

## Supporting Statement (Part A)

### Justification

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

#### Information Collection for the Energy Evaluation of Public Housing Capital Fund (PHCF), Category 4, Option 2 Grantees

Note: This submission is presented as an application for a new collection of information.

### Introduction

As part of the American Recovery and Reinvestment Act (ARRA), the Department of Housing and Urban Development (HUD) was allocated funds to invest in energy efficiency and green building programs. This legislation included a \$4 billion appropriation to the Public Housing Capital Fund (PHCF) for the modernization and renovation of the nation's public housing stock, and a \$250 million appropriation to establish the Green Retrofit Program for Multi-Family Housing (GRP), which provides loans and grants for green building retrofits of privately-owned rental housing receiving project based rental assistance.

Most of the Capital Fund Recovery funding was appropriated to Public Housing Agencies (PHAs) by formula. However, a small part of the funding was awarded to grantees through a competitive process. In September 2009, the Office of Public and Indian Housing (PIH) awarded \$995 million to Public Housing Agencies (PHAs) through 396 Capital Fund Recovery Competitive grants. The grant program types include the following:

1. Category 1: Improvements Addressing the Needs of the Elderly and/or Persons with Disabilities.
2. Category 2: Public Housing Transformation.
3. Category 3: Gap Financing for Projects that are Stalled Due to Financing Issues.
4. Category 4: Creation of Energy Efficient, Green Communities:
  - Option 1, Substantial Rehabilitation or New Construction.
  - Option 2, Moderate Rehabilitation.

The U.S. Department of Housing and Urban Development (HUD) Office of Policy Development and Research developed an evaluation to assess the effectiveness of the distributed funds. The Green and Energy Retrofit Assessment (GERA) study spans four years and seeks to evaluate the short- and long-term performance of the energy investments. Specifically, the overall purpose of this study is to estimate the energy savings obtained from energy retrofits funded through ARRA. The GERA effort encompasses several specific evaluation objectives (see below). In particular, as part of the GERA effort to achieve one of these objectives, this package requests clearance for a one-time data collection effort covering the universe of Capital Fund Recovery competitive Category 4, Option 2 recipients. This covers 229 grants provided to 127 PHAs for the green retrofit of 229 Asset Management Projects (AMPs)<sup>1</sup>.

- 1. Explain the circumstances that make the collection of information necessary. Identify any legal or administrative requirements that necessitate the collection. Attach a copy of the appropriate section of each statute and regulation mandating or authorizing the collection of information.**

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<sup>1</sup> This number is slightly larger than that shown in Table 1. The numbers in the table are from an earlier data set in which not all the ARRA PIH competitive grants had yet been implemented.

To meet the goals of transparency and accountability in the investment of ARRA dollars, the Office of Management and Budget (OMB) issued guidance that must be followed by Federal Agencies when allocating ARRA funding. Specifically, the OMB guidance established the following requirements:

- Funds are awarded and distributed in a prompt, fair and reasonable manner
- The use of all funds by recipients are transparent to the public, *and the public benefits of these funds are reported clearly, accurately and in a timely manner* (emphasis added)
- Funds are used for authorized purposes only and instances of fraud, waste, error, and abuse are minimized
- Projects funded under ARRA avoid unnecessary delays and costs overruns, and
- *Program goals are achieved, including specific program outcomes and improved results on broader economic indicators.* (emphasis added)

Based on the OMB reporting requirements, HUD’s Office of Policy Development and Research developed an evaluation to assess the effectiveness of the distributed funds. The Green and Energy Retrofit Assessment (GERA) study spans four years and seeks to evaluate the short- and long-term performances of the energy investments. In particular, this evaluation must:

1. Evaluate the investments made in Public and Indian Housing (PIH) formula, PIH-competitive (Category 4, Options 1 and 2), and Green Retrofit Program (GRP) for Multifamily Housing properties;
2. Estimate, validate, and refine the energy savings from the ARRA investments for the three programs, individually and collectively;
3. Identify the most cost-effective energy conservation measures (ECMs) and catalog them, and
4. Produce a model capable of estimating savings from future investments in ECMs

One component of this overall evaluation project is to evaluate the ARRA PIH Capital Fund Recovery Grants awarded through a competitive process with the purpose of creating energy efficient, green communities (Category 4). In particular, this funding aims to “substantively increase energy efficiency and environmental performance of public housing properties and thereby reduce energy costs, generate resident and PHA energy consumption savings, reduce Greenhouse Gas emissions attributable to energy consumption and improve indoor air quality to provide a healthy living environment.” Competitive proposals from eligible PHAs responding to one of two options available were funded under this category.

The Notice of Funds Available (NOFA) applicable to the funding of Capital Fund Recovery Competitive grants can be found in Appendix A. Of the four categories available for applicants under this NOFA, only Category 4, “Creation of an Energy Efficient, Green Community” is of interest for this study as it is the only one that involves energy efficiency and utilization improvements. There are two options for Category 4 funding: Option 1, Substantial Rehabilitation or New Construction, and Option 2, Moderate Rehabilitation. The initial distribution of Category 4 awards by Option and size is shown in Table 1:

**Table 1. Distribution of Category 4 Awards by Option and Size**

Type of Category 4 Grant	Number of Awards	Award Size
Option 1 – New Construction	12	\$10+ Million

or Substantial Rehabilitation	24	\$1-10 Million
Option 2 – Moderate Rehabilitation	3	\$10+ Million
	76	\$1-10 Million
	143	Less than \$1 Million
<b>Total</b>	<b>258</b>	<b>Approx. \$600 Million</b>

NOFA requires that Category 4 grantees maintain the following information on their projects:

- Option 1 grantees must achieve and certify that they met the requirements of the grant agreement, including meeting Enterprise Green Communities criteria
- Option 2 grantees were required to maintain utility cost data for one year prior to the beginning of retrofit, and for one full year after the end of retrofit.

The survey for which this PRA package is being submitted seeks to gather pre- and post-retrofit energy utility data and additional related retrofit and utility information maintained by Category 4, Option 2 grantees. These data will be used for the evaluation of investments made in PIH-competitive Category 4, Option 2 grants, one of the objectives of this study. Because they are required to maintain these records, PHA personnel will be able to access this information through utility bills kept at properties, or in the PHA accounting system. The survey is tentatively expected to be administered in July-August 2014.

**2. Indicate how, by whom, and for what purpose the information is to be used. Except for a new collection, indicate the actual use the agency has made of the information received from the current collection.**

This is a new data collection by HUD PIH. The information collected will be used within the GERA study to estimate the energy usage savings resulting from the implementation of the energy conservation measures implemented by Capital Fund Recovery Competitive Category 4, Option 2 grantees.

**3. Describe whether, and to what extent, the collection of information involves the use of automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submission of responses, and the basis for the decision for adopting this means of collection. Also describe any consideration of using information technology to reduce burden.**

The survey will be in an excel file format, and will be sent to the universe of public housing authorities (PHAs) who received PIH-competitive Category 4, Option 2 grants. The PHAs will be asked to provide monthly data from one year of pre-retrofit and one year post-retrofit

energy utility bills for the particular Asset Management Projects (AMPs)<sup>2</sup> at which the grantees have reported implementing the funded green retrofit.

Because AMPs are required to have all the requested information and because this information is expected to be stored in the same format for the entire period of data requested, it was deemed that the use of an Excel spreadsheet would be the least burdensome format of data collection for PHAs. As indicated in the numeral below, to avoid duplication of effort and to minimize burden, the Excel spreadsheet will be prepopulated with already available AMPs and retrofit information.

**4. Describe efforts to identify duplication. Show specifically why any similar information already available cannot be used or modified for use for the purposes described in Item 2 above.**

For this study, HUD will utilize a series of already existing data sources in order to minimize the burden on PHAs to provide evaluation data. These data will be used to pre-populate the Excel survey instrument, and only information not available from any other existing source will be requested from AMPs:

The already existing data sources are:

- **RAMPS data.** HUD created the Recovery Act Management and Performance System (RAMPS) to provide support to HUD programs in meeting data and reporting requirements for ARRA. RAMPS data contain a complete listing of all Category 4 grants that are subject of this study. In addition, Category 4, Option 2 grantees are required to provide RAMPS with AMP-level data quantifying the number of commonly applied ECMs and the number of units for which these ECMs were planned and implemented. RAMPS data will be utilized to determine the ECMs implemented in each AMP.
- **IMS/PIC Data.** This data system maintains information about all of PIH's inventories of PHAs, developments, buildings, and units. These data will provide property characteristics for each AMP in the HUD PIH inventory:
  - Building type
  - Location (zip code)
  - Average unit size in terms of number of bedrooms
  - Elderly/Family occupancy
  - Property size (units)
  - Vacancy

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<sup>2</sup>An AMP is either one building, or a collection of buildings that is managed as a single unit by a PHA. For this study we are defining "properties" as the development components according to the pre-asset management reform definition that make up each new AMP. For this document and throughout the study we will use three terms to reflect three concepts. Development is defined as it was in the pre-asset management reform world. Asset Management Project (AMP) is the grouping of units and buildings that form a new "development." In many cases old developments have been merged into a single AMP, and in some cases developments have been split into a number of AMPs. Property is the component of an old development that moved into a new AMP. For a single development that moved into a single new AMP the development, property and AMP are all the same. For an AMP that is comprised of a number of old developments, the properties in the new AMP are the old developments. In cases where old developments were split into a number of AMPs, the property is the portion of the old development that moved into the AMP. In this report, we use "property" and "development" interchangeably to refer to the entities used for sampling and described by analysis. ([http://portal.hud.gov/hudportal/documents/huddoc?id=PH\\_Capital\\_Needs.pdf](http://portal.hud.gov/hudportal/documents/huddoc?id=PH_Capital_Needs.pdf))

The data requested from AMPs are:

- Retrofit information:
  - Exact start and end dates of retrofit
  - Year of last retrofit
- Property information:
  - Energy source (utility) used for heating and cooling of units
- Utility information:
  - Whether tenants pay for the utility bills directly to energy provider.
- Utility meters
  - Number of utility meters for which PHA has information for each AMP
  - Whether utility meters cover usage of all common areas
  - Specific meter information:
    - identification number,
    - location,
    - whether meter was used before and/or after retrofit,
    - whether utility meter covers usage of common areas only, units only, or both common areas and units
    - Number of units which usage is covered by each meter
    - Number of units in building where meter is located
- Energy utilization information pre- and post-retrofit of AMPs:
  - Exact pre-retrofit start and end dates for which usage information is provided
  - Exact post-retrofit start and end dates for which usage information is provided
  - Units of energy consumption (for all energy utilities other than Electricity, which is measured in KWh)
  - Month for which usage is provided
  - Energy usage during a given month for which information is requested.

These exact data elements requested from each AMP are not available from any other source, and, as a requirement from NOFA, AMPs are required to maintain this utility usage information.

There is, however, one additional data source that can be used as a proxy for some of these data elements, although it would not provide the level of detail desired for the analysis. This additional data source is the **UEL Utility Data set**. These data are collected by PIH and used to calculate the Utility Expense Level that determines part of a PHA's operating subsidy for a given year. The utility usage information is provided in aggregate form for the year, spanning July 1st to June 30th. As a result, the period provided may not match with the pre- and post-retrofit dates required, and seasonal and weather variation across months are not captured. UEL data can be used to determine the type of energy consumption (e.g. natural gas, electricity, fuel oil) at a property in the absence of other available data.

**5. If the collection of information impacts small businesses or other small entities (Item 5 of OMB Form 83-I), describe any methods used to minimize burden.**

Data collection will only be required of PHAs who have voluntarily applied for a competitive grant from PIH. No small businesses will be impacted by the data collection effort.

**6. Describe the consequence to Federal program or policy activities if the collection is not conducted or is conducted less frequently, as well as any technical or legal obstacles to reducing burden.**

The overall purpose of the GERA study is threefold: (1) estimate, validate and refine the energy savings of energy retrofits funded through ARRA, (2) identify the most cost-effective ECMs and catalog them, and (3) produce a model capable of estimating savings from future investments in ECMs.

This data collection will allow for the estimation of energy savings for one particular type of grant, PIH Competitive Category 4, Option 2 grants, among three different types of grants that the GERA study encompasses. However, these data and estimation are also key elements in fulfilling other study objectives, namely, the identification of the most cost-effective ECMs and the construction of a future energy savings model

Should this data collection effort not be conducted, the achievement of the broader GERA objectives delineated in the paragraph above would be compromised. In turn, this may lead to HUD not meeting the goals of transparency and accountability in the investment of ARRA dollars, as established in OMB guidance provided to Federal Agencies.

This data collection cannot be conducted less frequently as it is a one-time data collection. The burden of collection cannot be further reduced as it is minimized by utilizing administrative HUD PIH data, and because the AMPs already should have these data since they were by NOFA to maintain all of the information required.

**7. Explain any special circumstances that would cause an information collection to be conducted in a manner:**

- **requiring respondents to report information to the agency more often than quarterly;**  
Not Applicable – the data collection will be conducted only once.
- **requiring respondents to prepare a written response to a collection of information in fewer than 30 days after receipt of it;**  
Not Applicable. Respondents will be given 30 days to provide the requested information.
- **requiring respondents to submit more than an original and two copies of any document;**  
Respondents will only be required to submit a spreadsheet filled with the requested information.
- **requiring respondents to retain records, other than health, medical, government contract, grant-in-aid, or tax records, for more than three years;**  
No such requirement is needed.
- **in connection with a statistical survey, that is not designed to produce valid and reliable results that can be generalized to the universe of study;**

No such requirement is needed.

- **requiring the use of a statistical data classification that has not been reviewed and approved by OMB;**  
Not Applicable
- **that includes a pledge of confidentiality that is not supported by authority established in statute or regulation, that is not supported by disclosure and data security policies that are consistent with the pledge, or which unnecessarily impedes sharing of data with other agencies for compatible confidential use; or**

Not Applicable

- **requiring respondents to submit proprietary trade secrets, or other confidential information unless the agency can demonstrate that it has instituted procedures to protect the information's confidentiality to the extent permitted by law.**

Not Applicable

8. **If applicable, provide a copy and identify the date and page number of publication in the Federal Register of the agency's notice, required by 5 CFR 1320.8(d), soliciting comments on the information collection prior to submission to OMB. Summarize public comments received in response to that notice and describe actions taken by the agency in response to these comments. Specifically address comments received on cost and hour burden.**

Not Applicable

**Describe efforts to consult with persons outside the agency to obtain their views on the availability of data, frequency of collection, the clarity of instructions and recordkeeping, disclosure, or reporting format (if any), and on the data elements to be recorded, disclosed, or reported.**

The data requested correspond to utility records that grantees are required to keep. No consultations with persons outside the agency were conducted.

**Consultation with representatives of those from whom information is to be obtained or those who must compile records should occur at least once every 3 years - even if the collection of information activity is the same as in prior periods. There may be circumstances that may preclude consultation in a specific situation. These circumstances should be explained.**

Not Applicable

9. **Explain any decision to provide any payment or gift to respondents, other than remuneration of contractors or grantees.**

Not Applicable

10. Describe any assurance of confidentiality provided to respondents and the basis for the assurance in statute, regulation, or agency policy.

Not Applicable

11. Provide additional justification for any questions of a sensitive nature, such as sexual behavior and attitudes, religious beliefs, and other matters that are commonly considered private. This justification should include the reasons why the agency considers the questions necessary, the specific uses to be made of the information, the explanation to be given to persons from whom the information is requested, and any steps to be taken to obtain their consent.

Not Applicable. No questions of this nature will be asked.

12. Provide estimates of the hour burden of the collection of information. The statement should:

- **Indicate the number of respondents, frequency of response, annual hour burden, and an explanation of how the burden was estimated. Unless directed to do so, agencies should not conduct special surveys to obtain information on which to base hour burden estimates. Consultation with a sample (fewer than 10) of potential respondents is desirable. If the hour burden on respondents is expected to vary widely because of differences in activity, size, or complexity, show the range of estimated hour burden, and explain the reasons for the variance. Generally, estimates should not include burden hours for customary and usual business practices.**

See table below

- **If this request for approval covers more than one form, provide separate hour burden estimates for each form and aggregate the hour burdens in Item 13 of OMB Form 83-I.**

Each PHA will be required to fill out only one survey form for each AMP in which retrofit was conducted.

- **Provide estimates of annualized cost to respondents for the hour burdens for collections of information, identifying and using appropriate wage rate categories. The cost of contracting out or paying outside parties for information collection activities should not be included here. Instead, this cost should be included in Item 13.**

Because this is a one-time data collection, the annualized costs are the same as the costs displayed below.

**Table 2: Burden Estimates for Green Energy Retrofit Assessment Data Collection Efforts**

Respondents	Number of Responses/ Instances of Collection	Frequency of Collection	Average Time per Response (Hours/AMP)	Burden (Hours)	Burden Cost (US\$)
127 (one respondent per PHA)	229 responses (one response per AMP)	One time	0.5 hrs/utility * 2 utilities/AMP =1 hr/AMP	1hr/AMP * 229 AMPs= 229 hrs	229 hrs*\$31/hr = <b>\$7,099</b>

Assumptions used to build burden estimates:

- One respondent per each PHA whose AMPs received Category 4, Option 2 grants. That is, a total of 127 respondents
- One response per AMP. Because each PHA may have more than one AMP receiving competitive grants, this amounts to 229 responses.
- This is a one-time data collection
- Because AMPs should already have all the required information, it was estimated that filling the information for one utility should not take longer than 0.5 hours
- It was estimated that, on average, AMPs will have 2 utility bills (electricity and natural gas or fuel oil). Thus providing all the information required for a given AMP is not expected to take more than one hour.
- 229 respondents at one hour per respondent leads to a total expected hours burden of 229 hours.
- The burden monetary cost is estimated as the average hourly rate of the respondent times the total burden in number of hours. This table assumes an hourly rate of \$31/hour for public housing managers.<sup>3</sup>

**13. Provide an estimate for the total annual cost burden to respondents or record keepers resulting from the collection of information. (Do not include the cost of any hour burden shown in Items 12 and 14).**

- **The cost estimate should be split into two components: (a) a total capital and start-up cost component (annualized over its expected useful life) and (b) a total operation and maintenance and purchase of services component. The estimates should take into account costs associated with generating, maintaining, and disclosing or providing the information. Include descriptions of methods used to estimate major cost factors including system and technology acquisition, expected useful life of capital equipment, the discount rate(s), and the time period over which costs will be incurred. Capital and start-up costs include, among other items, preparations for collecting information such as purchasing computers and software; monitoring, sampling, drilling and testing equipment; and record storage facilities.**

None, as this is a one-time data collection effort and grantees are required to maintain this information as a NOFA condition for their funding. Thus, no additional capital,

<sup>3</sup> Several sources were consulted to build this hourly rate estimate. In particular, the Bureau of Labor Statistics National Compensation Survey reported estimates that in 2010, the average property manager made about \$30.56/hour (see <http://www.bls.gov/ncs/>).

technology or data gathering services other than those already mandated by NOFA should be required

- **If cost estimates are expected to vary widely, agencies should present ranges of cost burdens and explain the reasons for the variance. The cost of purchasing or contracting out information collections services should be a part of this cost burden estimate. In developing cost burden estimates, agencies may consult with a sample of respondents (fewer than 10), utilize the 60-day pre-OMB submission public comment process and use existing economic or regulatory impact analysis associated with the rulemaking containing the information collection, as appropriate.**

None, as this is a one-time data collection effort directly from grantees, and grantees are required to maintain this information as a NOFA condition for their funding.

- **Generally, estimates should not include purchases of equipment or services, or portions thereof, made: (1) prior to October 1, 1995, (2) to achieve regulatory compliance with requirements not associated with the information collection, (3) for reasons other than to provide information or keep records for the government or (4) as part of customary and usual business or private practices.**

Not available. No equipment or services are expected to be purchased as result of this data collection effort.

- 14. Provide estimates of annualized costs to the Federal government. Also, provide a description of the method used to estimate cost, which should include quantification of hours, operational expenses (such as equipment, overhead, printing, and support staff), and any other expense that would not have been incurred without this collection of information. Agencies may also aggregate cost estimates from Items 12, 13, and 14 in a single table.**

**Table 3: Annualized Cost Estimate to the Federal Government**

<b>Respondents</b>	<b>Number of Responses/ Instances of Collection</b>	<b>Frequency of Collection</b>	<b>Average Time per Response (Hours/AMP)</b>	<b>Burden (Hours)</b>	<b>Burden Cost (US\$)</b>
127 (one respondent per PHA)	229 responses (one response per AMP)	One time	0.5 hrs/utility * 2 utilities/AMP =1 <b>hr/AMP</b>	1hr/AMP * 229 AMPs= <b>229 hrs</b>	229 hrs*\$48.83/hr <b>=\$11,182.07</b>

The methodology used to calculate this cost is the same as described above for Table 2. However, these are annualized costs were estimated using a pay equivalent to Washington, DC GS13 FY2014 rate of \$48.83/hr. This table indicates that the cost for the federal government to administer and process this data collection effort is one hour per survey collected at the Washington, DC pay equivalent rate.

- 15. Explain the reasons for any program changes or adjustments reported in Items 13 or 14 of the OMB Form 83-I.**

Not Available.

**16. For collections of information whose results will be published, outline plans for tabulation and publication. Address any complex analytical techniques that will be used. Provide the time schedule for the entire project, including beginning and ending dates of the collection of information, completion of report, publication dates, and other actions.**

The final comprehensive report of the GERA study is expected to be provided to the public during Summer, 2015. As indicated above, this data collection effort applies to the evaluation of one of three programs that are part of the overall study and contributes to the cataloguing and review of the efficiency and efficacy of alternative ECMs.

Table 3 below displays the timeline for the completion of the overall GERA study:

**Table 3: Timetable for GERA Study Completion of Tasks**

<b>Task Number</b>	<b>Task Name</b>	<b>Date</b>
1	Attend Start Up Meeting	10/12/2011*
2	Create Draft Energy Savings Model	12/30/2011*
3	Determine Cost Effectiveness of ECMs	12/30/2011*
4	Calculate Unit Equivalents Initially	12/30/2011*
5	Estimate Energy Savings	1/31/2012*
6	Catalog Cost Effective ECMs	1/31/2012*
7	Create PIH Field Staff Data Collection Method	9/30/2014
8	Develop On-Site Data Collection Strategy and Tools	4/21/2014*
9	Select Sites to Visit	4/1/2014*
10	Write On-Site Evaluation Report	10/31/2014
11	Write Case Studies	1/31/2015
12	Develop Survey	6/13/2014
13	Implement Survey	6/30/2014
14	Compile and Analyze Survey Results	11/30/2014
15	Create PHCF Competition Energy Evaluation Method	3/7/2013*
16	Complete PHCF Competition Energy Evaluation	1/31/2015
17	Develop Method for Evaluating the GRP for Multifamily Housing	9/31/2014
18	Collect Data on GRP for Multifamily Housing	11/30/2014
19	Estimate Energy Savings for Green Retrofit Program	1/31/2015
20	Validate Energy Model Update	1/31/2015
21	Submit Interim Evaluation Report	12/30/2012*
22	Submit Interim Evaluation report-Year Two	6/30/2014*
23	Submit Comprehensive Evaluation Report	3/28/2015

\*Completed

### **Analytical techniques used in the analysis of data gathered through this specific data collection effort.**

The goal of the estimation is to isolate the impact of the retrofit conducted by competitive grantees on utility usage at the property. The data are to cover twelve months of utility bills prior to retrofit and twelve months post-retrofit. Several different factors can result in changes in utility usage at a property including weather changes, occupancy changes, major property configuration changes, or other retrofits that occurred outside the program. Therefore, any analysis of usage savings must control for these factors. To do this, “avoided costs” are measured. Measuring avoided costs involves determining the usage savings in the post-retrofit period, in comparison to an estimate of what costs or usage would have been in the post-retrofit period if the retrofits had not taken place.

The most widely accepted standard for measuring avoided costs is the method outlined by American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)’s Guideline 14-2002<sup>4</sup>, as well as by the International Performance Measurement and Verification Protocol (IPMVP)<sup>5</sup>. The IPMVP standard is the basis for performance-based contracts under the Federal Energy Management Program (FEMP). There are four measurement and verification protocols for measuring avoided costs recognized in the IPMVP. HUD proposes using one of these protocols, the “Whole Facility” Protocol (Protocol C), which is designed to measure whole-facility changes in utility usage between a pre-retrofit period and a post-retrofit period.

The IPMVP Protocol C involves development of a series of regression models that model different types of fuel usage at the property. This protocol is designed to measure a whole facility’s changes in utility costs between a pre-retrofit and a post-retrofit period. The data required to use this protocol involves utility, vacancy and weather data from the twelve-month pre-retrofit period as well twelve months of continuous utility, vacancy and weather data from the post-retrofit utility monitoring period.

The IPMVP methodology has three basic steps:

1. Determine the pre-retrofit usage profile, using the pre-retrofit period monthly data, based on weather and occupancy in the time period being studied.
2. Estimate what usage would have been in the post-retrofit period had the retrofits not taken place, using the pre-retrofit usage profile and controlling for the factors in Step 1 above.
3. Compare the estimated energy usage based on pre-retrofit conditions to actual energy usage post-retrofit.

To account for differences in weather patterns between the pre- and post-retrofit periods, the usage for both properties has to be normalized. This normalization is done via a linear ordinary least squares (OLS) model where the dependent variable is electric or gas usage, and the independent variables are the total number of heating degree days (HDD) and/or cooling degree days (CDD) in the period under study.

The heating requirements for a building at a specific location are directly proportional to the number of heating degree days (HDD) at that location. A similar measurement, cooling degree days (CDD), reflects the amount of energy used to cool a home or business. Both are measured by the difference in the average temperature from a certain baseline temperature above/below which a building needs no heating/cooling.

The resulting equation can be used to predict the energy usage of the property at the post-retrofit condition in any occupancy and weather conditions. By comparing this usage to that in the pre-retrofit period, one can find the difference in usage that can be attributed directly to retrofits, and not to differences in weather or occupancy.

The analysis of changes in energy consumption associated with the retrofit implementation will also be compared to the initial predictions of potential energy savings submitted in each

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<sup>4</sup> This standard can be downloaded here for a fee: <http://resourcecenter.ashrae.org/store/ashrae/newstore.cgi?itemid=9012&view=item>

<sup>5</sup> The IPMVP Protocol can be downloaded here for free: [http://www.evo-world.org/index.php?option=com\\_content&view=article&id=272&Itemid=279&lang=en](http://www.evo-world.org/index.php?option=com_content&view=article&id=272&Itemid=279&lang=en)

AMP grant application. These predictions were based on an initial energy audit that AMPs conducted as part of the requirements for the GRP for their properties.

All the analyses and estimations will be conducted utilizing the statistical package STATA.

**17. If seeking approval to not display the expiration date for OMB approval of the information collection, explain the reasons that display would be inappropriate.**

Not available

**18. Explain each exception to the certification statement identified in Item 19, "Certification for Paperwork Reduction Act Submissions," of OMB Form 83-I.**

Not available.

## **Appendix A. Notice of Funds Available**

See Attachment.