Utilities in Federally Subsidized Housing

A Report on Efficiency, Utility Savings, and Consistency

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June 2012

About the Author

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Acknowledgments

The author would like to thank Larry Rosenthal for his invaluable guidance in this project, Ary Amerikaner, Sanaz Mobasseri, and Sean Tanner for their quantitative support, Sandley Chou for her collaboration, and Danielle Moultak, Chitrang Shah, and Shaheen Rashid for their helpful assistance. The author also wishes to thank Julie Guy and Lindsay Olson for their patience and support.

Disclaimer

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Acronyms

ARRA The American Recovery and Reinvestment Act
CDBG Community Development Block Grant
CDD Cooling Degree Day
FMR Fair Market Rent
HDD Heating Degree Day
HUD Department of Housing and Urban Development
PBRA Project-Based Rental Assistance (or Project-Based Section 8)
PD&R Policy Development and Research
PH Public Housing, specifically referencing HUD's Section 9 program
PHA Public Housing Authority
RHS Rural Housing Service
TBRA Tenant-Based Rental Assistance (or Housing Choice Vouchers, previously known as "Section 8 vouchers")
UA Utility Allowance

I. Introduction

Utility usage is interwoven with our everyday use of housing, from the water in our sink to the gas in our stove to the electricity in our sockets. Residential buildings account for 39% of U.S. electricity consumption and 20% of U.S. natural gas consumption.[1] The costs of these utilities also directly affect our pocketbooks and comprise one-quarter of average housing expenses nationwide.[2]

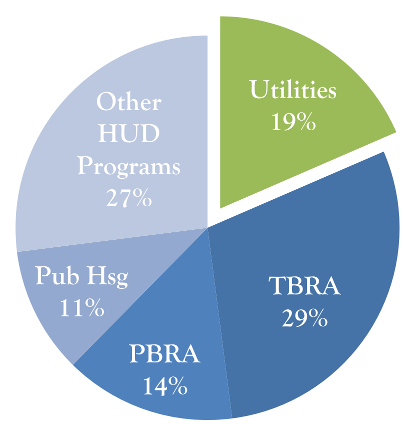
This report takes a close look at utility consumption in HUD-assisted housing. As a starting point, it describes the profile of HUD's utility usage and analyzes the costs involved. It then delves deeper into how decisions are made about utilities in HUD's three major rental assistance programs. Finally, it explains the initiatives currently underway at HUD to reduce utility consumption and offers policy recommendations and research questions to further the same goal.

Table 1. HUD's Rising Utility Bill

	Total Utility Costs	Percentage of HUD Budget
2004	$6.3 bil	13.9%
2006	$7.1 bil	16.7%
2008	$8.0 bil	16.3%
2010	$8.5 bil	15.3%
2012 (est.)	$9.1 bil	18.5%

Sources: See Table 7 for sources of utility costs estimates. HUD budget figures use historical and projected outlays. Figures estimated by author.

Figure 1. Isolating Utilities in HUD's Budget



Source: Author's calculations using projected FY2012 outlays and estimated utility costs from 2006, 2008, and 2012 HUD reports to Congress. Utilities portion represents only TBRA, PBRA, and Public Housing.

Rising Costs

Utility costs in federally subsidized housing[3] are rising quickly. In 2004, HUD spent $6.3 billion on utilities. By 2010, that amount had increased 35% to $8.5 billion. If similar trends continue, utility costs will rise to $9.1 billion in 2012 (see Table 1).

These rising utility costs also represent an

[1] U.S. Department of Energy, *Buildings Energy Data Book* (2011), Tables 6.1.1 and 6.3.5.

[2] Mary Schwartz and Ellen Wilson, U.S. Census Bureau, *Who Can Afford to Live in a Home?: A Look at Data from the 2006 American Community Survey*, p. 5, figure 3.

[3] Though other federal agencies (e.g., the Departments of Agriculture and Defense) provide housing or housing assistance, this report focuses solely on HUD.

increasing share of HUD's budget. As federal spending adjusts back to pre-Recovery Act levels, the steadily increasing cost of utilities may crowd out other HUD programs. In 2012, utilities will comprise an estimated 18.5% of the HUD's budget (see Figure 1).

Fluctuations in utility prices explain part of this cost increase, but not all of it. Between 2004 and 2008, when utility prices were steadily increasing 10% to 20% annually, HUD's total utility expenditures increased by a similar proportion. But between 2008 and 2010, when the price of electricity and other utilities *dropped* by 3.4%, HUD's total utility expenditures *rose* by 5.3%. Thus, HUD's utility costs may be driven by more than just utility prices. If utility prices remain relatively flat over the next 25 years, as forecasted by the Department of Energy,[4] that is no guarantee that HUD's utility costs will not increase.

Small Enough to Ignore, Big Enough to Matter

A host of issues, from energy independence to climate change, have increased attention on domestic energy consumption and environmental sustainability more generally. HUD, in particular, has a number of initiatives targeting environmental issues both within and outside the subsidized housing stock, through FHA mortgage insurance, rental assistance programs, and its new Office of Sustainable Communities.

These initiatives are laudable and consistent with HUD's commitment to energy conservation. This report suggests additional ways of analyzing HUD's utility consumption and planning for conservation. Its focus is not just on energy, but on utilities more generally. Water, for example, comprises close to a third of HUD's utility costs, and is a ripe source for energy-efficient upgrades with large and quick returns.[5] Many of HUD's current efforts concentrate on structural retrofitting and rehabilitation, but utilities are a day-to-day part of tenant's lives and of HUD's expenses.

One interesting and consistent theme in interviews conducted for this report was that, despite their dramatic environmental and budgetary impact, utilities are considered peripheral to most actors in HUD-subsidized housing. As one person put it, "The U in HUD doesn't stand for Utilities." Public housing authorities (PHAs) tend to see housing as their main service and frequently leave the utility bills to accounting staff. Private owners who rent to HUD-assisted tenants also tend to view utility expenses as one of the unavoidable, and largely unalterable, realities of housing provision, like the inevitable roof leak or clogged toilet. For tenants who pay their own utility bills, utilities are often just another monthly annoyance that drains their

[4] U.S. Department of Energy, *Annual Energy Outlook 2012*, Table A.3.

[5] PD&R, HUD, *Greening Affordable Housing: Renewing the Federal Commitment* (2012 Report to Congress), p. iii.

pocketbooks. For those who don't pay their own utility bills, their reflections on utilities are probably limited to those occasions when the power goes out or the water is turned off for maintenance. And for HUD field staff, utilities are too often overshadowed by other priorities. In essence, utilities are small enough to ignore. In absolute amounts, per-unit utility costs are double digit amounts per month (e.g. $24 in gas, $17 for water, etc.), and the differences across the tenant population seem negligible.

But the plain fact is that utility consumption, and its commensurate costs, are too big to ignore. These many small amounts become massive in aggregate; likewise, small savings per unit can yield large savings en masse. If HUD were able to reduce utility consumption by just $3 per month in each of its units with rental assistance, it would save about $160 million annually. Those cost savings could provide Housing Choice Vouchers to more than 20,000 additional families. In sum, utilities represent a remarkable opportunity for HUD to create a greener planet while simultaneously expanding its ability to provide more housing to low-income households.

Unfortunately, the current utility management structure needs improvement. This year, HUD will pay an estimated $9.1 billion in utilities, constituting a larger portion of HUD's budget than the entire Public Housing program. Yet HUD has no separate division or office with a primary and sustained focus on utility costs across its rental assistance programs.[6] Responsibility is instead divided between each of the major program offices, where there are few staff dedicated to questions concerning utility payment structures, the calculation of utility allowances, conservation incentives, or tenant behavioral change. In addition, utility costs are diffuse enough that few HUD field offices devote many resources to the issue. Furthermore, the owners and PHAs that calculate utility allowances have few financial or institutional incentives to be accurate. And many tenants who themselves control the consumption of utilities do not face the costs of their own usage. In short, reducing utility consumption may require reconsideration of HUD's utility management structure from both institutional and regulatory standpoints.

The Challenge Ahead

In an atmosphere of shrinking budgets, rising utility prices, and a warming planet, the status quo seems unsustainable from both environmental and budgetary perspectives. This report hopes to supplement the considerable work that HUD is already doing to reduce utility consumption nationwide. The bulk of recent HUD efforts focus principally on architectural energy efficiency

[6] The Office of Sustainable Communities has the potential to fill some of this gap, although much of its main focus is on the Sustainable Communities grant programs, not utility costs in HUD rental assistance.

initiatives such as weatherization and retrofits.[7] Energy-efficient retrofits are an oft-cited source of large energy savings, especially given the relatively old age and substandard condition of HUD's assisted housing stock. For example, replacing the insulation, windows, and boilers in pre-war buildings can reap large and immediate savings, as can replacing normal toilets with low-flow varieties. One recent study by Deutsche Bank found that, across a large sample of 19,000 New York City apartments, the average post-retrofit fuel savings were 19% and the average electricity savings were 7%.[8] These annual savings amounted to $240/per unit in fuel savings and $50/per unit in electricity savings, or about $5.5 million per year over the entire 19,000-unit portfolio. With this potential for cost savings, it makes sense that HUD's retrofit-oriented work concentrates on owners, their investment incentives, access to capital, and obstacles in driving demand.

However, relatively little attention has been placed on those on the other side of the doorknob. HUD has few initiatives focusing on federally subsidized tenants, on the utility allowances they receive, and on behavioral interventions that might encourage energy conservation. This report aims to remedy that gap.

Roadmap of the Report

Section II begins by way of explanation. Each of HUD's major rental assistance programs handles utilities differently. Even within each program, tenant-paid utilities are treated differently from owner-paid utilities. The terrain is surprisingly (and perhaps unnecessarily) complex. This Section provides an overview of the budget implications of utility costs and evidence that suggests past HUD reports have underestimated them.

Section III focuses specifically on utility allowances, which represent the bulk of HUD's utility costs each year. Each program requires different methods for calculating utility allowances and has a different oversight mechanism to ensure proper payment. This Section also introduces a new dataset of utility allowances that yields important insights about how the calculation of utility allowances might be improved.

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[7] *See, e.g.*, U.S. Green Building Council, *Better Buildings Through Executive Action: Leveraging Existing Authorities to Promote Energy Efficiency and Sustainability in Multifamily, Residential and Commercial Buildings* (2012); PD&R, HUD, *Enhancing Energy Efficiency and Green Building Design in Section 202 and Section 811 Programs* (2011); Energy Task Force, PD&R, HUD, *Implementing HUD's Energy Strategy* (2008); GAO, *HUD Has Made Progress in Promoting Green Building, but Expanding Efforts Could Help Reduce Energy Costs and Benefit Tenants* (2008); Energy Task Force, PD&R, HUD, *Promoting Energy Efficiency at HUD in a Time of Change: Report to Congress* (2006).

[8] Steven Winter Associates, Deutsche Bank Americas Foundation, *Recognizing the Benefits of Energy Efficiency in Multifamily Underwriting* (2012). These amounts do not account for the fixed costs of the retrofit itself.

Section IV identifies current HUD policies designed to encourage utility conservation and cost savings through behavioral change and utility allowances. Finally, Section V recommends additional policies for lowering utility consumption, saving federal tax dollars, and rationalizing the payment of utilities by aligning incentives and fostering greater consistency.

II. Utility Costs, Programmatic Differences, and Incentive Structures

Who Pays?

At first blush, the notion that utility costs comprise over 17% of HUD's budget might come as a surprise. Why, after all, is HUD paying for utility consumption in the first place? The answer is that HUD has long included utilities as part of its definition of "rent."[9] Thus, when the 1969 Brooke Amendment capped the amount owed in rent by subsidized tenants at 25% of their income, the cap affected both utilities and rent combined.[10] The 25% cap was later raised to 30%, where it has stayed since 1981.[11]

Table 2. Utilities Paid by HUD
Included
Electricity
Natural Gas
Bottle Gas (Propane)
Oil (Fuel Oil, Kerosene)
Other heat sources (Coal, Wood, etc.)
Water
Sewer
Garbage
Excluded
Phone
Internet
Cable/Satellite TV

Table 3. End Uses Allowed
Space heating
Water heating
Cooling (Air Conditioning)*
Refrigeration
Lighting
Plug load (for certain appliances)
**A/C is excluded in Public Housing.*

As in unsubsidized private housing, utilities are paid by either the tenant or the owner. For metered utilities — like water, gas, and electric — the payer depends on whether the property is individually metered or master-metered. In individually metered properties, the tenant pays the utilities, whereas in master-metered properties, the owner pays the utilities. But some utilities, such as garbage and sewer, are not metered by utility

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[9] *See, e.g.*, 24 C.F.R. § 982.4 ("Rent to owner. The total monthly rent payable to the owner under the lease for the unit. Rent to owner covers payment for any housing services, maintenance and utilities that the owner is required to provide and pay for."). In a proposed rule published in the Federal Register in 1982, HUD remarked that, "[i]n administering the low-income public housing program under the United States Housing Act of 1937, as amended, HUD historically has considered 'rent' to include shelter cost plus a reasonable amount for utilities. As a result, even prior to adoption of the 'Brooke Amendment' in 1969 (limiting the amount of 'rent' chargeable to public housing tenants to a stated percentage of income, then 25 percent), HUD provided for a system under which allowances were established as part of the rent schedule showing the amounts of electricity in kilowatt-hours to which tenants were entitled." *PHA-Owned or Leased Projects; Maintenance and Operation; Tenant Allowances for Utilities*, 47 Fed. Reg. 35249–35250 (1982).

[10] Pub. L. 91-152, 213, 83 Stat. 389.

[11] *See* 42 U.S.C. § 1437a(a)(1)(A) (2006) (providing that, with certain exceptions, "a family shall pay as rent . . . 30 per centum of the family's monthly adjusted income").

companies, and the owner normally decides whether to pay these costs or require residents to pay them independently. In any given HUD-assisted property, tenants may pay some utilities while the owner pays others. For example, tenants living in small buildings frequently pay for gas and electric while owners pay for water, sewer, and garbage. Regardless of who actually pays the utility company, HUD generally bears the ultimate costs of all utilities included in the top portion of Table 2, so long as they are used for one of the end-uses listed in Table 3.

When the owner pays for utilities, those utility costs are included in the rent. In this scenario, the costs of the utilities are passed on to HUD as a portion of the rent subsidy HUD pays to the owner. As discussed below, HUD does not know the exact amount of some of these utility costs because they are not always disaggregated from the rent amount.

When tenants pay for utilities, things are a bit more complicated. Because tenants pay the utility company directly, only they know exactly how much they consume. Yet, because of the 30% cap on housing-related expenses, HUD must reimburse tenants for approximately that same amount, or else tenant rent burdens would exceed 30%. For this purpose, HUD developed Utility Allowances (UAs), which subsidize tenants for the approximate cost of their out-of-pocket utility expenses. For ease of administration, UAs are generally deducted from the tenant's normal monthly payment to the owner and HUD's subsidy covers the difference between the reduced tenant contribution and the unit rent.

One noteworthy aspect of UAs is that they may over- or underestimate the actual utility costs paid by a tenant. In fact, they necessarily do, since UAs are not set for individual tenants (e.g., John Doe) but are approximations for larger categories of unit types (e.g., 2-bedroom units in Skyline Terrace). Regardless of a UA's accuracy, tenants are financially incentivized to conserve utilities because they can keep each dollar saved. In contrast, when the owner pays for utilities, tenants have virtually no financial incentive to conserve because utility costs, whether great or small, do not affect their monthly payments. HUD regulations do allow some owners to charge fees for "excessive" use, but only when they can identify major, tenant-owned appliances that do not fall within the regulatory definition of reasonable use.[12]

A third method of payment, more common in the south,[13] is called **checkmetering or submetering**. In this configuration, the owner pays the original utility bills but then charges each tenant according to his or her own usage. Checkmetering requires owners to install some type of individualized meter on each unit so that they can fairly assess each tenant's fair share of total

[12] 24 C.F.R. § 965.506 (allowing fees for excess consumption in Public Housing).

[13] HUD, "Utility Allowances," *available at* http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/phecc/allowances.

utility costs. In checkmetered units, tenants are given UAs and that amount is normally subtracted from their monthly rental payments.[14] If tenants use more than their allotment, they pay the owner the excess amount. Tenants usually, though not always, get to keep the cost savings if they consume below their UAs.[15] Checkmetering appears to be most common in Public Housing.[16] A 1991 GAO report estimated that approximately 177,000 of HUD's Public Housing units were checkmetered, or about 30% of Public Housing units receiving UAs at the time.[17] Table 4 provides a summary of the different methods of paying for utilities.

Table 4. Overview of Utility Payment Methods

	Owner pays utilities	Tenant pays utilities	Checkmetering/Submetering
Tenant	• Pays 30% of income to owner.	• Pays utility bills. • Pays owner 30% of income minus the amount of the UA.	• Receives utility bill from owner. • Pays owner 30% of income minus the amount of the UA. • Pays owner for any utility costs above their UA.
Owner	• Pays utility bills. • Receives 30% of tenant's income. • Receives HUD subsidy for the portion of rent (including utility costs) left unpaid by tenant.	• Receives 30% of tenant's income minus the amount of the UA. • Receives HUD subsidy equaling the portion of rent left unpaid by tenant.	• Pays utility company, usually at bulk rate. • Receives 30% of tenant's income minus the amount of the UA. • Sends individual bills to each tenant and collects for any use above the UA. • Receives HUD subsidy equaling the portion of rent left unpaid by tenant.
HUD	• Subsidizes owner for the amount of rent and utilities costs left unpaid by tenant.	• Subsidizes owner for the amount of rent left unpaid by tenant, which includes the UA.	• Subsidizes owner for the amount of rent left unpaid by tenant, which includes the UA.
Utility Co.	• Receives payment from owner.	• Receives payment from tenant.	• Receives payment from owner.

[14] The payment arrangement in checkmetered units can be structured in different ways. Regulations allow for quarterly, instead of monthly, billing, and are not specific about whether the tenant must be reimbursed for any unused portion of the UA. 24 C.F.R. § 965.504(a), .506(a).

[15] GAO, *supra* note 6, at p. 46.

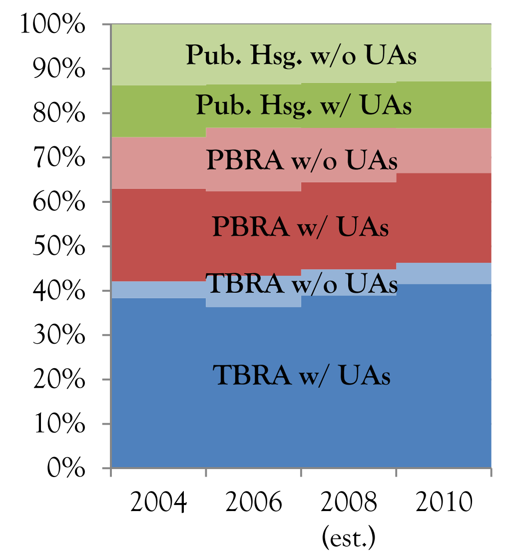
[16] GAO, *supra* note 6, at p. 45 n.13.

[17] GAO, *supra* note 6, at p. 19.

Programs Differ Greatly with Regard to Utilities

Determining who pays the utilities is just the first step in understanding HUD's utility cost structure. The second step concerns differences between HUD's three major rental assistance programs, Public Housing, Project-Based Rental Assistance (PBRA), and Tenant-Based Rental Assistance (TBRA).

Figure 2. Share of HUD units by Program and Utility Payment Method



Source: HUD's 2006, 2008, and 2012 reports to Congress on energy. 2008 data was unavailable, and is here shown as a simple average between 2006 and 2010.

Each of these programs manages utilities differently, and the discrepancies have potentially significant impacts on HUD's overall utility bill. The number and share of units in each program by payment method are described in Figure 2 and Table 5. Seventy-two percent of tenants in federally subsidized housing pay for at least some utilities themselves and receive a UA from HUD in return. The majority of these (57%) receive TBRA, otherwise known as Housing Choice Vouchers. As TBRA grows as a proportion of HUD's rental assistance portfolio, its overwhelming use of UAs, rather than owner-paid utilities, becomes increasingly important. The bulk of fully master-metered units, on the other hand, are in Public Housing (46%) and PBRA (36%).

Table 5. Number of Occupied Units with Tenant-Paid Utilities

	2003		2004		2006		2010	
Pub. Hsg. (% of total)	1,094,000	(26%)	1,213,949	(25%)	1,194,747	(23%)	1,072,465	(23%)
UAs (% of program)			*501,666*	*(46%)*	*458,854*	*(42%)*	*482,599*	*(45%)*
PBRA (% of total)	1,385,000	(32%)	1,449,786	(32%)	1,625,210	(33%)	1,391,700	(30%)
UAs (% of program)			*894,753*	*(64%)*	*890,786*	*(57%)*	*928,477*	*(67%)*
TBRA (% of total)	1,800,000	(42%)	2,138,214	(42%)	2,204,426	(43%)	2,121,908	(46%)
UAs (% of program)			*1,643,003*	*(91%)*	*1,704,725*	*(84%)*	*1,903,949*	*(90%)*
Total	4,279,000		4,801,949		5,024,383		4,586,073	
UAs (% of total)			*3,039,422*	*(71%)*	*3,054,365*	*(65%)*	*3,315,025*	*(72%)*

Sources: PD&R, HUD, Characteristics of HUD-Assisted Renters and Their Units in 2003; *HUD's 2006, 2008, and 2012 reports to Congress on energy.*

Table 6. Utility Cost Shares vs. Unit Shares				
	2004	**2006**	**2010**	**Avg.**
Public Housing				
% of utility costs	27%	26%	25%	
% of units	25%	23%	24%	
ratio	106%	112%	108%	**108%**
PBRA				
% of utility costs	25%	24%	23%	
% of units	33%	33%	30%	
ratio	76%	73%	76%	**75%**
TRBA				
% of utility costs	48%	50%	52%	
% of units	42%	44%	46%	
ratio	115%	114%	113%	**114%**

Unit counts partly explain the differences in HUD's overall utility costs, which are illustrated below in Figure 3 and Table 7. In 2010, 52.4% of HUD's total utility costs came from TBRA alone, but TBRA also accounts for 46.3% of total units. The other two programs spend roughly equal amounts. Public Housing comprised 24.5% of annual utility costs in 2010 and 23.4% of total units. PBRA comprised 23.1% of costs and 30.3% of total units. In sum, PBRA's share of utility costs is less than its share of units, while TBRA, and to a lesser extent Public Housing, comprise a greater share of utility costs in comparison to their shares of units. As shown in Table 6, this pattern is consistent in 2004 and 2006 data as well. On average over the three periods, TBRA's utility costs were 114% of their unit share, Public Housing's were 108%, and PBRA's were 75%. Finally, the most significant time trend in utility costs is the growth of TBRA UA costs as a percentage of HUD's utility bill, but that trend is mostly accounted for by changes in unit shares.

A similar comparison utilizes per-unit utility costs,[18], which vary widely between programs. Despite the fact that each program has a wide distribution throughout different climatic regions of the United States, per-unit costs diverge significantly. As shown in Figure 4, TBRA has the highest per-unit costs, estimated to be $2,092 in 2010. In that same year, Public Housing spent $1,936 per unit (8% lower) and PBRA spent only $1,405 (33% lower). The gaps look different, but no less pronounced when looking only at UAs. As shown in Figure 5, the per-unit cost of UAs within the universe of units with UAs is dramatically higher in TBRA than in either PBRA or Public Housing. These cost gaps between programs are areas meriting greater investigation, and possible explanations for these differentials are explored below.

[18] "Per-unit" costs are calculated by dividing the total costs of utilities in a given program by the total number of units. Thus, per-unit costs represent an average across all unit sizes and do *not* account for variation in unit size between programs.

Figure 3. Composition of HUD's Annual Utility Costs (in $ millions)

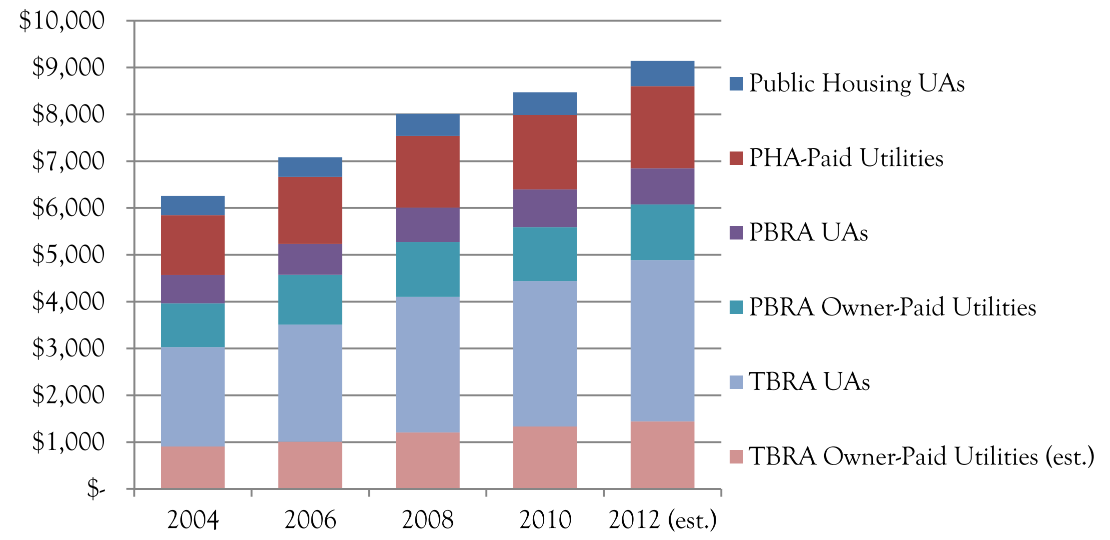


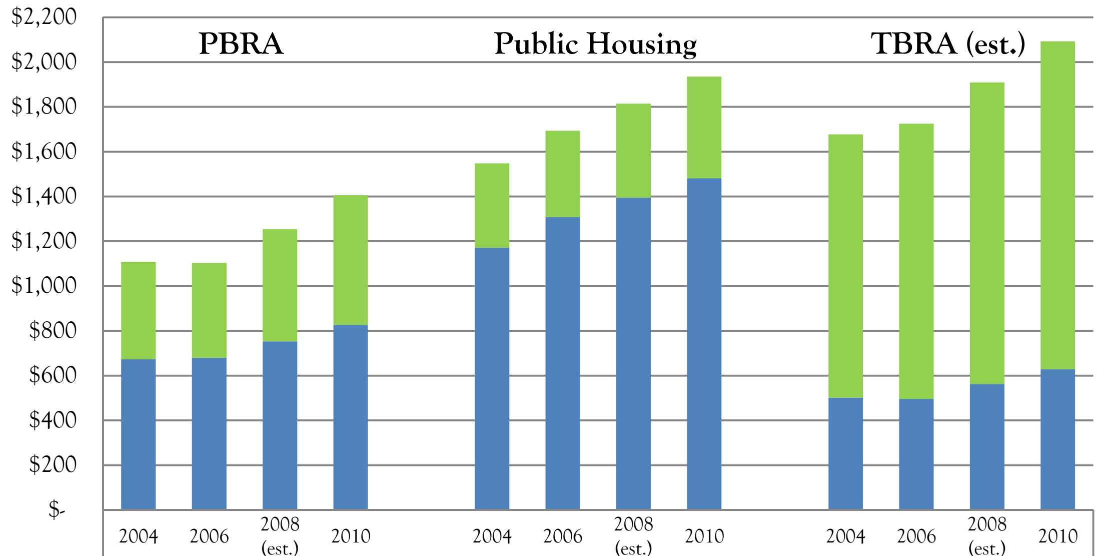
Table 7. Composition of HUD's Annual Utility Costs (in $ millions)

	2004*	2006*	2008*	2010*	2012 (est.)
Public Housing	**$1,688**	**$1,850**	**$2,001**	**$2,076**	**$2,290**
UAs	$411	$421	$471	$487	$539
PHA-Paid Utilities	$1,277	$1,429	$1,530	$1,589	$1,752
PBRA	**$1,542**	**$1,725**	**$1,905**	**$1,956**	**$1,963**
UAs	$605	$662	$735	$806	$772
Owner-Paid Utilities	$937	$1,063	$1,170	$1,150	$1,191
TBRA	**$3,028**	**$3,509**	**$4,103**	**$4,440**	**$4,886**
UAs	$2,122	$2,500	$2,896	$3,105	$3,443
Owner-Paid Utils. (est.)	$906	$1,009	$1,207	$1,335	$1,444
Total	**$6,259**	**$7,084**	**$8,009**	**$8,472**	**$9,140**
UAs	$3,138	$3,583	$4,102	$4,398	$4,754
Owner-paid utilities	$3,121	$3,501	$3,907	$4,074	$4,386
HUD cost growth from prior period		13.2%	13.1%	5.8%	7.9%
National utility price growth during the same period		20.5%	12.3%	-3.4%	1.3%

Sources: HUD's 2006, 2008, and 2012 Reports to Congress. 2012 estimates assume projected unit counts from HUD's 2012 Performance Plan p. 29 and utilize the average utility price growth rate from January 2010 to March 2012. Utility price growth is extrapolated from CPI for electricity, fuel, and other utilities using RECS-based utility-composition weights from LIHEAP's 2008 report to Congress. TBRA owner-paid utility estimates are explained in Appendix A.

**HUD's reports to Congress alternately use even and odd (2005, 2007, 2009, 2011) years, making analysis difficult without the underlying data. Even years are used as the best estimate of the actual timeframe, although the most recent report uses odd years.*

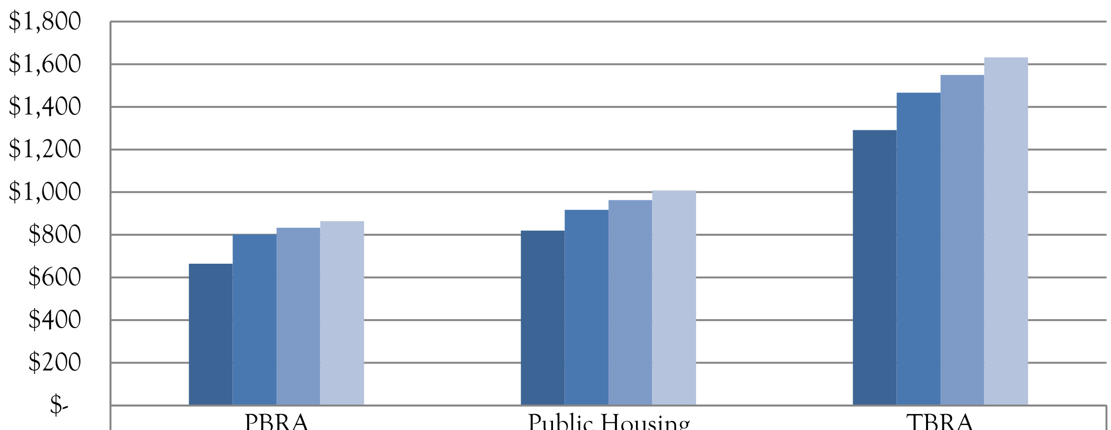
Figure 4. Per-Unit Annual Utility Costs, by HUD Program



	PBRA 2004	PBRA 2006	PBRA 2008 (est.)	PBRA 2010	Public Housing 2004	Public Housing 2006	Public Housing 2008 (est.)	Public Housing 2010	TBRA (est.) 2004	TBRA (est.) 2006	TBRA (est.) 2008 (est.)	TBRA (est.) 2010
Tenant-Paid (UAs)	$435	$423	$501	$579	$377	$386	$420	$454	$1,175	$1,229	$1,346	$1,463
Owner-Paid	$673	$680	$753	$826	$1,171	$1,309	$1,395	$1,482	$502	$496	$563	$629

Sources: HUD's 2006, 2008, and 2012 reports to Congress on energy. 2008 figures are simple averages of 2006 and 2010 figures. TBRA owner-paid utility costs are estimated using the method described in Appendix A.

Figure 5. Annual Per-Unit UA Costs for Units with UAs



	PBRA	Public Housing	TBRA
2004	$664	$820	$1,292
2006	$802	$917	$1,467
2008 (est.)	$833	$963	$1,550
2010	$864	$1,008	$1,632

Sources: HUD's 2006, 2008, and 2012 reports to Congress on energy. 2008 figures are simple averages of 2006 and 2010 figures.

The values in Table 7 exceed HUD's estimates of utility costs by anywhere from $900 million to $1.3 billion, depending on the year.[19] The explanation is that Table 7 includes a rough estimate of owner-paid utilities from TBRA, which HUD does not calculate. This amount is opaque to HUD because it is encapsulated in the total rent for the unit. However, because HUD implicitly pays those utilities, it should estimate an amount for that portion of utility costs, which is likely to be sizeable. In order to complete the picture of HUD's utility costs, this report calculated a rough estimate of owner-paid utilities in TBRA. In 2012, that estimate ranged between $842 million and $2.5 billion, with a conservative point estimate of $1.3 billion. See Appendix A for a detailed description of how these figures were calculated.

While overall utility costs are useful, more detailed information about *which* utilities are being used also deserves careful analysis. Unfortunately, less information exists regarding the type of utilities consumed in HUD-subsidized housing. With owner-paid utility expenses, Public Housing appears to have the best data, which breaks down utility costs into electricity, gas, fuel oil, and water/sewer. As shown in Figure 6, these shares have remained relatively constant over the past 5 years, with electricity and water/sewer each comprising about one-third of overall costs. The share of costs attributable to natural gas has declined from 24% in 2006 to 19% in 2011, which tracks changes in price. Fuel oil's trend in the opposite direction, from 13% to 15%, also tracks price changes.

Less data is available on owner-paid utilities in PBRA, but what data exists shows a downward trend in energy costs as a share of total utility costs. Available data does not disaggregate energy spending by fuel type, but energy's overall share of utility expenditures has declined from 80% in 2006 to 70% in 2011. The remaining share, belonging to water and sewer has, of course, increased by an equal amount. It may be that these changes signal improvements in the energy efficiency of PBRA properties (or reductions in water efficiency), but, without more data, it is impossible to disaggregate such effects from climatic differences, price variation, or even alterations in HUD's estimation model.

No data exists describing the composition of utilities consumed in TBRA[20] or in any of the tenant-paid utilities, even though those utilities cost HUD over $6 billion annually. Although aggregate data on UAs are collected in all three programs, no program collects a disaggregated number that shows how much is paid for each utility type. Such information would not only be helpful in

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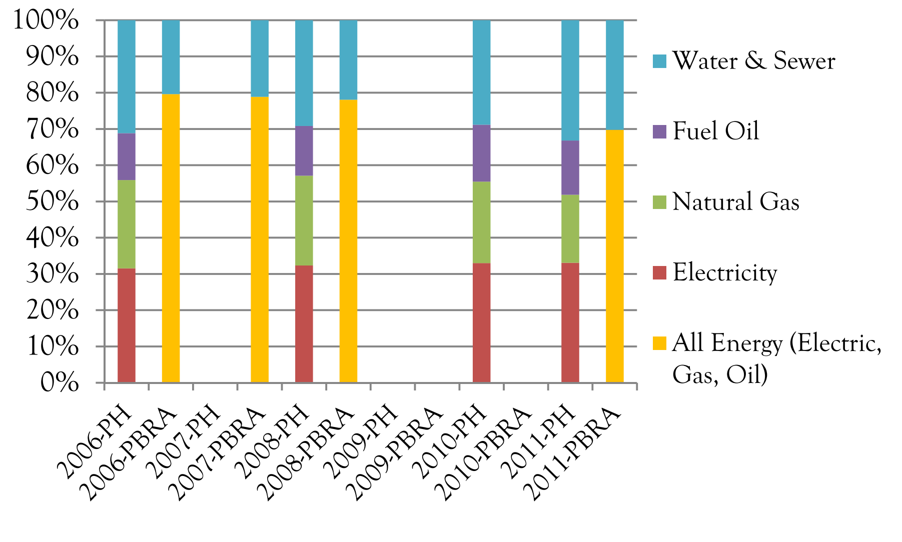
[19] *See, e.g.*, HUD, *FY 2012 Annual Performance Plan*, p. 45.

[20] Data from the 2006 American Community Survey shows that renters in single-family homes and mobile homes spent 56% of utilities on electricity, 27% on gas, 14% on water, and 3% on fuel oil. These figures are markedly different from those in Figure 6, but that is to be expected, given that they are (1) from only single-family homes (2) from a national, not solely low-income, sample (3) from tenant-paid costs, therefore reflecting differences in stock, consumption, and metering.

assessing the type of utilities consumed by HUD-assisted tenants, but also in determining the extent and type of individual metering.

Figure 6. Types of Utilities Used (in $ millions)



Sources: 2008 and 2012 HUD reports to Congress on energy. Data not available for all years.

Public Housing

Public Housing units are owned by PHAs and rented to low-income tenants. The Public Housing stock comprises one-quarter of HUD units and is older on average than other programs.[21] A 2010 report found that Public Housing had $26 billion in unmet capital needs, including $4.1 billion in energy- and water-efficiency retrofits.[22] In other words, the stock is not just old, it is inefficient. Because Public Housing buildings are older and tend to have many units, a greater share of them are master-metered than in other programs. In some jurisdictions like New York City, the percentage of units with UAs is below 10%. PHAs pay all of the utility bills in 55% of units, in which case tenants simply pay 30% of their income each month to the PHA as rent. HUD's subsidy to the PHA is designed to cover the difference between the overall operating costs of the property, inclusive of all owner-paid utilities, and payments collected from tenants (see Figure 7). PHAs' actual utility costs are captured by the calculation of utility expense levels (or UELs) as part

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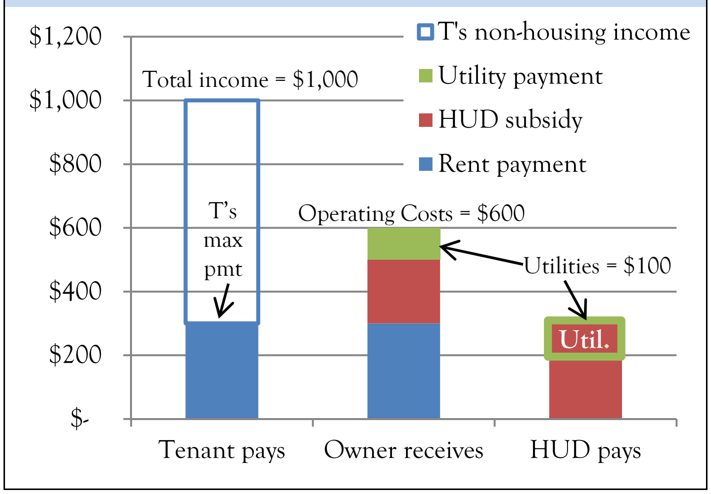
[21] *See* PD&R, HUD, *Characteristics of HUD-Assisted Renters and Their Units in 2003*, p. 20 (As of 2003, 97.1% of Public Housing units were built before 1990.).

[22] Abt Associates Inc., *Capital Needs in the Public Housing Program* (2010), p. v.

of the Operating Fund formula.[23] In any given year, subsidy levels are prorated to the appropriations level for the Operating Fund, and often do not match actual PHA expenses.

This payment method creates two important outcomes. First, tenants have no financial incentive to lessen their utility consumption, because their utility bills are paid by the PHA (with HUD funds). HUD regulations allow PHAs to charge tenants for excessive use, but only in two specific situations: first, when units are checkmetered, so that the PHA can calculate the exact amount of excess use; second, when tenants use major appliances not covered by HUD, such as air conditioning.[24] Anecdotal evidence suggests that excessive-use surcharges are rare in non-checkmetered buildings.

Figure 7. Example of Pub Hsg Owner-Paid Utilities



This first outcome is an example of the "split incentives" that beguile many efforts to decrease residential utility consumption.[25] The incentives are split because tenants have no motivation to save when owners pay for utilities, but owners have no incentive to initiate retrofits when tenants pay for utilities. In HUD's rental assistance programs, the incentives are sometimes split in a third direction, since owners, tenants, and HUD itself are all involved in paying the costs of utilities.

The second outcome of Public Housing's master-metered payment structure is that it provides little incentive for PHAs to curb utility consumption in their properties, since all operating costs, including utilities, are passed on to HUD. In an effort to remedy this problem, HUD now reimburses PHAs for their average utility costs from the prior 3 years (called a "3-year rolling base"). This allows PHAs to keep a portion of any cost savings derived from investments they make to the property (see Figure 8).[26] With the rolling average, PHAs keep 100% of cost savings from the year of the retrofit, 66% of savings from the second year, and 33% of savings from the

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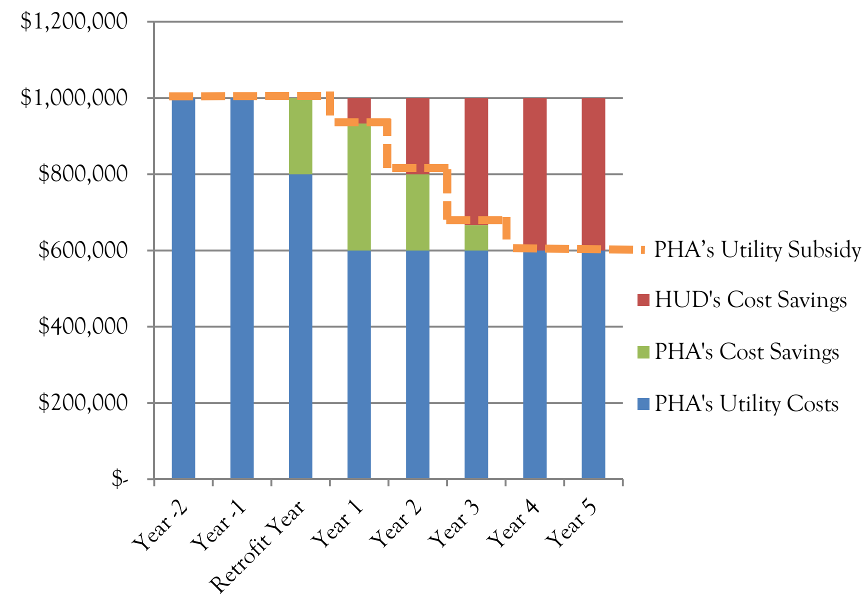
[23] *See* 24 C.F.R. § 990.170–.185.

[24] 24 C.F.R. § 965.506.

[25] *See, e.g.*, Gillingham, K., M. Harding, & D. Rapson, *Split Incentives in Household Energy Consumption*, 33 ENERGY JOURNAL 2 (2012), p. 37–62.

[26] PHAs use the 3-year rolling base to calculate Utility Expense Levels regardless of whether they implement retrofits. Thus, PHAs also share the burden of potential increases in utility costs, due to weather, price changes, or the like.

Figure 8. 3-year Rolling Base: Utility Expense Level Adjustment



Assumes the retrofit saves 40% and is completed halfway through Retrofit Year.

third year. However, this program only cures the incentive problem with regard to investments with quick payback periods. If the payback period is longer than three years, the 3-year rolling base will not fully reimburse PHAs for their investments. A further initiative extends the rolling base concept to longer term projects, so that PHAs which enter into Energy Performance Contracts can freeze their rolling base for the length of the contract (up to 20 years).[27]

In the 45% of Public Housing units where tenants pay at least some of the utilities, the PHA calculates a UA that "approximate[s] a reasonable consumption of utilities by an energy-conservative household of modest circumstances consistent with the requirements of a safe, sanitary, and healthful living environment."[28] This generalized standard does not provide PHAs with much direction, so they have considerable flexibility in how to calculate UAs, a subject covered in Section III below.

These UAs are usually specific to at least particular unit categories (e.g. townhouse, high-rise, etc.), and it is not uncommon for them to be property-specific.[29] UAs are always broken down by unit size (number of bedrooms). Property-specific UAs are often created using some degree of historical consumption data, but PHAs also obtain area averages from utility companies or estimate UAs using engineering models that emulate hypothetical consumption (see Section III for more detail).

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[27] For a quick explanation of these programs, see http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/phecc/funding.

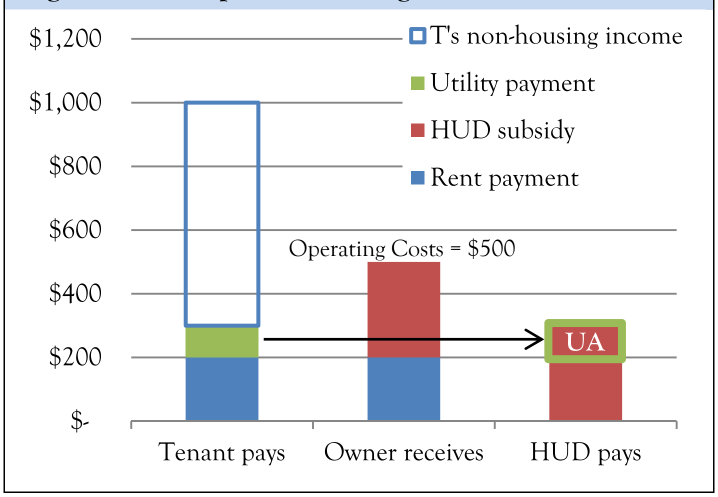
[28] 24 C.F.R. § 965.505(a).

[29] *See, e.g.*, http://www.hcdch.state.hi.us/documents/2010%20Utility%20Allowances%20Advertisement%205-22-10.pdf (providing UAs for all Public Housing properties in Hawaii).

HUD rarely, if ever, audits these UA calculations.[30] Theoretically, this should be one of the issues raised during periodic monitoring of PHA practices, but the extent to which UAs are actually monitored appears negligible. No one interviewed could recall an occasion on which a PHA's UAs were rigorously reviewed. In fact, the current impediments to effective utilities monitoring are substantial, and the payoff for monitoring remains unclear given the wide discretion afforded by the regulations. HUD's review teams are often unfamiliar with utilities, since utilities are overshadowed by other priorities. Moreover, the calculations involved require a fair amount of (often absent) expertise. Finally, even if one did have the expertise and desire to audit UAs, the current calculation standard is almost unchallengeable. "Reasonable consumption" could mean many different things, as could "modest circumstances" or other phrases in the regulation.[31] This ambiguity leaves reviewers with little to do besides ask for the documents supporting the PHA's calculations, which is one of the few bright line rules in the regulation. Suggestions for improving oversight are discussed in Section V.

The actual allowance does not go to the tenant directly, but is deducted from the tenant's monthly payment and HUD's subsidy covers the difference between the reduced tenant contribution and the unit rent. The only exception is when the UA is larger than 30% of the tenant's income, in which case the tenant's payment shrinks to $0 and HUD pays the difference directly to the tenant as a "utility reimbursement."

Figure 9. Example of Pub Hsg Tenant-Paid Utilities



From a financial incentives perspective, UAs have advantages and disadvantages over owner-paid utilities. On the one hand, tenant conservation incentives are more effectively aligned, since tenants reap the rewards of their behavior changes. On the other hand, UAs create the "split incentive" that is a common barrier to structural retrofits, in which tenants reap the rewards of more energy-efficient structures, preventing owners from recouping the full cost savings from retrofits.[32] Since current regulations result in UA adjustments being passed along to HUD,[33]

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[30] This conclusion was drawn from interviews with PHAs and PD&R. One interviewee from HUD headquarters stated that HUD has *never* audited UAs in the many years this person has worked there.

[31] 24 C.F.R. § 965.505(a).

[32] Some cost savings from common areas are captured through the 3-year rolling base.

[33] 24 C.F.R. § 990.170(e).

PHAs cannot currently use UAs as a method of funding such retrofits, though that possibility is discussed in Section V.

Tenant-Based Rental Assistance (TBRA)

TBRA, also known as the Housing Choice Voucher program, comprises nearly half of HUD's subsidized units. In this program, tenants choose units in the private housing market and pay 30% of their income in rent. TBRA's subsidy covers the rent left unpaid, up to a "payment standard" defined as a percentage of Fair Market Rent (FMR) for that area. One of the goals of TBRA is to deconcentrate poverty and provide low-income tenants with the benefits of living in mixed-income communities and areas with opportunities.

The overwhelming majority of TBRA recipients (90%) pay some of their own utilities, and therefore receive UAs. TBRA UAs work similarly to those in Public Housing. The tenant pays the utility bill directly and receives a UA as a deduction from the monthly payment. The owner then receives a subsidy from HUD equal to the unit's contract rent minus the tenant's reduced monthly payment. In TBRA the subsidy amount is capped at the lower of either the gross rent (contract rent plus utilities) minus the tenant contribution, or the area's payment standard minus the tenant contribution.

The main programmatic differences are in the details. Unlike Public Housing, TBRA UAs are calculated for more generalized categories of units. The number and diversity of TBRA properties makes it difficult to calculate property-specific UAs, so PHAs instead generate UA schedules for different unit types, like single-family houses, garden apartments, and elevator buildings. PHAs have the regulatory discretion to divide up units into whichever categories they deem relevant, so occasionally PHAs will create different schedules for different construction vintages (e.g., pre-1991)[34] or for properties that qualify as energy-efficient.[35] Some PHAs also generate geographically specific schedules, either by region or municipality.[36] On the other end of the spectrum, some small states, like Rhode Island and New Jersey, have just one UA schedule for the entire state.[37]

UAs are different in TBRA in a number of other ways. Unlike Public Housing, TBRA UAs include air conditioning where it is common in the majority of the local housing market. TBRA's standard for computing UAs is also different: it must be based on a community-wide comparison

[34] *E.g.*, Cowlitz County, WA: http://www.longviewha.org/utility_allowances.html.

[35] *E.g.*, Anaheim, CA: http://www.anaheim.net/com_dev/aRT/UtilityAllow1201511.pdf. Energy-efficient UAs are discussed further in Sections IV and V.

[36] *E.g.*, Alaska: http://www.ahfc.us/rental/utility_allowances.cfm.

[37] Rhode Island: http://www.rhodeislandhousing.org/filelibrary/UTILITY_SCHEDULE2011.pdf; New Jersey: http://www.state.nj.us/dca/hmfa/biz/devel/lowinc/pdf/utility_schedule_2010.pdf.

group, whereas Public Housing has no such requirement. In addition, TBRA's standard makes no mention that UAs should comport with consumption of those with "modest circumstances." Instead, UAs must approximate "typical" or "normal" (rather than "reasonable") consumption.

PHAs normally calculate TBRA UAs using one of three methods, as discussed more fully in Section III. The first method is HUD's Utility Schedule Model,[38] which approximates utility expenditures using national energy usage data. The second method is collecting average utility expenditures using a phone survey of local area tenants. A third method involves obtaining approximations of average utility costs from the local utility company. Given the flexibility of HUD's regulations, none of these methods is mutually exclusive.

As a result of some or all of these differences, average per-unit TBRA UAs are 75% higher than per-unit UAs in other programs. The most likely causes are threefold. First, the TBRA housing stock consists of smaller developments and many more single-family homes, which are far less energy efficient than comparable units in multifamily properties. Second, most PHAs interpret TBRA's community-wide consumption standard to require UAs that approximate average usage across all income groups, which is bound to be higher than an average of use among the low-income.

Finally, it is also possible that TBRA UAs are larger because they more frequently include a greater share of the utilities. When comparing per-unit UA costs (see Figure 5 on p. 16), it is important to recognize that some UAs include only electricity, while others also include gas, water, garbage, etc. There is no way of disaggregating these separate utility costs using HUD's current data. While one might expect that tenants in smaller buildings generally pay more of their own utilities, if only because individual metering is easier and more common as building size declines, there is no way to confirm this expectation or measure its degree. If this were true, per-unit UAs would be higher than per-unit owner-paid utilities in programs like TBRA, where a larger share of the utilities are normally paid by the tenant, while the reverse would be true in programs like Public Housing, where more utilities tend to be master-metered. Greater certainty is achieved by matching per-unit costs across both tenant-paid and owner-paid utilities combined.

When owners pay utilities in TBRA, those expenses are included in the overall rent. After tenants pay 30% of their income toward rent, HUD's subsidy covers the difference between the tenant's contribution and either the gross rent (contract rent plus utilities) or the payment standard, whichever is lower. Thus, HUD implicitly reimburses the owner for utility costs (see Figure 10). Yet because the actual utilities expenses are opaque to HUD, it has no estimate of how much it spends on owner-paid TBRA utilities. Under this payment method, HUD's utility subsidy

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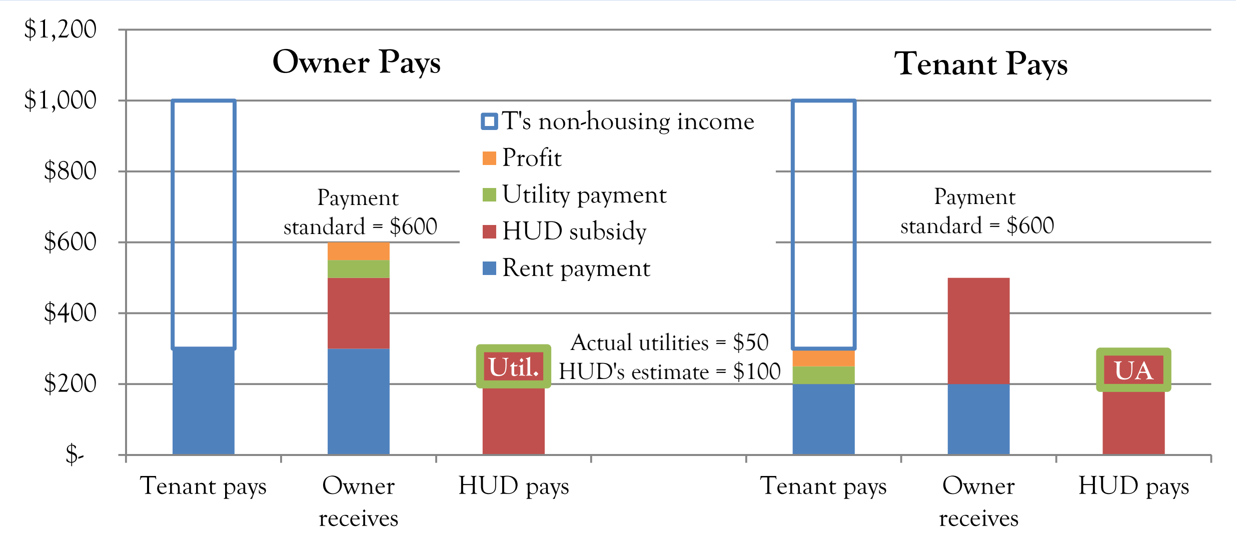
[38] HUD's model is available for download at http://www.huduser.org/portal/resources/utilmodel.html.

theoretically matches actual consumption, because the owner's market rent is designed for a competitive marketplace. In reality, however, payment standards seem likely to warp the market by serving as an attractor for both tenants, who want to get the best unit their voucher can buy, and landlords, who want to obtain the maximum possible subsidy from HUD.

Figure 10. TBRA Utilities Payment Methods (showing potentially overestimated subsidy)

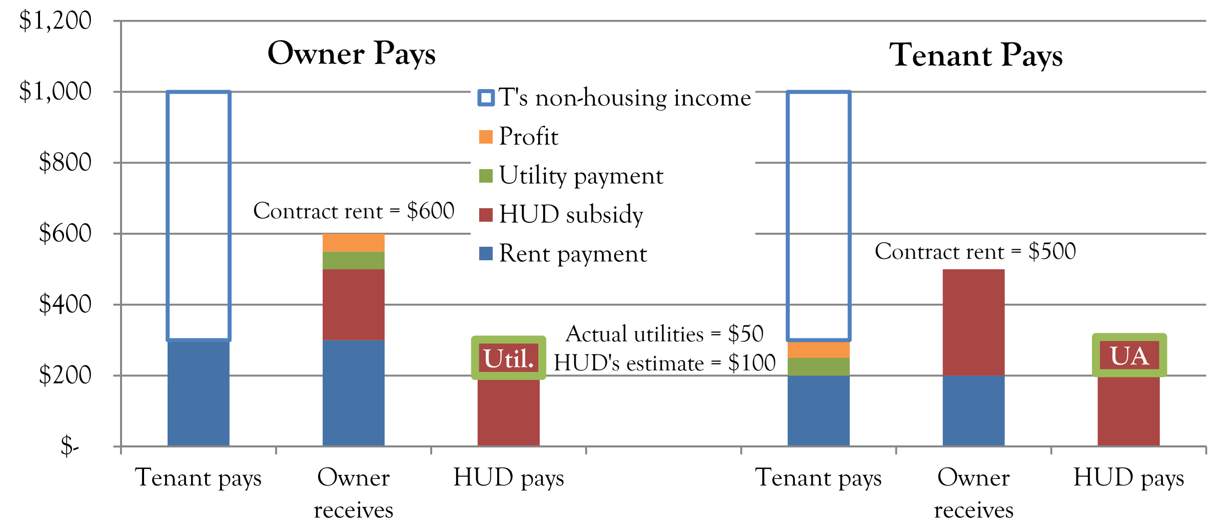


Project-Based Rental Assistance (PBRA)

About one-quarter of HUD's subsidized units are in PBRA, which is a hybrid between TBRA and Public Housing in that it attaches assistance to physical units, normally entire buildings, that are privately owned. PBRA is administered through HUD's Multifamily Department, rather than Public and Indian Housing where Public Housing and TBRA are housed, which creates a different regulatory environment. PBRA is structured through contracts with building owners that are usually renewed every five years. These contracts are overseen by contract administrators — including HUD itself and a few dozen subcontractors — who review renewal documents, set contract rents, and set utility allowances.

The most readily apparent difference in PBRA utilities is that per-unit costs are substantially lower than HUD's other programs. On average, per-unit utilities are 30% lower in PBRA than in other rental assistance programs (see Figure 4 on p. 16). It is possible that this gap is due to differences in the PBRA housing stock, especially in comparison to TBRA, which has much smaller buildings on average. But the marked difference between Public Housing and PBRA is less easily explained.[39] The gap may be due to differences in how PBRA contracts are monitored and how Multifamily UAs are calculated.

Figure 11. PBRA Utilities Payment Methods (showing potentially overestimated subsidy)



Owners pay for all of the utilities in 33% of PBRA units. As in other master-metered units, tenants simply pay 30% of their income as rent. HUD's subsidy is equal to the difference between the tenant's payment and the contract rent. PBRA contract rents are initially determined based on one of five "options" for which the property qualifies.[40] Although each option is distinct, several of them (accounting for the majority of PBRA units) use rent comparability studies, in which appraisers compile a group of similar properties in the same market and then owners request a certain rent based on those comparisons. Among the criteria used for selecting comparisons are vintage, efficiency, and the inclusion of utilities in the rent. Once determined, contract rents stay the same over the length of the contract, except for annual adjustments. These adjustments also vary, but the most common method – Operating Cost Adjustment Factors (OCAF) – uses a mix of national- and state-level data to determine average state-specific changes in operating costs. Another adjustment method, called "budget-based," adjusts rents based on the owner's submission of actual operating costs for the property, though this method accounts for only about 10 to 15% of annual PBRA adjustments in any given year.

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[39] While detailed data comparing the physical condition of each housing stock was unavailable, the simple mean physical inspection score of PBRA is actually lower than that of Public Housing (though that does not control for any other variables). *See* http://www.huduser.org/portal/datasets/pis.html.

[40] HUD established these five options to implement the Multifamily Assisted Housing Reform and Affordability Act of 1997 (MAHRA). See P.L 105-65. About 13% of the PBRA portfolio is still in long-term "original term contracts" (OTCs) with HUD and will not be eligible to renew under MAHRA until the OTC expires. The contract rents for OTC properties are adjusted each year by an "Annual Adjustment Factor" rather than an OCAF.

Under this system, where contract rents are set in advance, owners have the opportunity to save money by conserving utilities because they will get to keep most of the savings for the duration of their contract.[41] This provides an incentive for owners to retrofit the property and to encourage tenant behavior changes. The strength of this incentive differs depending on the length of the contract and the method of calculating contract rent at the time it is renewed. But since the majority of renewals set rents using rent comparability studies, the incentive is greater because efficiency upgrades can be incorporated into these studies, thereby raising the rent and HUD's subsidy.[42] In sum, owners paying utilities face very different incentives depending on how their contract rents are established, monitored, and adjusted.

Tenants pay at least some of their own utility bills in the remaining 67% of PBRA units. UAs function in much the same way as other programs, with the amount of the UA deducted from the tenant's monthly payment. The impact of various rent-setting and adjustment methods has an insignificant effect on tenant-paid utilities because the tenant, and not the owner, will capture most of the savings of any conservation efforts regardless. Owners will only increase profits if they complete highly visible retrofits that raise their market-based rents through a new set of comparables. Otherwise, UAs operate as a pass-through to HUD. If UAs decline, HUD's subsidy declines commensurately; if UAs increase, so too does HUD's subsidy. These owners therefore see very little conservation savings and have little financial interest in the accuracy of UAs.

PBRA's methodology for calculating UAs is distinct. On their face, HUD regulations, which amount to one paragraph, give little detail,[43] and PBRA's Renewal Policy Guidebook says virtually nothing about calculating UAs.[44] The regulations require owners to annually submit "an analysis of the project's Utility Allowances," including changes in rates or consumption patterns.[45] The real detail about the content of that analysis comes from HUD's field and regional offices, which issue separate, but relatively consistent, guidance explaining what utility analyses must include. The general practice is that owners must submit around one year's worth of recent historical consumption data from a sample of each unit type. The owner also suggests a specific UA schedule, but it is the contract administrator's decision to approve it or set different UAs. Though the extent of oversight varies, it is plausible that PBRA's low UAs are at least partially attributable

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[41] Only in the small percentage of properties where budget-based adjustments are required will actual utility usage decreases cause commensurate downward adjustments in HUD's subsidy.

[42] This assumes that market rents reflect efficiency retrofits — even hidden ones like insulation and window sealing — a topic over which there is considerable debate.

[43] 24 C.F.R. § 880.610.

[44] *See, e.g.*, *Section 8 Renewal Policy: Guidance for the Renewal of Project-Based Section 8 Contracts*, Chapter 9, p. 19.

[45] 24 C.F.R. § 880.610. This section also requires notice to tenants of UA changes and mandatory requests for UA increases if rates change by 10% or more.

Table 8. Differences in Utility Payment Structure Across HUD Programs

	Tenant pays utilities (UAs)	Owner pays utilities

Public Housing	▪ Tenants pay utilities separately and receive UAs in the form of a rent reduction.
	▪ HUD's subsidy to owners fills the gap between actual operating costs and tenants' rental payments.
	▪ UAs are often property-specific.
	▪ HUD rarely audits UA schedules.
	▪ Financial incentives to conserve:
	  ▪ Tenants: Yes
	  ▪ Owners: Limited to common areas
		▪ Owners pay utilities separately.
		▪ HUD's subsidy to owners fills the gap between actual operating costs and tenants' rental payments.
		▪ Operating costs are calculated using a 3-year rolling base, which allows owners to keep a portion of utility savings for 3 years.
		▪ Financial incentives to conserve:
		  ▪ Tenants: No
		  ▪ Owners: Yes (limited to 3 years)

TBRA	▪ Tenants pay utilities separately and receive UAs in the form of a rent reduction.
	▪ HUD's subsidy to owners fills the gap between the contract rent (or payment standard) and the tenant's rental pmt.
	▪ UAs are established for different unit-type categories and are often calculated using phone surveys or HUD's model.
	▪ HUD rarely audits UA schedules.
	▪ Financial incentives to conserve:
	  ▪ Tenants: Yes
	  ▪ Owners: Limited to common areas
		▪ Owners pay utilities separately.
		▪ HUD's subsidy to owners fills the gap between the gross rent (or payment standard) and the tenant's rental payment.
		  ▪ HUD does not estimate what portion of that subsidy goes toward utilities.
		▪ Rents are normally set to the area's payment standard, which does not differ if utilities are included in rent.
		▪ Financial incentives to conserve:
		  ▪ Tenants: No
		  ▪ Owners: Yes

PBRA	▪ Tenants pay utilities separately and receive UAs in the form of a rent reduction.
	▪ HUD's subsidy to owners fills the gap between the contract rent and the tenant's rental payment.
	▪ UAs are property-specific and calculated using recent consumption data.
	▪ Contract administrator approves UA levels and provides oversight.
	▪ Financial incentives to conserve:
	  ▪ Tenants: Yes
	  ▪ Owners: Limited to common areas
		▪ Owners pay utilities separately.
		▪ HUD's subsidy to owners fills the gap between the contract rent and the tenant's rental payment.
		▪ Contracts are usually for 5 years.
		▪ After efficiency upgrades, because contract rents are set prospectively, owners keep most utility savings.
		▪ Efficiency upgrades may cause market-based rents to rise when contracts are renewed. Mid-contract budget-based adjustments may lower rents.
		▪ Financial incentives to conserve:
		  ▪ Tenants: No
		  ▪ Owners: Yes

to its combination of more uniform annual utility analyses and heightened oversight. However, another possibility, sometimes mentioned in interviews, is that PBRA's UAs are lower because PBRA owners are less consistent about raising UAs when utility prices increase.

Possible Explanations for Per-Unit Cost Differences

The drastic differences across programs in per-unit utility costs could be attributable to a number of factors. Because the budgetary impacts are so significant, six possible explanations are explored in the following paragraphs:

- Extent of individual metering
- Variations in unit and household size
- Differences in housing stock
- Methodological variations
- Different regulatory consumption standards
- Monitoring and oversight

Extent of Individual Metering

The most benign explanation for the cost differences is that they simply reflect differences in the composition of UAs. For instance, if TBRA's UAs systematically include more utilities than PBRA's, then that would account for at least some of the gap between the two. It seems probable that tenants in single-family houses more commonly pay for electric, gas, water, sewer, and garbage individually. In addition, the number of tenant-paid utilities is likely to decrease as building size increases. Since TBRA properties are smaller on average than other programs, part of the gap in utility costs may be due to differences in which utilities are metered.

Variations in Unit and Household Size

Another factor contributing to per-unit cost differences between programs is variation in unit and household size. Obviously, each unit is not equal, but there are also systematic differences in unit size between programs, and these undoubtedly influence utility costs (see Table 9). In 2003, 60% of tenants in PBRA lived in a one-bedroom unit or a studio, compared to 45% in Public Housing, and only 24% in TBRA.[46] Likewise, many more tenants in TBRA lived in units of three bedrooms or more: 35% versus 28% in Public Housing and 13% in PBRA. These data suggest that the

[46] PD&R, HUD, *Characteristics of HUD-Assisted Renters and Their Units in 2003*, p. 21.

average unit size (in terms of number of bedrooms) is highest in TBRA and lowest in PBRA, a result which at least partially explains why PBRA's per-unit costs are so much less than TBRA's and Public Housing's.

Table 9. Programmatic Differences in Unit and Household Size

	PBRA	Public Housing	TBRA
% with none or one bedroom	60%	45%	24%
% with two bedrooms	27%	27%	41%
% with three or more bedrooms	13%	28%	35%
% with one person	60%	51%	33%
% with two-four persons	35%	38%	55%
% with more than three persons	5%	11%	12%

A similar conclusion can be reached by investigating differences in household size. In 2003, only 33% of TBRA households were composed of just one person, compared to 51% in Public Housing and 60% in PBRA.[47] Only 5.3% of PBRA households had five or more people, compared to 12% in TBRA and 11% in Public Housing. In sum, average household size is highest in TBRA and lowest in PBRA, a result which again explains part of the differences in per-unit utility costs. Unfortunately, estimating the degree of such effects are beyond the scope of this report.[48]

Differences in Housing Stock

Another explanation for the observed differentials in per-unit cost is variations in the stock of each program. This undoubtedly explains part of the answer, but probably not all of it. A 2003 HUD report found significant differences in the housing stock of each major rental assistance program, summarized in Table 10.[49] Most of the stock-related differences, with the possible exception of geographic distribution, tend to support the conclusion that TBRA's stock causes higher utility costs. TBRA's buildings are smaller than other programs and a larger percentage were built before 1950. TBRA units are also bigger and more likely to have extra bathrooms. The housing-stock explanation seems plausible for Public Housing as well, since it tends to be the middle program on most of the stock-related measures, and its per-unit costs are also between PBRA and TBRA. Without more granular data with which to control for unit and structure size, age, and climate, it

[47] *Id.* at p. 14.

[48] One could construct an average unit for each rental assistance program, that takes account of both unit and household characteristics, and find the average differences those characteristics create using utility data from RECS, AHS, or ACS.

[49] *Id.* at p. 19–21.

is impossible to estimate how large an explanatory factor stock differences are; these relationships represent an opportunity ripe for additional research.

Table 10. Programmatic Differences in Housing Stock

	PBRA	Public Housing	TBRA
% in structures less than 5 units	13%	35%	58%
% built before 1950	12%	18%	28%
Median year built	1976	1965	1969
% 3 or more bedrooms	13%	28%	35%
% more than one bathroom	13%	11%	29%
% in Northeast or Midwest	55%	53%	43%

Methodological Variations: Consumption, Engineering, and Site-Specificity

Another explanation, at least on the tenant-paid side, relates to the method for calculating UAs. Owners and PHAs generally use one of two methods to calculate UAs, an engineering model or an average of actual historical consumption. But these methodologies are not evenly dispersed across programs. In addition, each model can vary in its level of site-specificity. PBRA owners almost always use actual historical consumption from the property in question. When calculating TBRA UAs, PHAs also use historical consumption, but they cast a much wider net. They either do a phone survey of the utility expenses of area residents or they use national consumption data. Because both of these groups include higher income earners, they are more likely to generate consumption estimates that are higher than an average low-income household. The association between income and energy consumption can be seen in Figure 12, which shows a fairly linear relationship until income exceeds $100,000 per year. Thus, any inclusion of higher income earners is likely to overestimate the utility expenses of low-income households.

Figure 12. Income's Effect on Energy Use[50]

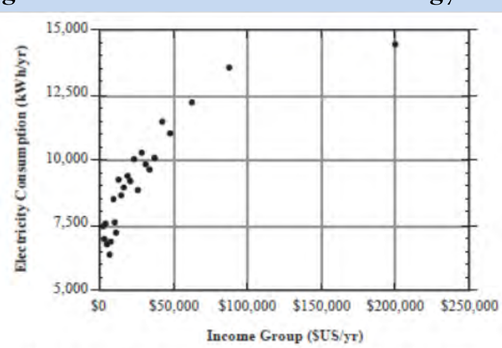

Fig. 1. Household electricity versus income for the US in 1997.

But what of Public Housing? Methodologies vary considerably by PHA. When PHAs hire consultants, which is not uncommon, they usually use engineering models that include the structure type and materials, building age and size, climate,

[50] Arne Jacobson, Anita D. Milman, & Daniel M. Kammen, *Letting the (Energy) Gini Out of the Bottle: Lorenz Curves of Cumulative Electricity Consumption and Gini Coefficients as Metrics of Energy Distribution and Equity*, 33 ENERGY POLICY (2005), p. 1826.

and unit size, among other relevant variables. If the PHA does its own calculations, the methodology likely involves analysis of actual historical consumption, although the amount and freshness of the data varies. This mix of methods may go some distance toward explaining why Public Housing's UAs are larger on average than PBRA's, but smaller than TBRA's.

Different Regulatory Consumption Standards

Another computational difference between the three major rental assistance programs (again, only on the tenant-paid side) is that they use different standards for calculating the appropriate UA level. Specifically, PBRA and Public Housing use a "reasonable consumption" standard whereas TBRA uses a "typical" or "normal patterns of consumption" standard. Though both standards are ambiguous, their wording does not *a priori* suggest that one would create larger UAs than the other, and it is therefore difficult to attribute to them much of the programmatic differences. Instead, these standards are more likely to lead to confusion and undesirable variation within (rather than between) all three programs.

Monitoring and Oversight

The final potential explanation for these wide cost gaps between programs is that each program has a different system of checks and balances. The one common thread throughout each program is that the entity calculating the UAs has little or no financial incentive to under- or overestimate them, because they do not bear the expense either way (UA expenses are passed through to HUD regardless of their amount). Accountability mechanisms can be both official and informal. For instance, tenants in each program act as an informal upward pressure on UAs. If UAs are set too low, tenants have standing to sue, although the loose regulatory standards make victory difficult to achieve. In PBRA, contract administrators play an important formal role in ensuring that UAs go through an annual review and approval process. Unlike other programs, they hold the power to establish the actual UA amounts even though owners are the ones doing the actual calculations. PBRA provides the best accountability model in this regard because it provides a formal routine check on the actual calculator (absent HUD auditing), although the effectiveness of such checks is unclear.

TBRA once had an important informal accountability mechanism but it is fast disappearing. Before 2008, IRS regulations required that builders in the low-income housing tax credit (LIHTC) program use UA schedules posted by the local PHA. However, since 2008, new regulations allow developers to use a number of alternative methods to calculate UAs for their new projects.[51] These developers previously exerted a downward pressure on UAs because they often complained that PHAs overestimated UAs. For LIHTC housing, lower UAs results in a higher income stream of tenant contributions for the owner, so UAs had direct and material consequences for financing the project. Now that these developers can calculate UAs using alternative methods, their informal downward pressure is quickly dissipating.

Public Housing has very few formal or informal accountability mechanisms when it comes to calculating UAs. Periodic reviews by HUD are supposed to cover UAs but interviews suggest that they frequently do not. Even when they do, the reviewer — perhaps lacking time or expertise — rarely looks beyond the mere presence of an updated UA schedule, and does not question the PHA's methods of calculation. The same is true of TBRA UAs, which HUD theoretically reviews during annual renewals, though no interviewer had heard of the ever occurring. All accounts suggest that enforcement is weak regarding the calculation of UAs. As suggested earlier, the weak enforcement may itself be in part a result of the loosely defined regulations.

Yet despite the potential need for greater accountability mechanisms, it is unclear how large of an impact their absence has on programmatic per-unit cost differences. PBRA seems to have the best accountability mechanism, while also having the lowest UAs, but it is difficult to attribute any causation to the latter without more information, such as whether these lower UAs are more or less accurate. And due to the flexible regulations, even if oversight were strengthened, it's not clear whether it would uncover many UAs set outside the loosely-defined guidelines. In short, accountability mechanisms probably account for some of the differences in per-unit costs, but not the majority.

Important Takeaways

Four main takeaways emerge from this comparison of utilities in HUD's three major rental assistance programs.

First, the largest component of HUD's rising utility costs is TBRA. Per-unit costs in that program are 9% higher than in Public Housing and 49% higher than in PBRA. In 2010, TBRA utilities constituted 52% of HUD's total utility costs, even though TBRA only comprises 46% of total HUD units. While TBRA's share of utility costs is rising proportionately with its share of overall units, it still represents the largest portion of costs. This observation must be coupled with the

[51] *See* "Section 42 Utility Allowance Regulations Update," Federal Register, Vol. 73, No. 146, p. 43863; 26 C.F.R. § 1.42-10.

finding that potential cost savings are frequently correlated with pre-intervention utility usage.[52] In other words, the largest savings are reaped from the largest users. Such a finding suggests that TBRA UAs may be the most sensible place for HUD to start looking for utility cost savings.

Second, master-metered utilities in Public Housing and PBRA are the second largest driver of HUD's utility consumption, but present serious impediments to tenant conservation. In 2010, owner-paid utilities in those two programs constituted 32% of HUD's total utility expenditures, with roughly 60% of those costs attributable to Public Housing. As discussed above, tenants in those units have very little financial incentive to conserve because all resulting cost savings will accrue to PHAs or owners. Despite this split incentive, HUD has recently attempted a few tenant-side interventions, as discussed in Section IV. From a cost-effectiveness standpoint, however, this should be HUD's next top priority.

The third takeaway is that, while more research is required, PBRA may provide a model for other programs with regard to utilities. In practice, their methodology narrows discretion and perhaps reaps lower, and potentially more accurate, utility cost estimates. In addition, from an administrative standpoint, PBRA's contract administrator model appears better at monitoring utility expenses for accuracy and consistency.

Finally, this review of utility expenses in HUD's major rental assistance programs yields three methods for decreasing HUD's utility costs, summarized in Table 11. Section V explores concrete policies under the first two of these approaches.

- **Reduce UAs.** Holding all else equal, HUD's utility expenses will drop (and tenant costs will rise) if UAs decline. But HUD obviously cannot simply reduce UAs without justification. However, as explored in the next Section, UAs may be overestimated. Even where UAs are accurate on average, HUD could still aim to reduce specific UAs that are above actual consumption.

- **Encourage tenant conservation in master-metered units.** Tenants have little financial incentive to conserve utilities when they receive no part of the savings. Conversely, PHAs and owners stand to gain (at least partially) from any decrease in utility usage, whether from retrofits or from tenant behavioral changes. However, for reasons discussed in Section V, owners may be unaware of certain interventions that create short-term cost savings. Moreover, PHAs in Public Housing may lack the financial wherewithal to

[52] *See* Steven Winter Associates, Deutsche Bank Americas Foundation, *Recognizing the Benefits of Energy Efficiency in Multifamily Underwriting*, p. 3; 13. David Rosen & Associates, *Low Income Housing Tax Credits Projects and Energy Conservation; Utility Calculator Analysis: Policy Options* (2011), p.23.

implement changes that will create long-term savings because those cost savings will be captured by HUD (unless the property participates in an energy performance contract).

- **Claw back utility overpayments.** HUD could, theoretically, achieve cost savings by identifying tenants and owners whom HUD has overpaid and developing ways to recoup or otherwise co-opt those overpayments. The 3-year rolling base is one example of this: it provides the allure of short-term cost savings while recouping, in the long term, most of the savings of any conservation initiative. Though this is certainly one possible approach to cost savings, it has two main disadvantages. First, it reduces or eliminates incentives to conserve. Second, it is the least feasible of these approaches, partly because of information asymmetries between HUD and those receiving utility subsidies, and partly because attempts to claw back utility savings might anger owners and appear to contradict HUD's commitment to greater energy efficiency.

Table 11. Preliminary Analysis of Cost Savings Approaches

	Potential for cost savings	Negative conservation incentives	Feasibility
Reduce UAs	High		High
Encouraging conservation in master-metered PH units	Medium		Medium
Claw back overpayments: ▪ UAs ▪ PHA-paid utilities ▪ Owner-paid PBRA utilities ▪ Owner-paid TBRA utilities	Medium	X	Low

III. Utility Allowances (UAs)

Utility allowances account for an estimated $4.8 billion in annual utility costs, or 10% of HUD's estimated 2012 outlays. That's 50% more than the entire budget for Community Development Block Grants.

Yet despite the cost, HUD knows relatively little about UAs. HUD does not know what portion of UAs is spent each year on water versus electric, or sewer versus natural gas. HUD does not know whether UAs are accurate, or whether they are over- or underestimated. In Public Housing and TBRA, HUD does not know how each PHA calculates UAs, nor does HUD appear to have a centralized dataset of UA schedules or a detailed breakdown of the actual allowances given. These information gaps scuttle many attempts at reform and, with some exceptions,[53] little is currently being done to remedy them. It is difficult to imagine another $5 billion program that garners as little attention and analysis.

This Section dissects UAs in detail, with particular focus on the following questions:

- Who calculates UAs?
- How are they calculated?
- What financial and political incentives exist in the current system?
- Are UAs accurate?

To accomplish this task, this report pulls data from three sources: HUD regulations, interviews, and a newly created dataset of UA schedules. In order to avoid cluttering the text, the relevant HUD regulations have been compiled in Appendix B for reference. A more detailed description of the UA dataset is in Appendix C while a list of interviews is available from the author.

Who Calculates UAs?

According to regulation, only two entities can establish UAs. In Public Housing and TBRA, that entity is the **PHA**. In PBRA, that entity is the **contract administrator**, which could be HUD, a PHA, or a third party agency. However, PHAs and contract administrators often seek assistance in

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[53] One notable exception is HUD's effort to benchmark water and electric usage in Public Housing, which led to the development of benchmarking tools that PHAs can use to assess their properties against average consumption in the Public Housing stock. *Available at* http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/phecc/ubenchtool.

establishing UAs, either from **engineering consultants** or from **companies** who run a business of calculating UAs for HUD units (e.g., Nelrod, 2RW). Even though the process of calculating UAs is intended to be simple, some believe they lack the necessary expertise in energy or engineering. Others may assume that these entities will provide more accurate UAs than they could calculate themselves. Finally, in PBRA, the owners are also integrally involved in establishing UAs, since they collect the historical consumption data necessary for the calculations. **PBRA owners** also recommend specific UA levels, and anecdotal evidence suggests that contract administrators normally accept the owners' recommendations. These five groups will be collectively referred to as UA "**calculators**."

The only calculators with any consistent expertise are the third-party companies and the engineering consultants. The other three groups, who calculate the bulk of UAs, spend little time thinking about UAs, with the exception of when they need recalculating. Interviews suggested that the person responsible for calculating UAs often switches from year to year. One can imagine it is a rote rather than analytical task, probably involving updating spreadsheets with the most current utility rates and printing out the new UA schedules.

For all of these calculators, the consequences of miscalculation are low. UAs do not impact their bottom line. Assuming no change in tenants' actual utility costs, when UAs are calculated upward, tenants get more money and PHAs and PBRA owners pass along the costs to HUD. When UAs are calculated downward, tenants get less money and the savings accrue to HUD. Moreover, there is very little accountability. HUD rarely (if ever) audits UAs as an independent matter. And although UAs are a topic during periodic PHA reviews, they are not normally a large focus. Even if thorough audits were conducted, the requirements for compliance are minimal. Calculators must be able to show a current schedule of UAs and may also be asked for documentation to support their calculations (e.g., billing statements, spreadsheet calculations, engineering models). The auditor is very unlikely to actually check the accuracy of UAs themselves, since the regulatory standards are flexible enough to accommodate most estimates.

The same is true of legal challenges, which do occasionally arise, but are difficult cases to win because HUD regulations give calculators considerable flexibility in setting UAs within a "reasonable" or "typical" range. In 1987, the Supreme Court held in *Wright v. City of Roanoke* that tenants have the right to sue under the Brooke Amendment if UAs are set at unreasonably low levels.[54] Thus, because utilities are included in the Brooke Amendment's 30% cap, tenants have an enforceable right to a reasonably accurate UA. *Wright* rejected the argument that the "reasonable" standard was "too vague and amorphous" to be enforced by courts, but it did not decide, and no court has since decided, what would constitute an unreasonable UA. Given courts'

[54] 479 U.S. 418 (1987).

traditional deference to reasonableness standards, the tenant's burden of proof in court is likely to be high.

Tenants and builders do provide two sources of unofficial pressure on UA calculators. It must be remembered that PHAs and PBRA owners interact with tenants more frequently relative to TBRA, providing a source of continuous feedback. Financial incentives aside, these entities normally have the interests of tenants at heart and have chosen to work in the low-income housing sector because they want to help the residents they serve. If UAs are set too low, it is likely that tenants will make that known to the calculators.

Case Study: Long Beach
In the early 2000s, the Long Beach Housing Authority was threatened with a lawsuit by tenants' rights attorneys for keeping its UAs at artificially low levels. The tenants alleged that the City kept them low in order to encourage new affordable housing investment. In response, Long Beach raised its gas-and-electric UAs by 71% for a normal 2-bedroom unit.

Until recently, LIHTC builders provided a counterbalancing pressure from the other side. In LIHTC, the income stream of the owner is determined in part by the UA, such that lower UAs yield more cash flow. Until 2008, LIHTC developers were required to use the TBRA UA schedules published by PHAs in their proposals for new construction. Because the UA schedules were calculated from a large slice of the housing stock, including many old and inefficient buildings, the UAs frequently overestimated utility expenditures of newly constructed buildings by substantial amounts (20–40%).[55] As a result, LIHTC developers often urged UA calculators to update or recalculate their UA schedules, in the hopes that the allowances would decline. The inset case study is one example of how LIHTC developers and tenants pressured UAs in opposite directions. However, this informal source of downward pressure largely ended in 2008, when the IRS adopted new regulations[56] allowing LIHTC developers to use alternative methods to calculate more accurate UAs that reflect the efficiency of newer buildings. In sum, there are few institutional forces ensuring the accuracy of UAs and virtually no forces ensuring that UAs are not overestimated. That responsibility is HUD's alone, but very little monitoring is currently in place.

Methodologies

Different calculators use different methods for establishing UAs. Indeed, interviews suggested that there was very little consistency within Public Housing and TBRA. To give a sense, GAO found

[55] These numbers are based on the average reductions in UAs achieved by using site-specific UAs as part of California's UA Calculator, discussed in Section V.

[56] *See* 26 C.F.R. § 1.42-10.

that one East Detroit PHA set their UAs by copying a neighboring PHA's UA schedule.[57] These variations are myriad, but the most important sources of dissimilarity are described in the subsections below and summarized in Table 12 on page 44.

Historical Consumption vs. Engineering Model

Perhaps the first decision a calculator must make is whether to use historical consumption data or an engineering model to establish UAs. Theoretically, each methodology has advantages and disadvantages.[58] The historical consumption method is supposedly easier because it requires less technical information, and it provides a more accurate picture of what a unit's real usage looks like, accounting for all the idiosyncrasies of construction. However, obtaining the usage data from utilities can be a hassle because you need each tenant's written permission. Furthermore, this method only tells you what consumption currently *is*, and not what it *ought* to be, so it may fall short of the "energy-conservative household" standard. The engineering-based method, on the other hand, is highly technical and may require a trained professional to help, but it doesn't require tenant authorization, nor does it require that data be collected annually. The engineering model does give an estimate of what reasonable consumption *ought* to be, but its results are entirely hypothetical, and may not match the actual unit's consumption. Engineering models are particularly useful for determining what the consumption of new or newly retrofitted units will be.

Data about the relative frequencies of either method was unavailable. However, all sources consulted suggested that the consumption method predominates in TBRA and PBRA. This method may also predominate in Public Housing, but at least one major third-party calculator, Nelrod, calculates Public Housing UAs using their own homegrown engineering model.

Outsourced vs. In-House

The decision to use an engineering method usually, but not always, precipitates third-party involvement because PHAs and PBRA owners rarely have the expertise on staff to run their own engineering models. Nelrod and 2RW are two of the largest national firms that do this work, but, according to Nelrod, local energy consultants and engineers also do much of this work. Nelrod conducts UA studies for both large and small PHAs, and annual prices for the calculations range from about $1,000 to $4,000, with an average of approximately $1,700. Nelrod claims that their

[57] GAO, *supra* note 7, p. 73.

[58] *See* HUD, "Calculating Utility Allowances," Public Housing Energy Conservation Clearinghouse, *available at* http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/phecc/allowances2.

services are a budgetable item for PHAs that HUD will reimburse under the operating subsidy, but that was unverified.

If a PHA or PBRA owner opts for the consumption-based model, they may still choose to outsource calculations. In fact, even when setting TBRA UAs, it is not uncommon for PHAs to hire an outside company, even though HUD provides a free Excel-based Utility Schedule Model online. This may be an indication that the model's user-friendliness could be improved.

Despite the popularity of third-party consultants, most UA calculations are probably completed in-house regardless of the program. For small PHAs and most PBRA owners, consumption data will be easier to come by and resources for hiring outside consultants are likely to be scarce. Alternatively, Nelrod indicated that very large PHAs often calculate UAs themselves using their own methodology that builds on years of experience.

Specificity of Categorization

There is also wide variety regarding the specificity of the allowance itself. On one extreme is a UA custom-generated for one particular unit. On the other is a UA established for all 2-bedroom units in the jurisdiction. All UAs are specific to a certain unit size, which is almost always represented by the number of bedrooms.[59]

PBRA's UAs are nearly always specific to a certain building, and a UA schedule for a fictional property called "Village Gardens" would provide UAs for each unit size, broken down by the utility and end-use. Thus, a 2-bedroom unit might get \$30 for plugload electricity and \$59, \$14, and \$39 in natural gas for space heating, cooking, and water heating, respectively.[60] The total UA, which is the only amount reported to HUD, is the sum of those amounts, or \$142. Each 2-bedroom unit in Village Gardens would get that same amount, regardless of the number of occupants, their ages, or their actual consumption pattern.

If PBRA is nearly always site-specific, TBRA never is. Because TBRA allows tenants to take their voucher to any unit within the PHA's jurisdiction, it would be costly to calculate allowances for each of the properties included in a given PHA's TBRA portfolio. Moreover, the current regulations may prohibit site-specific UAs, since they require that PHAs use "normal patterns of

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[59] The number of bedrooms is not a very accurate measure of unit size and it also obscures potentially significant variation within units with the same number of bedrooms. Square footage would clearly be more accurate and also more costly to compute.

[60] Example taken from Georgia's Northern Region UAs for multifamily units in 2010.

consumption for the community as a whole."[61] For these reasons, PHAs often establish UAs for broader categories of units.

By far the most common divisions are between different types of properties, especially as between single-family and multi-family units. Many PHAs (the majority of those collected) have distinct UA schedules for three to five property types, by separating out manufactured housing from mobile homes, detached houses from rowhouses, or low-rises and high-rises. Most PHAs stop at this level of specificity, which is the only form of categorization allowed by HUD's Utility Schedule Model. However, other PHAs divide up their stock by geography, particularly if the jurisdiction is large and there are different utility companies serving various localities. Still others used less conventional categories, such as building age or number of exposed walls. For example, Virginia publishes UA schedules that use the number of exposed walls as a proxy for unit type but also as an indicator of likely heating costs.

Public Housing calculators use a mix of site-specific UA schedules and broader categories. Unlike TBRA, PHAs are intimately familiar with their publicly owned housing stock, so site-specific UAs are plausible. But sometimes PHAs group together certain kinds of units — like all pre-war, steam-pipe heated high-rises — to save calculation time.

Comparison Group

When employing the consumption-based method, calculators also use different pools of consumption data as comparison groups. For example, all site-specific UAs, including all PBRA UAs, use the property itself as the comparison group because that is where the consumption data originates. Public Housing calculators normally use data only from within their pool of residents, although some use calculations from utility companies which use an area-wide comparison group.

The most significant variation in comparison groups is in TBRA. HUD regulations require PHAs to "use normal patterns of consumption for the community as a whole" and base UAs on "the typical cost of utilities and services paid by energy-conservative households that occupy housing of similar size and type in the same locality."[62] The "locality" and "community" phrases prompt some PHAs to use their own jurisdiction as the comparison group. One popular method is to conduct a phone survey of tenants in neighborhoods where vouchers are commonly used to determine how much they pay for utilities. It is unknown if these phone surveys are very scientific — susceptible, as they are, to selection and self-reporting bias, among others — but they may get enough data points for a reasonable estimation. The other popular method, the one used by Nelrod and 2RW,

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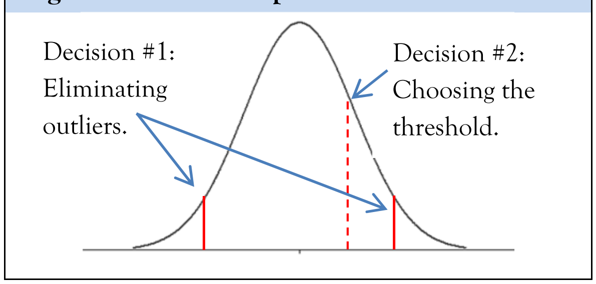
[61] 24 C.F.R. § 982.517(b)(1).
[62] 24 C.F.R. § 982.517(b)(1).

is to use HUD's Utility Schedule Model, which uses the nation as a whole as the comparison group. The HUD model is based on the Residential Energy Consumption Survey (RECS), which is a dataset created by the Department of Energy.[63] Regression analysis of RECS data created coefficients that have been integrated into HUD's model. Though this comparison group is a rather broad interpretation of "locality" or "community," it calculates UAs using local climate data (heating and cooling degree days), which provides a more localized approximation. However, because the HUD model uses average national consumption data, it probably overestimates for some localities and underestimates for others.

Consumption Threshold

The ambiguous language of HUD regulations gives calculators a choice of consumption threshold, which is actually two separate choices. The first choice is whether to use some subset of the comparison group which could be considered "energy-conservative." The second choice is to decide how to convert that distribution of data into a single UA. Examples of these two choices are represented in Figure 13, which shows a hypothetical distribution of utility consumption. The first choice is represented by the solid lines, which in Figure 13 eliminate the lightest and heaviest users. The second choice is represented by the dashed line, which sets the UA at one standard deviation above the mean, causing 15% of the sample to pay for utilities in excess of the UA. There appears to be no clear consensus on these choices among any of the programs. The conclusions in this report are based on anecdotal data and the suppositions of those familiar with PHA practices.

Figure 13. Consumption Thresholds



Most calculators seem to ignore the first question. If they do adjust their comparison group at all, it is by excluding a certain portion of data off the top and the bottom, thereby eliminating outliers. HUD's Utility Allowance Guidebook[64] also suggests adjusting historical consumption data for non-allowable end-uses by subtracting off consumption due to air-conditioning, laundry, or major resident-owned appliances.

As for the second question, opinions and practices vary widely. The average, whether calculated using a median or mean, seems to be a frequent approach. However, some argue that this is either too high or too low. The minority set UAs near the lowest consumer, arguing that if that tenant

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[63] *Available at* http://205.254.135.7/consumption/residential/.

[64] *Available at* http://portal.hud.gov/hudportal/documents/huddoc?id=doc_10600.pdf.

can survive on that amount, so can others. The majority set UAs at some higher level, arguing that most HUD tenants are already reasonably conservative in their utility usage. For either group, there is a question of whether to use a certain percentile, a standard deviation, or a multiplier to achieve the correct threshold. This decision alone may create considerable variation in UAs throughout all three programs.

Air Conditioning and Non-Allowable End-Uses

Air conditioning is treated differently in all three rental assistance programs. Public Housing regulations prohibit PHAs from including air conditioning in UAs.[65] TBRA regulations allow air conditioning only where it exists in a majority of the local housing market.[66] PBRA regulations are silent on the matter. It is difficult to know how closely these programs hew to the different regulations on air conditioning, but there is at least anecdotal evidence that, in spite the regulations, air conditioning is included in the UAs of all three programs.

HUD regulations also give calculators the discretion to exclude other non-allowable end-uses, such as laundry, ceiling fans, or major appliances not provided by the owner. There is likely some variation in this regard, although no evidence of systematic differences by rental assistance program.

Cross-Validation

One way to improve accuracy is to validate UAs by performing both the engineering- and consumption-based methods and checking their values against one another. This would prevent calculators from using an engineering model that badly miscalculated the required utility consumption. It would also help to identify those buildings whose tenants over-consume compared to the "energy-conservative household" standard. For all its benefits, cross-validation is a rare occurrence, if it occurs much at all. In fact, it is unclear whether calculators are even using one method correctly, much less two. The added expense is undoubtedly one reason cross-validation is rare.

Notice and Comment

Once UAs are set, each set of regulations has different requirements concerning notice to tenants and opportunity for comment. TBRA's regulations are silent on the subject. In PBRA, owners

[65] 24 C.F.R. § 965.505(e).
[66] 24 C.F.R. § 982.517(b)(2)(ii).

must give 30 days notice to tenants of a proposed decrease in UAs, and allow them opportunity to submit comments to HUD before it approves the decrease.[67] In Public Housing, PHAs must give 60 days notice before the effective date of any increases or decreases in UAs, and offer tenants the ability to submit written comments in response.[68]

Anecdotal evidence suggests that these comment periods can be quite political. Tenants and their advocates normally make the argument that UAs are set too low to cover the full extent of utility expenditures. On the other side are LIHTC developers, who push for lower UAs. However, after the 2008 changes to the IRS regulations, some states no longer require that LIHTC developers use the PHA's UA schedules, so this counterbalancing force is absent.

Review and Revision

Another disjuncture in both regulation and implementation is the extent of self-review and revision required of the calculators themselves. This is distinct from HUD's periodic reviews of PHAs and contract administrators. There are really three separate questions here:

- How often need UAs be reviewed?
- What does review entail?
- When are revisions required?

All three programs require that calculators review their own UAs at least annually. Public Housing also requires more frequent reviews when utility rates change 10% or more.[69] This regulation implies that Public Housing should be consistently monitoring utility rates, but the extent to which this actually occurs is unknown. PBRA also requires sub-annual utility analyses in connection with "special adjustments of contract rents."[70] Evidence gathered from interviews suggests that, in practice, calculators frequently fail to review UAs on an annual (much less subannual) basis.

What constitutes "review" is not always clear. Public Housing's regulations are the most explicit. They require a review of "the basis on which utility allowances have been established" which includes "all changes in circumstances . . . indicating probability of a significant change in reasonable consumption."[71] This would seem to require that PHAs review their calculations for

[67] 24 C.F.R. § 245.405(a), .410, .420.
[68] 24 C.F.R. § 965.502(c).
[69] 24 C.F.R. § 965.502(b).
[70] 24 C.F.R. § 880.610.
[71] 24 C.F.R. § 965.507(a).

determining reasonable consumption, but HUD's Utility Allowance Guidebook suggests that such recalculation is unnecessary if PHAs use certain methodologies.[72] In practice, most PHAs that conduct annual reviews probably only update utility prices, and not consumption estimates, unless the property has undergone a significant retrofit. One may guess that some PHAs simply change the date on their UA schedules.

Table 12. Summary of the Most Common Methodology Used by Each Program

	Public Housing	TBRA	PBRA
Consumption or Engineering	Probably Consumption	Consumption	Consumption
Outsource or In-house	In-house	In-house	In-house
Specificity of Categorization	Unit type and site-specific	By unit type	Site-specific
Comparison Group	One or more PHA-owned properties	The PHA's jurisdiction or nation	One property
Consumption Threshold	?	?	?
Air Conditioning and Non-Allowable End-Uses	AC prohibited	AC ok if common	?
Cross-Validation	None	None	None
Notice and Comment	60 days	30 days	None
Review and Revision			
How frequent?	Annual (more frequent if rates change)	Annual	Annual
What is review?	Alter rates/change date	Alter rates/change date	Submit utility analysis
What triggers revision?	Non-adherence and 10% change or more	10% change or more	10% increase or more

Source: Estimates from interviews with calculators and experts in the field.

TBRA regulations do not specify what review entails.[73] It is unlikely that PHAs do a new phone survey every year or start a new version of the HUD model. Instead, as in Public Housing, they likely update the utility rates each year if any update is made at all. PBRA is the only program that requires annual recalculation of recent consumption.[74] However, a recent study suggests — and my interviews confirmed — that many owners do not comply with that requirement.[75]

The final question is what triggers mandatory revision of UAs. In Public Housing, revision is required whenever necessary to "continue adherence" to the regulatory standards or whenever

[72] HUD, *Utility Allowance Guidebook* (1998), p. 87 (exception for use of a fixed, weather-normalized database).

[73] 24 C.F.R. § 982.517(c)(1).

[74] Regulations only require an "analysis," the contents of which is further clarified by each regional hub.

[75] Housing Preservation Project and the Sargent Shriver National Center on Poverty Law, *Inconsistent Administration of Project-Based Section 8 Utility Allowances Threatens Low Income Families* (2010), *available at* http://www.hppinc.org/_uls/resources/UA_Study_-_5-18-11_with_Tab.pdf.

utility rates change by 10% or more.[76] Both requirements are ambiguous. The first does not explain how different a UA would have to be to not adhere to the regulatory standards. The second does not specify whether PHAs should consider utility rates together or separately. If electricity prices rise but natural gas prices fall, do they cancel each other out or should both be revised? In TBRA, revision is required when utility rates change by 10% or more, but there too the requirement is not further specified.[77] In PBRA, the owner must request a change in UAs only when utility rates have increased by 10% or more.[78] No revision is required for decreases and no detail is given regarding whether changes in utility rates should be considered individually or as a group.

Historical Context

Some of these regulatory and methodological differences are the result of historical disputes between the relevant stakeholders. As one HUD statement put it, "The history of the utility allowance regulation has been marked by controversy."[79] Though a full history of UAs is not the goal of this report, a few important historical moments are described in this subsection. Because most of the controversy centered on Public Housing, the following references apply only to that program.

During the energy crisis of the 1970s, HUD began to pay greater attention to utilities, which had previously been a relatively modest expense. In 1975, as one way of reducing energy consumption, HUD proposed regulations that would require PHAs to individually meter all utilities "to the extent practicable."[80] This could be accomplished by submetering the utilities or by converting them to tenant-paid utilities. HUD studies found that these changes, which would force tenants to face the costs of their consumption, would result in utility consumption savings of 10–35%.[81] These regulations were adopted in 1976, and required PHAs to complete a cost-benefit analysis of conversion within 18 months.[82]

By 1978, approximately 100 projects had already been converted, and about 350 more were in the process of conversion, when the Massachusetts Union of Public Housing Tenants (MUPHT) sued

[76] 24 C.F.R. § 965.507(a), (b).
[77] 24 C.F.R. § 982.517(c)(1).
[78] 24 C.F.R. § 880.610.
[79] 49 Fed. Reg. 31401 (1984).
[80] 40 Fed. Reg. 44159 (1975).
[81] *Id.*
[82] 41 Fed. Reg. 20276–20278 (1976).

HUD to enjoin the regulations as arbitrary and capricious.[83] In 1983, the federal district court held in favor of MUPHT and enjoined any further conversions under the 1976 regulations.[84] The court found that HUD had not shown any rational basis for concluding that individual metering would cause 25–35% reductions in space heating costs. As a result, HUD removed the requirement that PHAs individually meter utilities. PHAs could still convert on their own volition, but threats of lawsuits were well publicized.[85]

In 1979, during the pendency of this litigation HUD proposed new regulations attempting to streamline the calculation of utility allowances by basing all allowances on "the actual consumption data for the project."[86] At that time, HUD's UA regulations had not been revised since 1963, resulting in different standards for utilities that were checkmetered versus those that were directly paid by tenants.[87] UAs for tenant-paid utilities were set at the average of actual tenant utility costs, whereas UAs for checkmetered utilities were set at the average plus 20%.[88] The 1979 proposed rule would have required PHAs to set all UAs at the average of actual utility costs for both tenant-paid and checkmetered utilities. The rule also provided for surcharges or credits for any checkmetered tenants that differed from the UA by more than 15%.

Both tenants and PHAs vehemently opposed the 1979 rule. Tenants believed that setting "reasonable" consumption to the average of actual consumption was too low, while PHAs argued it was too high.[89] Tenants argued that they should get a larger buffer than 15%, while PHAs argued the opposite. Moreover, PHAs argued that individualizing UAs to each property was overly burdensome. Some PHAs already collected property-specific data and calculated property-specific UAs, but many others collected more generalized consumption data (e.g., from utility companies) and calculated more generalized UAs (e.g., "all post-war garden apartments"). Based on these objections, HUD withdrew the proposed rule and instead instituted an interim rule in 1980, making mandatory a version of the 1963 standards that were previously discretionary.[90] For tenant-paid utilities, PHAs were to set UAs to the average of actual utility costs for certain categories of units decided by the PHA (e.g., "all 5+ story highrise apartments"). For checkmetered utilities, PHAs were to set UAs at the 90th percentile of actual tenant consumption, on the

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[83] Lynn E. Cunningham & Steven Ferrey, *HUD Utility Allowance Program Spawns More Disputes with Public Housing Tenants*, 19 CLEARINGHOUSE REVIEW (Nov 1985), p. 738.

[84] *See Massachusetts Union of Pub. Hous. Tenants v. Pierce*, 577 F. Supp. 1499, 1500 (D.D.C. 1984).

[85] *See* Cunningham & Ferrey, *supra* note 83, p. 740.

[86] 44 Fed. Reg. 1600 (1979).

[87] *See* Cunningham & Ferrey, *supra* note 83, p. 740.

[88] 49 Fed. Reg. 31401 (1985).

[89] 45 Fed. Reg. 59502 (1980).

[90] *Id.*

rationale of avoiding excess surcharges. Additionally, PHAs were required to adjust UAs if the amount of tenants surcharged exceeded 25%.

The reaction to the interim rule was no friendlier. Tenants commented that UAs were set too low while PHAs commented that the regulation was costly and included no incentives for tenants to conserve energy.[91] PHAs particularly attacked the portion of the regulation applying to checkmetered utilities. In their view, basing UAs on actual consumption did not encourage conservation, but worse yet, the interim rule also allowed 90% of tenants to escape from facing the costs of their utility usage.

Responding to these complaints, HUD in 1982 proposed a "single general standard" that would apply to all individually metered utilities: "reasonable consumption of utilities by an energy-conservative household of modest circumstances consistent with the requirements of a safe, sanitary, and healthful living environment."[92] In contrast to the earlier proposals, the new rule refused to mandate certain calculation methodologies:

> Experience with the proposed and interim rules and consideration of comments received from the public agencies required to administer them have persuaded the Department that it is inadvisable as a practical matter . . . to attempt to prescribe more restrictively the means by which individual PHAs must realize the general standards for allowances described above. There are more than 2,750 PHAs in the United States, located in different climates, having housing stock and appliances and equipment of widely varying characteristics. Data regarding energy consumption patterns, both within the public housing population and in the broader area or regional populations, that are available from utility companies in large urbanized areas are likely to be vastly different from the type and extent of data available to small authorities in rural areas.[93]

Rather than prescribe particular data sources or methods of calculation, the 1982 rule provided a number of factors on which PHAs should base their UA schedules, but gave them considerable flexibility in implementation. Once a UA was established, the 1982 rule provided no buffer for excess use, but required tenants to pay for anything above the UA, regardless of whether utilities were tenant-paid or checkmetered. Moreover, the proposed rule removed all requirements that HUD review and approve UAs. This rule was adopted, with minor changes, in 1985 and has remained substantially the same since.[94]

While it only covers Public Housing, this history illustrates several important dynamics that may be applicable to all three programs. First, it offers a glimpse into the arguments on both sides that HUD could expect if it sought to make any regulatory changes in this area. Second, the history

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[91] 47 Fed. Reg. 35250 (1982).
[92] 47 Fed. Reg. 35251 (1982).
[93] 47 Fed. Reg. 35251–35252 (1982).
[94] 49 Fed. Reg. 31399–31410 (1985).

explains why current HUD regulations have such vague standards for calculating UAs. The reason seems to be that HUD found it more feasible to decentralize discretion to the PHA level rather than continue the dispute at the national level. This may have been a sensible management decision but, given the controversy around the 1979 proposed rule and the 1980 interim rule, it could just as easily have been an effort to shift the political dispute from a national to a local level, allowing headquarters to stay above the fray. Regardless, the upshot of HUD's prior failed effort to streamline UA calculations is that an underlying tension remains regarding what amount of usage ought to be subsidized by HUD. Rather than HUD making that decision, PHAs currently make that decision, yet HUD must live with the budgetary consequences.

Are UAs accurate?

Taxpayers will spend nearly $5 billion on UA costs in 2012. Yet we know remarkably little about UAs on a micro level. The foremost experts in the country on UAs were unable to answer basic questions about them. Are they overestimated or underestimated? Are there states or PHAs where UAs are particularly high? How much do they fluctuate year-to-year, and does that fluctuation generally track changes in utility prices? How much variation exists within a given region? These questions and others are unanswerable without data that HUD does not currently collect.

PBRA does the best job of keeping data about UAs. A publicly available dataset lists the total UA for each property in the program, broken down by unit-size.[95] However, this data has significant shortcomings, especially in that it only reports a single dollar amount. The public UA dataset is not disaggregated by utility or end-use, nor are rates separated from consumption amounts (the same appears to be true of HUD's internal data). This makes it very difficult to compare across properties, regions, or years.

Yet, for all its shortcomings, PBRA keeps much better data than the other two major rental assistance programs. Public Housing keeps no comprehensive dataset. HUD stores the amount allotted each year to each tenant, but those amounts are not disaggregated or analyzed in any systemic fashion, nor are they made publicly available.

TBRA's regulations require that each "PHA must give HUD a copy of the utility allowance schedule,"[96] but compliance with this rule seems to be loosely enforced. None of the interviews with headquarters or any of the regional offices indicated that there was a compilation of UA schedules being stored. Many interviewees at PHAs and field offices said that submittal was not required in practice. In sum, TBRA also lacks a dataset of UAs for analysis.

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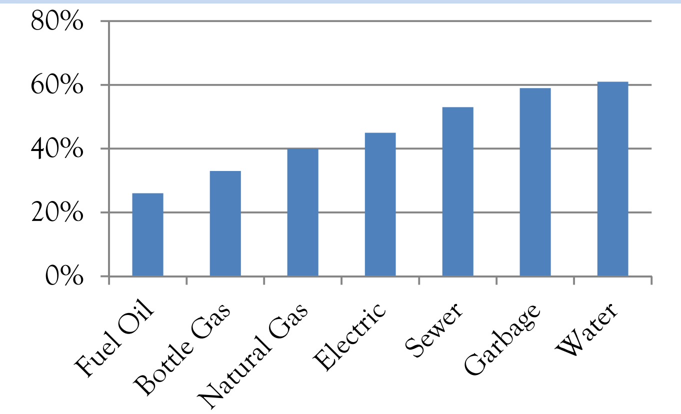
[95] *Available at* http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/mfh/presrv/mfhpreservation.
[96] 24 C.F.R. § 982.517(a)(2).

To remedy this data gap, UA schedules were gathered from approximately 500 PHAs and state housing-finance agencies around the country. A detailed description of the data is contained in Appendix C, but a couple important disclaimers should be noted here. First, this data included only publicly published UA schedules intended for TBRA. It did not include UAs for Public Housing and PBRA. Second, unlike the aforementioned PBRA data, which gives actual aggregated UAs, these UA schedules give non-actual disaggregated UAs, which has advantages and disadvantages. The disaggregation allows for comparisons within and between PHAs based on utility type and end-use, which is good. But the schedule itself does not indicate what actual UAs ended up being for each tenant; it's more of a menu from which final UAs are calculated. This deficiency makes it difficult to assess budgetary impact. Nonetheless, this dataset provides a very fruitful first look at the largest portion of HUD's utility costs. While the disparities in available data prohibit a comprehensive analysis across programs, the new data set of TBRA UAs is explored in more detail below.

Figure 14. Inconsistency of UAs by Utility (% of variance unexplained)



TBRA UAs Are Remarkably Inconsistent

Several interviewees noted that the only thing they could say for sure about UAs was that they varied widely (wildly, some said). "They're all over the map," one subject stated. The TBRA data collected in this report supports this conclusion. After controlling for bedroom size, year, region, end-use, and climate,[97] the UAs for each utility type still contained considerable statistically-significant variation (see Figure 14). For instance, just 39% of the variation in water UAs was explained by the control variables. In contrast, 74% of the variation in fuel oil was explained by the controls.

A closer look at particular regions bears out these dramatic – and seemingly inexplicable – variations. For example, data was collected from ten different PHAs within the Twin Cities metropolitan area, all within 50 miles of one another.[98] Between those ten PHAs, the UA for electric heating for a 2-bedroom single-family home ranged from $26 to $104 (see Figure 15).

[97] State fixed effects were used as a rough proxy for climate because HDD and CDD data was unavailable given the timeframe for writing this report. Once inputted, this latter climate data will better weather-normalize the dataset.
[98] See the map of the Twin Cities PHAs here: http://www.housinglink.org/Files/Section_8_jurisdiction_map.pdf.

What could explain this four-fold difference in PHAs right next door to one another? That same group of units shows a nearly five-fold difference in water UAs (see Figure 16).

Other regions show more uniformity, but still sizeable differences. Compare the Twin Cities with the 83 counties in the state of Michigan. There, UAs for electric heating for a 2-bedroom single-family home ranged between $69 and $105, a range half as small (but still considerable). Water UAs for those units ranged from $19 to $41.

Certain states exhibit much more variation than others. Figure 17 illustrates the level of unexplained variation within each state in the dataset, meaning the percentage of UA variation within each state not explained by the control variables. Texas, Florida, and California exhibit the greatest within-state inconsistency, whereas Missouri and the Carolinas exhibit the least. The size of the top three states might explain some of their variation, but many less climatically diverse states, like Louisiana and Wyoming, are near the top as well.

UAs within a given jurisdiction also exhibit strange time trends. For example, the four states shown in Figure 18 and Figure 19 provided at least five years of data from the same sources since 2003. Their growth patterns show very little relation to one another, either by utility type or on average over time.

Figure 15. Twin Cities UAs for Electric Heating in 2-Bedroom Homes

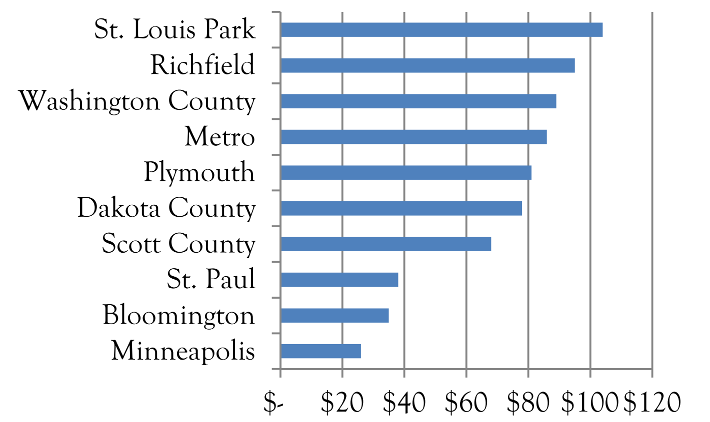
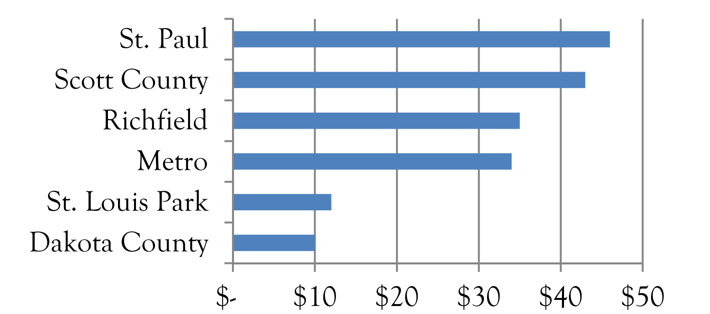


Figure 16. Twin Cities UAs for Water in 2-Bedroom Homes



In short, UAs vary considerably and in unexpected ways. Even controlling for differences in utility rates and weather does not eliminate the dramatic gaps between PHAs. Although several explanations could be advanced for these inconsistencies, interviews seem to indicate that differences in calculation techniques may account for a large portion of the variation. In any event, the extent of the unexplained variation underscores the notion that UAs are subjectively determined, and may even be systematically inaccurate.

Figure 17. Inconsistency of UAs, by State (% of variance unexplained)

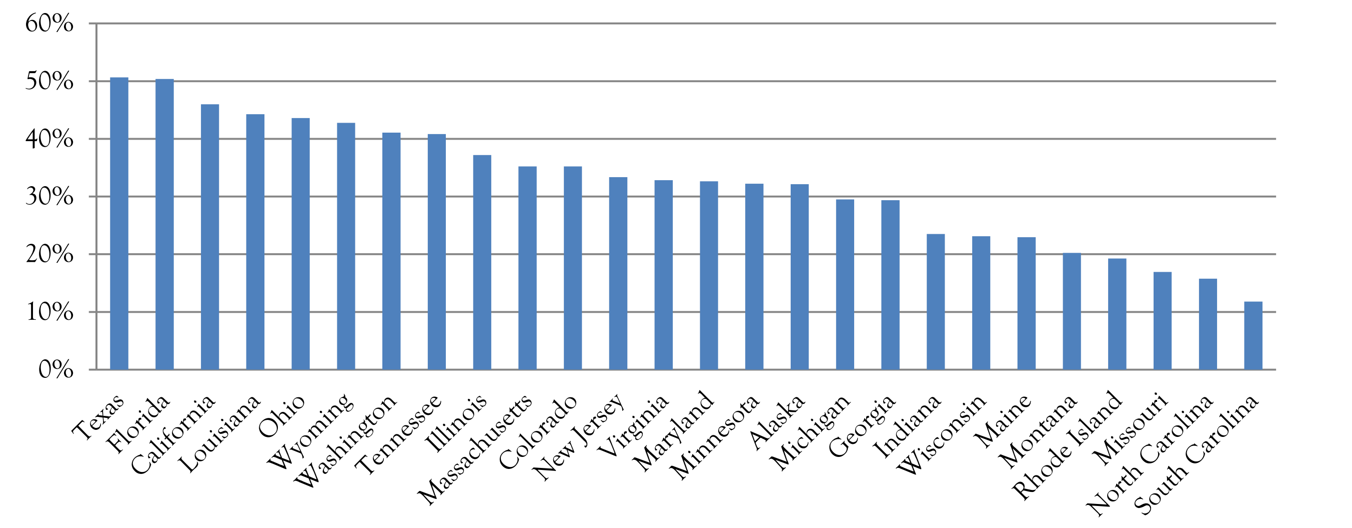


Figure 18. Avg. Annual UA Growth, 2003–11

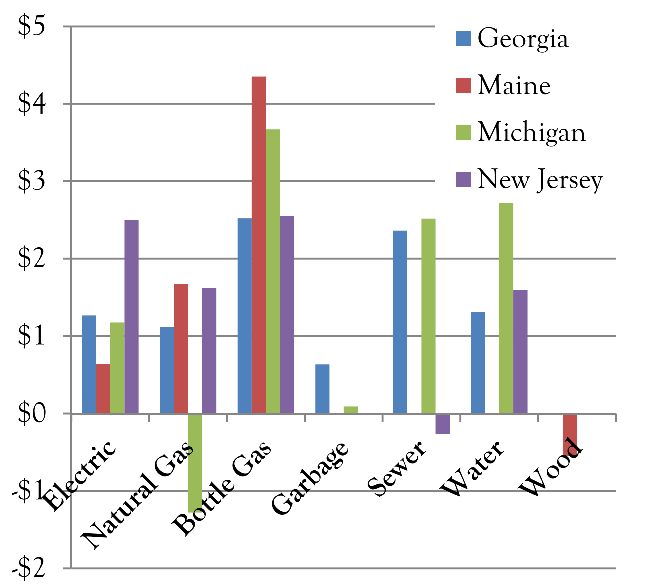
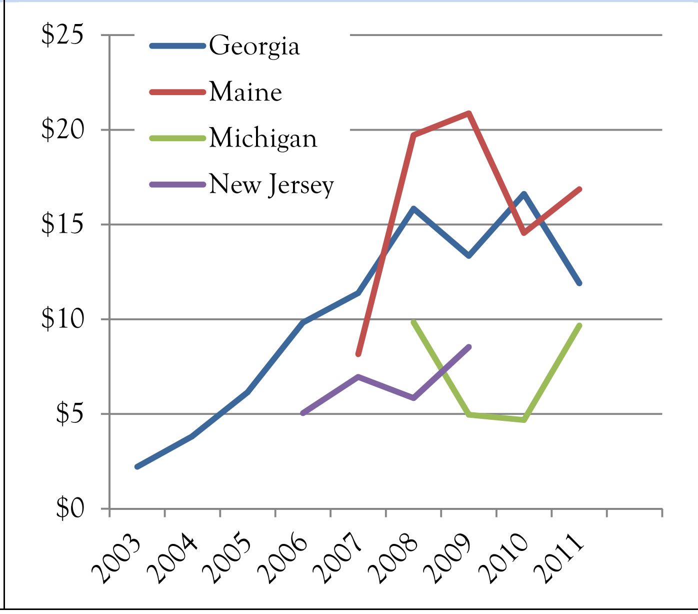


Figure 19. Growth in Average UAs Over Time



Are TBRA UAs Over- or Underestimated?

The next question is whether TBRA UAs are systematically over- or underestimated, or whether they simply vary around an accurate mean.[99] For example, take the Twin Cities case shown above in Figure 15, where electric heating UAs in 2-bedroom homes ranged between $26 and $104. Would an accurate UA be $65, the average between the two, or is the accurate number closer to the low or high end of the range? This question is important because, if UAs are systematically overestimated, then HUD may be overspending taxpayer funds, but if UAs are systematically underestimated, then tenant rent burdens may be too high.

Perspectives on this question strongly diverge. Tenant advocates insist that UAs are too low to account for the high and rising cost of utilities. They also complain that PHAs do not comply with the regulations requiring annual review and mandatory revisions. Even while acknowledging the sometimes lax practices of some PHAs, many owners and energy-efficiency experts disagree that UAs are insufficient. They insist that many of the commonly accepted calculation methods produce UAs that exceed the needs of low-income households.

The only known report to address this dispute is outdated and does not satisfactorily resolve the debate. In 1991, GAO published a report entitled "Utility Allowances Often Fall Short of Actual Utility Expenses," which found that 70% of the TBRA tenants they surveyed paid more than 30% of their income in rent and utilities combined.[100] However, GAO's analysis was overly simplistic. It asked tenants what they actually paid in utilities, but it did not subtract out the optional utility costs that tenants incur above and beyond those covered by HUD (e.g., dishwashers, laundry, air conditioning). It also did not account for tenants that voluntarily choose to increase their rent burdens above 30% by selecting units with rents above the payment standard.[101] Nor did GAO account for the possibility that tenants may choose to spend more on utilities than that which an energy-conservative household would. In other words, though GAO's findings are an important indicator of UA accuracy, they do not necessarily prove that UAs are underestimated.

Other evidence bolsters the conclusion that UAs may be insufficient to cover tenants' actual utility expenses. The most recent data from the Residential Energy Consumption Survey (RECS) show that in 2005 total energy expenditures for those below 100% of the poverty line were $1,485,[102]

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[99] In other words, the prior subsection dealt with the density of the distribution of UAs, whereas this subsection deals with its central tendency in relation to actual consumption.

[100] GAO, *Utility Allowances Often Fall Short of Actual Utility Expenses* (1991), p.3. The same report found that tenants in TBRA had an average rent burden of 36%, while those in Public Housing had an average rent burden of 30.5%.

[101] This is allowed up to a cap of 40% rent burden.

[102] 2005 RECS Survey Data on Consumption and Expenditures, Table US1, *available at* http://205.254.135.7/consumption/residential/data/2005/c&e/summary/pdf/alltables1-15.pdf.

whereas TBRA's per-unit UA costs during that period were around $1,200 — almost $300 less even after including some water, sewer, and garbage, which the RECS figures exclude. Unfortunately, more granular comparisons between the general population's consumption and the new UA dataset are not currently available.

Much of the disagreement about the over- or underestimation of UAs avoids the underlying issue, which is that the regulatory standard for setting UAs is inherently ambiguous. In other words, empirical issues aside, tenants and owners may simply disagree about what constitutes reasonable consumption for an "energy-conservative household." Clearly more data would aid in allowing for better comparisons between UAs and actual usage, but it would not clarify the underlying regulations or resolve the larger tension regarding what level of utility consumption the government *ought* to subsidize.

IV. Current Policies Encouraging Behavioral Utility Savings

Architectural solutions (retrofits) have dominated HUD's recent policies aimed at utility conservation. Even before ARRA, structural retrofits were the main focus of HUD's energy plan.[103] ARRA itself included $250 million for a Green Retrofit Program in PBRA and 202/811 and $1 billion for retrofits in Public Housing. This brick-and-mortar focus makes good sense, since cost savings from energy-efficiency retrofits are proven and often easily achieved. Most of HUD's work has focused on incentivizing these retrofits, removing financing and regulatory barriers, and driving demand for green retrofits.

Tenant conservation, especially concerning behavior change, has received far less attention and study from HUD. One reason for this is that the utility savings from tenant-side interventions are usually less certain and less pronounced. Behavioral changes are necessarily mediated through an unpredictable and diverse tenant population, which may respond differently to interventions developed in other regions or cultural contexts. Given the disparities in the data currently collected by HUD, outcomes are also more difficult to measure. Architectural alterations, by contrast, are more concrete and predictable.

But tenant-focused programs present promising, and relatively less expensive, interventions that can be coupled with retrofits or undertaken independently. These programs — which focus mainly on energy consumption, although some also integrate water, oil, or gas savings — use a number of techniques to alter tenant behaviors around utility consumption, ranging from simple information-sharing to goal-setting, competition, social norm comparisons, and consumption feedback. Most importantly, recent scholarship is unlocking the secrets to successful behavioral interventions and has more precisely measured the probable impacts of various interventions.

Potential Utility Savings in Behavioral Conservation

A variety of tenant motivational techniques have demonstrated success. While some of these techniques have already been studied by HUD, others are currently being tested by a variety of entities. Recent studies show potential savings of 5.7–10% when programs use social norms to encourage energy consumption.[104] Other studies show that extracting conservation commitments from tenants and setting concrete goals can induce energy savings. A 2007 study found that Dutch

[103] *See, e.g.*, Energy Task Force, PD&R, HUD, *Promoting Energy Efficiency at HUD in a Time of Change: Report to Congress* (2006).

[104] *Id.*, p. v.

tenants who were given a 5% goal along with information about the energy problem and feedback about their usage reduced energy usage by 5.1% after 5 months.[105] The benefit of conservation commitment techniques is that they tend to generate more durable savings patterns without repeated interventions.[106]

Feedback approaches seem especially promising. A recent meta-analysis of feedback interventions estimated 4–12% cost savings, depending on whether the feedback was in real-time or given each billing cycle (see Table 13).[107] The study found that enhanced billing, the least costly feedback option, created the most energy cost savings per dollar invested ($2.75).[108] OPower, a Virginia-based company, is the presumptive leader in this field (see inset), but competition is increasing.

Table 13. Savings from Usage Feedback

	Type of Feedback	Range of Savings	Mean Savings
<< More info/cost	Enhanced Billing	1–10%	5.2%
	Estimated Feedback	5–9%	6.8%
	Daily/Weekly	4–21%	11.0%
	Real-Time Aggregate	-6–32%	8.6%
	Real-Time Plus	9–18%	13.7%

Case Study: OPower

OPower provides enhanced billing services for utility companies that compare customers to their neighbors (see example below). The bill shows the customer's consumption in comparison to all similar neighbors, as well as those who are most efficient. It also gives an assessment of the customer's conservation, as a form of positive or negative reinforcement.

A 2009 study conducted a large-scale randomized control trial of OPower's billing services in Sacramento, CA and Puget Sound, WA. The study found that customers receiving OPower's billing inserts reduced their energy usage by an average of 1.2–2.1% compared to the control group. Sacramento saved $2.78 per household for each monthly mailer and Puget Sound saved $5.57 per household for each quarterly mailer. Perhaps most importantly for HUD's purposes, savings were greater at lower incomes. The two lowest income quintiles reduced energy use by 25–100% more than the mean.

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[105] Wokje Abrahamse, et al., *The Effect of Tailored Information, Goal Setting, and Tailored Feedback on Household Energy Use, Energy-Related Behaviors, and Behavioral Antecedents*, 27 J. OF ENVIRO. PSYCH., p. 271 (2007).

[106] Ehrhardt-Martinez et al., *supra* note 107, p. 50.

[107] Karen Ehrhardt-Martinez, Kat A. Donnelly, & John A. "Skip" Laitner, *Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities* (June 2010), p. 74.

[108] *Id.*, p. 78.

Energy Innovation Fund

Currently, HUD has only a few initiatives targeting resident behavior. One of these is the Energy Innovation Fund, which recently announced twelve recipients for their applied research grants, and four of those projects focus in whole or in part on resident behavior. For example, one project in Newark, NJ is experimenting with "providing real-time, tenant-specific information on energy use, along with education and some modest incentives" in a large, elderly-only, master-metered PBRA building.[109] Another project in Colorado is combining structural alterations with behavioral interventions developed by universities in the area.[110] These initiatives are promising but have not yet been launched.

Updating HUD's Utility Schedule Model

Another HUD initiative currently underway is the revision of the HUD Utility Schedule Model, used in the TBRA program. The current model[111] was last updated in 2007, when HUD incorporated 2005 RECS data. PD&R is currently in the process of updating the model with 2009 RECS data, which will update the consumption estimates embedded in the model. These updates alone could provide cost savings for HUD because indicators show that residential consumption of both electricity and natural gas fell between 2005 and 2009 by approximately 2.5% and 1.2%, respectively.[112] If these declines were reflected in UAs nationwide, the change would yield $60 million in taxpayer savings or 7,700 new vouchers.

In addition to updating the underlying consumption data, HUD also plans to move the Utility Schedule Model online. An online platform has many advantages, including the potential for improved ease of use and automated updates to the climate data (HDDs and CDDs). Moreover, through an online system HUD could begin to capture some of the UA schedules generated by specific PHAs. Developing such a dataset would help HUD understand whether UAs are accurate and how often they are updated. It could also give HUD a sense of how often its model is being used, and therefore a measure of consistency within TBRA. One of the potential disadvantages of moving the model online is that the calculations themselves would be hidden from the user. This would prevent users from catching errors in the calculations, which have been caught in the

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[109] Press Release, *HUD Awards $23 Million to Test New Energy-Saving Approaches in Older Multi-Family Housing Developments* (Mar. 8, 2012).

[110] *Id.*

[111] Available at http://www.huduser.org/portal/resources/utilmodel.html.

[112] World Bank International Energy Agency, *available at* http://bit.ly/J9PJXv; Energy Information Administration, *Trends in U.S. Residential Natural Gas Consumption* (2010), p. 1.

current model. However, the online system could be customized to fix that issue by showing the calculations for those interested.

Energy-Efficient Utility Allowances (EEUAs)

The final HUD initiative concerning the calculation of UAs is not officially a HUD initiative at all. Before the 2008 changes to the IRS's LIHTC regulations, a number of PHAs, especially in California, requested permission from HUD to calculate energy-efficient UAs (EEUAs). These UAs predominantly benefited LIHTC developers who sought lower UAs that more accurately reflected the energy-efficient buildings they planned to build. Municipalities were eager to offer EEUAs because they would lure LIHTC developers to build in their jurisdictions.

EEUAs were never officially sanctioned by HUD. The closest thing to official approval was a small blurb in the March 2004 issue of the *Public Housing Energy Conservation Clearinghouse News*, which listed the City of Riverside's EEUA schedule as a success story.[113] Apparently some PHAs also got HUD waivers from headquarters. The regulations themselves are silent on whether separate allowances for more efficient buildings are allowed.

It must be noted that the cost savings from EEUAs accrued mostly to owners and developers, not to HUD or its tenants. In fact, the future tenants of these new LIHTC developments saw their monthly payments rise as a result of EEUAs, because as their UAs declined, their monthly rent contribution increased. This could be seen as a fair tradeoff since those hypothetical tenants would have otherwise had rent burdens below 30%. The LIHTC program affects HUD only to the extent that TBRA or PBRA subsidies attach to units in LIHTC buildings. In those cases, the cost savings of EEUAs accrue to HUD and not the developer.

Though EEUAs were essentially created to spur LIHTC development in the new construction market, their use in existing developments has untapped potential. Using them in existing LIHTC properties would be suspect, since the result would increase income for owners at the expense of tenants. Such UA reductions should only be allowed when coupled with substantial energy-efficiency retrofits. On the other hand, the implementation of EEUAs in existing rental assistance properties is promising. The result would be to lower UA subsidies to tenants in energy-efficient buildings where UAs are overestimated. The cost savings would accrue to HUD and could be better utilized in other programs. This idea is more fully explored under site-specific UAs in the next Section.

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[113] "Success Stories: Housing Authority of the City of Riverside," *Public Housing Energy Conservation Clearinghouse News March–April 2004*, available at http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_10701.pdf.

V. Potential Cost-Saving Solutions in Utility Conservation

HUD could and should be doing more to reduce its $9.1 billion utility bill. Work on the retrofit side is hitting its stride, but work on the tenant side is lacking. This Section provides a menu of policy options that could reduce utility consumption and generate cost savings for HUD. Most of the suggested policies relate to UAs or to behavioral interventions with tenants. Some policies are regulatory, others are institutional, and still others are quick fixes. In each subsection, policy alternatives are explained, theoretical benefits are assessed, and the potential implementation challenges are diagnosed.

Reduce Overestimated Utility Allowances

The first series of policy options aim to reduce UAs. It bears repeating that UAs should only be lowered where they are overestimated. Given the nature of UAs, which are inherently approximations, some portion of UAs are bound to be overestimated. In addition, as discussed in greater detail in Section III, there are some reasons to believe that current UAs are systematically overestimated, although the weight of evidence seems to suggest the opposite. The policies presented here target both the individual and potentially systematic overestimation of UAs, but their approaches necessarily differ.

Site-Specific Utility Allowances

The 2008 changes to the IRS's LIHTC regulations inadvertently removed an informal accountability mechanism on TBRA UAs. Previously, developers would clamor when PHAs set UAs at excessive levels because those estimates directly impacted their pocketbooks. With the new regulation, most states now allow developers to calculate site-specific UAs, which results in less downward pressure on PHAs' UA schedules.

But this challenge may also present an opportunity. State tax-credit allocation agencies have begun to approve site-specific UA calculators for use in the new construction market. However, these same tools could be used on existing properties as well, where there is reason to believe that UAs are overestimated. The result would be to lower UAs to more accurate levels and simultaneously decrease HUD's subsidy to a more accurate amount.

The clear leader in this area is California, which first implemented the California Utility Allowance Calculator (CUAC) in 2009. The CUAC is a highly tailored engineering-based program that estimates the utility consumption of a given property. Using it requires the assistance of an engineering consultant who creates a model of the building which is then fed into the CUAC. It differs from other engineering models in its level of detail (e.g., architectural idiosyncracies) and in its general applicability (i.e., it takes standardized inputs).

Results from the CUAC are still preliminary, as California's tax-credit allocation agency has yet to validate the estimates with actual usage. However, around 35 buildings have thus far used the CUAC to calculate UAs for their LIHTC developments. The tax-credit agency estimates the costs of using the CUAC to be $5,000–$7,500 per building, mostly for creating the model. The ongoing annual costs of keeping the UA schedule updated are minimal. On average, the CUAC has lowered UAs in comparison to the local PHA's published UA schedule by around 20%. Where tenants in the property also qualify for California's reduced rates for low-income households, CUAC savings average around 40%. These reductions accrue to the developer as an income stream, and therefore encourage more affordable housing development. With average per-unit UAs at $1,632 per year, a 20% reduction for a 50-unit building would generate annual savings of $16,320. In that case, the payback period for the energy consultant would be less than 6 months.

Other state tax-credit agencies have expressed interest in the CUAC, and Washington has already arranged to obtain the CUAC free of charge from California's Energy Commission.[114] In addition, the Energy Commission is in the final stages of putting the CUAC online, and it should be available for use by June 2012. The online version will keep an updated dataset of California's energy rate tariffs and also improve the security of the calculator.

The potential benefits to HUD of site-specific UAs are considerable. Although HUD could not expect the same 20–40% savings that new buildings generated, some savings could be expected as long as the correct properties were selected. Targeting the tool is the real challenge. The greatest cost savings would be generated by newer, more efficient properties, and many of the larger targets that fit such criteria are in PBRA, which already uses (consumption-based) site-specific UAs. Another challenge is encouraging calculators to use such a tool when UA adjustments generally do not affect their bottom line.

This leaves three possible implementation strategies. The first is to use a site-specific UA calculator on properties undergoing energy-efficiency retrofits. Public Housing already has an initiative like this under their Energy Performance Contracting (EPC) program, called the "Resident-Paid Utility Incentive." This incentive allows PHAs to lower UAs after a retrofit while HUD freezes their subsidy for the length of the EPC contract.

[114] The Energy Commission expressed a willingness to share the CUAC with HUD if desired.

HUD is also piloting a similar program for PBRA in conjunction with Stewards of Affordable Housing for the Future (SAHF). SAHF will complete retrofits on a number of properties under EPCs lasting no longer than 10 years. After the retrofits are completed, UAs will be reduced by 50% of the anticipated energy cost savings, and HUD will increase contract rents by the same amount. After the first year, SAHF can reduce UAs by the full 100% of the actual consumption savings, and HUD will increase contract rents by 95% of those savings, thereby keeping 5% of the energy cost savings. Actual savings need only be calculated after the first year. One challenge for doing EPCs in PBRA concerns subordinated debt. EPCs normally want to be in the first position in the case of default, but FHA has not traditionally been willing to give up first position.

These two programs — the PBRA pilot and the Resident-Paid Utility Incentive in Public Housing — are steps in the right direction and the PBRA pilot should be expanded to other PBRA owners. Both programs fix the split incentive problem for energy-efficient retrofits. One change worth considering in the PBRA pilot is calculating actual savings on a more frequent basis, because the first year's data might be skewed for any number of reasons, and could therefore over- or underestimate the consumption savings from the retrofit.

The second implementation strategy is to target TBRA UAs, the largest driver of HUD's $9.1 billion utility bill. A system like CUAC would be a poor fit for TBRA, but there are other ways of implementing site-specific UAs, including a historical consumption method similar to that used in PBRA. PHAs could offer a cash incentive — say, $100 — to any owner that provided 12 months of historical utility data showing consumption 20% lower than the tenant's current UA. The PHA would then review the documents and set a unit-specific UA at the average historical consumption level (or perhaps some percentage above, to accommodate idiosyncrasies). In the average TBRA unit, the $100 cash incentive would pay back within the next 4 months. The PHA could receive an equal incentive payment from HUD that covers more than the costs of running the program (e.g., marketing and administration). HUD could even cap the total per-unit incentive at a certain percentage of the PHA's average annual UA and let PHAs experiment with setting the owner's portion of the incentive so as to maximize the PHA's benefit.

The tables below show the estimated cost savings from such a program. Using very conservative assumptions — low participation (1%) and actual consumption savings at half those represented in the utility bills (10%) — a program offering an incentive of 15% of the annual average UA would generate $10.0 million in energy cost savings over the first five years (accruing to HUD).[115] A program with equally low participation but with the estimated (20%) consumptions savings would generate $6.4 million each year after payback (or $23.1 million over the first five years).

[115] This figure accounts for the initial payback period and a 3% discount rate.

There are two important challenges to instituting such a program. One is the potential opposition from tenants, which could foster an adversarial position with their landlords. Tenant advocates might complain that accuracy improvements should go in both directions: if overestimated UAs are adjusted downwards, shouldn't underestimated UAs be adjusted upwards? There is a strong equity argument here, but plausible replies exist. For example, this is really an incentive to reward owners who are energy efficient. Moreover, the program's use of actual consumption only really works for adjusting UAs downward, otherwise tenants could increase their UAs by increasing their utility consumption. The second challenge is regulatory. As mentioned earlier, the current TBRA regulations are interpreted by some to require that consumption thresholds be based on a community-wide comparison group. The language of the regulations does not compel this conclusion, but regardless, a program such as this would need to be accompanied by guidance from HUD, if not regulatory change.

Table 14. Payback Periods (in months)*

Total Incentive (% of UA)	Actual average consumption savings				
	10%	15%	20%	30%	40%
5%	6	4	3	2	2
10%	12	8	6	4	3
15%	18	12	9	6	5
20%	24	16	12	8	6
25%	30	20	15	10	8

Table 15. Annual Cost Savings (in $ millions) after Payback Period with a 15% incentive

Owner participation	Actual average consumption savings				
	10%	15%	20%	30%	40%
1%	$3.2	$4.8	$6.4	$9.6	$12.8
2%	$6.4	$9.6	$12.8	$19.2	$25.7
3%	$9.6	$14.4	$19.2	$28.9	$38.5
5%	$16.0	$24.1	$32.1	$48.1	$64.1
10%	$32.1	$48.1	$64.1	$96.2	$128.3

**The numbers described in the text may not equal the numbers depicted in the table for two reasons: (1) those in the text account for the fixed costs of the incentive to the owner and PHA, and (2) they are discounted at 3%.*

Revise HUD's Utility Schedule Model

HUD's Utility Schedule Model is a unique tool for reducing overestimated TBRA UAs. Although the extent of its user base is unknown, interviews suggest that it is sizeable, and potential exists for growth.

HUD's planned revisions are a step in the right direction. Getting the Model online will boost usage and hopefully make the Model more user-friendly. Creating an easy-to-use tool will avoid the current situation, in which PHAs pay third parties to help them use the Model. Updating the Model's RECS data to 2009 consumption levels is also essential. If that dataset reflects other indicators of utility consumption, it could lower UAs by 1.2–2.5%.[116] Furthermore, an online model could collect data regarding UA schedules, which HUD currently lacks.

In addition to the current plans, HUD should also consider other revisions to the Model. A few are quite simple:

- **Fix current errors**: Nelrod, a commonly used third party calculator, has compiled a list of errors that need fixing. When such errors are found in the future, they should be immediately fixed.[117]
- **Optimize for search**: The Model's website[118] does not currently have the words "utility allowance" on it or the form number that PHAs must fill out (52667). Thus, PHAs searching for help calculating UAs may find it difficult to locate the Model online.
- **Correct the website**: The link labeled "HUD Utility Schedule Model" on the website currently takes users to a climate database and should be relabeled.

In addition to these easy improvements, the HUD Model could also be updated between the 4-year RECS data cycles. The current model has an inherent weakness in that it does not forecast future energy consumption, but instead lags at least a few years behind. Other datasets from the Energy Information Administration track consumption equally well and are updated much more frequently. Any concerns regarding noise could be remedied by using rolling averages. This change would increase accuracy but it would also alter utility costs in the direction that consumption is trending. For example, if all of TBRA's UA schedules were annually adjusted to account for consumption changes, HUD would have saved approximately $50 million in natural gas UAs over the course of the last 4-year RECS cycle.[119] However, if consumption increased, more frequent updates would cause cost increases, so there is a double-edged sword. Nonetheless, this change would probably result in net decreases in utility costs because overall energy consumption (in electricity and natural gas) has been flat or trending downward over the past decade.[120]

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[116] *See* Section IV, *supra*.

[117] My interview with Nelrod suggested that HUD refused to fix these errors in the past.

[118] http://www.huduser.org/portal/resources/utilmodel.html.

[119] Assumptions: (1) natural gas consumption falls by 1.16% each year (the average rate between 1990 and 2009); (2) natural gas is 20% of TBRA's UA expenditures; (3) starting year is 2008, when TBRA UAs cost $2.9 billion.

[120] World Bank International Energy Agency, *available at* http://bit.ly/J9PJXv; Energy Information Administration, *Trends in U.S. Residential Natural Gas Consumption* (2010), p. 1.

Increase Monitoring

With the exception of PBRA, where contract administrators provide some check on the calculations of PBRA owners, HUD does not routinely monitor the calculation of UAs. But, in essence, utilities are a $9.1 billion HUD program — and a program that large requires oversight. HUD's management personnel are probably better situated to determine exactly what kind of oversight would be most effective from an institutional standpoint, but interviews yielded a few ideas worth sharing.

Checks and Balances. The current institutional and regulatory framework provides few effective checks on the calculation of UAs. Tenant lawsuits are a plausible, but rarely utilized, check against underestimation; they are likely to be unsuccessful (see Section III).[121] Periodic reviews of PHAs provide a potential check against misestimation in either direction, but reviewing staff often lack the expertise or time to thoroughly review UA calculations. LIHTC developers previously provided a check against overestimation, but the 2008 IRS regulations have enabled them to obtain lower UAs through other means. Meanwhile, the calculators themselves — the PHAs and PBRA owners who run the numbers — have little financial stake in the outcome and are likely to have little expertise as well. Some structural shift is needed.

Audit UAs. One easy answer would be to audit UAs. In order for a team of five dedicated full-time employees to fully pay for their own salaries and benefits, assuming that they found just $1 of monthly overestimation on average in all the UAs they reviewed, they would each need to visit only 16 PHAs over the course of a year.[122] If that same team visited (or remotely consulted with) a more realistic number of PHAs — say, 50 each — and found $5 in monthly overestimations, such a team would generate $12.3 million in net cost savings for that year alone. Auditing has the additional purpose of sending an institutional signal to PHAs and PBRA owners that UAs are something that HUD headquarters cares about and is tracking.

It seems unlikely that UA auditing could be effectively integrated into HUD's periodic reviews of PHAs, given the lack of time and expertise. Though UAs may seem simple, only a trained eye can provide a useful assessment of whether a given UA schedule reasonably reflects the data collected. The process takes time and the ability to conduct statistical analysis, both of which may be lacking during periodic reviews. For this reason, an independent auditing team seems more likely to achieve accurate results.

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[121] One 1985 article compiled a non-exhaustive list of 28 lawsuits over the prior 12 years which challenged UAs during a time of heightened regulatory changes to UAs. Lynn E. Cunningham & Steven Ferrey, *HUD Utility Allowance Program Spawns More Disputes with Public Housing Tenants*, 19 CLEARINGHOUSE REVIEW (Nov 1985), p. 746–47.

[122] Assumptions: (1) Added $20,000 in travel expenses and $27,000 in costs of expertise to an average federal FTE cost of $123,000 (salary plus benefits); (2) 874 units per PHA (overall average in 2007).

Centralize Calculation. Another option would be to centralize the initial calculation of UAs. Deconcentrated authority yields beneficial outcomes when local knowledge and discretion are critical to the relevant decision. But when a task requires a degree of expertise unlikely to exist at the local level, centralization brings greater accuracy and consistency. UA calculations are a good example. Utility rate structures are complex and often hidden from ratepayers. A novice calculator might accept the publicly posted rates without uncovering the multitude of payment tiers, surcharges, monthly fees, and pass-through costs that may apply. And that is just for rates. The historical consumption analysis suggested by the UA Guidebook requires calculators to compute variance and test for statistical validity. Such calculations cannot be expected of an average PHA employee, and that is the less technical of the two methodologies. Perhaps the answer is to require that PHAs submit their consumption data to field or regional offices and hire staff at that level to calculate UAs. If each HUD field office hired one dedicated employee to this task, they would each need to find about a 25 cents worth of overestimated UAs to pay for their first year's salary and benefits.[123] However, such employees would soon stop paying for themselves if we assume that the current overestimation of some of HUD's UAs is a discrete and not ongoing phenomenon. Nonetheless, other options for centralizing calculation should be explored by those more familiar with HUD's management structure.

Targeted Interventions from Headquarters. HUD's central staff could also execute several interventions aimed at reducing overestimated UAs. Given data sharing limitations, such an office could only exist at HUD headquarters, and these tasks might logically be housed in the Office of Sustainable Communities. This office could formulate and implement a plan to remedy current data gaps, with the goal of developing more complete information about utility consumption. The office could then, for example, collect disaggregated UA data from HUD's three large rental assistance programs and use that information to target interventions at the highest spenders. Remember that potential utility savings are frequently correlated with pre-intervention utility usage, meaning that interventions targeted at the highest spenders will normally generate the most utility savings.[124] Headquarters could then track the success of various interventions and, in that way, develop best practices for other properties. With the right data in hand, HUD might even find properties that are so energy inefficient that it would make sense to *require* that property to enter into an EPC, given the annual utility costs to HUD.

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[123] Assumptions: (1) Added $27,000 in costs of expertise to an average federal FTE cost of $123,000 (salary plus benefits); (2) 2.8 million units divided up between 50 field offices.

[124] *See* Steven Winter Associates, Deutsche Bank Americas Foundation, *Recognizing the Benefits of Energy Efficiency in Multifamily Underwriting*, p. 3; 13. David Rosen & Associates, *Low Income Housing Tax Credits Projects and Energy Conservation; Utility Calculator Analysis: Policy Options* (2011), p.23.

Harmonize Calculation Methods for Utility Allowances: Align Regulations

In calculating UAs, there is undoubtedly a tradeoff between accuracy and calculation cost, especially given the diversity of the subsidized stock and its residents. Sometimes greater complexity in the calculation of UAs will yield greater accuracy and increase utility cost savings. But certain parts of HUD's current regulatory framework produce complexity without yielding any commensurate benefits.

Each of the three major rental assistance programs has its own set of regulations for calculating UAs (see Appendix B). Layered on top of each regulatory framework is further guidance in the form of handbooks, policy statements, and unwritten rules of thumb. Some differences between programs naturally flow from their distinct structures and histories, but many of the differences are unnecessary and cause confusion. These superfluous intricacies raise transaction costs by increasing uncertainty and ambiguity.

The following regulatory discrepancies serve little or no discernible purpose, and could serve as starting points for remedying the inconsistencies across programs.

Consumption Standard

Public Housing regulations require that UAs "approximate a reasonable consumption of utilities by an energy-conservative household of modest circumstances consistent with the requirements of a safe, sanitary, and healthful living environment."[125] The same consumption standard applies in PBRA, except it includes not just utilities, but also "other services for the unit."[126] TBRA uses a different standard entirely, "the typical cost of utilities and services paid by energy-conservative households that occupy housing of similar size and type in the same locality," and PHAs "must use normal patterns of consumption for the community as a whole and current utility rates."[127] There are four relevant differences between these standards that seem unjustified:

- **Utilities vs. Other Services:** Of what importance is the addition of "other services for the unit" in the otherwise identical PBRA standard? Should owners include services not generally considered utilities, such as plumbing or Internet? From interviews, it seemed that most owners ignored this distinction, but its presence creates ambiguity for potential legal challenges.

[125] 24 C.F.R. § 965.505(a).
[126] 24 C.F.R. § 5.603.
[127] 24 C.F.R. § 982.517(b)(1).

- **Comparison Group:** Both the Public Housing/PBRA and TBRA standards require that UAs be set in comparison to "energy-conservative households" although neither define that phrase. Does this mean that UAs should be calculated using a subset of the general population? When owners use the property's historical consumption to compute UAs, how can they determine which of the tenants are reasonable consumers? Putting aside those ambiguities for the moment, the regulations add an additional complexity, which is that the comparison group for Public Housing and PBRA must be those of "modest circumstances," whereas the comparison group for TBRA is those occupying "housing of similar size and type in the same locality" in the "the community as a whole." These phrases suggest that comparison groups might differ based on income, location, unit size, and unit type, but it is not clear how exactly. Many PHAs interpret TBRA's standard to prohibit a low-income comparison group, but that is not clear from the text of the regulation, which merely mentions location, unit size, and unit type. It seems rational to vary TBRA UAs based on differences in the available housing stock, but it seems less justified to calculate TBRA UAs based on the utility expenses of higher income earners. This common interpretation seems to prohibit PHAs from gathering actual consumption data from their voucher-holders, even though that seems like an otherwise workable calculation process. Instead, PHAs usually do either a phone survey of utility costs in their area or use national consumption data, which is truly an encompassing definition of "community as a whole."

- **Reasonable vs. Typical/Normal:** Why do Public Housing and PBRA provide for "reasonable" consumption while TBRA provides for "typical" or "normal" consumption? Moreover, what is the difference between these two standards? Or put differently, once a comparison group is identified, at what point in that distribution should UAs be set? Should it be the average (i.e., mean or median), as "typical" and "normal" suggest? Or does "reasonable" consumption comprise more (or less) than average? All available evidence suggests that practices vary widely on this question, perhaps because of the historical context mentioned in Section III. This same concern was expressed in the 1991 GAO report[128] and is an area ripe for improvement.

- **Safe, Sanitary, and Healthful Living Environment:** Finally, it is not clear what the final phrase of Public Housing/PBRA's standard adds to the calculus, and what its absence in TBRA's standard signifies. Surely it cannot imply that TBRA's UAs may be unsafe or sanitary, but does it push Public Housing/PBRA over some undefined minimum?

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[128] GAO, *Utility Allowances Often Fall Short of Actual Utility Expenses* (1991), p. 40.

- **A Unified Standard:** HUD should consider unifying its consumption standards for UAs, as a preliminary step toward unifying its calculations methods. Harmonization may create some initial fixed costs of adjustment but will cut transaction costs in the long term. One suggestion is that UAs be set to the "average consumption of utilities by energy-conservative households of modest circumstances in similar dwellings." Guidance should further clarify that "modest circumstances" means households with incomes that qualify for HUD-subsidized housing. This standard would allow PHAs the flexibility to use consumption data that matches the stock of each program, while narrowing discretion regarding "reasonable" usage and the incomes of the comparison group.

Air Conditioning

A second inconsistency in the regulations concerns air conditioning, which constitutes 20% of residential electricity consumption in America. Public Housing regulations do not allow UAs to incorporate air conditioning, TBRA regulations allow air conditioning if a majority of the market has it, and PBRA regulations are silent on the issue.[129] There seems little reason why two low-income tenants living in the same city should be treated differently when it comes to air conditioning. If it is a luxury for one it is a luxury for the other; if it is a necessity for one, it is a necessity for the other.[130] Of the available standards, TBRA's seems the most practical and humane choice, although it might cause a substantial increase in utility costs in Public Housing.

Revisions and Annual Review

Requirements for reviewing and revising UAs vary by program. In Public Housing, PHAs must "review at least annually the basis on which utility allowances have been established" and set new UAs if "reasonably required." In addition PHAs must revise UAs between annual reviews if utility rates change by 10% or more. TBRA regulations also require annual review of UA schedules and revision if rates change by 10% or more, but they do not require revisions between annual reviews, even if rates change dramatically. PBRA's regulations are more different still. They require that owners submit a utility analysis to accompany their annual rent adjustment, and require owners to request approval for increases in UAs due to rate changes, but say nothing of decreases.[131]

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[129] § 965.505 (e) (Public Housing); § 982.517(b)(2)(ii) (TBRA); § 880.610 (PBRA).

[130] According to the Pew Research Center, which tracks the percentage of Americans that deem certain items to be luxuries or necessities, 55% of Americans believe that a home air conditioner is a necessity, up from 26% in 1973, but down from 75% in 2006.

[131] 24 C.F.R. § 965.507 (a), (b) (Public Housing); § 880.610 (PBRA); § 982.517(c)(1) (TBRA).

In addition to variations *between* programs, there are also considerable variations in implementation *within* programs. A recent study by advocacy groups[132] examined the policies of 47 PBRA contract administrators and found that they enforced very different interpretations of the HUD regulations. In seeming conflict with the regulations, 26% of the contract administrators did not require utility analyses for both OCAF and budget-based annual rent adjustments, 15% did not require that UAs be changed when rates increased by 10%, and 55% did not provide tenants with an opportunity to comment before UAs were changed. In apparent response, the Multifamily Program recently published guidance requiring each of these three changes.[133]

This study focuses on irregularities within the PBRA program, but interviews indicated that the same was true in Public Housing and TBRA. In fact, given the lack of monitoring in the latter programs, there is reason to believe that annual self-reviews are less frequently completed by PHAs.

There seems little reason why review and revision requirements should differ so dramatically between programs. The current variation does not appear to correspond with any natural or structural differences between the programs, nor does it provide any advantages that might flow from greater flexibility. Instead, these inconsistencies cause confusion and noncompliance at the expense of tenants, HUD, and housing providers, all of whom might benefit from more regular revision and review.

Harmonize Calculation Methods for Utility Allowances: Publish Guidance

One option short of regulatory change is to publish guidance clarifying some of the ambiguous portions of HUD's currently regulatory framework. Some of these recommendations are novel, while others are similar to recommendations made by two previous reports on UAs authored by GAO and Exceed Corp. in 1991 and 2005, respectively.[134]

Define "Reasonable Consumption" and "Typical/Normal"

As discussed above, the consumption threshold in all three major rental assistance programs needs greater clarity. The Public Housing and PBRA programs use a "reasonable consumption" standard and TBRA sets UAs at a "typical" or "normal pattern[] of consumption." HUD should issue

[132] Housing Preservation Project and the Sargent Shriver National Center on Poverty Law, *Inconsistent Administration of Project-Based Section 8 Utility Allowances Threatens Low Income Families* (2010).
[133] Memorandum from Carol Galante, Deputy Assistant Secretary for Multifamily Housing Programs, "Clarification Utility Allowance Regulations [sic]," June 20, 2011.
[134] GAO, *supra* note 128, p. 53–55, 65–67; Exceed Corporation & Facility Strategies Group, *Utility Allowances: Issues in Implementation* (2005), p. 12.

guidance interpreting both phrases as meaning "average," so that owners and PHAs can use either means or medians in their calculations. Anecdotal evidence from prior reports and interviews seems to suggest that, while some PHAs use average consumption levels, others may set their UA threshold near the 80th or 90th percentile, while others use a number under 50% on the assumption that, if certain families can get by with low consumption, they all can.[135] Retaining this imprecision hampers any attempt by HUD to monitor or audit UA schedules, because there is no consistent standard against which to audit.

Specify Acceptable Calculation Methodology

Regardless of whether HUD pursues regulatory change, it should consider providing guidance that more narrowly specifies acceptable methodologies for calculating UAs in TBRA and PH. To be sure, there may be some benefit in allowing PHAs the flexibility of using their own methods. Local circumstances — regarding tenant cooperation, utility company policy, or utility rates, to name a few — may dramatically constrain the efficacy of a particular methodology. But experience from the PBRA program suggests that providing specific guidance, at least at the regional level, is possible. In PBRA, regional offices set the requirements for annual utility analyses. For example, in Region IX, owners must submit to their contract administrator 12 months of consecutive consumption data from the past two years from 10% of each unit size and type.[136] Instructions from Region X provide a similar level of specificity, but require the immediate 12 months of consumption data.[137] Obviously there are exceptions when such data is unavailable, or when the owner can justify a discretionary departure from the accepted practice, but the establishment of a presumption simplifies the role of the owner, bolsters compliance efforts, and provides consistency and fairness throughout those regions.

HUD should consider providing uniform guidance that extends the best practices in PBRA to every region and to the Public Housing program as well. Deconcentrated standards-setting make sense when implementation is highly variable and success depends on local expertise. But few regional offices — much less PHAs or owners — have expertise in utility calculations that will dramatically improve a centrally approved methodology. On the contrary, most actors at ground level perceive utilities as an inconvenience, a distraction from their normal job duties. For them, an approved methodology may free them from the annoyance of trying to reinvent the wheel on an annual basis. Meanwhile, a uniform method will yield benefits for tenants, PHAs, and HUD. Tenants and their advocates will be better positioned to challenge UA calculations if they believe

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[135] *See, e.g.*, GAO, *supra* note 128, p. 40.

[136] Memorandum from Tom Azumbrado, Director of San Francisco Multifamily Hub, "Clarification of HUD Policy Concerning Utility Allowance Regulations," June 20, 2011.

[137] Memorandum from Region X Multifamily Hub, "Tenant Paid Utility Allowance Guidance," April 12, 2012.

they are set too low. PHAs and PBRA owners can learn from each other and develop shared resources for making the process more streamlined. The cost for third-party UA calculators may even decline as the process is simplified. For HUD, a uniform methodology would increase accuracy and consistency and better enable oversight by regional offices and headquarters.

Implement Behavioral Interventions in Master-Metered Properties

Behavioral Initiatives

Section IV discussed recent research regarding behavioral interventions that encourage utility conservation. HUD has not implemented many tenant-side initiatives thus far, but they offer some of the most cost-effective interventions tested in the literature. The main challenge is finding ways to adopt these interventions to the master-metered portfolio, since many of them assume that tenants are individually metered (and therefore energy savings correlate to cost savings).

Enhanced billing programs, such as those offered by OPower, provide small savings but at a very small cost. Though such companies normally work directly with utilities, HUD might consider soliciting proposals for ideas about how to implement enhanced "billing" for tenants in HUD's master-metered portfolio. Real-time feedback mechanisms, which achieve much larger savings, especially when paired with suggestions for conservation, are also a ripe area for innovation. Companies in this area have focused mainly on the direct-metered market, but might be willing to develop a different product for the HUD portfolio. HUD's scale offers a tremendous opportunity to test new interventions in this area because even small changes could generate huge savings in aggregate.

Other promising interventions include the use of motivational devices – including pledges, commitments, and competitions – to inspire energy savings in the master-metered portfolio. Unlike those above, these initiatives do not require individually metered units. New York City Housing Authority, for example, is running competitions between buildings to see who can save more over a certain period. They use the competition as an opportunity to educate residents about utility consumption and then provide updates on the competition. Prizes are frequently used as incentives although research indicates that they are often peripheral to tenants' motivations. It may instead be more effective to focus on the environmental benefits.

An eager site leader is frequently the key to behavioral change, as recognized in behavior initiatives by the Center for Neighborhood Technology and Enterprise Community Partners, both of whom run trainings for "green leaders."[138] Recognizing this, HUD could consider incentives for training on-site green leaders. For instance, it could fund regional "trainer trainings" for building managers or PHA staff interested in energy-efficiency programs. It might also consider competitions, such as New York's, but over a broader scale, like offering one year of free utilities to the PHA that saves the most energy across the PHA's entire portfolio. Since behavioral savings persist over time, the savings spurred by the competition would easily pay back the reward.

Submetering (or Checkmetering)

One of the policies with the greatest savings potential seems at first to be more like a retrofit than a behavioral initiative. But submetering (or checkmetering) — which involves installing individual meters on units in a master-metered building — is actually aimed at tenant behavior change. As aforementioned, tenants in master-metered buildings have no financial incentive to curb their utility usage, resulting in much higher utility bills. The installation of submeters fixes this misaligned incentive, so that tenants face the costs of their ongoing consumption. The results in large residential buildings have been dramatic, showing average energy and cost savings of 18–26%.[139] A recent pilot in Baltimore Public Housing has seen 28% energy savings (see case study).

The submetering concept itself is simple. The building owner — public or private — continues to pay the utility company for the building's master-metered energy usage.[140] Large building owners generally pay a bulk rate that is less expensive than the rate individual tenants pay. After installing the submeters, the owner bills individual units for their respective energy consumption. The payment structure could then work one of two ways.

In the first model, tenants would continue to pay 30% of income as their monthly payment, but would receive an allotment (or UA) from the owner, above which they would be charged for excess use. This model comports with the checkmetering regulations for Public Housing and allows owners to keep any energy savings below the allotment. In the second model, the owner would give tenants an allotment that reduces their monthly payment (similar to a UA) but require tenants to pay the full amount on their bill. In this model, tenants would keep any savings below the allotment and owners would break even. Owners are likely to prefer the first payment structure, but the second payment structure is likely to produce greater energy savings because it

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[138] *See* http://www.cnt.org/equityexpress/ and http://www.practitionerresources.org/cache/documents/677/67764.pdf.

[139] National Science and Technology Council, Committee on Technology Subcommittee on Buildings Technology Research and Development, *Submetering of Building Energy and Water Usage Analysis and Recommendations of the Subcommittee on Buildings Technology Research and Development* (Oct. 11), p. 10.

[140] Submetering is most common for electricity. It is possible for water, but far less common and less proven.

gives tenants financial incentives to save both above and below the allotment (just as direct-metered utilities do).

Case Study: Baltimore Housing Authority
In order to dampen the rise in electrical costs for Baltimore's 13,400 units of Public Housing, the PHA there experimented in 2010 with submetering two of their properties. Both properties consisted of more than 200 units, but the first was older (built in the late 30s) and had 2- to 3-story garden-style apartments, whereas the second was newer (built in the late 90s) and had 2-story townhouses. Baltimore City Housing Authority installed Smart Meters on all the units and also installed a resident web interface that allowed tenants to track their usage in comparison to their monthly allowance. The total fixed costs were approximately $400,000 for the 488 Smart Meters and $350,000 for the resident web interface, both of which the PHA itself paid. Betty Kotcher, a researcher from Catholic University, tracked energy consumption in the periods before and after the sites were converted to individual metering. After studying 32 months of data, including usage both before and after the submeters were activated, her study found a remarkable 28.6% reduction in utility consumption after controlling for weather and other factors.[141] For these two properties, the PHA saved $144,200 in energy costs in the first year alone, or about $288 per unit each year. The PHA expects to pay back the $750,000 in fixed costs in less than 3 years, and the PHA is proceeding to convert many more of their buildings using the same method. While various research questions remain — regarding possible fade-out effects, the impact of building type and age, and the relative import of the submetering versus the web feedback interface — this study shows remarkable potential for submetering in federally subsidized housing. No other study looks at the effects of such an intervention on very low-income tenants. Kotcher suggests that the higher cost savings may be related to the higher marginal benefit of each dollar to a low-income tenant.

Submetering provides other benefits beyond the considerable energy cost savings. For tenants, it provides them with greater information about their energy usage so that can customize their conservation efforts. Such energy budgeting will be essential when tenants transition out of subsidized housing. In addition, submetering arguably provides a more equitable distribution of utility costs, insofar as heavy consumers pay their fair share. Individual submetering ensures that

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[141] Betty Kotcher, *The Role of Smart Metering in Reducing Household Energy Consumption: An Evaluation of an Implementation*, forthcoming 2012.

the heaviest users, who frequently consume three times the amount of the average user,[142] are required to pay for their usage. Further, submetering provides the same accountability mechanism as individual metering without the risk of utility disconnections.

Owners gain in three additional ways beyond the potential energy cost savings. First, it shifts the potentially volatile costs of electricity onto tenants (clearly, this is one downside for tenants). Second, it helps owners identify the most useful retrofit opportunities and then monitor their progress in a meaningfully granular manner. Finally, the owner may be able to charge tenants for the normal residential energy rate while paying the utility company using the bulk rate, allowing them to keep the differential (alternatively, the bulk rate savings could be passed along to tenants).

The process of submetering is far more complex than the simple sketch described here. There are multiple technologies for wirelessly communicating, numerous difficulties with building layout, several vendors for building automation, feedback software, and the submeters themselves, as well as other considerations such as data security, maintenance, and billing mechanisms. However, several entities are making inroads towards navigating the complex process: the National Science and Technology Council recently published a report discussing many of these details, and the New York State Energy Research and Development Authority (NYSERDA)[143] is a leader in this field. Some states and localities have begun to require submetering in large commercial buildings, and HUD is arguably well-positioned to encourage its use in the large-scale residential sector.

Furthermore, for all of its potential advantages, submetering will not work for many master-metered buildings. The fixed costs of the submeters and the necessary software probably require a fairly large building in order to make the investment cost-effective. All of the properties in the literature are larger than 100 units.

Local and state regulations also pose another major hurdle. Some states, like Massachusetts, forbid submetering altogether, while others actively encourage it. Some states require that building owners become "local power distributors" in order to resell energy to residents, while other states require that bulk rates are passed along to individual ratepayers. Thus, submetering requires customized implementation. Helpfully, a trade association has compiled many of the regulations for each state.[144]

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[142] National Science and Technology Council, Committee on Technology Subcommittee on Buildings Technology Research and Development, *Submetering of Building Energy and Water Usage Analysis and Recommendations of the Subcommittee on Buildings Technology Research and Development* (Oct. 11), p. 15.

[143] In particular, a man named Herbert Hirschfeld appears to be the foremost expert on this topic. He wrote NYSERDA's *Residential Electrical Submetering Manual* (2001) and other studies tracking energy savings in individual buildings. He also operates the website http://www.submeteronline.com.

[144] *See* http://www.utilitymca.org/HOME.aspx and follow links to their "Research Database."

One final challenge is the weight of history. As described in Section III, HUD's previous efforts to encourage submetering backfired in the form of a lawsuit that forced changes to HUD regulations. Even though the lawsuit's success was based upon a lack of evidence which is no longer the case, there are surely those who have not forgotten HUD's experiments in the early 80s. HUD could therefore find ways of encouraging local submetering without mandating it.

In sum, submetering offers a tremendous opportunity for energy cost savings, but could generate some challenges in implementation. The optimal targets would be large master-metered developments.

Eliminate Utilities from HUD's Budget

One possible — though rather extreme — option would be to eliminate utilities from HUD's budget entirely. After all, why should utilities form such a large part of HUD's budget? Why are utilities considered "housing-related" as distinct from food, phone, Internet, or television? Alternatively, why not include more of the latter categories in the definition of "rent"? This is not meant to suggest that utility expenses should be shifted entirely to tenants, only that HUD may not necessarily be the right institution to pay for them.

On its face, this option seems at once intriguing and drastic. Intriguing because it seems almost simple: HUD could simply redefine "rent" to exclude utility expenses. Drastic because that would effectively raise the rent on millions of low-income tenants who are already in precarious circumstances.

The rise in rent burdens could, of course, be remedied in other ways. At the same time as HUD redefined "rent" to exclude utilities, it could also lower the Brooke Amendment so that tenant costs stayed, on average, the same. Utilities currently average around 25% of tenant housing costs nationwide,[145] which would mean lowering the Brooke Amendment by around 7.5%. However, this "fix" raises a number of separate issues. First, tenant costs would stay constant on average, but would actually increase in some areas (those with high utility costs) and decrease in others (those with low utility costs).[146] From an equity perspective, it would seem undesirable to base tenant housing burdens in part on local climate or utility rates. On the other hand, food prices and other tenant expenses already range widely by region, so why should utilities be treated differently?

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[145] Schwartz and Wilson, *supra* note 2, p. 5, figure 3. HUD sees similar costs (20–25%) within its own rental assistance programs. *See* PD&R, HUD, *Greening Affordable Housing: Renewing the Federal Commitment* (2012), p. 6, table 2.

[146] According to 2006 AHS data, the average utility portion of housing expenses in California was 14.3%, whereas the average in Mississippi was 37.4%. *Id.*

A larger problem with a Brooke Amendment solution is that the 30% affordability threshold is, in some rather salient political and cultural ways, hallowed ground. The 30% affordability threshold not only forms the basis for many HUD (and other government) programs, but has also become a dominant standard for the general population. Thus, changing the affordability threshold for the sake of utilities seems like the tail wagging the dog. The other consideration is that nearly half (46%) of American renters currently pay more than 30% of income on rent, so it remains unclear whether the Brooke Amendment is a realistic affordability threshold in the first instance. As housing costs have grown to comprise a larger percentage of average household expenses, perhaps the affordability threshold should keep pace, in which case moving utilities out of the "rent" definition might not require lowering the affordability threshold at all. This would have the effect of raising rents on our nation's poorest household by an amount equal to their utility payments. It would therefore generate considerable outrage amongst tenant advocates — and for good reason.

The other issue with trying to eliminate utilities from HUD's budget is that redefining "rent" would only eliminate utilities that are currently paid by tenants. For example, master-metered utilities in Public Housing would continue to be paid through HUD's operating subsidy. Likewise, all master-metered utilities in TBRA would continue to be paid by HUD. These outcomes are not inevitable, of course. HUD could estimate the portion of rent that accounts for utilities and remove that from their subsidies in each program, and each program could then develop a way to pass those excess costs along to tenants. The relevant point is that it would be vastly more difficult than a simple regulatory change.

Given the consequences, eliminating utilities from HUD's budget seems both infeasible and perhaps also unwise. However, if utility expenses are not getting the attention they deserve under HUD's authority, or if they are institutionally out of place, it might be worth brainstorming other big-picture alternatives to the status quo.

VI. Conclusion

Utility expenses constitute a large and growing share of HUD's budget. Nearly one of every five HUD dollars is spent on utility costs. HUD's $9.1 billion utility bill poses both environmental and fiscal challenges, but fortunately these challenges can be addressed simultaneously.

A number of HUD initiatives have sought to decrease these costs by implementing architectural retrofits that save energy, fuel, and water. This report explores policies in areas that have thus far received less attention, especially the calculation of utility allowances and the implementation of programs targeted at tenant-side behavioral changes. These policies have the potential to generate substantial utility savings for tenants, housing providers, and taxpayers.

Appendices

Appendix A: Estimating Owner-Paid Utility Costs in TBRA

In 2012, the amount of owner-paid utilities in TBRA is estimated to be between $842 million and $2.5 billion, with a conservative point estimate being $1.3 billion.

This estimate was arrived at by comparing the percentage of units with UAs in each program to the percentage of program utility costs attributable to UAs. In Public Housing, UAs accounted for 24% of total utility costs in 2010 but only 45% of units had UAs, meaning that the share of total utility costs attributable to UAs when units had UAs was 53% (24% / 45% = 53%). In PBRA, UAs accounted for 41% of total utility costs in 2010 but only 67% of units had UAs, meaning that the share of total utility costs attributable to UAs when units had UAs was 62% (41% / 67% = 62%). These numbers tell us that the extent of individual metering in PBRA is greater than that in Public Housing, even among the pool of units that have some utilities individually metered. This much is consistent with other data sources and with the composition of the two programs' respective housing stocks.

In TBRA, about 90% of units have UAs, largely because the TBRA stock is composed of smaller buildings,[147] which more commonly meter utilities individually. Assuming that the average share of utilities covered by UAs (when units have UAs) in TBRA is no lower than that in PBRA (62%), then the upper bound of HUD's owner-paid utility expenditures in 2010 was $2.5 billion ([$3.1b / (62% x 90%)] – $3.1b). The lower bound of HUD expenses ($842 million in 2010) assumes that the average share of utilities covered by UAs in TBRA is 90%, which seems equally unlikely given that some UAs may only cover one or two of a given unit's utilities. The conservative point estimate of $1.3 billion in 2010 assumes that the average share of utilities covered by UAs (when units have UAs) in TBRA is 80%.[148] The remaining estimates for owner-paid TBRA utilities reported in Table 7 are based upon this 80% assumption, although they ranged between $570–$1,699 million in 2004, $619–$1,928 million in 2006, and $751–$2,281 in 2008. Estimates for 2012 were projected in the same manner as the other unit program categories.

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[147] *See* PD&R, HUD, *Characteristics of HUD-Assisted Renters and Their Units in 2003*, p. 19.

[148] While admittedly arbitrary, this percentage is based on the knowledge that water, sewer, and garbage costs are more often master-metered than gas and electric, and that combined they usually account for no less than 20% of total utility costs.

Appendix B: HUD Regulations Concerning Utility Allowances

Public Housing

Regulations pertaining to Public Housing can be found under 24 C.F.R. § 965, Subpart E, entitled "Resident Allowances for Utilities."

Table 16. Regulations for UAs in Public Housing

Provision	Description
§ 965.502(a)	PHAs must establish UAs for all tenant-paid utilities.
§ 965.502(b)	PHAs must keep a record of how UAs are calculated.
§ 965.502(c)	PHAs must post notice of changes 60 days in advance, describing the changes, and giving opportunity for tenants to comment.
§ 965.502(d)	UAs are not subject to HUD approval, only reviewed in audits.
§ 965.502(e)	PHAs determinations are final unless arbitrary and capricious.
§ 965.503	PHAs must establish separate UAs for each utility and each reasonably comparable (in terms of utilities) category of units.
§ 965.504(a), (b)	UAs must be monthly amounts (quarterly is OK for checkmeters). Seasonal variation is allowed.
§ 965.505(a)	The objective of UAs is to "approximate a reasonable consumption of utilities by an energy-conservative household of modest circumstances consistent with the requirements of a safe, sanitary, and healthful living environment."
§ 965.505(b)	UAs should include reasonable consumption for • major equipment provided by the PHA (e.g., heating furnace, hot water heater) • essential equipment (e.g., range and refrigerator) • minor equipment provided by residents (e.g., toasters and radios).
§ 965.505(c)	The complexity of UAs is up to the PHA's discretion and depends on the housing stock and the data and resources available.
§ 965.505(d)	UAs must account for: • different end-uses (e.g., gas can be used for cooking, heating water, or space heating) • climate • unit size and number of occupants • type of unit construction • energy-efficiency of PHA-furnished appliances • physical condition of the buildings

	• necessary temperature levels in day and night for air and water.
§ 965.505(e)	Air conditioning cannot be included in UAs. If a PHA installs air conditioning, it should allow for resident control wherever possible and should charge for resident usage (without reimbursement).
§ 965.506(a)	Where checkmetered, PHAs can surcharge for any usage exceeding the UA. The surcharge can be based on units or blocks of usage.
§ 965.506(b)	Where not checkmetered, PHAs must establish surcharge schedules for major resident-owned appliances and optional PHA-owned equipment based on reasonable usage and estimated cost.
§ 965.507(a)	PHAs must review UAs annually and change if reasonably required.
§ 965.507(b)	Between annual reviews, PHAs can revise UAs based on rate changes, and must revise them if rates change by more than 10%. 60 days notice is not required.
§ 965.508	PHAs can make exceptions for individuals based on special needs or factors beyond their control. Protocols for doing so should be established in advance.

Tenant-Based Rental Assistance (TBRA)

Regulations pertaining to TBRA can be found under 24 C.F.R. § 982.517, entitled "Utility Allowance Schedule."

Table 17. Regulations for UAs in TBRA

Provision	**Description**
§ 968.517(a)(1)	PHAs must establish UAs for all tenant-paid utilities and housing services, including trash disposal but not including telephone service.
§ 968.517(a)(2)	PHAs must submit to HUD a copy of the UA schedule and must provide, upon request, information and procedures used for calculation.
§ 968.517(b)(1)	UAs must be based on "the typical cost of utilities and services paid by energy-conservative households that occupy housing of similar size and type in the same locality" and "must use normal patterns of consumption for the community as a whole and current utility rates."
§ 968.517(b)(2)(i)	PHAs must provide UAs for all services necessary to maintain housing quality standards, but cannot provide UAs for non-essentials, like cable or satellite TV.
§ 968.517(b)(2)(ii)	UA schedules must classify UAs under these categories: • space heating • air conditioning (if the majority of housing units in the market provide central air conditioning or if wiring exists in the unit) • cooking

	• water heating • water • sewer • trash collection (disposal of waste and refuse) • other electric • refrigerator (cost of tenant-supplied refrigerator) • range (cost of tenant-supplied range) • and other specified housing services
§ 968.517(b)(3)	UAs must take into account: • Unit size (by number of bedrooms) • Unit types typical in the community
§ 968.517(b)(4)	UAs must be submitted to HUD in accordance with their form.
§ 968.517(c)(1)	PHAs must review UAs annually and must revise them when utility rates have changed by 10% or more. PHAs must maintain documents supporting their annual reviews.
§ 968.517(c)(2)	PHAs must revise UAs at HUD's direction if there are errors or updates.
§ 968.517(d)(1)	PHAs must use the unit size actually leased.
§ 968.517(d)(2)	At reexamination, PHAs must use the current UA schedule.
§ 968.517(e)	PHAs must approve higher UAs as needed to reasonably accommodate tenants with disabilities.

Multifamily & PBRA

Regulations pertaining to most of PBRA can be found under 24 C.F.R. § 880.610, entitled "Adjustment of utility allowances." Regulations for the Moderate Rehabilitation program can be found under 24 C.F.R. § 882.510.

Table 18. Regulations for UAs in PBRA

Provision	Program	Description
§ 880.610 § 881.610 § 883.710 § 884.220	Section 8 HAP New Construction Section 8 HAP Substantial Rehabilitation Section 8 HAP State Housing Agencies Section 515	Owners must submit an analysis of utilities as part of the annual adjustment process. In addition, owners must request changes to UAs when utility rates change by more than 10%.
§ 880.609	(same)	Contract administrators have the final approval of rent adjustments, including

		utilities.
§ 5.603	(same)	UAs must be "an amount equal to the estimate made or approved by a PHA or HUD of the monthly cost of a reasonable consumption of such utilities and other services for the unit by an energy-conservative household of modest circumstances consistent with the requirements of a safe, sanitary, and healthful living environment"
§ 245.405(a) § 245.410 § 245.420	(same)	Owners must give 30 days notice to tenants of a decrease in UAs, as well as an opportunity to comment.
§ 882.510	Section 8 HAP Moderate Rehabilitation	Owners must annually determine if UAs require adjustment. Owners must establish separate schedules for buildings of 20 or more units. Owners must use 12 months of actual consumption data to establish UAs.

PBRA's regulations are rather sparse in comparison to the other programs. More detailed requirements are listed in Chapter 7 of the HUD Handbook 4350.1.[149] Recent HUD guidance clarified that all PBRA owners have to submit annual utility analyses, regardless of whether their rents were adjusted through OCAF or budget-based.[150] Some regional hubs followed up with more specific guidance.[151] For example, Region IX now requires a utility analysis with the following components:

- Supporting documentation (e.g. bills) for a 12-month period
- List of unit types receiving a subsidy
- Include 10% of all unit types (3-20 actual units) in the analysis
- Data can't be more than 18 months old
- Each unit type's data must be for the same time frame
- Exclusion of vacant units

[149] *Available at* http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_25304.pdf.

[150] Memorandum from Carol Galante, *supra* note 133.

[151] *E.g.*, Memorandum from Region X Multifamily Hub, *supra* note 137 (Region X); Memorandum from Tom Azumbrado, *supra* note 136 (Region IX).

Rural Housing Service

Regulations pertaining to USDA's Rural Housing Service can be found under 7 C.F.R. § 3560.202(d), entitled "Utility allowances," which provides:

> In projects where tenants pay the utilities, borrowers must establish utility allowances for each size and type of rental unit in the housing project based on estimated utility costs. Borrowers must review utility allowances annually, adjust for accuracy, and submit any utility allowance changes to the Agency for approval. If no changes are needed, the borrower must notify the Agency that no changes were made. Documentation to justify utility allowances must be maintained in the housing project files.

Low Income Housing Tax Credit (LIHTC)

Regulations pertaining to the IRS's LIHTC program can be found under 26 C.F.R. § 1.42–10, entitled "Utility allowances."

Table 19. Regulations for UAs in LIHTC

Provision	Description
§ 1.42–10(a)	Tenant-paid utilities (not including telephone, cable TV, or Internet) should be included in gross rent as UAs.
§ 1.42–10(b)(1)	If the building gets assistance from RHS, all units must use RHS's UAs.
§ 1.42–10(b)(2)	If any tenant in the building gets RHS, all units must use RHS's UAs.
§ 1.42–10(b)(3)	If the building is regulated by HUD, all units must use HUD's UA.
§ 1.42–10(b)(4)(i)	For tenants receiving HUD rental assistance, that unit must use HUD's UA.
§ 1.42–10(b)(4)(ii)	Units not covered by the section above can use any of these five methods:
§ 1.42–10(b)(4)(ii)(A)	The applicable PHA UA.
§ 1.42–10(b)(4)(ii)(B)	A UA estimate prepared by the relevant utility company.
§ 1.42–10(b)(4)(ii)(C)	A UA estimate prepared by the relevant housing finance agency.
§ 1.42–10(b)(4)(ii)(D)	A UA estimate calculated using HUD's Utility Schedule Model.
§ 1.42–10(b)(4)(ii)(E)	A UA estimate calculated using an energy consumption model made by a properly licensed engineer or an HFA-approved qualified professional.
§ 1.42–10(c)	Building owners must annually review the basis for UAs and update accordingly.
§ 1.42–10(d)	Building owners must retain all supporting documentation.

Appendix C: Utility Allowance Dataset

While researching this project, it became clear that there was no comprehensive dataset of TBRA UAs. This seemed odd given their considerable impact on HUD's budget, but this fact was soon confirmed with PD&R staff. Because it was important to the project, the author created a TBRA UA dataset. This Appendix describes that process and the data itself in detail. For those interested in the raw data, it can be found here: http://sites.google.com/site/evanbwhite/ua. This dataset was a joint project with Danielle Moultak, but all mistakes are the author's alone.

Data Collection

During March 2012, UA schedules were downloaded from various locations on the Internet. The number of observations from each state is reported in Table 20. Some states, like Indiana[152] and Maine,[153] had all of their UA schedules conveniently posted on one page, but most states did not. Instead, UA schedules were often found on the websites of PHAs, municipalities, or state housing tax-credit agencies. All available UA schedules were downloaded, including those from prior years. Where Public Housing UA schedules were available online, they were downloaded and saved, but not entered.

The search process was methodical but not painstakingly systematic. The goal was for both breadth and depth. Since both prices and consumption vary by location, geographical diversity was sought. But deep data was also collected in particular locations to facilitate comparisons between UAs in the same region. There was a definite preference towards collecting UAs that were easily accessible online, and this may bias the dataset towards more tech-savvy PHAs or PHAs more attuned to the needs of LIHTC developers, which often request that UAs be posted online. The later selection issue would probably bias UAs downward, if at all.

Table 20. State Frequencies

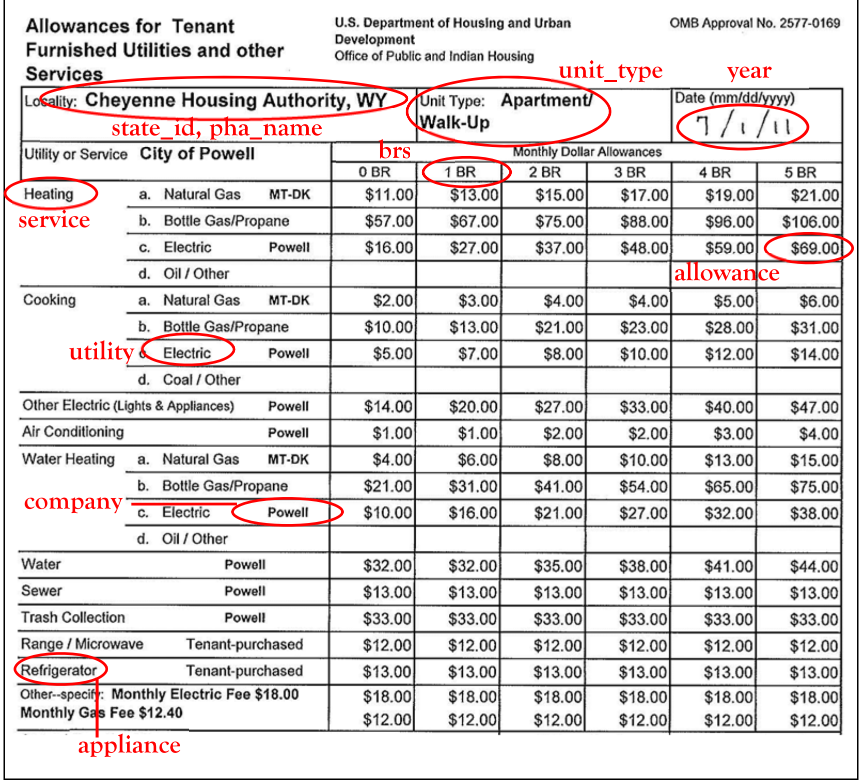
State	Frequency	Percent
Alaska	5,480	2.8
California	18,724	9.4
Colorado	2,825	1.4
Florida	3,777	1.9
Georgia	9,304	4.7
Illinois	756	0.4
Indiana	20,151	10.1
Louisiana	502	0.3
Maine	23,771	12.0
Maryland	4,842	2.4
Massachusetts	341	0.2
Michigan	55,230	27.8
Minnesota	2,646	1.3
Missouri	520	0.3
Montana	3,780	1.9
New Jersey	2,268	1.1
New York	24	0.0
North Carolina	660	0.3
Ohio	3,962	2.0
Rhode Island	626	0.3
South Carolina	1,134	0.6
Tennessee	603	0.3
Texas	7,125	3.6
Virginia	8,522	4.3
Washington	16,991	8.6
Wisconsin	315	0.2
Wyoming	3,847	1.9
Total	**198,726**	100.0

152 http://www.in.gov/ihcda/3102.htm.
153 http://www.mainehousing.org/Charts/rent-income-charts.

Variables and Data Entry

A normal UA schedule looks like Figure 20, with each allowance cell constituting one record:

Figure 20. Sample UA Schedule (with variables labeled)



Allowances for Tenant Furnished Utilities and other Services

U.S. Department of Housing and Urban Development
Office of Public and Indian Housing

OMB Approval No. 2577-0169

Locality: Cheyenne Housing Authority, WY | Unit Type: Apartment/ Walk-Up | Date (mm/dd/yyyy) 7/1/11

Utility or Service City of Powell — Monthly Dollar Allowances

Utility or Service			0 BR	1 BR	2 BR	3 BR	4 BR	5 BR
Heating	a. Natural Gas	MT-DK	$11.00	$13.00	$15.00	$17.00	$19.00	$21.00
	b. Bottle Gas/Propane		$57.00	$67.00	$75.00	$88.00	$96.00	$106.00
	c. Electric	Powell	$16.00	$27.00	$37.00	$48.00	$59.00	$69.00
	d. Oil / Other							
Cooking	a. Natural Gas	MT-DK	$2.00	$3.00	$4.00	$4.00	$5.00	$6.00
	b. Bottle Gas/Propane		$10.00	$13.00	$21.00	$23.00	$28.00	$31.00
	c. Electric	Powell	$5.00	$7.00	$8.00	$10.00	$12.00	$14.00
	d. Coal / Other							
Other Electric (Lights & Appliances)		Powell	$14.00	$20.00	$27.00	$33.00	$40.00	$47.00
Air Conditioning		Powell	$1.00	$1.00	$2.00	$2.00	$3.00	$4.00
Water Heating	a. Natural Gas	MT-DK	$4.00	$6.00	$8.00	$10.00	$13.00	$15.00
	b. Bottle Gas/Propane		$21.00	$31.00	$41.00	$54.00	$65.00	$75.00
	c. Electric	Powell	$10.00	$16.00	$21.00	$27.00	$32.00	$38.00
	d. Oil / Other							
Water		Powell	$32.00	$32.00	$35.00	$38.00	$41.00	$44.00
Sewer		Powell	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00
Trash Collection		Powell	$33.00	$33.00	$33.00	$33.00	$33.00	$33.00
Range / Microwave		Tenant-purchased	$12.00	$12.00	$12.00	$12.00	$12.00	$12.00
Refrigerator		Tenant-purchased	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00
Other--specify: Monthly Electric Fee $18.00 Monthly Gas Fee $12.40			$18.00 $12.00	$18.00 $12.00	$18.00 $12.00	$18.00 $12.00	$18.00 $12.00	$18.00 $12.00

The following data variables were recorded from each record:

Table 21. Dataset Variable Descriptions

Variable Name	Description
state_id	Identification number of the state (alphabetical)
pha_id	Identification number of the PHA
pha_name	PHA name
service	The end-use of the utility. E.g., “cooking,” “space heating,” “water heating,” “appliances,” etc.
utility	The type of utility. E.g., “Electric,” “Natural Gas,” “Propane,” “Water,” “Garbage,” etc.
appliance	The type of appliance, for when service is “appliances.” E.g., “range,” “refrigerator,” “air conditioning,” etc.
brs	The number of bedrooms.
unit_type	Type of units in the building. E.g., “townhouse,” “single-family home,”

	"elevator building," etc.
allowance	The amount of the allowance.
year	The year the UA schedule went into effect.
efficient_allowance	1 if the UA schedule was specifically for energy efficient buildings; otherwise 0.
zip	A postal code within the PHA's jurisdiction.
vintage	The age of the building to which the UA applies, if specified.
company	The name of the utility company, if specified.

Multiple PHAs are allowed in each region and multiple regions are allowed in each state. Each PHA can have multiple UA schedules, differing by *unit_type*, *vintage*, *year*, or *efficiency_allowance*. *Service* specifies the end-use while *utility* specifies the utility consumed. Thus a propane cooking UA has a *service* of "Cooking" and a *utility* of "Bottled Gas," water is entered as "Water"/"Water," and plug load is entered as "Other Electricity"/"Electric." Appliances are entered as "Appliances"/"Electric" with an additional *appliance* value. Multiple UAs might be entered for a given *service/utility* combination if the *company* differed. Finally, postal codes were looked up manually and any ZIP code within the PHA's jurisdiction was deemed sufficient. HDD and CDD information will soon be added to the dataset based on the ZIP code values. For the time being, states are used as a rough proxy for climate.

Description of the Data

Data from 27 states and approximately 500 PHAs/municipalities was collected. Ten states had statewide data available, and they are listed in Table 22. California, Minnesota, Texas, and Washington also had considerable data depth in certain regions like Minneapolis-St. Paul and Seattle-Tacoma. Two-thirds of the UAs are from the years 2009 through 2011. Only a few locations had multi-year data. Some were states, and they are also listed in Table 22; others were municipalities or PHAs.

Table 22. States with Statewide Data

	# of subdivisions	# of years*
AL	14	4
GA	3	10
IN	97	1
ME	7	5
MI	7	10
MT	18	1
NJ	1	4
RI	1	1
VA	5	3
WY	19	1

**Years of full statewide data; some states have greater multiyear data available but not for the whole state.*

Table 24 (page 87) shows the simple unadjusted average UA schedule for the dataset. Heating was the largest cost, and bottled gas and fuel oil were the most expensive utilities for heating. As shown in Figure 21, UAs for those expensive fuels rose by about $25 per bedroom while electric ($16/BR) and natural gas ($11/BR) rose less quickly. Figure 22 shows that average UAs for garbage and appliances remained mostly constant regardless of unit size while other utilities, like water and sewer, grew with unit size.

It was not uncommon for a jurisdiction to have multiple schedules for different types of units, with apartments predominating. Table 23 shows the breakdown of UAs by unit type, and shows how each unit-type's UAs compares to UAs in apartments, as averaged across all unit sizes, utilities, and services. As might be expected, high-rises and mobile homes have the lowest average UAs while manufactured and single-family homes have the highest.

Table 23. Frequency and Percentage of Each Unit Type

	Number	%*	Compared to Apartments**
Apartments	95,731	48.1	$0
Low-rises (garden-style)	29,498	14.8	($3.61)
High-rises	10,918	5.5	($7.49)
Single family houses	57,964	29.2	$4.99
Townhouses	40,635	20.5	$3.01
Duplexes	28,843	14.5	$2.51
Manufactured homes	22,291	11.2	$6.87
Mobile homes	9,717	4.9	($4.03)

**Percentages of total UAs. They do not sum to 100% because each UA may correspond to more than one unit type.*
***Mean difference from apartment UAs, averaged across all unit sizes, utilities, and services.*

Some variables were rarely used at all. Energy-efficient allowances only constituted 0.76% of the dataset. Likewise, UAs only specified building age 1.6% of the time and utility companies 2.2% of the time.

Table 24. Average Utility Allowance							
		Number of Bedrooms					
Service or Utility		0	1	2	3	4	5
Heating	Electric	$34.25	$48.89	$66.14	$83.36	$99.13	$116.49
	Natural Gas	$25.71	$35.62	$45.68	$55.88	$68.00	$79.33
	Bottle Gas	$62.65	$86.09	$111.75	$137.42	$171.41	$199.87
	Fuel Oil	$56.92	$80.73	$105.62	$130.66	$162.06	$186.05
	Wood	$35.31	$45.90	$64.63	$80.66	$91.16	$107.05
	Coal/Other	$65.32	$83.24	$107.83	$133.15	$170.38	$196.67
	Electric Heat Pump	$10.61	$14.23	$17.35	$21.50	$26.99	N/A
Cooking	Electric	$6.75	$8.62	$11.00	$13.37	$16.34	$18.51
	Natural Gas	$6.23	$7.21	$8.79	$10.18	$12.24	$13.47
	Bottle Gas	$11.13	$14.41	$18.60	$22.38	$27.92	$31.27
	Fuel Oil	$4.99	$6.79	$8.21	$10.01	$12.64	$14.70
Other Electric		$23.41	$30.84	$38.82	$48.07	$57.46	$66.58
Air Conditioning		$6.37	$8.54	$11.56	$14.74	$18.90	$19.86
Water Heating	Electric	$16.53	$23.52	$30.99	$38.58	$48.03	$55.53
	Natural Gas	$10.59	$14.45	$18.42	$22.79	$28.05	$31.71
	Bottle Gas	$25.32	$33.77	$43.96	$54.76	$69.55	$80.09
	Fuel Oil	$19.75	$27.27	$35.51	$44.34	$55.18	$63.56
Water		$18.43	$21.91	$25.98	$30.63	$35.96	$41.42
Sewer		$23.23	$26.42	$30.49	$35.26	$40.10	$45.40
Water and Sewer		$49.29	$49.60	$51.65	$55.69	$59.32	$64.09
Garbage		$19.57	$19.28	$19.36	$19.66	$19.86	$20.16
Range/Microwave		$7.15	$7.28	$7.32	$7.35	$7.43	$7.27
Refrigerator		$7.96	$8.14	$8.20	$8.36	$8.38	$8.36
Total UA for all-gas units		$141.50	$172.41	$207.30	$245.57	$288.95	$326.29
Total UA for all-electric units		$163.65	$203.44	$249.86	$299.38	$351.59	$399.58

Figure 21. Average Heating UAs

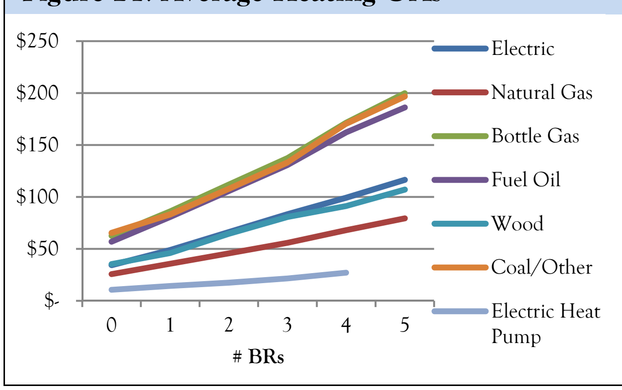


Figure 22. Other Average UAs