



Scaling the Nationwide Energy Retrofit of Affordable Multifamily Housing: Innovations and Policy Recommendations

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I. Executive Summary

The Compelling Affordable Multifamily Retrofit Opportunity

Federal policy papers do not usually begin by discussing a magic pill that would offer eternal life, youthful looks, improved health, greater riches, and improved planetary conditions. This one does. This paper posits that there is already available to the federal government a “magic pill” offering the possibility of over \$1 billion in annual savings, improved longevity, health, affordability, and thousands of new jobs. This panacea would allow the federally subsidized multifamily portfolio to become energy and water efficient, reducing operating costs, increasing building longevity, and offering health and affordability benefits to residents.¹ Not only is this pill available; it is free. It is just locked up. The “lock” is a variety of barriers to building retrofits, including the lack of a sophisticated capital market system, regulatory impediments, and a historic absence of prioritization.

The justifications for scaling a national affordable multifamily retrofit are manifold, and include at least the following:

- **Federal savings.** From a fiscal perspective, reducing the \$6.8 billion annual utility bill paid by the U.S. Department of Housing and Urban Development (HUD)—nearly 15 percent of its annual budget—alone justifies a scaled national retrofit initiative.² Achieving a portfolio-wide energy savings of only 20 percent could generate over \$1 billion in savings, reducing appropriations, or to be used to replenish dwindling project reserves, increase chronically underfunded capital subsidies, or build new affordable units.³
- **Benefits for our nation’s most vulnerable, low-income population.** These buildings house our nation’s poorest residents, including some of the most vulnerable populations. And the nation’s lowest income families bear energy burdens that are double the burden faced by families with average incomes.⁴ Five million families live in federally subsidized affordable multifamily units. Another 21 million families live in private multifamily buildings, including many in low-income

¹ Throughout this paper the term “energy retrofit” is used to encompass the energy efficiency and water conservation retrofit of an affordable multifamily building. Note also that water is relevant to energy efficiency. In California, estimates are that water is the single largest electricity user in the state, accounting for 19 percent of the state’s electricity use. Rocky Mountain Institute, “Drawing the Energy and Water Connection,” October 30, 2008. Energy is used to transport, desalinate, pressure, extract, lift, and pump water, as well as treat sewage.

² HUD believes that a portfolio-wide retrofit could generate between \$1 and \$2 billion in savings. This figure comes from conversations with HUD in September 2010. In addition, HUD notes that utility costs represent 23 percent of the operating budgets of public housing authorities.

³ Benningfield Group, Inc., “Addendum Report: U.S. Multifamily Housing Stock Energy Efficiency Potential,” prepared for the Energy Foundation, April 9, 2010. The Benningfield group recently determined the energy savings potential of multifamily assisted housing to be 29 percent (\$9 billion nationally). The study indicates a HUD affordable potential of \$1.9 billion in savings. With this in mind, a 20 percent figure seems both conservative and reasonable. Even at 10 percent, however, \$500 million in annual savings would be welcome.

⁴ Median-income families pay 3 percent of their household income toward energy costs. Low- and very low-income families pay more than 6 percent of their meager incomes toward energy costs.

neighborhoods, but without subsidy. Continued affordability for these families depends on preserving and reining in the operating costs of these buildings.

- **Strengthened capital assets within the federal portfolio.** From a real estate fiduciary perspective, the vulnerability of an aging portfolio of buildings to spikes in energy costs, declines in energy supply, and risks associated with climate change, could be significantly lessened. Over 86 percent of all multifamily buildings were built before 1990, and 70 percent were built before 1980, using far more energy and bearing far greater costs than properties built after those dates.⁵ Many of these buildings will still exist in 50 to 100 years.
- **Enormous carbon savings potential and reduced fossil fuel dependence.** A focus on residential buildings—which consume 22 percent of energy but use 38 percent of all electricity, and which account for more than half of the built environment’s emissions (and 21 percent of all U.S. carbon emissions)—could easily reduce our national carbon footprint through retrofits, while creating significant numbers of green jobs.⁶ In a post-Gulf Coast reality, helping reduce our nation’s dependence on fossil fuels through retrofits of federally subsidized housing seems incontrovertible.
- **Enhanced scalability possibility given small universe of owners.** From an administrative perspective, a focus on federally subsidized multifamily housing seems the most scalable of residential building segments, because we need to convert far fewer owners (33,614), and merely one subsidy provider, to accomplish efficiencies in upwards of 3.5 million homes.⁷ Together with the Low Income Housing Tax Credit (LIHTC) subsidized portfolio, the federal government touches nearly 20 percent of all multifamily units.⁸

And, yet, we don’t retrofit multifamily. This paper explains why retrofits have not scaled, and recommends a set of policies capable of changing this.

⁵ U.S. Census data as reported by HUD. Multifamily buildings built between 1940 and 1960 (11.5 percent of the nation’s multifamily portfolio) consume double the amount of energy per square foot, and with 50 percent greater energy costs, than buildings built after 2000.

⁶ Energy Information Administration, *Building Energy Data Book 2009*; Pew Center on Climate Change, citing Energy Information Administration, *Building Energy Data Book 2008*, online at www.pewclimate.org/technology/overview/buildings [accessed October 2010].

⁷ This figure is equal to the number of assisted housing buildings plus public housing authorities. A total owners figure is likely to be smaller, as many owners in the assisted portfolio own more than one building, although each PHA typically owns more than one building. In contrast to a single-family home initiative reaching 3.5 million different homeowners, a multifamily initiative reaching 3.5 million renters need only convert 34,614 owners, a much less onerous administrative hurdle. The total numbers of buildings in the HUD-assisted portfolio is from a conversation with HUD and may need clarification.

⁸ American Housing Survey, 2009. According to this survey there are 25.9 million occupied units in buildings that are not single-family homes (and therefore including 2 to 4-unit buildings). In addition to HUD and LIHTC, there are more units subsidized by the Department of Agriculture and the Veterans Administration.

Current Programs

Energy retrofit program authority is fragmented at the federal and state levels. HUD and the U.S. Department of Energy (DOE) share primary responsibility for administering residential energy retrofit programs. The vast majority of building retrofit funds and authorities reside within DOE, while the bulk of ordinary federally subsidized building operating and capital funds, many of which may be used for retrofit improvements, are administered by HUD. In addition, Treasury administers federal tax credits associated with low-income housing in addition to energy efficiency and renewables, and 24 state-regulated utilities administer public benefit funds for energy efficiency.⁹

Impediments to Scaling Affordable Multifamily Retrofits

Primary impediments to retrofitting arise from disincentives hindering both resident and owner action. Residents of affordable multifamily housing receive affordability subsidies which generally limit total rent (including utilities) to a regulated level of affordability.¹⁰ The utility subsidy (appropriately) masks the disproportionate utility burden typically shouldered by low-income families in unsubsidized housing.¹¹ From the affordable multifamily owner perspective, retrofits have not scaled because of barriers including: (a) an absence of upfront capital coupled with inchoate private financing mechanisms; (b) regulatory barriers to the use of existing project capital for retrofits and to a long-term savings-based repayment mechanism for assisted (but not public) housing; (c) split incentives; (d) poor-quality or nonexistent information on energy use and energy savings potential; and (e) a fragmented and siloed leadership structure—especially among HUD, DOE, and Treasury—and workforce capacity gap. In addition, the relatively low historic costs of energy have served to limit incentives for new solutions.

Innovations

Notwithstanding these barriers, some groundbreaking innovation has begun, undertaken by entrepreneurial owners, directors, lenders, associations, and technology companies. These innovations offer examples of solutions—financing, data gathering and predictive modeling, and leadership and workforce capacity-building—that are replicable and scalable, especially in a post-ARRA world where grant funding will become increasingly scarce.

Recommendations

Based on the impediments described and the innovations profiled, this paper recommends the following:

⁹⁹ U.S. EPA notes that 23 states and the District of Columbia administer public benefit funds. www.epa.gov/chp/state-policy/funds.html.

¹⁰ HUD-subsidized affordable rents are typically set at 30 percent of a resident's income. Most, but not all, units of assisted or public housing use utility allowances to calculate rents.

¹¹ As described later, the utility subsidy is either in the form of an "allowance" or a direct reimbursement of an owner's utility costs. In unsubsidized housing, the poorest households bear the highest utility burdens in the nation, and live in the least efficient homes. Energy Programs Consortium, "Bringing Residential Energy Efficiency to Scale," August, 21, 2009, p. 11. (Households with the highest poverty level have the greatest energy efficiency opportunities, with the highest average energy use per square foot.) Recent studies show the tradeoffs these households make just to afford energy. National Energy Assistance Directors Association Directors Study, 2008.

1. **Lead by example: HUD should establish and champion a five-year, market-transformative, national residential energy retrofit unit- and energy-savings goal.** To do so, HUD should develop a public/private task force to set these goals agency-wide, develop an implementation strategy, and launch new and re-designed programs within 9 months.
2. **Lift unnecessary regulatory barriers to project capital.** This includes (a) allowing use of existing project reserves and residual receipts to finance energy retrofits where energy savings can repay investment; (b) leveling the playing field for assisted housing owners to freeze utility subsidy based on current consumption and use the savings for debt service or as an incentive (as permitted now for public housing authorities (PHAs)); (c) integrating energy efficiency into all multifamily rehabilitation and capital events (and integrating Green PCNAs into all loan transactions) undertaken by owners; (d) offering a “green dividend” owners’ incentive for retrofits; and (e) permitting additional energy liens on HUD properties.
3. **Seed a robust capital market system capable of financing energy and water efficiency.** This can be accomplished by (a) using federal credit enhancement to reduce risk, guarantee loans and portfolios of loans, test innovative and tax-lien financing, bridge gaps in subsidy programs; and reduce transaction costs; (b) catalyzing safe and sound residential energy lending by extending HUD and banking regulatory authorities to provide extra Community Reinvestment Act (CRA) credit and affordable government sponsored housing enterprise (GSE) housing goal credit for multifamily homes made more affordable through energy cost reductions; (c) requiring the disclosure of energy efficiency for all residential buildings; and (d) using tax policy wisely, including by pairing the Low Income Housing and New Markets tax credits with energy retrofit and renewable incentives.
4. **Lever the enormous federal housing portfolio to gather, model, and verify data.** This includes (a) developing multifamily data protocols that can work across funding silos and climactic zones; (b) allowing expensing of energy management (data) systems and audits; (c) rewarding owners for the collection of solid data; (d) integrating energy assessments into capital needs assessments; (e) offering technical assistance (“TA”) to owners and property and asset managers to develop in-house systems and analytic capacity around energy data; (f) collaborating with federal agencies overseeing utilities to require or encourage automatic uploads of utility consumption and cost data to owners; (g) ensuring that DOE-led data efforts, like the Residential Energy Consumption Survey (RECS), include robust multifamily information; and (h) piloting a retro-commissioning strategy.
5. **Cultivate federal leadership and build workforce capacity.** Leadership and capacity will grow only through (a) a commitment by HUD and DOE to a more united, cross-agency, and cross-silo approach to allocating multiple funding sources to multifamily retrofits; (b) training of executives and staff in the housing and property management industries, and within HUD and DOE; (c) leveraging federal retrofit funds as an effective tool for multifamily retrofit job creation; (d) seeding or expanding intermediary organizations; and (e) engaging residents and deploying smart technology in ways that achieve behavior modification in the form of reduced consumption.

Thought Leaders Roundtable Summary

On September 27, 2010, the What Works Collaborative assembled a small group of innovators to present this paper to HUD and DOE, and to begin to prioritize among recommendations. The group agreed that in a post-ARRA world, we must fast act to pilot innovative public/private partnerships to accomplish the energy retrofit of affordable multifamily housing, including the HUD-assisted stock, the

FHA-insured stock, the LIHTC subsidized stock, and unassisted affordable buildings. To get from here to there, the group discussed the following urgent and next steps:

- a. invest now to achieve significant savings, reduction of dependence on foreign oil, and vulnerability to energy price spikes in light of HUD's \$6.8 billion annual expenditure
- b. Quickly assemble a small group, including HUD, DOE, and Treasury, to set a national goal, to implement the recommendations of this paper, and to scale the innovations profiled
- c. Divide the recommendations into short- and long-term and prioritize accordingly
- d. Use FHA in its historic role as seeding financial innovation to implement truly innovative retrofit financing and to leverage private capital markets
- e. Integrate energy retrofits into existing transactions, and integrate green PCNAs into loan processes, and work should begin to identify each and every transaction that is appropriate
- f. Expand some of HUD's early financial innovations to a broader set of philanthropies, and to maximize the leverage of federal resources by including Treasury, DOE, Veterans Affairs, and Agriculture
- g. Consider how PETRA's transformation of rental assistance into market-based rents, particularly for public housing, will incentivize energy retrofits
- h. Build better relationships with states housing and energy offices and regional and local utilities and utility regulators around multifamily energy retrofits, to best rationalize the array and availability of subsidy and to enable accurate data baselines and projections
- i. Remember that 80 percent of multifamily is not touched by the federal government and help states and localities implement market catalysts, such as transaction-triggered disclosures

II. Background

A. Paper Scope

This paper, drafted for the What Works Collaborative, presents in detail the opportunity that might arise from energy retrofits of federally subsidized multifamily residential buildings occupied by low-income households. The goal: to identify those innovations (and the policy changes enabling them) capable of scaling and transforming the affordable residential energy efficiency marketplace in a post-ARRA world.¹²

The multifamily portfolio examined in this paper is subsidized primarily by two different HUD sources: the “HUD-assisted” portfolio—2.3 million rental units in approximately 31,240 privately owned apartment buildings subsidized by HUD or insured by the Federal Housing Administration (FHA); and the public housing portfolio—1.2 million units of housing (in 13,000 developments) owned and subsidized by the federal government, though managed by 3,300 local public housing authorities. The vast majority of this paper focuses on the HUD-assisted portfolio, because it is most challenged in accessing capital to undertake a retrofit. In addition, the innovations identified in this paper may be applicable to the 2 million units of housing built through the Low Income Housing Tax Credit (LIHTC) program administered by the U.S. Treasury Department (Treasury), and to those affordable multifamily buildings subsidized by the federal departments of Agriculture and Veterans Affairs, and state housing finance agencies.¹³ These innovations could also be useful in identifying strategies to retrofit unsubsidized multifamily housing serving low-income populations who are extremely vulnerable to rises in energy costs.

On buildings, this paper examines only energy retrofits of existing buildings, and not new green building or new energy efficiency construction or substantial rehabilitation (like HOPE VI) that essentially tears down and rebuilds old housing. Newly built buildings remove some of the enormous capital challenges, offering owners the ability to integrate green installations upfront, at nearly the same cost. While HUD and state taxing entities should absolutely encourage more efficient construction tactics in new multifamily construction, the challenges facing new development pale in comparison to those found in energy retrofits of existing, aging buildings.

On energy, this paper considers energy retrofits to be those building efficiency improvements that can reduce energy and/or water consumption, in turn, reducing federal outlays. While this paper does not generally address retrofits which use renewable energy—such as solar, wind, or geothermal—it does include a very brief description of three applicable solar financing innovations. While this paper does not go into detail about healthy green retrofits, we do note that green property maintenance and the choice of healthy installations are both critical, should be integrated into an energy retrofit, and are often key to getting the energy equation correct.

This paper defines “innovation” broadly to include some actions that are completely new, or new to the housing arena, and some actions that arise merely from the removal of impediments or the elimination of cumbersome case-by-case decisions that stand in the way of scaling. In one instance, this paper defines as innovative the state- or city-wide targeting of existing non-HUD funding to multifamily retrofits, due to the current difficult fiscal and economic climate. Finally, this paper’s exemplary profiles

¹² ARRA is the American Recovery and Reinvestment Act of 2009, also known as the federal economic stimulus package.

¹³ Many LIHTC projects are also assisted by HUD.

are not constructed as formal case studies, in order to consider an extremely broad set of innovators, including some that are quite early in development or deployment to multifamily purposes.

B. Federally subsidized multifamily housing

HUD pays \$6.8 billion annually to subsidize resident utility bills in 3.5 million public and assisted housing units. In federally subsidized housing, tenant rent charges (including amounts dedicated to utility costs) are typically set at 30 percent of the tenant's income (or a proxy for LIHTC units). The following summaries describe the primary federal housing subsidies and their correlated utility costs and subsidy structures.

Public Housing

Approximately 1.2 million households live in 13,000 public housing developments owned and subsidized by the federal government, and managed by 3,300 local public housing authorities. Approximately 100 of these local housing authorities are considered large, managing over 5,000 units, with the remainder managing small or medium-sized portfolios. HUD subsidizes the entirety of PHA operating and capital costs, although capital subsidies have been chronically underfunded. The vast majority of this housing stock is more than 20 years old. The division of Public and Indian Housing (PIH) oversees public housing work at HUD.

Utility Payments

HUD pays for utilities by reimbursing public housing authorities via operating subsidies for direct outlays (calculated on a three-year rolling utility usage mechanism) or HUD provides a utility allowance (especially for individually metered units) that effectively covers the difference between the building's rent-plus-utility cost and a regulated affordable rent level charged to residents. The three-year rolling base means that any reduction in utility costs (whether through consumption or efficiency improvements or both) will be "taken back" by HUD by the end of the third year, unless some of the incentives HUD offers PHAs for energy efficiency (described below) are used. In the most recent report, HUD provides \$1.5 billion in annual operating subsidy costs for utilities, and \$471 million in annual utility allowances for residents of public housing. Note that HUD's proposed transition of public housing to housing with market-based rents will eliminate the rolling base concept; therefore utility payments will be incorporated into market rent levels.¹⁴

HUD-Assisted Housing

Approximately 2.3 million households live in 31,240 apartment buildings owned by private (including nonprofit) owners but subsidized by HUD.¹⁵ The method of subsidy varies, and includes development or rehabilitation assistance, project- or tenant- rent subsidies ("Section 8"), and FHA mortgage insurance. Much of this stock is more than 20 years old, since new commitments under the Section 8 program ended in the early 1980s, although many of the properties have undergone recapitalization and rehabilitation since then. The Office of Housing/FHA oversees assisted housing at HUD.

*Utility Payments*¹⁶

¹⁴ HUD's Proposed Preservation, Enhancement and Transformation of Rental Assistance (PETRA) proposal, proposed as part of the HUD FY2011 budget in the spring 2010.

¹⁵ Of these 2.3 million units, 0.9 million are merely insured, and possibly market-rate, while 1.4 million are considered either assisted or assisted and insured, and definitely low-income.

¹⁶ These figures are being updated by HUD at the time of publication.

HUD pays over \$735 million in utility allowances for residents of HUD assisted housing (primarily where there are individual meters), while private owners pay over \$1.1 billion in direct utility expenses for this portfolio.¹⁷ For master metered units, the tenant pays the entire rent amount to a landlord. For individually-metered units, the amount of rent payable to the landlord is reduced by a “utility allowance.” For tenants whose rent contribution (30 percent of income) is lower than the utility allowance, HUD or the landlord pays the difference to the tenant so that the tenant can still afford the utility charge. HUD calculates utility allowances annually, not over three years, meaning that any efficiency or consumption savings accomplished by a resident or owner would be “taken back” by HUD within a single year. HUD regulations also prohibit, except on a case-by-case basis, excess project reserves or residual receipts to be used to fund energy efficiency.

LIHTC Units

Two million households live in affordable housing developed under the Treasury’s Low Income Housing Tax Credit (LIHTC) authority established under Section 42 of the Internal Revenue Code. Some of these units are also subsidized with Section 8 or other HUD subsidies. Tenant rents are set at 30 percent of the income ceiling for participation in the program, typically 60 percent of the area median income, as adjusted for family size. For buildings with individually metered utilities, the rent payable to the landlord is reduced by the “utility allowance.” These developments are relatively newer than public or HUD-assisted housing, since the LIHTC was enacted in 1986, although the vast majority is still 10 to 25 years old.

C. Major energy programs and funding available for multifamily energy and water retrofits

The federal government has long subsidized, though significantly underfunded, multifamily building energy retrofits. ARRA enactment for the first time appropriated these (and new) programs at landmark levels. The following summary introduces the major federal funding sources for multifamily retrofits.

1. HUD authorities

*Public Housing*¹⁸

- (a) **Frozen utility subsidy rolling base.** For more than a decade, HUD regulations have given public housing agencies the ability to freeze the 3-year rolling base of utility subsidy/consumption, for up to 20 years to finance an energy performance contract undertaken by an energy services company (ESCO) or retrofit work performed in-house and managed by a consultant.¹⁹ ESCOs

¹⁷ In addition, HUD provides \$2.9 billion in annual utility allowances to Housing Choice Voucher holders.

¹⁸ Note that HUD’s proposal to transform public housing into market-based rental housing would eliminate the existing system of public housing operating and capital subsidies and instead substitute ordinary market rents. This would therefore eliminate public housing utility subsidies as well as the ability to freeze utility consumption, ultimately eliminating the existing energy performance contracting authority. As explained elsewhere, HUD’s expectation is that market rents and private capital markets would instead provide the funding to recapitalize public housing, including appropriate energy retrofits.

¹⁹ The rolling base refers to the 3-year average of subsidy provided to the public housing authority. It is tied to consumption, since HUD pays its subsidy based on the PHA’s consumption. However, because operating subsidies have consistently fallen slightly short of actual needs, the utility subsidy amount is not exactly equal to the PHA’s average of consumption over each year; rather, the subsidy is slightly less than consumption. 24 CFR 990.

predict and sometimes guarantee a certain savings level based on detailed pre-retrofit analysis, undertake the improvements and installations, and perform measurement and verification during the guarantee period. This 20-year revenue stream over time can be quite large, allowing the repayment of multi-million dollar energy and water retrofit deals without any additional HUD appropriations, but merely by freezing existing energy usage at historic levels. (Outside capital is needed for the upfront investment, but PHAs can typically access traditional debt or municipal leasing financing based on the frozen base subsidy stream.) More than 117 mostly mid- and large-sized public housing authorities have used the frozen base to date.²⁰

- (b) **Operating Subsidy.** HUD permits PHAs to use “add-on” operating subsidy in lieu of the frozen base to finance energy efficiency measures that can be repaid over time from savings. If add-on subsidy is used, the PHA is not permitted to freeze the rolling base.
- (c) **Capital Funds.** HUD capital funds may include capital improvements installed to reduce energy consumption, although the chronic underfunding of this subsidy stream may deprioritize energy capital improvements absent specific regulatory incentive. ARRA allocated nearly \$1 billion in competitive public housing capital grant funds explicitly for energy retrofits.

Assisted Housing

- (a) **Green Mark-to-Market.** HUD’s expanded mark-to-market program innovatively integrates energy retrofits into the process of marking budget-based (over-market-priced) rents to market levels, and resizing FHA-insured loans accordingly. HUD provides owner incentives to carry out these retrofits. Approximately 10 developments have been retrofitted to date in this program.²¹
- (b) **Green Retrofit Program.** ARRA authorized \$250 million in one-time grant funding for retrofitting HUD-assisted multifamily. With an average per-unit cost of \$10,000, this program can retrofit approximately 25,000 units. As of the date of this writing, these funds have all been effectively committed to properties.
- (c) **Office of Housing and FHA Authorities.** FHA insurance products and the Office of Housing programs include financing (or insurance) programs which can be used to incorporate energy efficiency into rehabilitation; however, the project economics need to work without depending on the savings.²²
- (d) **HUD Energy Innovation Fund.** The Fiscal Year 2010 appropriation act provided \$25 million to HUD to catalyze multifamily energy retrofits, and another \$25 million for single family retrofits.

Housing financed with funds administered by the Office of Community Planning and Development

²⁰ “Energy Performance Contracting: Field Office Procedures, First Pic, Inc.” D&R Limited, February 28 to March 1, 2006, slide 12. HUD is in the process of assembling a new database that will report on how many PHAs have used the rolling base and add-on subsidy, and the total level of investment in energy improvements made possibly by both subsidy streams. This presentation is current as of 2003, and shows 132 EPC projects in 117 PHAs.

²¹ As of April 2010, from conversation with HUD staff.

²² The FHA Section 241(e) program offers a second mortgage for energy/utility efficiencies, but is seldom used.

(a) **CDBG and HOME.** Multifamily rehabilitation that includes energy efficiency measures is an eligible use of both the Community Development Block Grant (CDBG, funded at approximately \$4 billion/year) program and the HOME Investment Partnerships program (HOME, funded at approximately \$1.8 billion/year), but HUD has no data on the extent of their use for this purpose and there are no specific CPD programs for energy financing or energy retrofits.

2. Department of Energy programs. The Department of Energy administers many programs to catalyze energy efficiency and renewable power sources nationwide. Three programs today are the primary sources for building retrofits nationwide, and are administered by the Office of Energy Efficiency and Renewable Energy (EERE). However, experts note that only a modest amount of the \$11.3 billion in ARRA energy efficiency funds is likely to be targeted to federally assisted multifamily housing buildings.²³

(a) **Weatherization Assistance Program (“Weatherization” or WAP).** Weatherization is the only grant program in the nation to provide funding explicitly for retrofitting residences occupied by low-income households. Administered by DOE, and allocated by States through subgrantees, typically local community action programs (CAP agencies), weatherization funds are used overwhelmingly to weatherize single-family homes. As a result, the bulk of the weatherization agency decision-makers, and the weatherization industry (installers, auditors) are single-family focused and skilled. Nearly 34 million households are eligible for weatherization assistance; however, until passage of ARRA, only approximately 100,000 units/year were retrofitted.²⁴ ARRA authorized \$5 billion in weatherization, an enormous increase. The Weatherization program now authorizes up to \$6,500 per unit for retrofit, thought to achieve a 10 to 20 percent efficiency improvement. HUD and DOE entered into a Memorandum of Understanding (MOU) in 2009 to facilitate the deployment of weatherization funds for energy efficiency measures in federally subsidized affordable multifamily, by streamlining tenant income verification. In April 2010, DOE issued new guidance thought to help implement the MOU by allowing owners to receive weatherization funds (and be construed as providing resident benefits) even if residents do not pay for their own utilities.²⁵ In April, 2010, DOE announced a Weatherization Innovation Pilot, awarding \$30 million to innovative low-income weatherization projects with a whole-house orientation and using non-traditional partnerships. A substantial percentage of these innovation funds may be deployed to multifamily buildings and awarded in the fall of 2010.

(b) **State Energy Program.** The DOE State Energy Program (SEP) provides state energy offices with annual funding to use at their discretion to improve energy efficiency, including building retrofits. States are permitted to spend funds for their own priorities. Multifamily housing

²³ Stewards of Affordable Housing for the Future (SAHF), “Comments of SAHF on H.R. 2336, The Green Resources for Energy Efficient Neighborhoods Act of 2009,” p. 3, June 10, 2009.

²⁴ As an example, \$227 million in annual funding in 2008 and 2004 allowed for approximately 100,000 homes to be weatherized, including approximately 16,787 multifamily units. U.S. Department of Energy, “Weatherization Briefing Book,” August, 2008. Note however, that DOE counts 2 to 4-unit buildings as multifamily.

²⁵ WAP Notice 10-15-A , “Guidance regarding accrual of benefits to low-income tenants in multifamily buildings under the weatherization assistance program,” April 8, 2010.

competes for SEP funding with many other energy needs of states, including transit, renewables, and more. ARRA appropriated \$3.1 billion in SEP funds to states.

- (c) **Energy Efficiency and Conservation Block Grant (EECBG).** Funded for the first time ever in ARRA, at \$3.2 billion, this program provides energy-efficiency and conservation block grants to cities, based on the CDBG allocation formula. Grants may be used for any number of uses, including building retrofits. Approximately \$454 million of these funds were awarded competitively for energy retrofits in April 2010, under the Retrofit Ramp Up competition.

3. Utility Energy Efficiency Funding

- (a) **Public Benefits Programs.** Approximately 24 states charge energy consumers a “public benefit” fee which is used to subsidize energy efficiency and renewables. In many jurisdictions, these subsidies are targeted in part to benefit low-income residents. Utility subsidy programs are typically, but not always, set up as rebates, a complicated mechanism for affordable housing owners who may lack upfront capital. Public benefit funds are estimated to amount to \$4.5 billion annually.²⁶ Like weatherization funds, public benefit funds typically are not made available to multifamily owners. Even when multifamily housing is an eligible use, the delivery mechanism (measure by measure installation by various vendors irrespective of a whole-building approach) is optimized for single family homeowners.²⁷ This delivery mechanism makes it challenging for multifamily owners to combine a set of measures that make economic and operational sense.²⁸

- (b) **Energy Efficiency Portfolio Standards.** A number of states have enacted energy efficiency portfolio standards (EEPS) which create another source of retrofit funding by requiring electric or natural gas utilities to run efficiency programs that meet certain energy savings targets. Many of these are subsets of a Renewable Energy Portfolio Standard. Ultimately, these utilities recover the costs of these programs through charges to rate payers.²⁹

- 4. **Low Income Heating and Energy Assistance Program (LIHEAP).** While this program does not provide funds for retrofits, a description is included here given the appropriation size each year, and the significant numbers of households served. The Department of Health and Human Services (DHHS) administers a heating and energy assistance grant program which effectively helps very low income owners and renters pay their utility bills by providing an ongoing utility subsidy. In FY2009, this

²⁶ Harak, Charlie, “Up the Chimney: How HUD’s inaction costs taxpayers millions and drives up rents for low-income families.” National Consumer Law Center, August, 2010, p. 18, based on M. Nevius, R. Eldridge, and J. Krouk, “The State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts 2009,” Consortium for Energy Efficiency, March 2010.

²⁷ Harak, “Up the Chimney,” p. 18.

²⁸ Conversation with Bill Kelly, President, SAHF.

²⁹ At least 30 state programs (EEPS and REPS) are described in the American Public Power Association’s April 2010 list. In addition, there are at least a handful of independent utility portfolio standards for energy efficiency. Critics contend that there should be more of an emphasis on EEPS, although most of the standards are REPS.

program received \$5.1 billion in appropriations, and served 8.3 million households.³⁰ This program is critical for the families who need help in paying utility bills; however, most energy and budget experts agree that it would be more cost-effective in the long run to retrofit the units in which LIHEAP recipients live than to pay unnecessarily high utility bills.

³⁰ These households represent 18.7 percent of the 44.3 million eligible low-income individuals. 2009 NAEDA Survey, announced in January, 2010.

III. Barriers to Transformation

Enormous barriers stymie the nationwide energy retrofit of federally subsidized affordable multifamily housing, including lack of capital, split incentives, insufficient data, and limited leadership and capacity.

Capital

By far, the largest barrier to retrofitting multifamily arises from the absence of capital for the upfront cost of an energy retrofit, even if resulting energy savings would more than repay costs over time. At a weatherization per-unit cost of \$6,500, the nationwide retrofit of 3.5 million homes would cost at least \$22.75 billion, a challenging figure even if savings eventually repay that amount over time.³¹

- **Regulatory and Arbitrary Impediments to Accessing Available Project Capital.** In an arbitrary approach based on multifamily subsidy type, HUD allows long term savings-based repayments to public housing authorities via a frozen utility subsidy calculation but not to assisted housing owners. HUD-paid utility allowances subsidize resident utility payments so that the monthly rent-plus-utility payment is always affordable. This important federal subsidy unfortunately disappears dollar-for-dollar any time that resident utility costs are reduced, thwarting owner abilities to recoup savings to repay an energy efficient investment. HUD has fixed this problem in half the national portfolio, allowing public housing owners to freeze utility usage (and thereby the stream of HUD utility subsidies) for up to 20 years. However, the utility allowance dollar-for-dollar disincentive constitutes an enormous regulatory and capital barrier to private owners of HUD-assisted housing.

In assisted housing, regulatory barriers also essentially lock up extra project reserves and residual receipts and limit increases in owner distributions (even if the distribution is to repay an energy efficiency investment), further stymieing retrofits.

Finally, federal policy arbitrarily separates energy improvements from capital improvements in both public and assisted housing, resulting in a short-sighted or at best incomplete renovation plan for a building that is not required to include energy renovations. While this is not a barrier, per se, the absence of clear federal prioritization of energy retrofits during project rehabilitation, capital upgrades, and the regular capital needs assessment process thwarts the unique opportunity to integrate energy use into every capital event and analysis HUD buildings undergo. This too often results in a replacement-by-replacement approach to energy installations (which are replaced only when broken or failing) rather than a coherent and integrated whole-building-wide approach.

- **Absent Capital Markets.** Absent direct grant appropriations or use of existing project capital, widespread retrofits will require a novel form of financing, at a moment when the nation's

³¹ Energy retrofit-per-unit costs are calculated in a variety of ways, and range from no cost (using merely an energy efficient version of an appliance being replaced) to \$100,000 per unit. Deep retrofits often cost approximately \$10,000 or more per unit, while shallower retrofits can cost much less. Since the weatherization program under ARRA authorizes up to \$6,500 per unit, that figure is used here to posit a total portfolio retrofit cost for HUD-assisted housing. This total figure does not include tax credit or state financed units, but it is over-inclusive, since some of the housing in HUD's portfolio is new or already energy efficient as a result of recent green construction or energy retrofits.

housing financing system has been very reluctant to underwrite the risk associated with energy loans. This reluctance appears even as these same institutions have historically underwritten multifamily rehab and new construction loans which include green retrofit components, and which depend on operating cost (including utility cost) projections. It occurs for two, interdependent reasons: first, energy savings are just not valued or otherwise appraised, even if utility costs are part of the underwriting. Second, lenders lack confidence in the realization of savings projections, in part because data and proof of savings is generally missing, as described below. As a result, lenders generally require liens or recourse, both of which are problematic in buildings that already possess senior debt. In one case, 50 percent cash reserve (credit enhancement) was required!³²

The capital problem confronted by HUD-assisted owners is also laden with complex, multilayered preexisting financing, unnecessarily large transaction costs, a lack of transparency in ESCO negotiations, un-aggregated square footage (and fragmented ownership), and tax credit idiosyncrasies.³³

Split Incentives

Split incentives exacerbate the upfront capital problem.³⁴ In typical, unsubsidized multifamily housing with individual meters, resident interest in lower utility costs is often thwarted by owner disinterest in making energy efficiency investments that can't be directly recouped through savings. In the case of federally subsidized housing—especially those developments with individually metered units—even owners otherwise willing to undertake energy cost-cutting and greener operations can't recoup sufficient savings (in part because they cannot increase rents) to pay back the investment.³⁵ Sometimes, owners cannot recoup savings from investments because residents may already be entitled to subsidized energy rates, reducing incentives for larger building-infrastructure changes.³⁶ In addition, owners who invest in efficiency may be exposed to resident behavior that thwarts predicted savings.³⁷

³² In Chicago, the Clinton Climate Initiative and Enterprise designed an ESCO approach to MF in which lenders required an enormous 50 percent credit enhancement contribution.

³³ Pre-existing financing creates its own set of barriers to energy efficiency capital. Usually the holders of senior debt must agree to allow new debt and approve its terms. Some existing debt instruments prohibit or limit prepayment, add lockouts, or impose enormous transaction costs making a refinancing or additional debt legally or practically impossible.

³⁴ SAHF refers to this split as “misaligned” since affordable housing owners’ interests are typically on the same side as the tenants.

³⁵ This problem is exacerbated in affordable developments with individually metered utilities. In those units, residents see the savings, but owners cannot access those savings to repay the investment, and cannot charge more rent.

³⁶ In California, one nonprofit developer of assisted housing added solar just to common areas, and not to individual resident units, in part because the utility already subsidizes tenant utility charges to such a low level that incremental savings from solar power would make the project economically unsound.

³⁷ A compelling anecdote is a PHA that replaced a dysfunctional master-metered heating system (that caused residents to wear summer clothes all winter and to keep windows open) with a system that kept thermostats at 70 degrees, causing residents to keep their stoves on to supplement the heat to former levels.

Information

The success of a multifamily retrofit project, as well as the availability of retrofit financing, both depend on information and data indicating existing energy consumption and costs, predictable efficiencies, the potential for energy and cost savings, and measurement and verification (post-retrofit) to make sure that improvements function as intended. New, defensible financing models cannot be created absent this data. And capital markets do not have access to solid data in part because owners have never been required to gather or publicly disclose energy performance, even at sale.³⁸

Unfortunately, the national affordable housing portfolio lacks these solid, historic, and predictive data around energy costs and consumption. DOE's sophisticated Residential Energy Consumption Survey (RECS) data does not include current and robust information about multifamily housing.³⁹ In addition, owners struggle with a variety of issues around regular data tracking and energy audits, including learning whom to hire and how to pay for an audit, and whether to integrate audit findings with capital needs assessments. HUD's historic operating cost tracking requirements include utility expenses, but not consumption, and HUD generally has not analyzed the data it possesses. HUD's portfolio-wide capital needs assessments conducted periodically fail to use the opportunity to analyze energy capital needs and opportunities.⁴⁰ Utilities have generally been reluctant to allow even an anonymous automatic uploading of consumption and rate data to housing providers because of confidentiality concerns.⁴¹ Without consensus around what to track, different regulators and lenders each seek different data, inhibiting scale and market transformation.

³⁸A number of shareholder proxy resolutions have been filed urging publicly traded real estate development firms to disclose the energy efficiency of their developments as a material risk. Recently, in January 2010, the SEC issued guidance clarifying that corporations are required to make disclosures on wide ranging climate-related business impacts. Although the guidance does not single out real estate owners or efficiency disclosures, it moves the discussion further. 17 CFR parts 211, 231, and 241.

³⁹ RECS data are compiled periodically by the Energy Information Agency, a division of DOE. It is the survey most turned to by experts in the residential energy field, although affordable housing experts believe that it is particularly weak in its multifamily data.

⁴⁰ Portfolio-wide capital needs assessments are undertaken by HUD every 10 years for public housing, and every five years for assisted housing. In the latest public housing capital needs assessment, begun in 2009, HUD did add some additional work to estimate some costs for some energy improvements.

⁴¹ Utilities are concerned, in part, with security breaches. In addition, utilities are concerned with unfunded mandates in providing real-time and historic information to consumers. On the other hand, California CPUC recently required utilities to provide energy usage information to all consumers. In Congress, Representative Markey proposed HR 4860 (e-KNOW) to require utilities to provide electricity information to consumers. A consortium of companies led by Google and Microsoft wrote a letter to the President on April 5, 2010, urging the required disclosure of energy use to consumers (ultimately enabling new technology to help reduce consumer energy use). Clearly the issue of what is provided, how it is provided, and to whom the information may be provided is still up for debate. See Katherine Tweed, "The Looming Fight over Power Data," Greentech Media, April 6, 2010.

Leadership and Capacity Gaps

- *Leadership.* Fragmented leadership at the federal level, complemented by an industry-wide capacity vacuum, constitutes yet another barrier. Fragmentation arises from shared and decentralized responsibility among HUD, DOE, Treasury, state housing finance and state energy agencies, and local utilities. These disparate public agencies are charged with governing affordable housing operations and capital improvements on the one hand, and energy efficiency, tax, and utility policy on the other. HUD and DOE have begun to cement a more unified approach, embodied in a weatherization program MOU in the spring of 2009. HUD's establishment of an Office of Sustainability represents important leadership and accountability in thinking through the energy use and opportunities in HUD programs and buildings. DOE's Retrofit Ramp Up competitive program and ARRA-allocated SEP guidance also exemplify innovative approaches to buildings and energy efficiency. But these are just a beginning and not alone sufficient. Many implementation difficulties continue to arise, even unintentionally, such as requiring that any weatherization grant to owners be in the form of a loan, rather than grant. This small requirement impedes implementation, since it results in adverse tax consequences for owners and LIHTC investors.⁴²
- *Workforce Capacity.* Policy fragmentation exacerbates an enormous nationwide workforce capacity vacuum, at all levels. The housing industry lacks a cohesive energy leadership cadre. Assisted housing owners, public housing directors, property and asset managers, and engineers all lack targeted training on the importance of and implementation techniques in financing, operating and renovating energy and water efficient homes. Only a few program staff outside HUD's Office of Sustainability—in FHA, Ginnie Mae, PIH, and CPD—are trained in energy building science and financing innovations. And even where there is solid experience, such as HUD's decade-long experience using ESCOs, staffing is short-handed, contributing to delays. Outside HUD, the auditing and weatherization industries generally lack multifamily expertise needed to scale capacity. Indeed, this workforce gap—especially in the audit and installation arenas—exacerbates the lending industry's skepticism about energy savings estimates.

Diverse Asset Class Complicates Market Solutions

Finally, multifamily retrofits have not scaled in part because multifamily affordable housing is an asset type that is complicated, and does not fit easily into a residential or commercial bucket in typical financing and energy initiatives. The size, vintage, quality, tenancy, energy systems, and geography of the nation's affordable housing portfolio is enormously diverse and challenges the development of a uniform approach to multifamily retrofits. Typical multifamily financing is complex with layered subsidies, multiple public and private lenders and other investors. Situated in every single state of the nation, affordable multifamily housing resides in every climactic zone with every possible energy variation. The absence of a clearly defined federal residential energy leadership body and policy framework contributes to a paucity of solutions capable of addressing this complex portfolio of buildings.

⁴² Other state-imposed barriers to weatherization exist, including prevailing wage requirements which rule out expensive multifamily retrofits in Florida and Maine, and individual meter requirements which rule out many HUD-assisted and public housing developments nationwide. Bendix Anderson, "Battle to Weatherize," *Affordable Housing Finance*, June 2010.

IV. Overcoming Barriers to Transform the Marketplace

Ultimately, this paper recommends scaling multifamily retrofits in HUD-assisted and HUD-funded public housing because it is the right thing to do. Scaling multifamily retrofits results in less costly building operations and less federal affordability subsidy over time, increases the life expectancy of these buildings and their affordability restrictions, and offers the possibility of lower expenses and increased health to residents. For developments with problematic cashflows, efficiencies offer the potential to strengthen project financial performance. Perhaps most importantly, retrofitting this portfolio presents a chance to reduce carbon emissions while reducing reliance on scarce fossil fuels, all while shoring up building financials and improving housing quality.

The United States can scale and transform the multifamily marketplace. It can accomplish this by exerting federal leadership in a novel way to implement innovations occurring nationwide. In particular, we can scale this marketplace through five actions:

1. Leading by example, establishing a national goal of retrofitted multifamily units and energy savings
2. Lifting regulatory impediments to the use of existing project capital for retrofits, and to the arbitrary availability of a “frozen” utility subsidy stream to public housing authorities (but not assisted housing owners)
3. Using federal credit enhancement and tax incentives to seed public private financing mechanisms capable of providing upfront capital that can be repaid over time with energy savings
4. Amassing solid information about this portfolio, and catalyzing the private market through informed disclosure (upon transactions) of building energy usage
5. Cultivating unified federal leadership at least among HUD and DOE, and building leadership and workforce capacity among the affordable housing and energy performance industries

Notwithstanding the barriers to retrofitting, important, innovative examples of energy and water retrofits have arisen over the past decade. Some of these are grant-funded, and in a post-ARRA world, not scalable. Others offer examples of leveraging, unique approaches to data gathering, and replicable leadership-building that might indeed lend itself to a scaled approach. The following are exemplary innovations involving: (a) retrofit financing; (b) pre- and post-retrofit analysis; and (c) cultivated leadership and workforce capacity. Because PHAs have overcome the capital barrier through their access to a 20-year frozen rolling base of utility subsidies and because PHAs' ESCO and in-house solutions have typically included audits, data systems, and some financing, the first two sets of innovations primarily apply to assisted housing developments. Some of the following innovations have been deployed and completed; others are just on the drawing board. All exemplify important, replicable innovations.

Financing

Retrofitting requires an upfront investment that usually can be repaid over time, from savings.⁴³ The problem is two-fold—a need for upfront capital, on the one hand, and an ability to collect and use the savings for repayment, on the other.

As described earlier, the upfront capital problem is exacerbated by the absence of a sophisticated capital market for multifamily energy investments, and the unwillingness of seasoned housing financial institutions to underwrite a energy efficiency (rehabilitation) loan whose repayment is based entirely on savings. In part, this reluctance to lend arises from a lack of data and predictability of savings.⁴⁴ Lack of capital arises also from split incentives, HUD’s dollar-for-dollar reduction in utility subsidies once efficiencies are achieved, and locked up project capital.

Financing innovations therefore help identify capital for upfront investment, recapture savings for repayment, integrate efficiency investments into rehabilitation or refinancing transactions already familiar to (and underwrite able by) the housing finance arena, and unlock project capital. Note that these financing innovations do not even take into account the value of carbon reductions, a value that will come into play with a national carbon trading mechanism.⁴⁵ HUD is called upon to use its credit enhancement and funding authority to pilot and scale important financing innovations capable of transforming the marketplace.

The financing innovations described in this section fall into one of the following five categories:

⁴³ Efficiency payback is generally thought to take 3 to 12 years, depending on the scope of improvement (with water improvements paid back much faster even). In contrast, solar retrofits usually require a 20 to 25-year payback.

⁴⁴ This reluctance to underwrite savings is not entirely out of line. There are a few reasons why at least until the industry matures, it has been difficult for the financial world to completely count on savings repayment. This is in part because of the absence of data, but also because data previously overestimated savings on an installation-by-installation accounting rather than a whole building approach that created interactions among improvements and lowered actual savings. In addition, tenant behavior may prove to be unpredictable. On the other hand, lenders will provide acquisition and rehab financing that relies on utility data that may or may not be accurate.

⁴⁵ This value is considered when calculating payback tolerance for an investment in retrofitting homes occupied by low income families, authored by the Energy Programs Consortium. However, this value is primarily considered in a unit-by-unit investment (akin to how weatherization is deployed), and does not specifically address multifamily housing investments. In general, the carbon value is more significant the more that energy prices are high. Computed at \$20/ton (prices are now \$3.23/ton), the carbon value with a 30 percent energy savings investment amounts to \$734 to \$970 for families at 200 to 400 percent of poverty. Energy Programs Consortium, “Bringing Residential Energy Efficiency to Scale,” August 21, 2009, p. 24. The Energy Programs Consortium is an energy policy and research organization that is a joint venture of: National Association of State Community Services Programs (NASCS), representing the state weatherization and community service programs directors; National Association of State Energy Officials (NASEO), representing the state energy policy directors; National Association of State Regulatory Utility Commissioners (NARUC), representing the state public service commissioners; and National Energy Assistance Directors' Association (NEADA), representing the state directors of the Low-Income Home Energy Assistance Program.

- **Unlocking project capital**, in which assisted housing owners were permitted access to project reserves and residual receipts for energy improvements
- **Integrating into existing financing**, including re-opening and refinancing existing mortgages, expanding owner incentives, and freezing existing utility consumption or subsidy streams for the duration of a performance contract
- **Off-balance sheet innovations**, defined as unsecured financing typically undertaken by third-party vehicles to monetize tax credits or portfolio standards and accumulate energy savings, including Solar and Energy Efficiency Power Purchase Agreements (PPA), and the Managed Energy Service Agreement (MESA) approach
- **Meter-secured innovations**, which are long-term capital structures. These include property assessed clean energy mechanisms (PACE) and onbill financing that attach to the “meter” rather than the home, so that they can be assigned to future owners/tenants
- **Reduced transaction costs**, which ultimately reduce the cost of the energy retrofit transaction, through greater transparency in ESCO negotiations and by the aggregation of multiple developments in a single retrofit transaction

1. **Unlocking project capital.** As David Abromowitz describes in his landmark paper on greening HUD-assisted multifamily housing,⁴⁶ HUD regulations hamstring owners’ abilities to invest even available cash in energy efficiency improvements capable of reducing operating costs and increasing affordability over time. To fix this, HUD need only unlock owners’ access to this existing, available capital.

(a) **Explicit authorization of project reserves and residual receipts to fund energy efficiency measures:** Currently, HUD uses its regulatory authority irregularly to grant a case-by-case approval to allow use project reserves or residual receipts for energy efficiency, although this is never permitted “new reg” Section 8 properties. Ad hoc permission is administratively burdensome, inefficient, and arbitrary for new reg Section 8 owners and others who may not know about these exceptions. To scale energy retrofits, this authority should be exercised widely, and also made available for financing energy audits. Currently, Region IX offers important flexibility in unlocking project capital for retrofits, generally. Also, as described in the off-balance sheet innovation section, below, Eden Housing was permitted the use of \$1 million in existing project reserves to use toward an \$8 million solar panel installation on 26 of its assisted housing developments in California.

2. **Integrating energy efficiency costs into existing multifamily capital structures.** One of the easiest ways to retrofit is to add, where possible, to existing capital or debt, obviating the need for new energy underwriting or energy financing structures.

⁴⁶ David M. Abromowitz, “Green Affordable Housing: Within our Reach” (Washington: Center for American Progress, 2008). These authorities were embodied in legislation proposed by Representative Kilroy in H.R. 4099, and are included in H.R. 2336, approved by the House Committee on Financial Services on April 27, 2010. A companion bill was introduced in the Senate by Senator Bennett (D-CO) as the Energy Efficiency Modernization Act (S. 2897).

- (a) **“Re-opening” existing insured loans to add supplemental co-first retrofit financing:** While the majority of financial institutions have been reluctant to underwrite energy savings, some have accommodated the “re-opening” of an existing portfolio loan, to add in supplemental financing. Community Preservation Corporation (CPC), a community development financial institution (CDFI) in New York that has a large portfolio of affordable (mostly unsubsidized) multifamily buildings, is scaling a supplemental retrofit approach structured as a “co-first loan” to add to existing debt a new debt amount equal to the cost of the energy retrofit, to the maximum amount supported by the property (and the first mortgage). Generally, these retrofit loans amount to approximately \$2,000 to \$4,000 per unit. To date, CPC has already closed on \$5 million of financing (two developments, 330 units), with a pipeline of another \$10 million (2,250 units).⁴⁷ The structure partners CPC with the New York State quasi-public mortgage insurer, SONYMA. The new co-first is supported by the property’s existing underwriting, and does not require an underwriting of the savings from energy conservation measures. This is because most of these properties are in good condition, about 5 to 10 years after the initial 30-year mortgage was originally issued, and have accrued equity since the original financing. To enable this innovative retrofit financing method, CPC secured the approval of its secondary market holders—two state pension funds who made the original investments.

The innovation in this solution is that it modified an existing structure—existing debt, lenders and secondary market players—to provide capital for a novel activity: energy retrofits. The interest rate on the co-first is blended with the original interest rate, so that this structure can accommodate rates that are lower or higher than the original mortgage.⁴⁸ More, this traditional debt vehicle is characterized by a long amortization schedule—typically up to a 30-year mortgage—whose length exceeds nearly all other energy financing solutions.⁴⁹

- (b) **Expanding owner incentives to align energy efficiency with other capital events:** Outside capital can be amassed for energy efficiency by integrating efficiency improvements into many other capital events undertaken by a HUD-assisted multifamily property. Three examples include:
- (i) **HUD’s Mark-to-Market:** The best example of this is HUD’s own Green Mark-to-Market program, in which HUD provides owners with incentives to retrofit properties,⁵⁰ and allows rents to remain slightly higher than they would have been if marked down under the original program, but still at market. HUD withholds some of these incentives until after the retrofit is completed, and upon review of the savings results. Notably, the green mark-to-market approach avoids the need for outside capital for an energy retrofit, instead allowing owners to use an existing market and capital mechanism (the marking to market of budget-based rents).

⁴⁷ As of early June 2010.

⁴⁸ Because these are typically re-opened 5 to 10 years into a 30-year mortgage, even a higher interest rate will end up providing a blended rate that is not that much higher than the original instrument’s rate.

⁴⁹ Typically, energy loans offer a 7 to 15-year maximum term, while solar may be up to 20 years, with terms dependent on the “useful life” of the improvement.

⁵⁰ The primary incentive reduces required owner contribution from 20 percent to 3 percent.

(ii) **Freddie Mac Incentives/CPC:** CPC and Freddie Mac recently launched an incentive to provide CPC borrowers with an 80 percent LTV ratio and a 30 basis point discount for new acquisition and refinance loans incorporating energy efficiency rehabilitation. This differential allows for some energy retrofit work, and could be scaled well beyond CPC's portfolio. While Freddie Mac has innovated by employing important green incentives, the fact that Freddie must hold these in its portfolio, rather than allow for a capital markets execution, makes the rate on these loans too high to be competitive, ultimately limiting the marketability of these loans.

(iii) **Deutsche Bank/CPC Mod Rehab:** Deutsche Bank has partnered with CPC to provide \$50 million in substantial rehab funds for existing, occupied affordable (unsubsidized) multifamily, where approximately 10 percent of the construction loan is designated for green retrofit measures. These buildings are aging buildings, and the innovation is to integrate an audit and retrofit financing into the substantial or mod-rehab process, and allow for \$2,000 to \$4,000 per unit in retrofit activity. To date, \$25 million has been closed.

(c) **Accessing project capital by freezing current utility levels to enable savings to be used to repay upfront investment.** As described above, public housing agencies possess the unique (HUD) authority to freeze current utility usage for up to 20 years to finance energy and water retrofits. For large PHAs, especially, this regulatory relief amounts to significant capital—in Boston, amounting to \$63 million in its latest energy performance contract with an ESCO. Some public housing authorities have used the frozen rolling base ability to bring retrofit capacity in-house and incorporate retrofit and renovation jointly, with great economies in financing and engineering.⁵¹ Note that this innovation will be impossible to use when HUD transitions public housing to market-based rents.⁵²

(d) **Increasing project capital by modernizing tax credit utility allowances for energy consumption:** In lieu of freezing high levels of consumption, those assisted housing developments may now use an energy consumption utility allowance calculation which – in theory – would reduce residents' utility allowances, bringing in more project capital in the form of an increased tenant rent payment (although the gross rent for the building stays the same). This authority was

⁵¹ From conversations with Jeanne Engel and Sean Neill, CEO of Cycle-7, lead consultant to many PHA retrofit projects. Note, for example, the subsidiary created by the District of Columbia Housing Authority, Construction Services Administration, LLC, to combine retrofit and renovation work. In their original incarnation, ESCOs performed retrofit work with no or low upfront cost, and got paid out of savings in a shared-savings structure. Over time, the shared savings structure disappeared and ESCOs—at least in the context of public housing—charge a fee for service, and for the guarantee of savings. To freeze the utility consumption base (the revenue source for public housing retrofits) public housing authorities are permitted by regulation to either hire an ESCO in a performance-based contract or to hire a qualified engineer and contract out the work directly. This regulatory backing has enabled ESCOs to access municipal lease or bond financing for upfront costs. More and more housing authorities are choosing the independent consultant route because it avoids the guarantee cost, typically a 5 to 10 percent reduction from the ESCO cost which can be utilized to make deeper retrofits.

⁵² The PETRA proposal is predicated, however, on the fact that market based rents are thought to enable public housing agencies to access the private capital markets on a continual basis to undertake capital renovations, including energy improvements. HUD must ensure that those retrofits can take place since the loss of the EPC ability will be a huge loss of a long-term energy-specific stream of funding.

enacted in 2008, and many state housing finance agencies are just implementing it now (primarily in the new construction or substantial rehab context), as this new consumption-based allowance often results in larger rent contributions merely because tax credit developments are newer and more efficient upon construction than the public housing siblings to which the utility allowance schedule was previously tied.⁵³ While the regulations provide a variety of different ways to update this allowance, one is based on a consumption model (and software) undertaken by an engineer. Only a few states, including California, have ratified this precise, consumption-based method of calculating utility allowances.⁵⁴ On the other hand, owners of existing buildings with individual meters may face political ramifications (as well as tenant outcry) making a resident rent increase difficult, even if they were previously paying that differential in the form of a utility payment. There are examples of implementing an energy consumption based utility allowance in public housing, where the residents and owners share the savings even with a tenant rent increase.⁵⁵

- (e) **HUD proposal to incorporate energy loans into FHA refinancing transactions:** FHA recently indicated it would move forward on two separate initiatives designed to use existing FHA authorities to catalyze multifamily retrofits:⁵⁶
- (i) **Expanded risk-sharing program with Fannie Mae:** For multifamily LIHTC properties that are at least ten years old, FHA has agreed to a top-loss risk sharing arrangement with Fannie Mae in exchange for including an energy retrofit requirement in the property rehabilitation plan. Specifically, FHA will take the top 5 percent loss position, and share the remainder of any losses evenly with Fannie Mae, in exchange for Fannie Mae expanding its loan underwriting and sizing parameters so more funds can be lent than are available under its standard refinancing program. Borrowers will be required to allocate at least 5 percent of this larger loan to energy retrofit activities.
 - (ii) **Philanthropic bridge loans to prove underwriting:** A private philanthropic program-related investment (PRI) fund is moving forward with an initiative to issue 3- to 5-year “bridge” energy retrofit loans on existing FHA insured developments. These loans will pay for the retrofit, but repayment will be subject to property cashflow. If the savings materialize as predicted, FHA will take out these loans with a standard FHA second loan product. The second loan is fully amortizing, and functions as a “co-first.” In this way, private

⁵³ *Federal Register* Vol. 73, No. 146, June 29, 2008, p. 43863.

⁵⁴ California now offers a “California Utility Allowance Calculator” and accompanying software to accomplish this more precise calculation, intended especially for the GoSolar program. The California utility allowance is available only to new or substantially rehabilitated (torn-down and rebuilt) developments.

⁵⁵ Harak, “Up the Chimney,” p. 28. Harak notes that in Riverside and Ventura counties (both in California), public housing authorities used a model to allow PHA owners to raise rents in order to implement energy efficiencies, resulting at least in resident outlay that was no more than before. And, tenant utility allowances were not decreased fully, so they still ended up with a net savings vis-à-vis rent plus utilities prior to the efficiencies.

⁵⁶ These initiatives were announced at a Roundtable to present this paper to HUD and DOE, held at Brookings on September 27, 2010. They are not yet launched, but will hopefully be implemented before the end of 2010.

philanthropy takes the risk during the period in which savings are being proven, and FHA takes out the loan based on actual savings realized.

3. Off-balance sheet energy financing innovations applied to multifamily. Commercial building owners have long used targeted energy financing mechanisms, and especially those that avoid liens and are sometimes off balance sheet, to finance energy retrofits or installations.⁵⁷ Now some (especially around solar) are moving into the affordable multifamily space.⁵⁸ Note that some renewable financing mechanisms are highlighted because they are quite innovative in financing approach, and potentially applicable to energy efficiency retrofit financing. However, buildings should be maximally energy efficient before thinking about solar, a “loading priority” often required by state solar and local incentives. Each of these solutions also includes a long-term investment in savings outcomes (and therefore, in “measurement and verification”) ensuring some level of performance accountability.

(a) **The Solar Power Purchase Agreement Model (PPA):** The PPA model is a mechanism that allows an owner to reap solar or efficient energy without any upfront investment merely by paying a predictable (lower) power purchase price over the length of the improvement. The solar PPA providers typically own and install the equipment, provide upfront financing, and charge a negotiated price for power “generation” each month. Private, for-profit ownership is precondition to accessing the federal grant in-lieu of the renewable investment tax credit.⁵⁹ The PPA firm effectively aggregates these deals, attracts private capital investment, and monetizes the federal and state renewable tax credits. At the end of the 20 years, the provider may purchase the system. The PPA monthly power price, typically much lower than current utility costs, is effectively the cost of the installation, less the value of the credits available. Off balance sheet treatment is attractive to owners whose lien holders do not want additional debt on the project.

In affordable multifamily housing, the PPA model has become attractive for two reasons. The primary reason is that use of the PPA model is one of the only ways to reduce the cost of solar by 30 percent (the value of the federal renewable energy investment tax credit, or ITC). In addition, the model is attractive for those developments that do not have or cannot access project reserves or additional debt to finance solar upfront. Most of the housing providers who have used a PPA model also depend heavily on state tax credits like the California Public Utility Commission’s (CPUC) Multifamily Affordable Solar Housing (MASH) tax credit, which offers a generous 25 to 60 percent subsidy in addition to the 30 percent federal investment tax credit.⁶⁰

⁵⁷ Most experts agree that the off-balance sheet nature of these mechanisms is not easily applicable to federally subsidized or tax credit developments, since most will still need to get HUD consent and the consent of all the owners/partners and lenders.

⁵⁸ Note, however, that these mechanisms are not permitted for HUD developments if they include financing for equipment “essential” to running the property that is not otherwise owned by the owner.

⁵⁹ Section 48 credit.

⁶⁰ The MASH subsidy is either \$3.30/kwh or \$4/kwh depending on whether or not it is used just for common areas or also for tenant units. Regardless, this grant ends up subsidizing at least 25 percent of the project cost. In Eden’s case it amounted to 50 percent. Another developer has said it achieves 60 percent with MASH.

This means that the cost of solar is only 20 to 45 percent of its actual cost, when both credits come into play. Unfortunately, the MASH credits typically most useful to affordable multifamily are no longer available for new retrofits, making questionable the functionality of the PPA model for assisted or public housing in California, unless other utility incentives/rates come into play. The following three examples offer slight deviations from the straight, commercial PPA model.

- (i) **Housing Authority of Santa Barbara:** This PHA oversees 850 affordable multifamily units, of which approximately half are public housing and the remainder are LIHTC units. The County Housing Authority recently leveraged proceeds from an energy performance contract (utilizing the frozen base authority) and pooled them with public housing capital funds from ARRA to finance the installation of solar panels on 22 public housing and tax credit developments, transforming them (through targeting) into net-zero electric energy buildings. The PHA also took advantage of the CPUC's MASH incentives for affordable multifamily. In this innovation, as an adjunct to the PHA's pre-existing (nonprofit) development company, the PHA created its own independent captive energy company, which charges a low price to affordable housing property owners through a power purchase agreement (PPA). Eligible for both the ITC and MASH, this captive energy company facilitates a low-cost transfer of the panels at the end of the 20 years. In financial terms, the \$10 million solar retrofit is funded entirely through a wide range of sources including the PHA's own \$4 million in leveraged proceeds from the energy performance contract/frozen base. On the other hand, creating this financing structure has been characterized as extremely complex.
- (ii) **Eden Housing:** Eden Housing uses an innovative mix of debt and a PPA model to access lower cost solar installation (via the ITC and MASH) through a PPA provider for 26 developments, including HUD-assisted and LIHTC units. The system is approximately \$8 million, with 80 percent covered through the state and federal tax credits. Of the remaining 20 percent, Eden used its own reserves to cover \$1 million and another \$500,000 through regular financed debt, including philanthropic PRI funds.⁶¹ The remainder went to the PPA in the form of the power purchase agreement, repaid monthly as the power purchase price. However, because of the relatively small size of the PPA financing, Eden was able to negotiate the purchase of the panels at no cost after five years. Eden admits that it could have absolutely financed the whole system outright, without the PPA, but for its need to access the federal investment tax credit.
- (iii) **Sunwheel Energy Partners.** A subsidiary of the McCormack Baron development company, Sunwheel Energy Partners offers a PPA model for 11 public/private housing ventures (approximately 1,600 families) in California by coupling the solar and ITC tax credits with

⁶¹ Usually, the PPA model helps owners cover an upfront cost. In this case, Eden had access to the cost of the system, through its own project capital or access to traditional debt. Therefore, it only needed to repay through the power purchase arrangement the amount related to the PPA portion (\$200,000), and the PPA only needed the structure for five years to cover its own investors. Because of this unique arrangement Eden was able to negotiate this no-cost transfer after five years. Eden received some funds from the San Francisco Foundation's PRI fund. A PRI is a program-related investment fund, an innovative and permitted use of a foundation's endowment that provides a return through mission-aligned investments.

New Markets Tax Credits (NMTC) and state MASH credits, resulting in advantageous project economies and job creation.⁶² In California, even where units are individually metered, Sunwheel provides residents with free power, primarily by adjusting the power purchase price to owners. Structurally, the PPA firm (Sunwheel) serves as the Qualifying Business that owns the panels and can receive the new markets tax credit.⁶³

- (b) **Energy Efficiency Power Purchase Agreement.** Most PPAs do not offer financing for non-renewable, efficiency-only retrofits because the federal tax credits available for energy retrofits are not nearly as deep or accessible (and therefore not as capable of attracting investors or reducing project costs) as the credits for renewable energy projects. On the other hand, the cost of efficiency improvements is typically significantly less than the cost of renewables. Recently, a few companies have launched PPAs that finance efficiency or combined efficiency/generation projects, though only one is developing a solution readily applicable to the multifamily residential market. Energy Resource Management (EnRM) is developing a PPA that plans to monetize efficiency portfolio standards required by state public utility commissions in addition to monetizing federal energy efficiency tax credits. In other words, the building owner becomes an efficiency “host site” producing efficiency via the installations and improvements, and this efficiency is sold back to the utility (via the PPA provider). Like solar PPA providers, EnRM stays invested in the outcomes and outputs achieved by the owners, since it will guarantee a minimum production level to the utilities. The policy framework for this type of transaction is only now beginning to evolve at the state level, and EnRM believes that the most effective renewable portfolio standards will be those in which “efficiency energy” is fungible with any other low-carbon energy source.
- (c) **MESA (Managed Energy Services Agreement):** The MESA, offered by Transcend Equity, is currently available to non-residential commercial building owners. Somewhat of a hybrid between a PPA provider and an ESCO, a MESA is a long-term energy purchase and services contract to building owners, including those with individually metered tenants, who pay for their energy directly to Transcend, rather than a utility. In this way, Transcend gets paid primarily out of savings accruing over time. Transcend takes over responsibility (akin to a developer through outsourcing to general contractors or construction management companies) for tuning, adjusting, and replacing energy systems as well as paying for the actual utility bill to the utility. The MESA power bill is generated by a third party model of energy usage based on what the building would have incurred absent a retrofit, adjusted for weather and occupancy. This virtual “lockbox” (similar to the public housing “frozen base”) effectively freezes the prior (historic) level of utility usage for 5 to 10 years, allowing the MESA energy services company to institute improvements and capture all the savings during the 10-year agreement (and payback)

⁶² Each of Sunwheel’s projects at least includes public housing. The Sunwheel model also depends on the very lucrative MASH credit, which is why all 11 deals take place in California. Absent MASH, projects will need to come up with some other source to make the numbers work.

⁶³ Sunwheel’s founding CEO, Jonathan Goldstein, believes that pairing the ITC and the NMTC are an ideal match, since they result in job creation in the solar and housing industry, realizing the job-creation intent of NMTC. See Jennifer Dockery, “Solar installation provides free power to tenants,” *Novogradic Journal of Tax Credits*, March 2010.2010, volume I.

period.⁶⁴ Commercial clients have obtained off-balance sheet treatment for MESA, based on opinions from major accounting firms. On the hook for savings, MESA also performs all measurement and verification (M&V). MESA is not an ESCO because it does not perform the work and does not charge for a guarantee; rather it serves as the “developer” overseeing the work, earning a nominal development fee and a portion of the savings as they accrue over time. Transcend is actively exploring an application of the MESA model for multifamily residential.

4. **Meter-secured assessment and billing charges:** Two different financing innovations—PACE assessments and onbill financing—are added to a municipal assessment or utility bill offering a relatively long-term amortization.⁶⁵ This longer amortization makes the annual payment more affordable than shorter-term loans and potentially matched to the realization of annual savings. The integration into an existing charge makes payment administratively simple for the end user. Additionally, these two mechanisms enable the charge to “stay with the meter,” even after the occupant or owner leaves. While these are referred to colloquially as “meter-secured,” only the PACE mechanism is a lien security; onbill is typically unsecured.

(a) Property Assessed Clean Energy (PACE) assessments have been launched as a secured financing mechanism primarily in the single family and solar arena. These assessments effectively offer homeowners the ability to receive an upfront investment whose repayment is integrated with the property tax and repayable generally over 20 years. Capital is raised through a municipality’s issuance of bonds. The innovation of PACE is twofold: (a) it is a tax assessment, like an infrastructure charge, and therefore can be senior to the mortgage, capable of attracting significant capital investors; and (b) it does not require the owner to repay the investment in full upon sale of a home; rather, the charge stays with the meter. PACE is currently fighting uphill challenges given the lending and financial regulatory community’s concerns about these liens. On July 6, the Federal Housing Finance Agency (FHFA), which oversees Fannie Mae and Freddie Mac, essentially prohibited PACE loans senior to mortgages issued under these GSEs, contending that these place undue risk on an already fragile housing market.⁶⁶ This followed Fannie Mae’s May 10 underwriting guidance.⁶⁷ The Office of Comptroller of the Currency (OCC) also issued guidance cautioning against PACE for commercial loans.⁶⁸ DOE is currently working to think through solutions with states and localities that have received nearly \$150 million to implement PACE programs, and the State of California has filed a suit against the GSEs and FHFA to permit the continuation of the state’s PACE programs.⁶⁹

⁶⁴ MESA is unlikely to be able to lock individual units’ payments to prior consumption; therefore, this model will enable the retrofit of large systems that are likely to be master-metered.

⁶⁵ The schedule is typically tied to the useful life of the improvement.

⁶⁶ Federal Housing Finance Agency Statement on Certain Energy Retrofit Loan Programs, July 6, 2010. The statement indicates a willingness to waive these prohibitions for PACE loans already extended.

⁶⁷ Fannie Mae Lender Letter 2010-06, issued May 5, 2010.

⁶⁸ OCC Bulletin 2010-25, July 6, 2010.

⁶⁹ Suit filed on July 14, 2010 in United States District Court.

At a minimum, PACE loans might function for those affordable multifamily developments that have no outstanding debt.⁷⁰ To date, we know of no PACE loans that have been extended to multifamily developments. However, the city of Boulder had planned to include multifamily in its new PACE program, halted when the FHFA issued its guidance in July. In addition, the Low Income Investment Fund (LIIF) recently published a report evaluating the sensitivity of the city of San Francisco's multifamily portfolio to each of PACE and traditional loans at a variety of different retrofit levels and interest rates.⁷¹ Based on this analysis, LIIF found that those properties with the highest utility costs per unit could function best with a PACE model lien. Moreover, the report notes that if scaled, with robust capital markets and investors, PACE has the potential to be one of the lowest cost financing mechanisms given its 20-year payment horizon.⁷² For this tool to work, the senior lien issue will need to be resolved, or the tax assessment can be merely a collections tool without seniority.

- (b) **Onbill financing (unsecured):** Onbill financing refers to the ability to integrate repayment of energy efficiency investment directly with the utility bill over time. The innovation of onbill is that the bill can integrate repayment seamlessly, so that the utility payer may see no perceptible difference in a utility bill over what was being paid historically. In addition, the utility could set it up so that the payer sees a savings each month (by sharing the savings with the resident instead of using the entirety to repay the loan), even as the investment is repaid. In the past, onbill financing required the utility to play both the lender and billing integrator roles. Because utilities do not enjoy issuing or collecting on loans, and because onbill requires some billing system upgrades, most don't offer onbill financing. More current innovations (especially in single-family) partner a financial institution with the utility bill, so that the utility is merely a billing vehicle integrator.⁷³

While onbill has typically been available primarily to small businesses and commercial enterprises, Holyoke Gas and Electric has offered onbill financing to owners of multifamily residential.⁷⁴ In the single family retrofit arena, onbill offers owners the perception that the investment never has to be repaid, since the monthly savings each month reduces (potentially

⁷⁰ Additionally, PACE might make sense for non-residential community facilities, such as community centers and buildings financed with CDBG. The City of San Francisco has proposed a PACE model for community facilities, although the state may repurpose PACE funds in some other mechanism, given the OCC and FHFA guidance. In addition, even on a building with no debt, the presence of a PACE loan might jeopardize future debt opportunity.

⁷¹ Lori Bamberger, "San Francisco Community Facilities: Energy Retrofit Demand and Sensitivity Analysis," Low Income Investment Fund, November 2009.

⁷² The reduced costs associated with a scaled PACE program result, in part, from reduced transaction costs. Today, in an environment where PACE loans are still novel and not routinely available in the capital markets, the interest rates associated with the PACE model are quite high (unless otherwise subsidized as in San Francisco).

⁷³ In Portland, Oregon, Shorebank Cascadia serves as the lender for a single-family onbill financing mechanism in partnership with the utility (which serves as the billing integrator).

⁷⁴ Holyoke offers up to \$2500/unit up to a maximum of \$20,000, interest-free over 5 years. In 2008, approximately \$1.4 million in loans were outstanding, although it is unclear what proportion of this amount is attributable to multifamily.

to zero) the outstanding debt obligation. In the multifamily arena, this perceptive advantage may not be important. On the other hand, onbill is one of the very few ways for low income residents to repay efficiency improvements that they may undertake without an owner's help. Additionally, onbill may be right vehicle for owners to use where units are individually metered to allow for repayment over time, even if the owner finances the improvement.⁷⁵

5. Reducing project and transaction costs. A final set of innovations identifies cost reductions possible in energy retrofits.

- (a) **Making ESCO transactions more transparent:** ESCO critics contend that the cost of the improvements and guarantees are higher than necessary—sometimes adding 40 percent to the cost of the deal. In one of the largest and most recent ESCO transactions, Boston Housing Authority set a precedent by successfully using transparency in the negotiations to significantly reduce the cost of the guarantee and the whole project. Alternatively, HUD could set a maximum threshold for the guarantee price. PHAs and other owners have employed third-party reviewers to ensure costs are appropriate, and more and more ESCOs will work without a guarantee.
- (b) **Aggregating square footage to reduce costs:** Aggregated square footage per retrofit transaction—at least in the same region and climactic zone—could reduce transaction costs and create economies of scale needed in retrofits. This aggregation could benefit assisted housing as well as public housing, where less than 1 percent of PHAs with fewer than 250 units have entered energy performance contracts.⁷⁶ In public housing, a few smaller PHAs have attempted an aggregated approach to attract ESCO efficiencies and bring costs down, although the fragmentation of decision making posed challenges, in addition to issues around diverse geography, multiple utilities, and varied legal authorities. Clearly, to the extent that aggregation is made possible in public or assisted housing, HUD (or intermediaries) would need to work out the issues and help by negotiating a master agreement.

Pre- and Post-Retrofit Energy Data and Analysis

The absence of solid, dependable, understandable data on multifamily energy consumption and energy potential stymies the scaling of retrofits. Data inform a variety of different evaluative tools, energy efficiency and green building rating systems, and predictive models, and each is complex and tied to different programs, funding sources, and sponsoring agencies. Owners struggle with a variety of issues around data and audits, including learning whom to hire for an audit, how to pay, and whether to integrate audits with capital needs assessments. Few auditors nationwide are skilled at multifamily audits and evaluations. In the public housing developments that retain ESCOs, the ESCO performs both

⁷⁵ The author is not aware of anyone who has done this, but it seems plausible that an owner could partner with a utility to allow repayment via the tenant portion of the bill as long as it is no higher than prior bills. This would require the utility and the owner to partner in a way that made sure that tenants would always have the same or lower bills. It would also eliminate the dollar-for-dollar utility allowance adjustment that currently occurs, enabling the owner to invest even where meters are individual.

⁷⁶ Out of 132 energy performance contract projects undertaken by housing authorities through 2003, only 11 were in the smallest PHAs. "Energy Performance Contracting," slide 181.

audits and M&V, allowing owners to do less of their own monitoring on both ends. States and utilities have prioritized the funding of and installation of meters, but these need to be the right tools with the right measures for a multifamily housing owner. The lexicon around audits, consumption analysis, modeling, M&V, and energy and green building ratings is confusing to owners. Finally, the absence of a consistent multifamily audit protocol, which would guide the standardization of retrofits and the development of underwriting guidelines, inhibits lender action and retrofit activity.

In particular, better data and protocols are needed for the following reasons:

- **Underwriting:** To scale a residential capital market for energy efficiency, data are needed to understand performance and efficiencies⁷⁷
- **Leveraging and carbon reduction thresholds:** Many federal and state energy subsidies and rebates are tied to efficiency potential. In addition, at some point, national carbon trading and carbon reduction credits may exist. Even today, there is already a functioning energy “attributes” market in the Northeast.⁷⁸ To maximize the eligibility of HUD’s multifamily portfolio—whether public or assisted—to tap into these markets, energy consumption and efficiency potential must be tracked and modeled
- **Targeting:** One way to target scarce funding in an energy environment is to identify those developments with the greatest inefficiencies and greatest potential for savings or other resident benefits. To target therefore requires tracking and modeling
- **Catalyzing demand:** To create a new demand for efficiency, data are needed to help owners and property managers learn about potential (energy) cost reductions
- **Fiscal and asset stewardship:** To help build an educated energy property management cadre of professionals, we need to track data from which we can offer a variety of solutions
- **Market valuation and transformation:** Buyers need data to be able to include the energy cost variable into their purchase and pricing decisions

While HUD requires the tracking of utility expenses, most public and assisted housing providers do not track consumption or even performance post-retrofit, although HUD could probably get data from earlier public housing retrofits directly from ESCOs.⁷⁹ In addition, while HUD requires public housing

⁷⁷ Deutsche Bank and Living Cities recently issued a joint RFQ to hire a consulting team to develop a reliable data protocol upon which underwriting could be based. This RFQ is intended to aggregate and interpret data on retrofit and operating practices as well as economic impact. Key data points to collect, pre- and post-retrofit, include: building performance (heat, hot water, and electricity) usage and expenditures, modeling scope and methodology, retrofit scope and energy saving prediction, implementation scope, and actual savings.

⁷⁸ The Regional Greenhouse Gas Initiative (“Reggie”).

⁷⁹ Expenses are not always correlated with consumption. In some cases rates could go up, but consumption remains constant. In some cases, residents are eligible for ultra-low utility rates, also masking consumption. In some cases, billing idiosyncrasies result in extra high or low charges, regardless of consumption. Billing idiosyncrasies may mask performance problems. HUD’s Mark to Market program does capture utility use and indoor air quality data for nearly 10,000 units per year, and the EPA’s Energy Star Portfolio Manager program

authorities and assisted housing owners to provide annual or five-year assessments of their developments' capital needs (and every 10 years for public housing), those assessments do not regularly consider energy or water building installation needs.

It is clear that HUD should use its regulatory authority to incentivize and require data tracking, analysis, and investment opportunities. DOE would also do well to use its authority around RECS and other funds to encourage owners of unassisted multifamily to begin to collect useful energy data.⁸⁰ To get there, however, requires a determination of what to track, what tools to use, and how much funding to allocate for data tracking and analysis. Finally, other federal agencies like the Federal Energy Regulatory Commission (FERC) are called into play to allow utilities to help owners get their energy consumption data automatically, while many cite confidentiality reasons for not doing so.

There is a flurry of nascent activity around innovations in tools and data in the affordable multifamily housing arena. HUD should examine each of these and weigh in on the best approaches, and especially those most capable of attracting the lending community at scale. Once that is done, HUD should use its regulatory authority to require and fund (or allow expensing for) data collection. The following are some examples of innovations in data analysis, tracking, labeling and predictive modeling.

1. SAHF, NCR, and BrightPower: Leveraging a large portfolio to prioritize and collect pre- and post-retrofit energy analysis data

- (a) **National Church Residences:**⁸¹ National Church Residences owns 23,000 units across 310 developments in 28 states, with 407 different electric accounts, 226 different gas accounts, and 528 different water/sewer accounts. Just the size and diversity of this portfolio complicates a portfolio-wide analysis. NCR undertook an impressive approach to gathering and analyzing data around energy, water, and procurement. First, NCR hired a utility data management firm to validate the accuracy of utility bills, flag potential savings opportunities, and negotiate resolution with utilities. The \$75,000 annual cost of this service generates approximately \$200,000 in savings that arise from faulty meter readings, water leaks, meter inaccuracy, rate optimization, and reduced late fees, alone. NCR believes the real benefit is the data collected from the utility bills (including consumption, late fees, meter reading dates, utility rates) that allows the targeting of properties for implementation of specific energy-saving measures and for monitoring and validation of savings. Using this information, NCR's in-house staff: (a) benchmarks utility consumption; (b) manages retrofit projects; (c) tracks consumption pre- and post-retrofit; and (d) negotiates utility commodity fixed rates in states where there is choice. To effectively benchmark, NCR has developed six different "property profiles" to subdivide the portfolio into similar property types that can be compared.

includes 1000 multifamily projects to date. See Casius Pealer, "More Focus Needed on Data Collection," *Affordable Housing Finance*, June 2010.

⁸⁰ Additionally, HHS possesses some data given its authority around the Low Income Heating and Energy Assistance Program.

⁸¹ From conversations with and a presentation authored by Steve Bodkin, NCR's VP of Engineering, Energy Systems, and Procurement.

As a result of these data and targeting, NCR implemented lighting retrofits and water conservation measures totaling \$1.3 million and generating \$600,000 in annual savings. NCR is in the process of installing energy management systems monitoring and real time pricing from the utility. The energy management system will use the data to control loads. Finally, NCR's property data is exported to EPA's Energy Star Portfolio Manager and Brightpower (described below) to generate a multifamily property energy rating system.

- (b) **SAHF and Brightpower:** With a membership that owns and operates over 80,000 units of HUD- and LIHTC-assisted affordable multifamily housing in all 50 states, and with a combined operating budget of over \$400 million, the Stewards for Affordable Housing for the Future (SAHF) leverages its large portfolio to gather the data to inform energy retrofit tools and decisions. SAHF's groundbreaking data initiative now encompasses 630 developments, using current and historical data. SAHF has partnered with BrightPower, an engineering and software development firm tailoring data products and systems to the affordable multifamily housing. The tools Brightpower and others in this nascent software/tracking industry are developing help understand at least: (a) utility bill analysis; (b) consumption and usage; (c) potential savings (predictions); and (d) actual savings achieved through enhanced property management and efficiency measures.
2. **CNT: One-stop shop for audits and M&V.** The Center for Neighborhood Technology (CNT), a nonprofit intermediary in Chicago, has effectively created a "one-stop-shop" for all affordable multifamily developments to undergo audits, obtain financing (for unsubsidized developments via a partnership with CIC, a CDFI) and conduct measurement and verification. One of the strengths of this one-stop intermediary is that CNT does not need to adopt a single audit tool or a single consumption analysis software provider. Instead, it can learn and use them all, and make recommendations based on the needs, budgets, and regulatory (or funding) requirements of each building. In addition, CNT stays with the development over time, after the retrofit, to conduct the M&V necessary to make sure that installations are performing properly and to continually update assumptions and improve predictive modeling.
3. **Green capital needs assessment.** Because energy efficiency improvements are a subset of capital improvements, Enterprise and Recap Advisors have joined efforts to launch a Green Capital Needs assessment (CNA) that predicts ROI from energy investments and helps owners and lenders understand tradeoffs between investments and timing, and a savings-to-investment ratio calculation. The CNA relies on a Green Retrofit Audit Protocol, pioneered by Enterprise Community Partners to standardize investment grade green multifamily audits.⁸² This CNA is based in part on one of the earliest green CNAs developed, for HUD's Green Retrofit Program.⁸³ To complete the assessment, Recap incorporates into the basic CNA a Targeted Retrofit Energy Analysis Tool (Treat) to predict energy consumption.⁸⁴ Treat is one of the few audit tools permitted under the

⁸² Enterprise Community Partners is a nonprofit housing intermediary that is one of the nationwide leaders in supporting and financing green affordable housing.

⁸³ HUD Notice H-0902, Green Retrofit Program, May 13, 2009.

⁸⁴ TREAT was developed by Performance Systems Development, LLC with funding and backing from NYSERDA.

Weatherization program, although it is not accepted nationwide.⁸⁵ The approach is truly innovative in that it integrates a green/energy analysis into the regular financing processes required of all multifamily owners. It also helps owners take a whole-building approach to considering energy retrofits, rather than a replacement-by-replacement approach.⁸⁶ As an example, the Michigan State Housing Development Agency utilized these protocols for its Low Income Housing Tax Credit transactions, putting all the funds into multifamily retrofits.⁸⁷

4. **Statewide multifamily protocol development leadership.** One of the primary challenges to scaling retrofits is a lack of consensus around what historic and predictive data lenders and governments should use to guide underwriting and investment decisions. A “protocol” is a dataset that determines what should be measured, profiled, predicted, and accomplished in a retrofit, and protocols are developed based on building type. In addition, protocols are the precondition to developing a rating or labeling system, including ASHRAE (heating systems), LEED, and Energy Star.⁸⁸ Historically, multifamily is grouped into the commercial building sector, with protocols not well suited to subsidized rental housing. To scale energy efficiency, multifamily protocols must be tailored to the affordable sector and acceptable to lenders.

Today, innovation in protocol development consists primarily of assembling stakeholders across sectors to reach consensus. As described above, Enterprise Community Partners recently launched a multifamily audit protocol. In addition, StopWaste, a government organization in Alameda County, California, currently leads the assembly of regional and state stakeholders around development of a consensus-driven multifamily protocol. Ultimately, this protocol will help the California Energy Commission in determining which buildings might be eligible for SEP or WAP funding, and in helping cities set up their own retrofit standards and labels. In addition, thinking to the future, StopWaste is developing a multifamily carbon calculator to position developments for evaluating carbon reduction assets.⁸⁹

5. **Required energy performance disclosure.** In the real estate arena, the required disclosure of information annually, or upon sale or purchase, can educate an uninformed market, creating

⁸⁵ States are delegated the authority to choose appropriate energy predictive models for their own weatherization program. California’s more seasoned and rigorous approach to energy and energy codes imposes thresholds for energy audits and predictive modeling tools that are different than other states. However, this means that a CNA will need to work in a variety of energy code settings.

⁸⁶ A replacement-by-replacement approach would merely replace existing systems or installations with more energy efficient ones at the time that they break down or need replacement. This approach requires much less upfront financing, yet does not take advantage of important building-wide efficiencies that arise from looking at a building’s entire energy needs at the same time.

⁸⁷ The author notes that this example is still awaiting confirmation at time of publication.

⁸⁸ ASHRAE is the American Society of Heating, Refrigerating, and Air-Conditioning Engineers. LEED is the green building rating system established by the U.S. Green Building Council. LEED stands for Leadership in Energy and Environmental Design.

⁸⁹ Stopwaste serves as a clearinghouse for retrofit program design. It assembles stakeholders and develops protocols around issues of professional certification, IT infrastructure, financing, and other program design issues.

rational, market-based solutions. This method is used in Europe, where an Energy Performance Certificate is required prior to the sale of residential buildings. This disclosure is intended to inform buyers of the true, all-in carrying costs of a building, while catalyzing a new valuation of buildings and a set of new financial tools for newly valued energy retrofits. Closer to home, the City of Seattle in early 2010 passed an ordinance requiring the annual reporting of all large commercial and multifamily buildings' energy performance, via an annual Energy Star Portfolio Manager benchmarking.⁹⁰ Applicable to all buildings over 10,000 square feet, and to multifamily buildings with more than five units, the ordinance promises results that will inform owners, sellers, and purchasers of the electricity, gas, and water consumption and performance of the building. In part, passage was facilitated by the city's own electric utility, which offered to provide automatic uploads of the data to the audit tool. Annual or transaction-triggered disclosure requirements could help the affordable housing marketplace indirectly by lowering the costs of acquiring buildings that are not efficient, and integrating the retrofit costs into an acquisition loan.

6. **Using energy data to inform decisions.** Some efforts employ data innovatively to drive decisions.
 - (a) **Data driving audit allocation decisions:** The City of San Francisco recently launched a \$4 million multifamily energy retrofit fund capitalized with DOE SEP funding allocated by the State of California. Given the expense of multifamily audits, the city has decided to target funding for costly audits to those developments with highest utility costs per unit, since they have the greatest payback potential.
 - (b) **Data driving retro-commissioning:** One study of 643 buildings shows that changing operating and maintenance decisions alone can result in 5 to 30 percent energy savings.⁹¹ Retro-commissioning refers to a process of maximizing an existing building's energy use and systems without replacing any equipment. Buildings with deferred maintenance, incorrect or inadequate system design, construction deficiencies, malfunctioning systems, or air/water balance issues could benefit from retro-commissioning, which requires a skilled audit and consultant working closely with a building's management team to optimize performance. This study showed a 16 percent energy savings overall, and 30 percent where the retro-commission was comprehensive, with a stunning 1.1 year payback. While there is some question as to the applicability of retro-commissioning to smaller multifamily, the cost-benefit potential may merit a demonstration.

Building Leadership and Capacity

Innovation in cultivating the leadership around retrofitting multifamily is beginning. Yet, the retrofit industry desperately needs a federal leadership cadre capable of regulating, financing, and implementing multifamily retrofits. This cadre must have an intimate understanding of both the

⁹⁰ Seattle Building Energy Disclosure Council Bill 116731, passed on January 25, 2010. The Energy Star Portfolio manager is not an audit, but is a benchmarking tool designed by U.S. EPA to track and assess energy use across a portfolio of buildings, and to benchmark performance to other similar building types.

⁹¹ Evan Mills, 2009, "Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions," <http://cx.lbl.gov/2009-assessment.html>, cited in Clinton Climate Initiative, "Retro-Commissioning: Introduction and Best Practices." This study does not include residential buildings.

diversity and complexity of the affordable multifamily housing portfolio, and the innovations in retrofitting. While HUD and DOE have each expanded their own programs and knowledge exponentially in the past year, there is still much more to be done, including a partnership well beyond the confines of the weatherization MOU. And, while HUD possesses the leadership around multifamily residential properties and the residential financial markets, energy efficiency and energy funding expertise resides primarily in DOE. At a minimum, these two agencies should pool funds toward common goals, share information on best practices, innovations, and data, and remove barriers to the pairing of programs. And while HUD's Office of Sustainability exhibits tremendous leadership potential, HUD must continue to think through how all of its efforts and organizational units, including Ginnie Mae, CPD, PIH, and FHA (including single-family) might each contribute to a coherent community-oriented retrofit effort. In addition, federal leadership—ideally by HUD in partnership with DOE—is needed to facilitate the retrofit of affordable housing subsidized by federal or state agencies outside HUD, including buildings financed and regulated by Treasury (LIHTC and NMTC), the Department of Agriculture (rural housing), and even public revenue bond-financed housing administered by state housing finance agencies.

The scaling of affordable multifamily retrofits also depends on building a skilled workforce across the country that includes multifamily auditors, energy contractors, ESCOs and similar firms that target smaller developments, and lenders. At a minimum, information about HUD funding should inform local workforce investment boards (WIBs) helping to build capacity.

The following examples showcase innovation in each of the following: (a) uniting regulatory regimes toward jointly prioritized multifamily retrofits; (b) building workforce and leadership capacity; and (c) launching and expanding intermediaries to help in scaling multifamily energy retrofits nationwide.

1. Uniting regulatory regimes through multifamily targets. The innovative targeting of public resources and priorities among diverse federal and state agencies has begun, and may fast increase as a result of the Department of Energy's recently issued guidance to local CAP agencies interested in allocating weatherization funds to affordable multifamily developments.⁹²

(a) **Joining weatherization, HUD preservation, private philanthropy and a state Housing Finance Agency around multifamily retrofit:** The Pennsylvania state Housing Finance Agency (PHFA) recently succeeded in receiving a \$21.2 million weatherization allocation, 10 percent of the state's total allocation. This was the state's first ever targeted allocation for multifamily accomplished through innovative partnering, leveraging, and joining of priorities. Specifically, the PHFA leveraged \$2 million of its own funds, \$2 million of rural housing funds, and \$1 million in private philanthropic funds. These funds should allow for the audit of 90 buildings with 7000 units, and a 10 percent minimum energy savings threshold

(b) **State allocation of weatherization to multifamily:** In addition to Pennsylvania, at least six other states have allocated or otherwise targeted significant weatherization funds directly to affordable multifamily weatherization, including: (a) a 25 percent allocation in Kansas, Florida, and Oregon; (b) New York (\$60 million, 9400 units); and (c) Massachusetts (\$31 million).⁹³ At

⁹² WAP Notice 10-15A, "Guidance regarding accrual of benefits to low-income tenants in multifamily buildings under the weatherization assistance program," April 8, 2010.

⁹³ National Housing Trust, "Multifamily Weatherization State Best Practices," Fact Sheet, March 2010.

least three other state housing finance agencies have partnered with their state WAP agency to move multifamily retrofits forward, including New Jersey, Rhode Island, and Vermont. Another set of states has increased flexibility—in part through state regulatory changes—to enable multifamily to use weatherization funds more easily, including Ohio, Washington, and Kansas⁹⁴

- (c) **EECBG and SEP deployment to include MF:** DOE recently awarded competitive retrofit ramp up (EECBG) funds to cities and states, at least six of which articulated priorities to target affordable multifamily housing retrofits, including: Chicago, Maryland, Los Angeles, Seattle, Philadelphia, and Cincinnati. SEP targets have also been set for multifamily, including those established under the New York State Energy Research and Development Authority (NYSERDA), which has historically used SEP to discount multifamily energy loans⁹⁵
- (d) **NMTC and LIHTC allocation:** These two tax credits, generally available for new or rehabilitated housing or community development, can and do leverage and maximize the outcomes from energy funds/credits, particularly in new development and in connection with solar
- (e) **CDBG and EECBG and weatherization:** Because CDBG entitlement jurisdictions receive both CDBG and EECBG, it is possible to use HUD capital funding to accomplish certain retrofit preconditions ordinarily prohibited with energy subsidies. As an example, weatherization funds cannot be applied toward a new roof required for a solar panel, but that is a permitted use of CDBG funds

2. Using multifamily funds to build workforce capacity. ARRA implementation holds the promise of millions of new jobs, some of which will be created through building retrofits. While job creation is not HUD’s primary mission, HUD first-source Section 3 regulations make it a partner in job programs in many localities. A few cities and housing providers, showcased below, have begun to move even farther in thinking innovatively about using HUD funds as a jobs lever for jobs at all skill levels.

- (a) **Training for multifamily auditors:** Because the Pennsylvania weatherization allocation was first ever multifamily allocation in that state, there were few auditors skilled in analyzing multifamily. In a truly innovative workforce collaboration, PHFA borrowed auditors from outside its state. Given the high costs incurred in borrowing these “traveling” auditors, PHFA decided to create its own training program for auditors, and has now reduced multifamily auditing costs by 50 percent, to approximately \$7,000 to \$15,000 per development
- (b) **Engineering BPI Training, and pre-apprentice weatherization employment program:** The Philadelphia Housing Authority has leveraged its formula and competitive retrofit and HOPE VI funds innovatively to create and improve workforce capacity at a variety of skill levels.⁹⁶ Philadelphia is using its own in-house retrofit team rather than an ESCO. This created a large

⁹⁴ Colorado installed a multifamily expert to help allocate and administer SEP; Kansas eliminated a required owner contribution, and New York state partnered with LISC and Enterprise to retrofit New York City buildings.

⁹⁵ NYSERDA’s low-interest Energy Smart Loan program is temporarily on hold, undergoing programmatic revisions.

⁹⁶ The Philadelphia Housing Authority used some of its public housing capital fund ARRA (\$126 million) and \$153 million of its HOPE VI (new development) funds for this.

pool of funds for significant retrofit work. Innovative job-related accomplishments include: (a) greening its property management expertise, by sending a dozen engineers to receive BPI training;⁹⁷ (b) conducting training (by these engineers) of other engineers in energy efficient practices for public housing units; (c) leveraging the PHA's large volume of retrofit dollars to ensure that 10 percent of all new jobs are filled with Section 3 eligible populations; and (d) integrating weatherization training practices across the board in its existing pre-apprenticeship program. Last year, nearly half of the PHA's 100 pre-apprentices received weatherization training in addition to their basic training, and a continuous BPI training program is under development for managers.

- (c) **Leveraging skillset acquisition to green more affordable housing:** The District of Columbia Public Housing Authority used regulatory flexibility to build its own ESCO, retrofitting cost-effectively. In a truly innovative move, the PHA decided to lever this new skill set and make the ESCO available to help other affordable (non-public housing) multifamily housing providers retrofit; however, all of these assisted housing units are also managed by the Housing Authority
- (d) **Clinton Climate Initiative (CCI): Retro-commissioning RFQ:** CCI is in the process of soliciting bids from commissioning firms to set up a retro-commissioning initiative for multifamily housing. This consultancy would work alongside multifamily owners and managers to help audit for retro-commissioning opportunities, set up data systems for highly analytic measurement and verification, and train owners and managers on new operating and maintenance processes through which to obtain significant, and fast-paying, retro-commissioning energy savings

3. Cultivate Leadership. Even more than funding, leadership is needed to transform the affordable multifamily building stock into an energy efficient, less-carbon-intensive, building stock. Philadelphia Housing Authority Executive Director Carl Greene thinks that the answer is in convening—bringing the nation's housing directors together, nationally, to learn the best practices, tactics, leadership skills in greening affordable housing.⁹⁸ Leadership can take many forms, including educating and convening, advocacy, and intermediating across silos until energy and water efficiency are a natural part of the affordable housing lexicon. The following examples represent innovative beginnings in cultivating leadership:

- (a) **Cross-pollinating conferences and boot camps:** Living Cities, LISC, Enterprise, the Institute for Professional and Executive Development (IPED), and others have convened city governments and assisted housing providers for years on sustainability. Now, these conferences include energy efficiency and solar retrofit leadership and tactical practices. More recently, the U.S. Green Building Council (USGBC) and the National Housing Conference have launched a quarterly affordable multifamily housing stakeholder convening to consider both HUD and DOE issues. Finally, USGBC and Enterprise Community Partners have teamed up to develop a public housing

⁹⁷ The Building Performance Institute (BPI) is the primary national entity that provides certification in home performance and weatherization retrofit work to contractors and other building professionals.

⁹⁸ From a conversation with Carl Greene, Executive Director of the Philadelphia Housing Authority, in April 2010. He recommends the resurrection of public housing executive director leadership institutes initially convened during the Clinton Administration.

authority sustainability network aimed at helping build capacity among PHA staff and sharing innovations and successes

- (b) **Intermediaries:** The silo-ization of federal policy among and between housing, energy, and workforce is mimicked at the state and local level. To address the multitude of policies, programs, funding sources, regulatory requirements, climactic zones, and building typology, some existing and new organizations are beginning to play a leading role in intermediating among these issues. Some examples include:
- (i) **One-stop analysis, financing, and policy intermediation:** CNT, described above, offers an innovative regional example of a community development approach to the building science (audit, benchmark, oversee performance, and M&V), and in partnership with CIC, the financing side of energy efficiency. It also plays a leadership role locally and nationally around policy and the integration of regulations as applied to buildings in low-income neighborhoods
 - (ii) **Leveraging large portfolios and housing finance expertise:** SAHF, CPC, and Enterprise Community Partners offer examples of existing housing intermediaries that have added to their skill sets and leveraged their large portfolios to build green expertise, finance green improvements, advise on retrofit implementation, and develop leading policy solutions, essentially serving as models for one-stop delivery⁹⁹
 - (iii) **Green CDFIs:** Other CDFIs are beginning to leverage their housing finance expertise to incorporate green lending. Some include:
 - (1) Boston Community Capital: Solar financing for multifamily affordable; creation of new software for multifamily owners
 - (2) LIIF: Green Fund for charter schools, PACE financing for community facilities, and co-administering (with Enterprise Community Partners) San Francisco's multifamily retrofit initiative
 - (i) **Jobs intermediary:** Recognizing that the ability to retrofit quickly will depend on a skilled retrofit workforce, the Mayor's Office in Seattle seeded the creation of a new workforce intermediary to help develop the training, certification, and job classification standards associated with retrofit work. Essentially, the intermediary functions as a one-stop for training for all jobs arising out of federal and state dollars allocated to retrofits. Unfortunately, HUD funding is not included in this clearinghouse
 - (ii) **Multifamily policy intermediary:** The California Housing Partnership Network, a preservation-focused intermediary, is building relationships with energy and utility regulators in the state to prioritize allocation of weatherization funds to affordable multifamily. The organization established a new workgroup to convene housing and energy

⁹⁹ In addition to the reopen/refinance loan innovation, CPC offers acquisition plus energy retrofit loans; a ConEdison program for specific listed items; and NYSERDA program loan funds.

stakeholders around workable multifamily retrofit strategies. This workgroup was funded in part through local philanthropic dollars

- (iii) **Building capacity through resident leadership, training, and metering technology:** Studies show that up to 10 percent of building efficiency outcomes depend on resident behavior.¹⁰⁰ That means that innovations in educating residents and encouraging certain behaviors need to be developed and deployed nationwide. Many different efforts are focused on resident training and incentives, in both the public and assisted arenas.¹⁰¹ As a subset of resident education, smart meters provide residents and property managers with the visual display of energy consumption (at a minimum) as well as automatic mechanisms for changing use, utility rates, and awareness. In a study of 150 households in the Pacific Northwest, consumption decreased by up to 50 percent, and \$40/month/household, once smart meters were installed.¹⁰² The Baltimore City Housing Authority has launched an energy performance contract to retrofit five developments and 3,200 units, generating \$3.3 million in annual savings. Understanding that resident buy-in and action are critical, the housing authority is using smart kiosks where residents can track their daily consumption and measure against energy use targets. Resident behavioral incentives also include awards for key resident conservation ideas.

This flurry of activity and technology around resident behavior and metering warrants centralized guidance—ideally from HUD—at least in terms of evaluating outcomes, cost-effectiveness, and ease of administration in deploying different types of resident incentives, resident education, and smart meters in public and assisted housing

¹⁰⁰ Gary Adamewicz and John Spengler, “Leadership through Green and Healthy Housing Training (LIGHT) Program proposal,” a proposal for funding for a Boston Housing Authority initiative to employ peer-to-peer training similar to that used at Harvard campus (with students) with residents, and other energy and healthy housing initiatives. At Harvard, peer-to-peer student (behavioral) training achieved 5 to 10 percent energy savings.

¹⁰¹ Some examples include: The Philadelphia Housing Authority, Enterprise, Boston Housing Authority and Los Angeles Housing Authority in terms of resident training.

¹⁰² Scott Simpson, “Smart Meters Promise Big Power Savings,” *Vancouver Sun*, June 17, 2010. Study was conducted by DOE’s Pacific Northwest National Laboratory. Some of the reductions in electricity consumption resulted purely from monitoring and behavior adjustment; others resulted from automated changes to consumption and rate systems.

V. Conclusions and Policy Recommendations

The retrofit of multifamily housing can and should be scaled up, because it is the right thing to do. It results in less expensive operations, reduces emissions, extends the useful lives of these buildings, and provides more affordable living for the nation's poorest residents. Energy retrofits have the potential to help properties with poor cash flows. As the nation's largest landlord, HUD has the unparalleled ability to catalyze and meet demand. By helping to allocate scarce public resources to multifamily housing energy retrofits, it can reduce the administrative burden of retrofitting all American residences, merely because there are far fewer owners (and only one primary regulator) of multifamily developments. HUD's enormous assisted portfolio can also be levered to create economies of scale and to minimize transaction costs. Finally, a scaled and targeted retrofit initiative has the potential to significantly reduce energy consumption and reduce carbon emissions while creating hundreds of thousands of jobs.

But we need to get it right.

First, it will take federal leadership. The historic silo-ization of residential energy policy within and outside HUD must be abandoned, in favor of partnering our greatest thinkers and leaders with diverse skills and knowledge in retrofitting this complicated, diverse asset class. HUD and DOE should assume appropriate roles to evaluate these innovations quickly. They should link into this thinking multifamily housing subsidized through federal and state tax credits and revenue bonds, financed through CDFIs, financed or insured by any division of HUD, or subsidized by other federal agencies including the departments of Agriculture, Veterans Affairs, and Treasury.

Such activity could be organized and catalyzed under the auspices of a nationwide housing energy retrofit goal for units retrofitted and energy and carbon saved, akin to the National Homeownership Initiative launched over a decade ago.¹⁰³ HUD should be applauded for starting the process of setting a numeric goal—159,000 units retrofitted by 2011, as articulated in its Strategic Plan in May 2010. But this is not enough. It should also assemble a working group that includes experts from inside and outside the federal government, and that incorporates buildings with all subsidy, regardless of which division within HUD retains programmatic jurisdiction.

Of course, capital is needed, as well as relief from split incentives and federal regulations that unintentionally impose insurmountable barriers. Fortunately, initial, up-front savings can be used to encourage other private and philanthropic capital to pay for some of this retrofit.¹⁰⁴ Data, good predictive models, and dramatically enhanced industry capacity are crucial, too.

As HUD transitions public housing to an important market-based system, capable of attracting and leveraging significant private capital, the agency must make sure not to lose the gains it has already made. In particular, HUD incentives to recapitalize public housing should include meaningful and cost-

¹⁰³ Jeanne Engel proposes a national multifamily energy efficiency goal and set of strategies. In addition, goals should be set for each of single-family and community facilities serving low-income communities.

¹⁰⁴ HUD cautions, however, that to the extent we use any portion of that annual \$6.8 billion utility bill to pay for the retrofit, it is not immediately available to use for other purposes.

effective energy retrofit work, and HUD should continue to capture the energy consumption and spending data that it currently possesses.¹⁰⁵

The following represents a comprehensive list of policy recommendations arising out of the innovations profiled in this paper, and capable of scaling a national affordable multifamily energy retrofit initiative.

1. **Lead by example: Establish a 5-year, market-transformative, national residential energy retrofit unit- and energy-savings goal, championed by HUD.** The federal government must articulate a commitment to retrofitting multifamily housing. This commitment should be in the form of numeric goals—including number of buildings, units, and carbon reduction and dollar savings achieved. This goal should be market transformative, and therefore, inclusive of all multifamily, whether market-rate or subsidized by HUD or any other government entity. Serving as the administrative champion of this goal, HUD must ensure that the goals can be implemented across and within agency silos. HUD, in collaboration with DOE, should immediately convene a public/private task force to set numeric targets, develop an agency-wide implementation strategy that includes all multifamily housing, whether subsidized by the Office of Housing, insured by FHA, using Section 8 assistance, or subsidized through the Low Income Housing Tax Credit, and launch new and re-designed programs within nine months.
2. **Lift unnecessary regulatory barriers to accessing project capital.** While these are not innovations per se, the following recommendations comprise important regulatory relief reforms allowing the investment (and repayment out of savings accruing over time) of existing project funds into energy retrofit improvements. These reforms would avoid the need for outside funding. The first two are the most critical recommendations, because they have the potential to fully finance retrofits without additional subsidy or capital. In particular, the regulatory barrier lifts include:
 - (a) **Unlock project capital** by allowing the use of reserves and residual receipts to finance retrofits. Many projects have funds for repairs and replacements. Energy retrofits should absolutely be an eligible use, especially since they can pay for themselves over time out of savings, replenishing these very reserves.
 - (b) **Level the playing field by allowing assisted housing owners to freeze utility subsidy/consumption:** This single act has the potential to massively scale retrofits on the assisted housing side, providing assisted owners with a powerful stream of funds for upfront energy efficiency investments which can be repaid over time out of savings, at no new cost to the government.¹⁰⁶
 - (c) **Integrate energy efficiency (and audits) into all other multifamily rehab or capital events:** This overall integration strategy adds an energy audit and the financing of energy and water

¹⁰⁵ Current conversations with HUD indicate the possibility that PETRA's passage and market rents will eliminate HUD's "need" to gather public housing energy consumption data that is currently collected. Clearly, HUD will need to balance a national interest in making these buildings competitive and truly market-based with its stewardship obligations that might require a national repository on energy and consumption data from the very buildings HUD subsidizes.

¹⁰⁶ Implementation will be much easier in master-metered projects than in projects with individual meters.

conservation improvements into the ordinary HUD-funded rehab and refinancing process—regardless of subsidy form—and begins to regularize the pairing of retrofits with rehab and refinancing. This mechanism would build a long-term amortization schedule into energy efficiency (by linking to the mortgage financing), and has the potential to begin to create savings-based underwriting. In particular, the rehab events that should be integrated with energy retrofits include the subsidy preservation programs including Section 8 reauthorization; any rehabilitation and acquisition/rehab programs funded via FHA, CDBG, HOME, and public housing; and LIHTC rehab work, including year-15 refinancing. HUD and a Task Force should begin the process of identifying every single transaction that might include energy retrofit activity for integration.

- (d) **Offer owners a “green dividend:”** Allow for increased distributions, or offer a green development fee to owners who make the upfront energy retrofit investment.¹⁰⁷ This recommendation takes a strategy currently used in the green mark-to-market program and incorporates it into all assisted housing retrofits. At least until energy financing is scaled, it makes sense to encourage owners to do the extra work necessary to explore retrofit financing and tactics. As in the mark-to-market program, this incentive could be structured as a reduced owner contribution requirement.
- (e) **Allow for additional energy liens to be placed on HUD properties.** HUD currently prohibits senior liens, and allows concurrent or subordinate liens only on a case-by-case basis. HUD should standardize and deploy acceptable practices for all energy liens, whether senior, subordinate or concurrent.

3. Seed a robust capital market system capable of financing energy efficiency. Throughout its history, FHA has pioneered and standardized new financial instruments, proven complicated underwriting can work, and reached and scaled lending to underserved housing markets. Now more than ever, FHA must seed a capital market for residential energy lending, at a minimum by testing the use of its powerful federal credit enhancement to encourage the private market to develop new, scalable, functional energy products benefitting low-income residents and neighborhoods. In addition, other non-HUD federal authorities can help seed this market. The following examples illustrate how FHA, DOE, and Treasury authorities can seed a robust capital market system for energy efficiency:

- (a) **Stimulate a private capital market system using federal credit enhancement to reduce risk and catalyze innovation through regulatory authority:**
 - (i) **Test FHA and Ginnie Mae and DOE Section 17 credit enhancement and loan guarantee authority for multifamily residential energy financing and portfolios of loans:**¹⁰⁸ These authorities should be deployed to test or leverage with a variety of multifamily financing innovations, including at least PPA or MESA models, onbill financing mechanisms, reopened

¹⁰⁷ David Abromowitz coined the term green dividend to allow for an increased distribution to owners in the amount of the energy savings to recoup an upfront investment. In addition, Jeanne Engel promotes a new kind of developer fee for undertaking an energy retrofit to accomplish this.

¹⁰⁸ This portfolio loan guarantee concept is described in detail in a December 1, 2009 SAHF proposal which calls for a partial federal guarantee (80 percent of the loan), issued by energy conservation investment firms authorized to securitize them.

co-firsts, PACE on no-debt properties, and credit enhanced or guaranteed energy retrofit lending that underwrites savings.

(ii) Use HUD funds or credit enhancement to bridge gaps in financing:

(1) Assist in the bridging of upfront capital costs that will be reimbursed through utility rebates.¹⁰⁹

(2) Encourage CDBG and public housing capital fund deployment for energy efficient capital improvements that facilitate (for example, through meeting leveraging requirements) project eligibility for other funds, like weatherization, EECBG, or utility-based public benefit subsidies.

(iii) Reduce project costs by ensuring greater transparency around ESCO contracts and, where feasible, by assisting with local and regional efforts to aggregate square footage for retrofit economies of scale.

(b) Catalyze safe and sound residential energy lending by extending HUD and banking (FDIC, FHFA, OCC) regulatory authorities, including

(i) **Offer extra CRA credit** to lenders whose loans allow the energy retrofit of affordable multifamily. This credit would be premised upon enhanced affordability of homes with reduced energy costs.

(ii) **Offer extra affordable housing goal credit to Fannie Mae and Freddie Mac** for affordable, energy efficient financing and incentives, also premised upon reduced energy costs and greater affordability for renters.

(iii) **Require the disclosure of energy performance upon sale for all residential buildings**, catalyzing the appraisal of energy performance, along with associated financing innovations.¹¹⁰ If all buildings are required to disclose, more efficiencies, especially among market rate owners, will begin to be implemented. And the larger the market, the more that financial innovations will be scaled and less costly. The Real Estate Settlement and Procedures Act (RESPA) should require disclosure of utility costs for single family homes;

¹⁰⁹ Harak, "Up the Chimney," p. 24.

¹¹⁰ Transaction-triggered disclosure would truly transform the single-family market and the unsubsidized multifamily market merely by requiring the provision of better information about energy costs and energy performance to buyers. In the subsidized arena, financing challenges would continue to impede market transformation even in a disclosure oriented scenario. However, this paper includes disclosure as a tactic because the financial innovations that would likely accompany this regulatory mechanism could be equally beneficial and applicable to subsidized housing. On the single-family side, HUD possesses the regulatory authority (RESPA) to require energy efficiency disclosure as a means of ensuring that buyers understand the true (total) carrying costs of their home.

and HUD should award retrofit funds in part, to those cities that have implemented multifamily disclosure ordinances.¹¹¹

(c) Employ tax policy wisely to promote energy and water conservation in low income developments: (a) Pair LIHTC and NMTC with energy and renewable credits for greater leveraging in energy efficiency; (b) Create an energy efficiency investment tax credit that offers equal benefits to the renewables investment tax credit, and that can be provided directly to nonprofit organizations for multifamily building retrofits that benefit low-income residents or neighborhoods.¹¹² Additionally, facilitate use of the solar investment tax credit more directly by nonprofit organizations.¹¹³

4. Leverage the federal housing portfolio to systematically gather, model, and verify data. To truly transform the market through the creation of innovative financing, underwriting, and retrofit science, multifamily owners must collect, model and verify current and post-retrofit energy consumption and cost data. HUD and DOE, in particular, should use their respective authorities to encourage, reward, and require data collection, as well as help lay the groundwork for protocols and data system needs. Critical policy reforms include the following:

- (a) **Establish protocols:** In partnership with the lending and affordable multifamily industry community, HUD and DOE must assist in developing protocols, benchmarking tools, and energy capital needs assessment tools that are viable nationwide, across diverse climactic zones.
- (b) **Allow expensing of HUD and DOE funds for data systems purchase and upgrades, as well as audits.** Project reserves and residual receipts should be included in funding sources for these critical purchases.
- (c) **Reward good data with retrofit incentives,** and, where feasible, target scarce federal funds to those developments whose data show the greatest energy saving potential.¹¹⁴

¹¹¹ An assumption is that the new Consumer Financial Protection Bureau, responsible for overseeing consumer mortgage transactions and RESPA, does not have jurisdiction over commercial or multifamily mortgage finance, so that any disclosure requirement will likely have to be through HUD and Treasury (for the affordable subsidized portfolio), and via state energy codes or local ordinances. See Dodd-Frank Wall Street Reform and Consumer Protection Act (H.R. 4173, Pub. L. 111-203).

¹¹² SAHF proposes and explains the mechanics related to a low income housing energy conservation tax credit available only for retrofit of affordable housing, and able to be monetized, like the LIHTC.

¹¹³ Currently, nonprofit organizations—including general partnerships with significant for-profit investors—cannot take advantage of at least part of the ITC, which creates transactionally complex and unnecessarily expensive PPA retrofit transactions. This is arbitrarily different treatment from the way the tax code treats these partnerships for purposes of the LIHTC. On the other hand, even a nonprofit housing syndication of the ITC (assuming nonprofit eligibility) would incur some transaction costs. The bottom line is to equalize access to these credits.

¹¹⁴ At some point, we may use energy efficiency to help those developments with cash-flow needs. At this point in time, it may make sense to use federal funds for good performers, to be able to gather data, and create lending tools that can work.

- (d) **Piggyback energy audits on all capital needs assessments** for both public and assisted multifamily housing. In particular, HUD should require a Green PCNA for all loan transactions on all multifamily, whether assisted, public, insured, or otherwise financed with HOME, CDBG, LIHTC, or any federally assisted development.
- (e) **Offer technical assistance:** to help owners and project management staff develop in-house data systems and analytic capacity to: identify billing problems, negotiate utility rates, monitor and assess utility consumption and expenses, evaluate audits to determine retrofit suitability, test data-driven solutions, and perform measurement and verification.
- (f) **Collaborate with federal agencies overseeing utilities (FERC)** to help owners obtain an automatic upload of utility consumption data.
- (g) **Ensure that DOE's RECS data includes current and robust information on multifamily.** HUD and DOE should ensure that RECS obtains high quality, accurate, reliable data on multifamily that also includes a substantial subset of federally subsidized buildings.
- (h) **Pilot a HUD-multifamily retro-commissioning strategy,** which would use data to make sure that actual systems are working as they should be.

5. Build leadership and capacity: The federal government must build unified leadership around retrofitting affordable multifamily residences, including a commitment to target funds, help educate states, cities, owners and housing and energy practitioners around the importance of multifamily retrofits, and build competencies and create nimble, cross-sectoral intermediaries needed to accomplish retrofits.

- (a) **Unify federal commitment to multifamily, in part by developing multifamily allocation targets** for non-HUD funds, at least until the capital markets are made more robust, and including DOE funds (including Weatherization, SEP, and EECBG), Treasury programs (including LIHTC, NMTC, and the renewable ITC), and utility-provided subsidies. Explore also the allocation of LIHEAP to multifamily residents.
- (b) **Deploy national training institutes for HUD leaders** as well as asset and property management staff around energy and water conservation.
- (c) **Use federal funding as a jobs lever,** at least by providing information on funding allocations directly to local Workforce Investment Boards (WIBs).¹¹⁵ This will enable them to develop appropriate training for jobs created as a result of multifamily retrofits. In addition, maximize resident job opportunities arising out of weatherization grants provided to affordable multifamily properties.
- (d) **Seed and expand residential energy intermediaries:** HUD and DOE should provide seed funding or support to develop or expand, ideally in collaboration with philanthropies, one-stop

¹¹⁵ Established under the Workforce Investment Act, WIBs administer workforce training funds allocated by the U.S. Department of Labor.

organizations that can work across federal and state silos, and cement innovations across financing, data, building technology and performance, and workforce capacity.¹¹⁶

- (e) **Engage residents and deploy technology around resident energy reduction outcomes**, through education, meetings and conferences, and technology like smart meters. HUD and DOE should each make sure that funds allocated to multifamily retrofits include basic and proven strategies designed to maximize efficiencies through behavioral changes.

Ultimately, these recommendations amount to a new national prioritization of energy retrofits that benefit the buildings in which this nation’s lowest-income families reside, and by extension, those families. Only through a coherent set of policies and initiatives can the nation begin to reduce the cost of, and appropriately preserve, its scarce supply of affordable housing, while at the same time meeting the critical environmental challenge of the 21st century.

¹¹⁶ Ideally, these intermediaries should also help catalyze single-family housing retrofits (especially those occupied by low and moderate-income families) and the retrofit of community facilities—buildings like community centers, health clinics, child care facilities, homeless shelters, and senior centers—which are typically built with CDBG funds and serve low-income neighborhoods.

MULTIFAMILY ENERGY RETROFIT INNOVATIONS: Financing

#	Sponsoring Organization & Location	Type	Type of Multifamily	Capital Source/ Provider	Federal Role	Other Gov. Role	Financing Mechanism	Collection Mechanism	Secondary Market Role	Security	Eligible Measures
1	Eden (California)	Unlocked Project Capital (Reserves) & Solar PPA	Assisted	Private Debt & PPA Firm & Philanthropic PRI & Existing Project Reserves	HUD waiver (for use of reserves), Treasury (ITC credit)	State CPUC (MASH) renewable credit	Debt & PPA (Power Purchase Agreement)	5- year PPA payments & Debt Loan payment	None	PPA is off balance sheet; debt is secured	Primarily solar panels
2A	Community Preservation Corporation (New York)	Integrate Existing Financing: Co-First/Loan Re-Open	Unassisted	Private Debt	None	None	Refinanced mortgage loan structured as a Co-First	Loan payment	Must approves reopen, refinance	Yes-mortgage	Anything supported by loan
2B	HUD's Green Mark-to Market (National)	Integrate Existing Financing: Owner Incentives	Assisted	Private debt refinancing	HUD provides owners incentives (reduced contribution)		Mark-to-Market Recapitalization	Loan payment	N/A	Yes-mortgage	All HUD-permitted green measures
2C	CPC & Freddie Mac (New York)	Integrate Existing Financing: Rehab Loans with Incentives	Unassisted	Private debt	None	None	Rehab loans with large energy retrofit component	Loan payment	Freddie Mac discount & expanded LTV ratio	Yes-mortgage	Energy efficiency
2D	HUD/Fannie Mae Expanded Risk Sharing	Integrate EE into Rehab Loans for buildings more than 10 years old	LIHTC Subsidized	Private	HUD takes top loss position, and shares the remainder losses evenly with Fannie in exchanged for resized loans		Risk-sharing	Loan payment	Risk share	Yes-mortgage	At least 5% of the loan must be for energy efficiency improvements

MULTIFAMILY ENERGY RETROFIT INNOVATIONS: Financing

#	Sponsoring Organization & Location	Type	Type of Multifamily	Capital Source/ Provider	Federal Role	Other Gov. Role	Financing Mechanism	Collection Mechanism	Secondary Market Role	Security	Eligible Measures
2D	HUD and Philanthropy Bridge Loan	Integrate EE into FHA refinancing	FHA insured	Philanthropic PRI plus HUD	Takes out philanthropic bridge loan after 3-5 years with new second (co-first) mortgage	Tests and proves savings estimates via philanthropy, offers second loan that matches real savings	Energy retrofit bridge loan	Loan payment	n/a	Mortgage	EE
2E	Boston Housing Authority	Integrate existing financing: EPC & ESCO transparency	Public	Private debt/municipal Lease (& HUD frozen base)	Permits freeze of rolling base of utility subsidy for up to 20 years	PHA demanded more transparent negotiations reducing costs	20-year EPC with frozen base; debt pays for EPC, repayment from savings	Muni lease payment (20 years)	None	HUD funding	Energy efficiency & solar
3A	Housing Authority of Santa Barbara County	Off-balance sheet: Solar PPA	Public housing and LIHTC units	Captive energy company, monetized tax credits, & HUD frozen base	ITC credit, HUD's frozen base of utility subsidy for 20 years	State MASH credits	Solar PPA	20-year power purchase payments	None	None	Solar, but EPC financed other efficiency measures, too
3B	Sunwheel (California)	Off-balance sheet: Solar PPA	Assisted and Public Housing	Solar PPA firm, monetized tax credits, & project energy savings	ITC, NMTC; possible frozen base	MASH	Solar PPA	Multi-year PPA payment	None	None	Solar: but includes free power for residents
3C	Energy Resource Management (EnRM)(National)	Off balance sheet: Energy-Efficiency PPA	None yet; applicable to all multifamily	Private Energy Efficiency PPA firm, monetized utility portfolio standards & tax credits & Project savings	Energy Efficiency investment credits (eventually)	State utility EE portfolio standards	Energy Efficiency Power purchase agreement	Multi-year PPA payment	None	None	Energy efficiency

MULTIFAMILY ENERGY RETROFIT INNOVATIONS: Financing

#	Sponsoring Organization & Location	Type	Type of Multifamily	Capital Source/ Provider	Federal Role	Other Gov. Role	Financing Mechanism	Collection Mechanism	Secondary Market Role	Security	Eligible Measures
3D	Transcend Equity (National)	Off-Balance Sheet: Managed Energy Services Agreement	None yet; applicable to all multifamily	Energy Efficiency MESA Firm, project savings	Monetized ITC and efficiency credits	Monetized state credits, if applicable	Managed energy services payment	Useful life of efficiency (10 years)	None	None	Energy efficiency
4A	City of San Francisco, LIIF	Meter-secured: PACE	Public/community facilities	Capital markets through muni bond issuance	Possible SEP (might write-down rates)	State funds beyond sep are possible	Property Tax Assessment	20 year-assessment payment	Capital markets purchase muni bonds	Senior lien, and assumable	Solar and Energy efficiency
4B	Holyoke Utility (Western Massachusetts)	Meter-secured: Onbill Financing	Unassisted	Utility company provider; project savings	Possible DOE funds	Possible state utility funds	Utility bill surcharge	5 years	None	None	Energy efficiency

Innovations: Energy Efficiency Data and Analysis

#	Sponsoring Organization & Location	Description/Type	Type of Multifamily	Leverage large portfolio?	One-stop elements?	Integrate into existing needs assessments?	Convene stakeholders?	Required disclosure?	Data and Analysis informing decisions?
1	National Church Residences (National)	Leverage large portfolio: Data Collection & analysis	Assisted	Yes	No	Potentially	N/A	No	Yes
2	SAHF (National)	Leverage large portfolio: Data Collection & analysis	Assisted	Yes	Developing audit, financing, and M&V capacities for members	Potentially	Yes	No	Yes
3	Center for Neighborhood Technology (Chicago)	One-stop	Assisted, Unassisted	N/A	One-stop audit, finance (with CIC) , & M&V	Potentially		No	Yes
4	Enterprise Community Partners/Recap Advisors: (National)	Green Capital Needs Assessment (CNA)	Assisted	N/A	Single required evaluation for lenders includes capital and green needs	Yes	Yes	No	Potentially
5	Stop Waste (Alameda County, California)	Convening stakeholders around protocol development	All	N/A	Clearinghouse on program design features including protocols, worker qualifications and training, IT infrastructure, & financing	Potentially	Yes	No	Yes
6	City of Seattle (National)	Required commercial (including multifamily) energy efficiency disclosure	All commercial buildings over 10,000 square feet	Yes	City does have one-stops for jobs and other retrofit needs; this ordinance is explicitly about Data and Analysis	N/A	Yes	Yes	Yes
7	City of San Francisco (National)	Uses audit Data and Analysis for retrofit eligibility	All	Yes	City multifamily initiative offers one-stop on audit, financing, and retrofit performance assessment	Potentially	Yes	No	Funding Targets for audits based on analysis
8	Clinton Climate Initiative (National)	Proposal to use Data and Analysis to determine retrocommission potential	All	N/A	One-stop for audit, Data and Analysis setup, M&V, owner & Manager training	Potentially	N/A	N/A	Yes

Innovations: Leadership											
#	Sponsoring Organization/ Location	Targeting non- HUD funds to Multifamily	Funding Source	Lever Housing Retrofit Funds for Workforce?	Build worker capacity	Build leader capacity	Inter- mediary: jobs	Intermediary: finance , audit, & Data & Analysis	Inter- mediary: Green CDFI	Cross- pollinate	Resident initiatives/ Smart meters
1	States: NY, MA, KS, FL, OR	X	Weatherization								
2	Chicago, Maryland, Los Angeles, Cincinnati, NYSEDA	X	EECBG & SEP								
3	PA Housing Finance Agency	X	Weatherization	X	X						
4	Philadelphia Housing Authority	X	EECBG, Hope VI & Public Housing Capital Funds	X	X	X					
5	District of Columbia Housing Authority ESCO			X	X						
6	Convening Orgs: Living Cities, LISC, NHC, USGBC, SAHF					X				X	
7	CNT/CIC					X		X	X	X	
8	Intermediaries for Policy, Data, and Analysis: SAHF, Enterprise					X		X		X	
8	CDFIS: LIIF, BCC, CPC							X	X		
9	City of Seattle	X	SEP	X	X	X	X				
10	California Housing Preservation Network	X	Policy advocacy to target Weatherization	X		X				X	
11	Baltimore City Housing Authority				X						X

Scaling Multifamily Energy Retrofits: Policy Recommendations

	Goal	Policy Outcome	Type of Housing	Type of Recommendation	New Funding Needed?	Agency	Division or Authority
1	Establish 5-year national multifamily retrofit goal	Championing Goal	All	Policy Guidance	No	HUD	HUD Secretary
1	Immediately assemble a task force to develop a short- and long-term plan to achieve the national goal	Championing goal	All	Policy Guidance	No	HUD, DOE	HUD Secretary and including FHA, CPD, PIH, Treasury, VA, and Ag
2	Allow Assisted Housing to Freeze Utility Subsidy for Long-Term Repayment	Lift Regulatory Barriers	Assisted	Regulatory /Statutory	No	HUD	FHA/Housing
2	Allow Project Reserves & Residual Receipts for Retrofits	Lift Regulatory Barriers	Assisted	Regulatory /Statutory	No	HUD	FHA/Housing
2	Integrate Energy Efficiency Into Capital Events	Lift Regulatory Barriers	All	Regulatory/Program Guidance	No	HUD, Treasury	FHA/Housing,, PIH, CPD
2	Offer a "Green Dividend" to Owners	Lift Regulatory Barriers	Assisted	Regulatory/Statutory	Yes, but savings may more than equal the dividend	HUD, Treasury	FHA/Housing
2	Allow for Additional Energy Liens	Lift Regulatory Barriers	Assisted, unassisted	Regulatory/Statutory	No	HUD, Treasury	FHA/Housing
3	Test FHA and Ginnie Mae & DOE Section 17 credit enhancement: PPA, onbill, reopened co-firsts, portfolios, PACE & other innovations	Seed Capital Markets	Assisted, unassisted	Regulatory /Statutory	Not necessarily: Depends on whether this is a carve-out or new funding	HUD & DOE	FHA/Housing, Ginnie Mae, DOE EERE
3	Extra CRA Credit and extra affordable housing goal credit	Seed Capital Markets	Assisted, unassisted	Regulatory /Statutory	No	Treasury, FHFA, OCC, FDIC	
3	Require Energy Performance Disclosure	Seed Capital Markets	All	Regulatory /Statutory	No	HUD	HUD and Treasury (CFPB), RESPA; also depends on state/local ordinances
3	Develop a multifamily EE Investment Tax Credit	Seed Capital Markets	All	Statutory	Yes: unless a carve-out of other tax credits	Treasury	
3	Pair Tax Credits for reduced cost energy efficiency for MF	Seed Capital Markets	All	Statutory/regulatory/ program guidance	No	Treasury	LIHTC, NMTC, ITC, EE TC

Scaling Multifamily Energy Retrofits: Policy Recommendations

	Goal	Policy Outcome	Type of Housing	Type of Recommendation	New Funding Needed?	Agency	Division or Authority
3	Gap and Bridge Financing using CDBG, HOME, and other sources	Seed Capital Markets	All	Regulatory	Not necessarily	HUD	CPD, FHA/Housing
3	Reduce Project Costs through Transparency & Aggregation	Seed Capital Markets	Public, Assisted	Program guidance	No	HUD	PIH/ESCOs, FHA/Housing
4	Allow Expensing of Energy Systems and Audits	Data and Analysis	Public, Assisted	Regulatory /Program Guidance	Not necessarily	HUD	FHA/Housing, CPD, PIH
4	Require Energy Audits with Capital Needs Assessments	Data and Analysis	All	Regulatory /Program Guidance	No	HUD (& Banking Regulators)	FHA/Housing, PIH, CPD
4	Establish multifamily retrofit Protocols	Data and Analysis	All	Program guidance	No	HUD & DOE	FHA/Housing, PIH, CPD, and DOE EERE
4	Require Automatic upload of utility Data & Analysis to multifamily owners	Data and Analysis	All	Regulatory /Statutory	No	FERC, HUD, DOE	Also depends on state & local utility laws
4	Target Retrofit Funding Based on Data and Analysis	Data and Analysis	All	Program guidance	No	HUD and DOE	FHA/Housing, CPD, PIH, and DOE EERE
4	Help Develop In-House Staff Capacity/Leadership Training	Data and Analysis	All	Capacity Building	Yes, probably.	HUD and DOE	FHA/Housing, PIH, CPD, and DOE EERE
4	Pilot a Multifamily Retrocommission Strategy	Data and Analysis	Public, assisted	Regulatory /Statutory	Yes, but savings may more than equal upfront costs	HUD	FHA/Housing, PIH
5	Allocate federal non-HUD retrofit funds to multifamily retrofits	Leadership and Capacity	All	Program guidance, interagency partnership	No	DOE, HUD, Treasury, Ag, VA	FHA/Housing, CPD, PIH, and DOE EERE, Rural Housing, VA housing
5	Develop Residential Energy Intermediaries	Leadership and Capacity	All	Capacity Building & Public/philanthropic Partnership	Yes, probably	HUD, DOE, Public, philanthropy	
5	Deploy national training institute for housing industry and HUD & DOE staff & leaders	Leadership and Capacity	Public, assisted	Capacity Building, Interagency Partnership	Yes, probably, unless existing admin funds.	HUD, DOE, Public, philanthropy	
5	Communicate Multifamily Retrofit allocation awards and Employment Information to WIBS	Leadership and Capacity	All	Program guidance, interagency partnership	No	HUD, DOE, DOL	Fair Housing (Section 3), DOE EERE, PIH, FHA, and DOL WIA

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