 million combined for both Lead Hazard Control programs.

Healthy Homes Grants. These grants are competitively awarded to states, local governments, and private organizations to identify and eliminate housing-related health hazards. The Recovery Act provided approximately \$20 million to the Healthy Homes program.

The Green and Healthy Homes Initiative Pilot. This public-private partnership pilot seeks to coordinate and implement a national healthy homes agenda that will create safer, more efficient, and more stable homes, and improve the health of children and families. This initiative offers integrated health, safety, and lead hazard reduction; energy efficiency; and weatherization interventions in low- to moderate-income homes in targeted communities. HUD is building on the success of the pilot to launch a nationwide initiative, the *Safe and Healthy Homes Investment Partnership*.

Programmatic Enforcement. Housing units are made healthy through enforcement efforts of the federal Lead-Based Paint Disclosure Rule and the federal Lead-Safe Housing Rule. Such efforts generate settlement agreements with commitment from private landlords to fix housing-related health hazards in their inventory. For FY 2010-2011, enforcement efforts produced 1,190 lead-safe housing units.

3.5 Field Offices and Office of Field Policy and Management

Many of HUD's field offices took action to support energy partnerships with local communities, and to promote energy efficiency and green building in HUD-financed projects. The following are representative of local initiatives to promote energy efficiency and green building in their regions:

- *Region I.* The Boston Field Office worked with the Boston Housing Authority to approve a \$63 million Energy Performance Contract (EPC), projected for completion in January 2012, with a 20-year projected utility cost savings of \$97.8 million, as well as the Washington Beech HOPE VI development, which is LEED Gold-Certified and is part of an Energy Star Homes Pilot Program. The project utilized \$10 million in Recovery Act funds and \$19.4 million in HOPE VI and other state, local, and private funding. The Hartford Field Office partnered with the Connecticut Department of Social Services to leverage DOE weatherization funds for 122 units of HUD-assisted multifamily housing. Another 170 units have begun the weatherization process, 495 additional units have been audited, and 70 units are pending weatherization approval out of a total 3,833 units.
- *Region II.* The New York Field Office is monitoring two EPCs, in Yonkers and New York City. The New York City Housing Authority project is likely going to be the largest public housing EPC in the country when it is completed. The Buffalo Field Office approved three EPCs (Geneva, Lackawanna, and Olean) while the Newark Field Office partnered with New Jersey's PHAs to ensure that all new and existing developments are energy efficient; there are currently six New Jersey PHAs utilizing EPCs to fund energy efficiency improvements.
- *Region III.* HUD's Pittsburgh Field Office is participating in the Western Pennsylvania Energy Conservation Collaborative (WPECC), a 5-year effort to retrofit the majority of existing multi-unit affordable housing to reduce energy and water consumption and to ensure that all residents live the healthiest environments possible. The Collaborative has brought together affordable housing providers and managers, industry leaders, government agencies, and community resources to collectively and collaboratively find ways to address the need for more efficient and healthier existing buildings. The Collaborative's 14 members account for 17,000 units and 340 individual properties.
- *Region IV.* The Birmingham Field Office partnered with the Alabama Association of Habitat for Humanity affiliates to host a 2010 statewide, 3-day energy, water, and sustainable communities conference. Other partner organizations included the Home Depot Foundation, Auburn University Office of Sustainability, Auburn University College of Architecture Design and Construction, and the US Green Build Council of Alabama.
- *Region V.* The Region V Sustainability Officer and the Chicago Field Office's Office of Public Housing are collaborating with the Smart Energy Design Assistance Center (SEDAC) at the University of Illinois at Urbana-Champaign and the Illinois Department of Commerce and Economic Opportunity on the Efficient Living: Illinois PHA Energy Program. This initiative has made a total of \$1.4 million in utility funds available to PHAs in Illinois PHAs to incorporate

energy reduction practices into their daily operations. SEDAC conducts site visits to assess the energy needs of buildings, creating a baseline against which improvements can be made.

- *Region VI.* HUD provided \$600,000 in seed funding through a Hispanic Serving Institution Assisting Communities (HSIAC) grant to build a demonstration energy conservation house on the University of Texas at Brownsville and Texas Southmost College campus (UTB/TSC) as part of the Go Green Assistance Center. The “Go Green Center” is a green resource center located in the southernmost region of the Texas-Mexico border. HUD has also supported Proyecto Azteca, a nonprofit organization that builds new single-family housing for families living in the colonias using Rural Housing and Economic Development, HOME, Self-help Home Ownership Opportunity Program (SHOP), and state funds. Proyecto Azteca has been implementing sustainable features in these homes that include low-E windows, low water plumbing fixtures, low VOC paints, radiant barrier roofing materials, Energy Star refrigerators, added insulation, and a 2-year-old nursery of native trees and plants to help provide shade from the Texas sun.
- *Region VII.* The Kansas City Regional Office of HUD partnered with the Kansas City, Kansas Board of Public Utilities and other local partners in planning and presenting the “Build Green” Conference from 2005 to 2010. HUD served as a member of the planning committee each year. The conference provided an opportunity to share knowledge and discuss issues aimed at advancing sustainable growth and renewal in Kansas City, and to recognize energy efficiency leaders with special recognition awards. Approximately 300 to 500 people attended the conference each year.
- *Region VIII.* Region VIII has supported a wide range of energy and green building partnerships. Standout examples include the Denver Housing Authority’s 100-unit housing complex at 1099 Osage, the first phase of the 18-acre South Lincoln Homes public housing redevelopment. Now known as Tapiz at Mariposa, the building is on track for LEED Gold certification and will house a youth culinary academy; community resource center; and Arts Street, a nonprofit program that provides creative job training for community youths. The site is near a light-rail stop and will include a bike-sharing and storage station and an urban garden. In South Dakota, the Thunder Valley Community Development Corporation has led a team to develop the Oyate Omniciye Regional Plan for the Pine Ridge Indian Reservation. A key part of the plan is the Oglala Lakota Sustainable Housing Partnership, which has built a demonstration straw bale home with the University of Colorado at Boulder and the Oglala Lakota College. The home is one of four sustainable housing prototypes planned for the reservation that include solar energy and grey water reuse systems.
- *Region IX.* Region IX hosted a Regional Energy Forum in Sacramento in partnership with the National Consumer Law Center, the National Housing Trust, Emerald Cities Network, and the Benningfield Group to facilitate discussions with utilities, state energy regulators, and energy industry representatives on how to address energy efficiency needs and opportunities in affordable housing. A follow-up Weatherization Forum was held at the HUD San Francisco Regional Office to address conflicting policy and program requirements to increase access and achieve greater integration of utility and federally funded energy programs and resources.

Also in Region IX, HUD launched an initiative to increase the participation of HUD multifamily properties and increase the scope of weatherization work traditionally offered by weatherization agencies with the California Housing Partnership Corporation (CHPC), a nonprofit affordable advocacy organization, and engaged the California’s Department of Community Service Development (CSD), the state administrator for DOE’s Weatherization Assistance Program

(WAP), and local weatherization agencies in efforts to improve weatherization services. HUD also launched a partnership with the California Energy Commission to increase linkages between HUD-supported housing projects and community-based green workforce training and development in helping grantees meet HUD's Section 3 requirements.

The Honolulu Field Office partnered with Hawaii Energy and the Hawaii State Office of Community Services to assist HUD-assisted housing to access the Weatherization Assistance Program (WAP). One multifamily housing property received WAP funds for 12,858 compact fluorescent light bulbs (CFLs) to convert lighting in 1,300 units throughout the state. Activities involved a whole-building approach to weatherization and energy efficiency upgrades, including a resident engagement component.

The Las Vegas Field Office's Office of Multifamily Housing partnered with Nevada Energy, HELP of Southern Nevada, and the Urban League to identify HUD-assisted housing to access the WAP. HELP of Southern Nevada provided weatherization assistance to 496 units of HUD-assisted projects through the end of the 1st quarter of 2011, with a total project cost of \$1.6 million.

- *Region X.* HUD's Alaska Field Office spearheaded a partnership with USDA Rural Development, the Denali Commission, the Alaska Housing Finance Corporation, Tribally Designated Housing Entities, and the Cold Climate Housing Research Center to promote the design and production of more sustainable and energy-efficient affordable housing in the Arctic and sub-Arctic climates. Construction of new Sustainable Northern Shelter (SNS) program homes was completed in remote Alaska communities based on two successful demonstration homes that reduced typical construction costs by 50 percent and energy costs by 90 percent.

4. CONTINUING THE COMMITMENT: HUD'S ENERGY ACTION PLAN

As noted in earlier sections of this report, energy efficiency is a priority for HUD, as the nation's affordable housing and community development agency, because more energy-efficient homes can be more affordable, longer lasting, more comfortable, and potentially healthier – while resulting in less energy waste and fewer greenhouse gas emissions.

This section of the report describes seven strategies that are designed to scale up HUD's impact in increasing energy efficiency in assisted and public housing and to help accelerate progress in unsubsidized, market-rate homes. This section identifies 18 planned actions under each strategy that HUD has undertaken in 2012 and will continue in 2013.

HUD's overall goal in executing these strategies is to improve the energy efficiency and health of public and assisted housing, including Indian housing, as well as unsubsidized market-rate housing where HUD programs are providing financing or insurance. In addition, the intent of these initiatives is to “move the needle” on green building in HUD programs, where feasible. HUD recognizes that private investment and consumer choice, not government programs, will be the fundamental drivers of the necessary transformation of the nation's residential building stock. HUD believes that its most valuable contribution can be in demonstrating successful approaches that the private sector and consumers can take to scale.

Historically, HUD's previous efforts to develop an energy strategy and plan relied largely on voluntary measures, limited incentives through competitive grant and other programs, and the commitment and creativity of HUD staff at Headquarters and in the field – efforts that yielded modest progress. As described in this report, that has changed significantly over the past 3 years - with the infusion of Recovery Act funds, establishing energy efficiency as one of HUD's top Annual Performance Goals, implementing enhanced tracking and reporting systems, and creating stronger incentives and minimum energy requirements. Further progress will be dependent on continuing these efforts, as well as addressing structural and regulatory barriers that impede energy investments and improvements, and institutionalizing HUD-wide energy priorities, standards, and approaches across programs.

Accordingly, the strategies that will guide HUD's energy agenda are:

- *Prioritize energy efficiency through HUD programs*
- *Create incentives for private investment*
- *Develop tools to support smarter decisions*
- *Expand training and technical assistance to key stakeholders*
- *Strengthen data collection and reporting systems that drive market-based action*
- *Implement federal statutes and provide regulatory flexibility*
- *Strengthen interagency and private sector partnerships*

4.1 Prioritize Energy Efficiency through HUD Programs

Action 1: Implement Energy Efficiency and Healthy, Green Building Annual Performance Goal

The department established a 2-year goal of retrofitting 159,000 energy-efficient and green units in FY 2010-11, including 126,000 units of energy-efficient housing and an additional 33,000 interventions in lead hazard controls and healthy homes. HUD established a similar goal of 159,000 for FY 2012-13

UPDATED ENERGY ACTION PLAN								
	PIH	FHA Multi- Family	FHA Single- Family	CPD	OHHLC	PD&R	OSHC	FPM
Prioritize Energy Efficiency Through HUD Programs								
1. Implement Energy Efficiency and Healthy Green Building Annual Performance Goal	•	•	•	•	•	•	•	•
2. Provide Incentives Through Competitive Grant Programs	•	•	•	•	•			
Create Incentives for Private Investment								
3. PowerSaver: Provide Innovative Financing for Home Energy Improvements			•				•	
4. Implement Innovative Financing for Multifamily Energy Retrofits		•					•	
5. Implement Green Refinance Plus Fannie Mae – FHA Risk Sharing for Multifamily Properties		•						
6. Develop Energy Efficiency Tools Targeted to Small PHAs	•							
Develop Tools to Support Smarter Decisions								
7. Expand Use of Green Capital Needs Assessments	•	•						
8. Strengthen Benchmarking of Energy and Water Performance in Public Housing	•							
9. Develop Common Energy and Green Retrofit Standards or Protocols	•	•	•	•	•	•	•	•
Expand Training and Technical Assistance to Key Stakeholders								
10. Implement Training and Technical Assistance through HUD's Transformation Initiative	•	•		•	•		•	•
11. Include Energy and Green Building Training in HUD's Core Curriculum	•	•	•	•	•	•	•	•
Strengthen Data and Reporting Systems That Drive Market-Based Action								
12. Evaluate HUD's Recovery Act Energy and Green Building Investments		•	•			•	•	
13. Strengthen Energy Consumption Data in Public Housing	•							
14. Develop Energy Modeling and Scenario Planning Tool*							•	
15. Conduct Broad-Based Sustainability Research and Evaluation						•	•	
Implement Federal Statutes and Provide Regulatory Flexibility								
16. Make Determination on Minimum Code Requirements	•	•	•			•	•	
17. Explore Green Total Development (TDC) Cost Limits in Public Housing	•							
Strengthen Public and Private Sector Partnerships								
18. Continue DOE, EPA, and Other Interagency Partnerships; Explore Utility and Other Private Sector Partnerships					•		•	
*Contingent on FY 2013 Appropriations								

(See Appendix G). HUD will continue to refine its reporting of these units and develop a methodology to estimate the costs and savings associated with these investments.

As noted in Section III of this report, HUD achieved the 2-year FY 2010-11 goal. A significant share of the units completed in FY 2010-11 were funded through the Recovery Act, including the Public Housing Capital Fund (both formula and competitive), the Multifamily Green Retrofit Program, the Indian housing NAHBG and ICDBG programs, and the Tax Credit Assistance Program. Additional programs that contributed to this goal are Energy Performance Contracts and HOPE VI in public housing; the Mark-to-Market Green Initiative and Sections 202 and 811 Supportive Housing programs in multifamily housing, and the CDBG and HOME formula grant programs. In FY 2012-13, HUD will close out Recovery Act programs and continue to implement on-going programs in support of energy efficiency.

Action 2: Provide Incentives through Competitive Grant Programs

HUD will continue to provide incentives (or establish minimum requirements) for energy efficiency and green building through its various competitive grant programs. These programs award approximately \$2.7 billion annually for a range of housing and community development initiatives. HUD continues to set energy efficiency and green building as a Policy Priority in the General Section of its annual notices of funding availability (NOFAs). As a Policy Priority, programs may award additional points for energy efficiency, or make energy efficiency a threshold requirement, in ranking and rating grant applications.

Competitive grant programs that established a minimum threshold or provided one or more points for energy efficiency in FY 2010-11 included: Section 202 Supportive Housing for the Elderly, Section 811 Supportive Housing for Persons with Disabilities, HOPE VI, Rural Housing and Economic Development, and ICDBG. One program, the SHOP, continues to set Energy Star for New Homes as a minimum requirement for new construction.

As an additional incentive, HUD is developing a system for certifying communities under its *Safe and Healthy Homes Initiative Partnership (SHHIP)* program. This program, administered by the Office of Healthy Homes and Lead Hazard Control, will certify units of local government that have successfully coordinated the delivery of home intervention services to residents across the disciplines of health, energy, and housing. This service delivery model has proven to be more effective in creating healthy and efficient outcomes for residents. The certification would not be directly tied to any funding or resources, but could be used as criterion for competitive funding in NOFAs from HUD or other federal agencies.

4.2 Create Incentives for Private Investment

Action 3: PowerSaver – Provide Innovative Financing for Home Energy Improvements

In February 2011, HUD launched PowerSaver, a new federal financing program designed specifically to support home energy retrofits. PowerSaver will start as a 2-year pilot program. The purpose of the program is to determine the feasibility of delivering affordable financing for home energy improvements through mainstream lenders in a manner than can be scaled through capital market investments. The pilot is also intended to generate data that strengthens the economic case for home energy improvement lending.

Industry forecasts suggest that homeowners are interested in making their homes energy-efficient. Yet options are still limited for financing home energy improvements, especially for the many homeowners who are unable to take out a home equity loan or access an affordable consumer loan. PowerSaver is

designed to provide private lenders with a new product option to serve a potentially growing market, while generating jobs for contractors, suppliers, and manufacturers at the local level.

Under the program, homeowners are able to receive low-cost, federally insured loans of up to \$25,000 to make eligible energy-efficient improvements of their choice, including the installation of insulation, duct sealing, doors and windows, energy efficient HVAC systems, water heaters, solar panels, and geothermal systems.

FHA mortgage insurance will cover up to 90 percent of the loan amount in the event of default. Lenders will retain the remaining risk on each loan, incentivizing responsible underwriting and lending standards. FHA will provide streamlined insurance claims payment procedures on PowerSaver loans. In addition, lenders were eligible for incentive grant payments from FHA to enhance benefits to borrowers, such as lower interest rates. Grant funds were provided through a one-time, \$25 million appropriation in HUD's FY 2010 Budget to establish an Energy Innovation Fund.⁴⁶

PowerSaver was designed to meet a need in the marketplace to allow borrowers who have the ability and motivation to take on modest additional debt and realize the savings over time from a home energy improvement. PowerSaver loans are available only to borrowers with good credit, manageable overall debt, and at least some equity in their home (maximum 100 percent combined loan to value).

Lenders were selected to participate in the PowerSaver pilot based on their capacity and commitment to provide affordable home energy improvement financing. Lenders are required to serve communities that have already taken affirmative steps to expand home energy improvements, coordinating, where possible, with existing programs such as the DOE-supported Home Performance with Energy Star and the Better Building Neighborhood Program.

The University of Virginia Credit Union became the first lender to approve PowerSaver loans, working in partnership with the Local Energy Alliance Program (LEAP) to promote the product in Central Virginia. Other states where PowerSaver has initiated activity include Maine, Colorado, Pennsylvania, and California.

In addition, in December 2011 an MOU was signed between FHA and Fannie Mae that provided for Fannie Mae purchase and securitization of PowerSaver loans, thereby providing an important source of liquidity for PowerSaver-approved lenders who are also Fannie Mae-approved seller servicers.

The results of the pilot will be assessed through an independent evaluation. HUD will assess whether mainstream lenders can deliver affordable home energy improvement mortgage or consumer loans through an approach that can be scaled in the capital markets. The evaluation will also shed light on the performance of such loans. PowerSaver will also help inform the broader inquiry unfolding on many fronts as to whether: (1) specific home energy improvements result in energy savings, (2) homeowners derive a financial benefit from energy savings, and (3) whether the energy improvements have an impact on home values.

⁴⁶ The Consolidated Appropriations Act of 2010 (Pub L. 111-117) included an appropriation of \$50 million to establish an "Energy Innovation Fund" at HUD. Congress intended "to catalyze innovations in the residential energy efficiency sector that have promise of replicability and help create a standardized home energy-efficient retrofit market." Of the \$50 million, Congress directed HUD to target \$25 million to the single-family market and \$25 million to multifamily homes.

Action 4: Implement Innovative Financing for Multifamily Energy Retrofits

The multifamily residential sector, especially affordable multifamily buildings, represents the most challenging part of the built environment to retrofit. In addition to the many structural, financial, and behavioral barriers to retrofits that generally apply across all building types, affordable multifamily properties face additional barriers. One barrier is the “split incentive,” in which property owners may be required to invest in energy improvements but residents benefit from the savings. Another is the complex nature of financing and ownership that applies to many multifamily properties. In some cases, HUD rules and regulations may impose additional complexity and barriers.

In many respects, issues in retrofitting multifamily properties remain poorly understood, even among energy experts. One recent report noted that “it is only a fairly recent phenomenon that analyses on energy code measures have included multifamily characteristics at a similar level of specificity as has generally been applied to single-family construction analyses. Additionally, over 70 percent of the nation’s existing multifamily units were built before there were any building energy codes (1978).”⁴⁷

In 2011, HUD issued a NOFA announcing the availability of up to \$25 million in competitive grant funds under the HUD Energy Innovation Fund – Multifamily Energy Pilot Program. In March 2012, \$23 million was awarded to 12 organizations. The purpose of the program is to demonstrate solutions to longstanding challenges to retrofits, with an emphasis on easy-to-replicate private sector investment and innovation. While HUD recognizes the limitations inherent in a one-time \$23 million program, it is committed to leveraging the impact of this investment to the fullest extent feasible.⁴⁸ The federal grants are leveraging an additional \$60 million in philanthropic, local government, and private capital funds.

In addition to several financing demonstrations, a number of grants have been awarded for “applied research” demonstrations that will address behavioral change strategies, including testing the value of better information and resident training by using in-unit displays and various incentive structures to overcome the “split incentive” issue in master-metered buildings; employing strategies aimed at increasing owner and tenant awareness and control over building energy use; and testing the use of online monitoring and management systems to regulate apartment temperatures. One focus of the grants, as well as of a DOE-funded pilot implemented by the Stewards for Affordable Housing for the Future (SAHF), will be to advance energy performance contracting in privately owned assisted housing. There are several challenges in using EPCs in this sector. Accordingly, HUD is considering waivers that will allow rent adjustments that reflect the energy savings achieved for the duration of the EPC contract.⁴⁹

Action 5: Implement Green Refinance Plus: Fannie Mae – FHA Risk Sharing For Multifamily Properties

In May 2011, HUD and Fannie Mae launched Green Refinance Plus. The program enables owners of affordable multifamily properties seeking to refinance their mortgages to access larger loans, provided that they deploy the additional proceeds to make energy and other environmental improvements to the property. The purpose of the program is to establish a market-based incentive program for encouraging multifamily owners to make energy improvements that potentially can be scaled within the housing industry.

⁴⁷ Benningfield Group, Inc., *U.S. Multifamily Energy Efficiency Potential by 2020*, Prepared for the Energy Foundation, October 29, 2009.

⁴⁸ http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2012/HUDNo.12-051.

⁴⁹ <http://www.sahfnet.org/energyPolicy.html>.

Green Refinance Plus is an expansion of the longstanding FHA-Fannie Mae Risk Sharing program. Although this latter program has not been high-volume, it has been effective: 175 loans have been funded under it, with an outstanding principal balance as of August 31, 2010, of \$588 million and zero loan defaults or claims. Almost all of the loans have been for newly built affordable properties utilizing Low-Income Housing Tax Credits.

As the properties have aged, and interest rates have dropped recently, owners have sought opportunities to refinance. Under the current FHA-Fannie Mae Risk Sharing program, while underwriting standards may be adequate to refinance the outstanding loan balance, they usually do not generate sufficient loan proceeds to complete needed property renovations or energy retrofits. Green Refinance Plus will address this need through additional insurance coverage from FHA in consideration of underwriting flexibility from Fannie Mae.

Under this program, loans may be at least 5 percent larger than otherwise possible. Based on an average projected loan size of \$3.5 million, the program will generate a minimum of \$175,000 on average in additional loan proceeds to pay for energy-saving improvements. HUD anticipates an initial annual volume of \$100 million under the program and has signed a new Risk Sharing Agreement with Freddie Mac that may increase the opportunity for Green Risk Sharing transactions.

In order to access the additional proceeds, properties must prepare a Green Capital Needs Assessment (Green CNA) that determines their property's deferred capital needs and cost-effective opportunities for increasing energy and water efficiency, reducing operating and capital costs, and improving indoor environmental quality. HUD pioneered the development of such a tool for the Green Retrofit Program under the Recovery Act: the Green Physical Condition Assessment (GRPCA) protocol. Properties participating in Green Refinance Plus may use this tool or a comparable one.

Although just getting underway, the new Green Refinance Plus launched one project in June 2012 with a closing for a 274-unit project in Santa Ana, California, valued at \$19.4 million. While Green Refinance Plus has started as a relatively small program in the context of the multifamily housing sector, HUD may expand it based on performance. In addition, FHA can adopt the approach of the program – providing a targeted financial incentive with an interactive information tool to inform investment decisions – more widely in the future.

Action 6: Develop Energy Efficiency Tools Targeted to Small PHAs

Energy Performance Contracts (EPCs) can be effective tools for reducing utility costs and improving the quality of public housing developments. Through EPCs, HUD provides incentives for PHAs to leverage third-party financing for energy-efficient and water-conserving retrofits. In a basic EPC – in which a PHA partners with an Energy Services Company (ESCO) and uses the Frozen Rolling Base incentive – the PHA can retain up to 25 percent of the utility cost savings achieved for the life of the contract (up to 20 years).

HUD is exploring ways to make EPCs work better for smaller PHAs. Of the 265 contracts executed to date, only 27 involved very small PHAs (less than 250 units) – just 1 percent of the 2,300 very small PHAs, while nearly 14 percent of PHAs managing between 250 and 499 units took advantage of energy performance contracting incentives.

**Table 17 – Energy Performance Contracts By Small PHAs
Number and Percent By PHA Size, 2011**

PHA Type by Unit Count	PHAs	Percent of PHAs	Number of Executed EPCs	PHAs w/Executed EPCs	Percent PHAs with EPCs	Percent of Total
Very small (Less than 250)	2,332	74.6%	27	26	1.1%	11.7%
Small (250-499)	430	13.8%	72	64	14.9%	28.8%
Medium (500-1,249)	229	7.3%	68	65	28.4%	29.3%
Large (1,250-6,599)	120	3.8%	87	61	50.8%	27.5%
Very large (More than 6,599)	14	0.4%	22	6	42.9%	2.7%
Total	3,125	100%	265	222	7.1%	100.0%

Source: HUD-PIH Energy Performance Contracts Status Summary Report – 2011, and Operating Fund Annual Report, Calendar Year 2009.

Small PHAs can face difficulty attracting competitive services from energy services companies that may not see the small size of their project as cost-effective. At the same time, a lack of technical expertise can prevent smaller PHAs from implementing a “self-developed” EPC. To address these gaps, HUD is exploring options for developing tools targeted toward small (250 to 500 units) and very small PHAs (250 units or less).

4.3 Develop Tools to Support Smarter Decisions

Action 7: Expand Use of Green Capital Needs Assessments

A Capital Needs Assessment (CNA) is an inspection of a multifamily property that provides a cost estimate of maintaining the property over a 5-to-20 year period. CNAs enable properties to plan for annual improvements, as well as eventual refinancing and rehabilitation; determine the adequacy of reserves to fund necessary improvements; and set priorities for capital investments. CNAs have been widely used by HUD, federal and state agencies, private sector institutions, and in the multifamily industry for more than 20 years.

However, CNAs generally have not included an analysis of building energy use and opportunities for energy savings, as typically provided through an energy audit. In recognition of this flaw, HUD created a Green CNA – the Green Retrofit Physical Condition Assessment (GRPCA) protocol – for the multifamily Mark-to-Market Green Initiative. The GRPCA integrates a conventional CNA with a comprehensive energy audit and detailed financial analysis of retrofit options in a single tool. It identifies a set of immediate energy efficiency improvements, but also provides a long-term reserve and replacement strategy that ensures that sufficient reserves are set aside over time to replace equipment at the end of its useful life. It also requires an analysis of additional green measures and provides guidance on additional optional features (e.g., renewable energy).

The GRPCA developed for HUD’s Mark-to-Market and Green Retrofit programs illustrates the benefits of a Green CNA. It offers flexibility to property owners: rather than mandating a one-size-fits-all set of building improvement measures or specified level of energy performance, the Green CNA drives an analytical process that determines the most cost-effective energy efficiency and other environmental and health improvements for their property. This approach reflects the fact that existing properties vary widely in terms of their type, condition, overall capital needs, underlying finances, and external environment (climate zone, energy costs, and local requirements and incentives).

HUD's Green Retrofit Physical Condition Assessment Protocol

HUD's GRPCA protocol was developed for the Multifamily Green Retrofit Program. Twenty-three mandatory items are included as core elements of the Multifamily GRP. Not all items will apply to each property, but where they do apply, two green alternatives must be considered in the analysis. One green alternative would be a baseline green alternative, while the second would be a more efficient green alternative. Where Energy Star products are considered, the most economical Energy Star item, considering durability, will be the baseline green alternative. The Green Retrofit Physical Conditional Assessment has three parts:

1. Physical Condition Assessment (PCA) of Traditional and Green Requirements: The traditional PCA identifies repairs necessary in the first year following financial restructuring and the repairs and replacements during the next 20 years. The Green PCA offers both "traditional" and green components that meet or exceed local building codes, and provides cost estimates for both options. For mandatory green measures, the PCA provides an evaluation of the costs and benefits for two levels of "green."

2. Energy Audit: An energy audit identifies how energy is used in a facility and provides a prioritized list of recommended cost-effective energy efficiency improvements to reduce energy costs. The assessment of energy use is accomplished by collecting data on energy use and costs, conducting a physical inspection of equipment and space conditions and building envelope characteristics and conditions, reviewing past maintenance schedules, assessing the remaining useful life of equipment and appliances, and evaluating system performance. Energy improvements are identified on the basis of whether the estimated energy savings exceed the installed cost of the energy measure over the measure's useful life. These recommendations are based on engineering and economic analysis and consider factors such as operating hours, equipment efficiency, and building and occupant energy demand characteristics.

3. Integrated Pest Management Plan (IPM): The Integrated Pest Management evaluation identifies the current level of pest infestation and existing pest control practices and procedures. The findings are used in the development of a required IPM Plan.

The Green Retrofit Program also requires a **Green Operating and Maintenance Plan**.

This approach has the potential to be a valuable resource for the multifamily housing industry. For owners, the tool provides information that enables them to improve energy and water efficiency while reducing operating costs. For lenders and investors, it creates the basis for potentially underwriting energy savings as part of refinance and rehabilitation transactions.

HUD is actively applying the Green CNA, or a similar approach, more widely across FHA multifamily and public housing programs. In public housing, PHAs are required by law to complete an energy audit for each PHA-owned project under management not less than once every 5 years, and to integrate utility management with capital planning. The Office of Public and Indian Housing (PIH) is implementing a Physical Needs Assessment (PNA) process to achieve a number of critical goals in the management of public housing and HUD's oversight of Public Housing Authorities (PHAs). The PNA tool will collect energy audit data to be integrated into the PHAs long term plan to allow the PHA to evaluate green improvements on a continuous basis rather than as an isolated activity once every 5 years at the time of the required energy audit. A Green Physical Needs Assessment (GPNA) tool was developed and pilot-tested by HUD at 9 PHAs ranging in size from 80 to 5,400 units representing a total of 11,000 public housing units. In addition nearly 20 PHAs voluntarily participated in beta testing of the tool and provided comment on their experience with the tool. A final version of the Green PNA tool (version 1.0 dated July 2, 2012) including a final draft users guide is now available to PHAs to begin using in advance of the final rules.

In addition to the PNA tool, HUD published two new rules which serve to implement the PNA requirement and set out the basic outline and protocols of the process. A new *Physical Needs Assessment Rule* (proposed July 20, 2011) will require all PHAs to complete a comprehensive PNA for each of their public housing developments once every five years and to update these assessments annually. A new *Energy Audit Rule* (proposed November 17, 2011) will establish standards for public housing energy audits, integrating energy conservation measures with capital planning in a holistic planning approach. The rules are both in the final rulemaking process and are expected to be published as final rules for implementation by PHAs over the ensuing one year period with due dates based upon fiscal year end dates. HUD also published a proposed Capital Fund rule on February 7 2011, which implements the energy requirements of the Energy Policy Act of 2005. The movement to synchronize, standardize, and integrate these activities will strengthen PHAs' planning efforts and, it is believed, will reduce administrative burden and uncertainty in the compliance with some of the requirements.

Finally, federal agencies and programs currently have different requirements for what constitutes a valid CNA. While some of these differences are necessary consequences of using CNAs for different purposes, administrative alignment of minimum requirements and standards of CNAs across federal rental housing programs will help avoid duplicative studies if owners and developers introduce a new federal funding source to the project. HUD is therefore working with USDA, the Department of the Treasury, and the White House Domestic Policy Council to develop a uniform set of principles and standards for a CNA, including a green component.⁵⁰ The final report of the Interagency Rental Policy Working Group recommends the development of a single uniform CNA protocol for the participating agencies (and any stakeholders in the multifamily industry that elect to utilize it), which includes green and energy efficiency components.

Action 8: Strengthen Benchmarking Of Energy and Water Performance in Public Housing

HUD created a building utility benchmarking tool in partnership with EPA and the Oak Ridge National Laboratory. The tool was developed to allow PHAs to measure their buildings' energy and water performance against the performance of similar buildings. The tool could be used as a first step in identifying buildings with poor performance and to enable PHAs to make informed capital planning decisions.

The energy and water consumption data used to develop the tool were obtained from a sample of 349 PHAs nationwide representing 9,100 buildings. Analysis was performed on the datasets to determine which of more than 30 characteristics (e.g., building size, unit size, climate, building age, laundry type, parking, and utility prices) are most closely linked to energy and water use. Based on these results, utility consumption models were developed by correlating the dominant and most common building characteristics to building energy and water consumption. The findings of this analysis were presented in a report, *Benchmarking Utility Usage in Public Housing*.⁵¹ The benchmarking tool scores each building from 0 to 100. Lower scores indicate less-efficient buildings relative to the benchmark. A score of 50 is average.

⁵⁰ See Rental Policy Working Group, Federal Rental Alignment: Administration Proposals, December 31, 2011. Retrieved from <http://www.whitehouse.gov/blog/2011/12/30/improving-affordable-housing-delivery-across-federal-agencies>.

⁵¹ Office of Public and Indian Housing, *Benchmarking Utility Usage in Public Housing*, December 13, 2007. Prepared by D&R International, Ltd. under Contract C-OPC-22650.

HUD is exploring options to leverage the existing utility consumption information that it receives for funding purposes for broader analytic purposes. HUD hopes to be able to move to a system where it can more easily determine which properties are the most inefficient and costly to operate.

Action 9: Develop Common Energy and Green Retrofit Standards or Protocols

HUD will explore options for developing more uniform guidelines and standards for energy efficiency and green building investments in HUD-assisted properties. Currently, a variety of program-defined standards and guidelines exist, reflecting different program requirements and historical practices and procedures for each program (see Attachment B). There are significant benefits to more uniform requirements: ease of reporting for grantees and partners, ability for HUD to consistently measure and track results against uniform metrics, and ease of use for program partners.

As part of the Interagency Rental Policy Working Group, in partnership with USDA, DOE, and other agencies, HUD established a framework for energy standards, as follows:

1. New Construction

- *New construction with federal grants.* New construction or gut rehabilitation of rental housing supported with federal grants should meet or exceed the current requirements for Energy Star for New Homes or Energy Star for Multifamily High Rise, or Builder's Challenge Quality Criteria.
- *Other new construction.* New construction of rental housing supported with federal insurance, direct loans, loan guarantees, or public housing capital and operating funds should meet or exceed the most current applicable International Energy Conservation Code (IECC) or ASHRAE 90.1 standard that is deemed feasible to apply on a nationwide basis. The current applicable codes are the 2009 IECC and ASHRAE 90.1-2007.

2. Substantial Rehabilitation

- Substantial rehabilitation of rental housing is encouraged to implement energy improvements that are recommended by a new CNA template tool, and that the CNA Work Team determines are financially feasible for the property.

3. Moderate Rehabilitation and Energy Retrofits

- *Moderate or Other Rehabilitation.* Moderate or other rehabilitation, minor rehabilitation, capital improvements, or modernization of rental housing may also implement measures recommended in a CNA, but should at minimum replace systems and appliances as needed with the most energy- and water-efficient options, including Energy Star, WaterSense, or Federal Emergency Management Program (FEMP)-designated products and appliances, to the extent that they are financially feasible.
- *Energy Retrofits.* Energy retrofits are specifically targeted toward promoting energy and water conservation. They are custom-designed to implement a package of water and Energy Conservation Measures (ECMs) that are deemed "cost-effective" for each property; no changes

are required for these programs. Examples include DOE's WAP and Energy Performance Contracting in public housing.⁵²

Energy standards for new construction are, to a large extent, set by the statutory requirements of the Energy Independence and Security Act of 2007, and will be implemented as required by the statute (See Action 17). The most challenging area to address will likely be minimum energy requirements or guidelines for moderate and minor rehabilitation developments. Few HUD programs today address energy requirements in these kinds of developments.

4.4 Expand Training and Technical Assistance to Key Stakeholders

Action 10: Implement Training and Technical Assistance through HUD's Transformation Initiative

HUD's Transformation Initiative (TI) includes a significant commitment to increasing the capacity of HUD's grantees and partners to adopt energy-efficient and green building practices. The Department identified the need for "comprehensive and coordinated" technical assistance that cuts across program areas, achieves economies of scale, and serves a cross-section of HUD partners and stakeholders.

HUD has launched a three-pronged initiative to deliver comprehensive and uniform guidance, training, capacity building and project- and place-based technical assistance in support of the Department's energy efficiency strategic objectives. In combination, these initiatives will provide different levels of training and technical assistance to HUD grantees to support their energy and green building goals, and will be carried out in close coordination with, and significant input from, HUD field offices. HUD's Green Technical Assistance Initiative will have three components:

Green Training and Certification. The program will provide training on Energy Efficiency and Green Building for Affordable Housing (2-day core course, plus four 1-day, topic-specific courses). The objective of this training is to provide a basic understanding of green building – especially energy efficiency – and the use of best green building practices in the new construction, rehabilitation, operations, and maintenance of neighborhoods and buildings.

Green Accreditation Initiative. This program will pilot an Energy Efficiency and Green Accreditation initiative for PHAs, multifamily owners, and other interested HUD grantees. The purpose of this accreditation initiative is to enable PHAs and other interested HUD grantees/partners to be recognized by HUD as having established energy-efficient and green management, operations, and development practices and procedures and demonstrated a commitment to institutionalize these practices throughout their organizational structure. HUD will select up to 100 participants in a voluntary pilot accreditation program. Participants will include a representative group of PHAs, HOME Program CHDOs, assisted multifamily portfolio managers/owners, and other interested HUD grantees/partners.

Green Technical Assistance Provider Corps. This program will focus on direct, project- and place-based technical assistance to HUD grantees and partners. The initiative will support a national cadre of highly skilled experts who can support HUD grantees and partners in carrying out energy efficiency and green building projects. These experts will jointly constitute a National Green Affordable Housing TA Corps; each of these experts will have expertise in the building types, climate conditions, and available resources for particular geographies and climate zones associated with each HUD region. This regional approach

⁵² Rental Policy Working Group, *op cit.*

will minimize the costs and expenses of providing assistance to HUD stakeholders and maximize the familiarity of the provider with the needs and challenges of their assigned region.

The Department will work to align these initiatives with existing training, certification, accreditation, and technical assistance programs. The training, technical assistance, and green accreditation will incorporate DOE's Guidelines for Home Professionals and Standard Work Specifications for both single-family and multifamily housing as appropriate.⁵³ In addition, HUD recognizes that a number of organizations already provide high-quality programs and services in this area and will strategically deploy technical assistance and training to complement and augment these existing resources.

Action 11: Include Energy and Green Building Training In HUD's Core Curriculum

HUD published a NOFA under the "OneCPD" Integrated Practitioner Assistance System. OneCPD represents a fundamental change in the way HUD's traditional program-specific technical assistance has historically been structured and delivered to state and local government grantees, and to nonprofit organizations. The NOFA included a request for qualifications for HUD's new Core Curriculum for Skills-Based Training that includes green building.

The Core Curriculum will support development and delivery of training courses and seminars to improve grantee skills in the areas of development finance, environmental review and compliance, asset management and preservation, and construction and rehabilitation management. Funding for certain core curricula was made available through this NOFA, while other core curricula will be funded via future NOFAs and/or procurement actions. The individual trainings are intended to support a core curriculum that includes an introduction to green building concepts and follow-up courses that provide more intensive one-day trainings for facilities managers, housing developers, and PHA directors.

4.5 Strengthen Data Collection and Reporting Systems that Support Market-Based Action

A key element of HUD's energy strategy is to strengthen HUD's baseline data on the costs and benefits of energy efficiency investments in HUD's portfolio of public and assisted housing, as well as in the residential sector generally. To that end, a range of initiatives is under way to evaluate current investments, as well as to strengthen data reporting systems and to establish uniform data guidelines.

Action 12: Evaluate HUD's Recovery Act Energy and Green Building Investments

The Administration has committed to investing Recovery Act dollars with an unprecedented level of transparency and accountability. In FY 2011, HUD's Office of Policy Development and Research (PD&R) initiated an evaluation of the energy and green programs funded through HUD's Recovery Act investments. The evaluation primarily focuses on three HUD programs: (1) Public Housing Capital Fund – Competition, (2) Public Housing Capital Fund – Formula, and (3) Green Retrofit Program for Multifamily Housing. These three programs were selected for evaluation since they committed the lion's share of HUD's Recovery Act investments in energy efficiency – some \$3 billion in formula funds and another \$850 million in competitive grant awards specifically for energy efficiency and green building. The evaluation will include an estimate of the energy consumption savings and greenhouse gas emissions resulting from these investments, as well as best practices and lessons learned from these investments.

⁵³ For further information on these DOE initiatives, see http://www1.eere.energy.gov/wip/retrofit_guidelines_overview.html and http://www1.eere.energy.gov/wip/retrofit_guidelines.html.

The evaluation will use existing data reported through the Recovery Act Management and Performance System (RAMPS) and data collected through random sampling and site visits.

In addition, the PowerSaver and the Multifamily Energy Pilot Programs both have an evaluation component, which will enable HUD to provide data and experience that can inform additional private investment and innovation.

Action 13: Strengthen Energy Consumption Data in Public Housing

Detailed, accurate, and complete data is essential to evaluating the office of Public and Indian Housing's (PIH) programs and policies. Since the transition to Asset Management in 2008, PHAs have reported utility consumption annually for individual projects, instead of authority-wide, which was the previous reporting requirement. This change provides a more accurate account of utility consumption and costs in public housing.

HUD also commissioned a study to assess the feasibility of capturing utility consumption data directly from utility companies. HUD is in the process of examining the recommendations from this study, as well as exploring other ways that data can be gathered and improved.

While utility data collected under Asset Management has improved, there is room for greater improvement. For example, project-based accounting requires aggregation of financial reporting across multiple properties in an Asset Management Project (AMP). AMPs can consist of properties of differing age, construction type, and energy fuel type. For example, one property could be all electric, one could use gas for heat, and another could use gas for heat, for domestic hot water, and for cooking. While this meets the objective of project-based accounting, it obscures detailed information on energy usage by property or unit.

Action 14: Develop an Energy Modeling and Scenario Planning Tool*

Overall, a significant shortage of reliable data describing the federally assisted portfolio, the levels of investment that are required to retrofit the stock, and the cost effectiveness of current and projected energy investments have limited HUD's ability to prioritize policies, incentives, and standards and performance measures to achieve measurable energy savings over time. As noted in a report from the American Council for an Energy Efficient Economy:

Without good data, sound energy policy decisions cannot be appropriately made nor can the effectiveness of their implementation be properly measured. Inadequate, erroneous, or obsolete energy efficiency data can result in mistakes or poor choices costly to governments, businesses, utilities, and customers. When policies are designed without proper data and forecasting, energy savings opportunities can be lost, resulting in billions of dollars of lost savings to the U.S. economy.⁵⁴

In its FY 2012 and 2013 budgets, HUD proposed a Residential Energy Modeling System (REMS) to address this issue. The goal of the database would be to create a modeling and forecasting tool that will allow HUD to create a fact-based strategic plan for reducing energy costs in this stock of affordable housing.

⁵⁴ Rachel Gold and R. Neal Elliot, *Where have all the Data Gone: The Crisis of Missing Energy Efficiency Data*, American Council for An Energy-efficient Economy February 2010.

If funded, the proposed scenario planning tool will enable HUD, working closely with DOE, the national laboratories, and EPA, to model a variety of energy saving scenarios, support budget requests, or policy initiatives necessary to achieve energy savings goals for each scenario, and enable HUD to move beyond short-term actions to undertake long-range energy modeling of its portfolio through the year 2030. These longer time horizons are critical to enable HUD's partners to establish long-range goals for lowering energy use in their portfolios.

**Contingent on Congressional Appropriations*

Action 15: Conduct Broad-Based Sustainability Research and Evaluation

HUD's Office of Policy Development and Research (PD&R), in partnership with the Office of Sustainable Communities, initiated a new competitive Sustainable Communities Research Grant Program to support research that builds on existing evidence-based studies in the broad area of sustainability. The first grant awards were awarded in FY 2011. Grants were awarded to evaluate tools and strategies that promote and implement more effective policies that preserve housing affordability, improve accessibility through effective transit systems that create neighborhoods of opportunity for all residents, reduce regulatory barriers to sustainable development and strengthen land use planning and urban design standards, advance economic opportunities that create jobs and promote diverse communities, and address the health of the environment by reducing carbon emissions and conserving energy.⁵⁵

4.6 Implement Federal Statutes and Provide Regulatory Flexibility

Action 16: Make Determination on Minimum Code Requirements

The Energy Independence and Security Act of 2007 (EISA) requires that HUD apply the 2006 International Energy Conservation Code (IECC), or, in the case of multifamily high-rises, ASHRAE 90.1-2004, to new construction of public and assisted housing and single-family and multifamily residential housing (other than manufactured homes) with mortgages insured under the National Housing Act.⁵⁶ EISA also covers gut rehabilitation of housing funded by HOPE VI revitalization grants under Section 24 of the United States Housing Act of 1937.

EISA also provides that, within one year after IECC and ASHRAE standards are updated, HUD shall either amend its energy efficiency standards to meet or exceed the new standards or formally decline to adopt the revisions by determining that compliance would not result in a significant increase in energy efficiency, not be technologically feasible, or not be economically justified. The most recent updates to the standards are the 2012 IECC (published in July 2011) and to the ASHRAE 90.1-2010 (published in October 2010).

Under the statute, if HUD does not make any of the required determinations within one year, then all covered housing must still meet the revised standards, provided that: (1) the Secretary determines that the revised codes do not negatively affect the availability or affordability of housing under covered programs and (2) the Secretary of Energy has made a determination that the revised standards would improve energy efficiency.⁵⁷

⁵⁵ http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2011/HUDNo.11-219.

⁵⁶ See Appendix A.

⁵⁷ DOE has issued the following determinations on the more recent IECC and ASHRAE standards: (1) on July 19, 2011, that the 2009 IECC would achieve greater energy efficiency in low-rise residential buildings than the 2006 IECC; (2) on May 17, 2012, that

The American Society of Heating, Refrigerating, and Air-Conditioning Engineers published the ASHRAE 90.1-2010 standards on October 28, 2010, and the International Code Council published the 2009 IECC on January 28, 2009. Therefore, HUD may adopt ASHRAE 90.1-2010 and the 2009 IECC for the covered programs by determining that such adoption would not negatively affect the availability or affordability of covered housing under EISA. HUD has commenced a process to analyze the feasibility and impact of such a policy. HUD will work closely with all interested stakeholders on this process.

HUD is sensitive to the complexity of meeting this requirement of Congress. After all, building codes are largely a state and local responsibility. Code adoption, compliance, and enforcement are highly uneven nationwide, due to gaps in knowledge, capacity, and resources, as well as concerns about cost. DOE tracks code adoption and compliance, as well as providing technical assistance to states in updating their codes.⁵⁸ A recent study found that \$810 million per year was necessary to raise energy code compliance to 90 percent in the United States, though currently less than \$200 million annually is spent, according to estimates. However, the study also stated that every \$1 spent on enforcement, such as more building inspectors, yields \$6 in energy savings.⁵⁹

These issues may be especially acute for affordable rental housing. In addition, different approaches are necessary to address energy efficiency in newly constructed homes versus various types of rehabilitation, and in single-family homes versus multifamily properties.

The Department is also aware of research that suggests the benefits of stronger codes can be significant and that they may, in fact, be achievable on a cost-effective basis. According to a recent study – the first of its kind – stronger residential energy codes are associated with a 4 percent decrease in electricity consumption and a 6 percent decrease in natural gas consumption.⁶⁰ Another analysis found that building and rehabilitating low-income developments to the Energy Star for Homes standard or a similar standard added only 2.1 percent to total project costs, on average.⁶¹ The study also found that the average projected lifetime utility costs savings were greater than the average additional upfront costs.⁶² These findings are consistent with other research on the costs and benefits of broader green building measures, which include features not directly related to energy use.⁶³

Action 17: Explore Green Total Development Cost Limits in Public Housing

Statutes and regulations generally set limits on the costs that PHAs or developers can incur when building new or modernizing existing public housing. For recent Recovery Act competitive grant awards, HUD has approved waivers of Total Development Cost (TDC) limits for activities that maximize energy conservation and efficiency.⁶⁴ For those waivers, the Department required that PHAs submit a detailed

the 2012 IECC would achieve greater energy efficiency in low-rise residential buildings than the 2009 IECC; (3) on July 20, 2011, that ASHRAE 90.1-2007 achieves greater energy efficiency in multifamily buildings than the 2004 standard; and (4) on October 19, 2011, that ASHRAE 90.1-2010 achieves greater energy efficiency in multifamily buildings than ASHRAE 90.1-2007.

⁵⁸ <http://www.energycodes.gov/status/>.

⁵⁹ The New York Times, “A Mundane Approach to a Vexing Problem,” November 28, 2010, at http://www.nytimes.com/2010/11/29/business/energy-environment/29iht-green.html?_r=4&src=bushn.

⁶⁰ Grant Jacobsen and M. Kotchen, *Are Building Codes Effective at Saving Energy? Evidence from Residential Billing Data in Florida*, July 2010.

⁶¹ Bourland, Dana, *Incremental Costs, Measureable Savings: Enterprise Green Communities Criteria*, 2009.

⁶² *Ibid.*

⁶³ Davis Langdon, *Cost of Green Revisited: Reexamining the Feasibility of Sustainable Design in the Light of Increased Market Adoption*, 2007.

⁶⁴ U.S. Department of Housing and Urban Development, *Substantial Rehabilitation or New Construction of the Capital Fund Recovery Competition*, Notice of Funding Availability (NOFA), 2009, Option 4.1, Creation of Energy-efficient Green Communities.

list of the planned energy conservation improvements, an explanation and justification for the proposed improvements, and an independent third-party cost estimate. HUD approved these waiver requests on a case-by-case basis. HUD is exploring allowing PHAs to request a TDC exception for integrated utility management, capital planning, and other activities that maximize energy efficiency.

4.7 Strengthen Interagency and Private Sector Partnerships

Action 18: Continue DOE, EPA, and Other Interagency Partnerships; Explore Utility and Other Private Sector Partnerships

Under the Recovery Act, significant progress was made in partnering with DOE to leverage weatherization assistance funds for multifamily buildings. Several states allocated funds for multifamily properties, including California, Pennsylvania, Michigan, Illinois, and Connecticut. By providing preliminary income eligibility determinations of multifamily properties for placement on DOE's website, HUD eliminated duplicative income certification requirements for the weatherization program. Going forward, HUD will continue to work with DOE to streamline the process for multifamily weatherization, including, but not limited to, the need for standard energy audit requirements, developing uniform work specifications for multifamily properties, and working with states to ensure that reporting, intake, and application procedures for multi-unit buildings are also streamlined.

HUD will also continue its partnership with EPA to adopt Energy Star standards for new homes, products, and appliances, to promote the adoption of WaterSense products, and where feasible to incorporate green infrastructure approaches such as green roofs and rainwater harvesting to lower water and energy costs.⁶⁵ HUD also will work with USDA to establish uniform energy standards in rental housing. Furthermore, through the Office of Healthy Homes and Lead Hazard Control's Safe and Healthy Homes Investment Partnership certification program, HUD will recognize and support local grantees that form partnerships with DOE's local grantees.

HUD will also explore partnerships with local utilities (both investor-owned and municipal) to assess the potential for, and identify resources available through, utility demand-side management programs that can be leveraged for HUD-assisted, affordable housing.

⁶⁵ See EPA's WaterSense website at http://www.epa.gov/watersense/new_homes/index.html.

Appendix A: Congressional Actions To Increase Energy Efficiency in Affordable Housing

Energy Policy Act of 2005 – The Energy Policy Act of 2005 implemented several actions targeted at public housing that established for the first time energy efficiency product purchasing requirements, called for greater integration of energy efficiency in ongoing capital investment planning, and extended the financing period available for Energy Performance Contracting in public housing.

Energy Policy Act of 2005
(1) PUBLIC HOUSING CAPITAL FUND CAPITAL PLANNING (Section 151). <i>Requires integrated utility management and capital planning, processes to maximize energy conservation and efficiency measures; extends contract period for Energy Performance Contracts; and requires installation of fixtures and fittings that meet ASME/ASI standards.</i>
(2) PURCHASE OF ENERGY-EFFICIENT APPLIANCES (Section 152). <i>Requires public housing to purchase energy-efficient appliances that are Energy Star products or Federal Energy Management Program (FEMP)-designated products.</i>
(3) ENERGY CONSTRUCTION FOR HOPE VI (Section 153). <i>Requires adoption of the International Energy Efficiency Code for HOPE VI new construction and rehabilitation projects.</i>
(4) ENERGY EFFICIENCY IN FEDERALLY ASSISTED INDIAN HOUSING (Section 506). <i>Requires HUD to promote energy conservation in housing that is located on Indian land and assisted with federal resources through the use of energy-efficient technologies and innovations, shared savings contracts, and other similar technologies and innovations.</i>

Energy Independence and Security Act of 2007 (EISA) – The Energy Independence and Security Act of 2007 enacted substantial updates to federal energy building performance standards for new construction projects supported by HUD’s housing programs and financing products and for manufactured housing.

Energy Independence and Security Act of 2007
(1) APPLICATION OF INTERNATIONAL ENERGY CONSERVATION CODE TO PUBLIC AND ASSISTED HOUSING (Section 481). Required HUD to “meet or exceed” the International Energy Conservation Code (IECC 2006, or for multifamily high-rises, ASHRAE 90.1-2004) for new construction for public housing, assisted housing, single-family, and multifamily residential housing (other than manufactured homes) subject to mortgages insured under the National Housing Act, and new construction and rehabilitation of HOPE VI projects, and to “meet or exceed” revisions to these codes subject to certain determinations.
(2) ENERGY CODE IMPROVEMENTS FOR MANUFACTURED HOUSING (Section 413). Required DOE, in consultation with HUD, to establish standards for energy efficiency in manufactured housing within 4 years based on most recent IECC, except where the code is not cost-effective.

Housing and Economic Recovery Act of 2008 – The Housing and Economic Recovery Act of 2008 provided new attention on the energy efficiency opportunities and needs within existing single-family residential markets, particularly with respect to FHA-insured market-rate housing transactions and the growing inventory of foreclosed and abandoned properties in communities.

**Appendix A: Congressional Actions
To Increase Energy Efficiency in Affordable Housing (Continued)**

Housing and Economic Recovery Act of 2008	
(1)	ENERGY-EFFICIENT MORTGAGE (EEM) PROGRAM (Section 2123). Required HUD to change lending limits on energy efficiency mortgages to 5 percent of the property value or 2 percent of the limit established under section 203(b)(2)(B) of the Act; and limits EEM production not to exceed 5 percent of the aggregate number of mortgages insured by HUD.
(2)	INCREASING ACCESS AND UNDERSTANDING OF ENERGY-EFFICIENT MORTGAGES (Section 2902). Required HUD to consult with the residential mortgage industry and state governments to develop recommendations to eliminate the barriers that exist to increasing the availability, use, and purchase of energy-efficient mortgages; submit a report to Congress that summarizes the recommendations and includes any recommendations for statutory, regulatory, or administrative changes necessary to institute such recommendations; and carry out an education and outreach campaign, in consultation with DOE to inform and educate consumers, home builders, residential lenders, and other real estate professionals on the availability, benefits, and advantages of improved energy efficiency in housing; and energy-efficient mortgages.
(3)	EMERGENCY ASSISTANCE FOR REDEVELOPMENT OF FORECLOSED AND ABANDONED PROPERTIES (Section 2301). This statute establishing the NSP provides that rehabilitation may include improvements to increase the energy efficiency or conservation of such homes and properties or provide a renewable energy source or sources for such homes and properties.
(4)	INCLUSION OF ENERGY EFFICIENCY IN LIHTC PROGRAM QUALIFIED ALLOCATION PLANS (section 3004). Statutory amendments include reforms to Low Income Housing Tax Credit program requiring State Housing Finance Agencies to consider energy efficiency in making such Tax Credit allocations and including energy efficiency considerations in state government plans for allocation of credit among projects.

The Consolidated Appropriations Act of 2010. The law included an appropriation of \$50 million to establish an Energy Innovation Fund at the Department of Housing and Urban Development. Congress intended “to catalyze innovations in the residential energy efficiency sector that have promise of replicability and help create a standardized home energy-efficient retrofit market.” Of the \$50 million appropriated, Congress directed HUD to target \$25 million to the single-family market and \$25 million to the multifamily market. Congress provided that funds would remain available until September 2013.

Appendix B: Energy-efficient and Green Units – High-Priority Performance Goal

Energy-efficient and Green Units Counted Toward FY 2010-11 Performance Goal			
Types of Energy Improvements		Methodology	Measure
Public and Indian Housing			
Recovery Act – Capital Fund Formula	Range of ECMs, including air sealing, energy-efficient windows and doors, new or more efficient HVAC, Energy Star refrigerators, and other appliances.	Unit Equivalents	Top Ten ECMs W. Unit Equivalent Factor
Recovery Act – Capital Fund Competition 4.1	Primarily new green units that meet Enterprise Green Communities standard or Energy Star for New Homes, and may include renewable energy systems.	Energy Standard	Enterprise Green Communities (Minimum - Energy Star for New Homes)
Recovery Act – Capital Fund Competition 4.2	Package of ECMs that reduce energy costs by 20 to 40 percent, including HVAC, envelope improvements, and Energy Star appliances.	Program-defined	ECM Package Required to Achieve Minimum 20 Percent Savings
Recovery Act – ONAP	Range of ECMs, including air sealing, energy-efficient windows, etc. Also includes some new green homes.	Unit Equivalents	Top Ten ECMs W. Unit Equivalent Factor
HOPE VI	New or rehabilitated units that meet Energy Star for New Homes, LEED, or other green standard.	Energy Standard	Energy Star for New Homes, LEED, or Other Green Standard
Energy Performance Contracts	Targeted package of ECMs including lighting, water, building envelope, and HVAC improvements, as recommended by investment-grade energy audit.	Program-defined	ECMs Must Be Cost Effective
Community Planning and Development			
Recovery Act – HOME/TCAP	New homes built to Energy Star for New Homes standard or above (at least 15 percent more efficient than standard construction).	Energy Standard	Energy Star for New Homes
Regular HOME Program	New homes built to Energy Star for New Homes standard or above (at least 15 percent more efficient than standard construction).	Energy Standard	Energy Star for New Homes
Regular CDBG Program	New homes built to Energy Star for New Homes standard or above (at least 15 percent more efficient than standard construction).	Energy Standard	Energy Star for New Homes
Multifamily Housing			
Section 202/811	Either Energy Star for New Homes or includes Energy Star appliances, products, and other energy measures.	Energy Standard or Program-defined	Energy Star for New Homes or Other Energy-Efficiency Improvements
Green Retrofit Program	Measures identified as cost effective in energy audit, including additional insulation, more efficient windows, HVAC, and lighting; also includes green measures.	Program-defined	ECMs Required to Meet SIR Greater than 1
Mark-to-Market	Same as Green Retrofit Program.	Program-defined	ECMs Required to Meet SIR Greater than 1

Appendix C: Recommended Energy and Green Measures for NSP

Recommended Energy-efficient and Environmentally Friendly Green Elements for NSP 1,2, and 3	
Renewable Energy	<ul style="list-style-type: none"> — Passive Solar. Orient the building to make the use of passive solar heating and cooling. — Photovoltaic-ready. Site, design, engineer, and wire the development to accommodate installation of photovoltaic panels in the future.
Sustainable Site Design	<ul style="list-style-type: none"> — Transportation Choices. Locate projects within a one-quarter mile of at least two, or one-half mile of at least four, community and retail facilities. — Connections to Surrounding Neighborhoods. Provide three separate connections from the development to sidewalks or pathways in surrounding neighborhoods. — Protecting Environmental Resources. Do not locate the project within 100 feet of wetlands; 1,000 feet of a critical habitat; or on steep slopes, prime farmland, or park land. — Erosion and Sediment Control. Implement EPA's Best Management Practices for erosion and sedimentation control during construction. — Sustainable Landscaping. Select native trees and plants that are appropriate to the site's soils and microclimate. — Energy-efficient Landscaping. Locate trees and plants to provide shading in the summer and allow for heat gain in the winter.
Water Conservation	<ul style="list-style-type: none"> — Efficient Irrigation. Install low volume, non-spray irrigation system (such as drip irrigation, bubblers, or soaker hoses).
Energy-efficient Materials	<ul style="list-style-type: none"> — Durable Materials. Use materials that last longer than conventional counterparts, such as stone, brick, or concrete. — Resource Efficient Materials. Use layouts and advanced building techniques that reduce the amount of homebuilding material required. — Heat Absorbing Materials. Use materials that retain solar heat in winter and remain cool in summer. — Solar-reflective Paving. Use light-colored/high-albedo materials and/or open-grid pavement with a minimum solar reflective index of 0.6 over at least 30 percent of the site's hardscaped areas. — Local Source Materials. Use materials from local sources that are close to the job site. — Green Roofing. Use Energy Star-compliant and high-emissive roofing, and/or install a green (vegetated) roof for at least 50 percent of the roof area; or a combination of high-albedo and vegetated roof covering 75 percent of the roof area.
Healthy Homes	<ul style="list-style-type: none"> — Green Label Certified Floor Covering. Do not install carpets in basements, entryways, laundry rooms, bathrooms or kitchens; if using carpet, use the Carpet and Rug Institute's Green Label-certified carpet and pad. — Healthy Flooring Materials. Use of non-vinyl, non-carpet floor coverings in all rooms. — Healthy Flooring Materials. Install a whole-house vacuum system with high-efficiency particulate air filtration to reducing dust. — Sealing Joints. Seal all wall, floor, and joint penetrations to prevent pest entry; provide rodent and corrosion proof screens (e.g., copper or stainless steel mesh) for large openings. — Termite-resistant Materials. Use termite-resistant materials in areas known to be infested. — Tub and Shower Enclosures. Moisture Prevention. Use one-piece fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board, fiber-glass reinforced board, or cement plaster. — Green Maintenance Guide. Provide a guide for homeowners and renters that explains the intent, benefits, use and maintenance of green building features, and encourages additional green activities such as recycling, gardening, and use of healthy cleaning materials. — Resident Orientation. Provide a walk-through and orientation to the homeowner or new tenants.

Source: NSP2 2009 Notice of Funds Availability, Appendix 2, "Recommended Energy-efficient and Environmentally Friendly Green Elements," and NSP3 Notice of Formula Allocations and Program Requirements, Attachment C, "NSP Recommended Energy Efficient and Environmentally-friendly Green Elements."

Appendix D: Required Measures – Multifamily Green Retrofit Program

Multifamily Green Retrofit Program – Green Retrofit Measures	
Mandatory Green Measures	
•	High-efficiency faucet aerators, shower heads, and toilets
•	Energy-Star qualified refrigerators
•	Energy-Star qualified dishwashers
•	Energy -Star qualified HVAC, Packaged Terminal Air Conditioner, Packaged Terminal Heat Pumps systems, or evaporative cooling in lieu of air conditioning
•	High-efficiency domestic hot water heaters
•	Energy-Star qualified windows, sliding glass doors, storm doors, and exterior doors
•	Additional insulation
•	Energy Star-rated interior compact fluorescent light bulbs
•	Energy Star-rated ceiling fans
•	Energy Star-rated bath and kitchen exhaust fans
•	No- or low-volatile organic compound (VOC) cabinets, or sealing open surfaces and cut edges, when replacing kitchen cabinets and bath vanities
•	Use of no- or low-VOC paint and sealants for interior applications
•	Carbon monoxide alarm on each occupied floor of the unit, near the bedroom, if there is a nearby combustion source
•	Landscaping improvements for water conservation, including xeriscaping
•	Integrated pest management approaches
•	Household waste recycling options
•	Green management of rehabilitation/construction debris
Optional Green Measures	
•	Combined heat and power
•	Renewable energy including solar, wind, or geothermal system installations
•	Green roofs, including vegetative roof and cool roofs, and Energy Star shingles and roofing products
•	Flooring, including conversion of carpeted surfaces to smooth-and-cleanable surfaces such as linoleum
•	Porous pavers
•	Compact fluorescent lighting and LED lighting fixtures
•	Retention ponds
•	Grey water recycling

Appendix E: HOPE VI Projects with Energy Star or LEED Certification

HOPE VI Projects with Energy Star or LEED Certification			
City		Project	Green Strategy
Allentown, PA	2004	Hanover Acres/Riverview	Energy Star for New Homes
Boston, MA	2001	Maverick Gardens	LEED NC
Camden, NJ	2000	Baldwin Run	Energy Star for New Homes
Chicago, IL	2001	Rockwell Gardens	Energy Star for New Homes/Green Alleys Program
Columbia, SC	2003	Hendley Homes (Rosewood Hills)	LEED ND
Cuyahoga, OH	2003	Valley View Homes (Tremont Point)	Energy Star for New Homes; Enterprise Green Communities
Denver, CO	2002	Park Avenue/Block 3 (Arrowhead Apts.)	LEED ND Gold
Duluth, MI	2002	Harbor View Homes	Energy Star For New Homes
El Paso, TX	2004	Alimito Apartments	Energy Star for New Homes
Elizabeth, NJ	1997	Pioneer Homes (Portside II Elderly Bldg.)	Energy Star for New Homes
Hagerstown, MD	2001	Westview Homes	Energy Star for New Homes
High Point, NC	1999	Springfield Townhouses	Energy Star for New Homes
King County, WA	2001	Park Lake Homes (Greenbridge)	Energy Star for New Homes
Long Branch, NJ	2005	Seaview (Garfield Court)	Energy Star for New Homes /LEED Silver
Louisville, KY	2002	Clarksdale (Liberty Green)	Energy Star for New Homes
Memphis, TN	2000	Hurt Village; 2003 Lamar Terrace	Energy Star for New Homes
Milwaukee, WI	2000	Lapham Park; 2002 Cherry Court	Energy Star for New Homes
Nashville, TN	2003	John Henry Hale	Energy Star for New Homes
Newark, NJ	1999	Stella Wright	Energy Star for New Homes
Newport, RI	2002	Tonomy Hill	Energy Star for New Homes
Norfolk, VA	2000	Roberts Village	Energy Star for New Homes; EarthCraft
Oakland, CA	1998	Chestnut Court	Energy Star for New Homes
Paterson, NJ	1997	Christopher Columbus	Energy Star for New Homes
Philadelphia, PA	2004	Ludlow Scattered Sites	Energy Star for New Homes
Portland, OR	2001	Columbia Villa; 2 Mixed-use Buildings	Energy Star for New Homes /LEED Silver
	2006	Iris Court	Energy Star for New Homes
Raleigh, NC	2003	Chavis Heights	Energy Star for New Homes
Richmond, VA	1997	Blackwell Phase II	Energy Star For New Homes; EarthCraft
St. Louis, MO	2001	Blumeyer Homes (Renaissance Place)	LEED ND
Seattle, WA	2000	High Point	Energy Star for New Homes; 20 Breathe Easy Homes
Tacoma, WA	2000	Salishan	Energy Star for New Homes; BuiltGreen
Washington, DC	2001	Arthur Capper/Carrollsborg	LEED Community Center
Youngstown, OH	2002	Westlake Terrace	Energy Star for New Homes /LEED Rec Bldg.

Source: 2009 HUD Survey of HOPE VI Projects

Appendix F: FY 2012-13 Annual Performance Goal – Energy and Green Units

Program	FY 2012 Goal	FY 2013 Goal	Cumulative Goal (FY 2012 -13)
Total Public and Indian Housing*	44,779	31,733	76,512
Tax Credit Assistance Program—Recovery Act*	2,204	3,708	5,912
HOME Investment Partnerships**	3,843	5,393	9,236
Community Development Block Grant**	212	213	425
Total Community Planning and Development	6,259	9,314	15,573
Sections 202 (Elderly) and 811 (Persons with Disabilities) Supportive Housing**	1,650	1,650	3,300
Mark-to-Market Green Initiative	2,864	2,864	5,728
Green Retrofit Program	3,348	0	3,348
PowerSaver Pilot Retrofit Program	4,500	19,500	24,000
FHA Endorsements with Green Elements*	4,620	0	4,620
Total Housing	16,982	24,014	40,996
Other Units	1,419
Total Energy Retrofits	68,020	65,061	134,500
Healthy Homes and Lead Hazard Control	12,000	12,500	24,500
Total Energy and Green Retrofits/New Units	80,020	77,561	159,000

*Includes some new units

** Includes all new units

Appendix G: 2011 Calendar Year Data Reporting

The utility expenditure data used for this report were the most complete data available to HUD as reported in 2011 for each of HUD's programs:

- **Public Housing.** The 2011 public housing data reported in this report are from financial statements for the "Cycle 11" reporting period. PHAs submit unaudited financial statements including utility expenditures within 60 days of the end of their fiscal year; audited financial statements can be submitted 9 months after the end of their fiscal year. Accordingly, the most recent complete cycle for which complete data was available when this report was written was Cycle 11 (that is, covering PHA fiscal years ending 9/30/09, 12/30/09, 3/30/10, or 6/30/10). To allow for audited financial statements to be submitted, Cycle 11 data reporting was completed in June 2011, and it is these data that are included in this report.
- **Utility allowances.** Utility allowance data were extracted as of September 30, 2011. However, the effective date of each record in the extract spans the period April 1, 2010, to September 30, 2011.
- **Assisted Multifamily–Owner-Paid Utilities.** Owner-paid utilities for multifamily assisted housing are reported as of December 2011, covering utility expenditures in FY 2011; there is a 3-month delay in the reporting of estimated multifamily owner-paid utilities.

The time period covered for each of these data sets is illustrated in Appendix G Table on the following page.

Appendix G: 2011 Calendar Year Data Reporting (Continued)

Consumption Data Reported in CY 2011	Calendar Year	2008												2009												2010												2011												2012											
	Month	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S												
	Fiscal Year	FY 2009												FY 2010												FY 2011												FY 2012																							
	Quarter	Q1				Q2				Q3				Q4				Q1				Q2				Q3				Q4				Q1				Q2				Q3				Q4															
	Month	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S												
	Month	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S												
Public Housing*	PHA-Paid Utilities Cycle 11 - S																																																												
	PHA-Paid Utilities Cycle 11 - D																																																												
	PHA-Paid Utilities Cycle 11 - M																																																												
	PHA-Paid Utilities Cycle 11 - J																																																												
	Utility Allowances																																																												
Assisted Multifamily Housing Owner-Paid Utilities	Assisted Only																																																												
	Insured and Assisted																																																												
	Capital Advance (202)																																																												
	Capital Advance (11)																																																												
	Direct Loan (202)																																																												
Assisted Multifamily Housing Utility Allowances	Project-Based Section 8																																																												
	202/8																																																												
	202/PRAC																																																												
	811/PRAC																																																												
	Moderate Rehabilitation																																																												
	Rental Assistance Payment																																																												
	Rent Supplement																																																												
	Section 236																																																												
HCV	Below Market Interest Rate																																																												
	Section 8 Vouchers																																																												

Consumption Period

Extrapolated to 12 Months from Data Sampled for 1 Month Period Between April 2010 - September 2011

Reporting Period

Complete Program Data Available to HUD