



HPD Building Benchmarking and Performance Tracking Protocol

Version 1.0 (revised February 8th, 2016)

About this Protocol

This Protocol sets forth best practices for building benchmarking and performance tracking and includes the requirements of the New York City Department of Housing Preservation & Development (“HPD”) with respect thereto.

Section 1: Introduction includes general information on building benchmarking, and some suggestions on successful implementation strategies along with the general rationale and framework by HPD.

Section 2: Basic Framework details the structure and protocol of the building benchmarking requirements. Affected parties should reference this section for reporting and compliance requirements.

Section 3: Beyond the Basics gives a general high level introduction to advanced strategies for building benchmarking and performance tracking. Building owners/managers interested in developing a more sophisticated approach to building performance monitoring will find this section helpful in thinking about possibilities and approaches.

This Protocol uses excerpts from the *Building Performance Tracking Handbook* (2012), with permission of the California Commissioning Collaborative (www.cacx.org).

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Section 1: Introduction

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Introduction to HPD Building Performance Tracking

As of September 2015, buildings financed by the New York City Department of Housing Preservation and Development (HPD) will be required to track and document utility usage as a condition of financing. Building owners and managers will be responsible for tracking and documenting the total electricity, heating and water used in the building from both common spaces and tenants.

This section will provide an overview and reasons behind HPD’s building benchmarking and performance tracking initiative. Topics and questions covered in this section include:

What is building benchmarking and performance tracking?

- What does the term “building benchmarking and performance tracking” mean?
- What are the reasons for heightened awareness around building performance tracking?
- What are the essential elements of a building performance tracking strategy?

Why has HPD implemented performance tracking on buildings HPD finances?

- What are the strategic business and financial reasons for tracking building performance?
- What are the overarching goals within the City driving this initiative?
- What might HPD interaction with building owners and manager look like in the future?

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Building Performance Tracking: A process of Continuous Improvement

Building performance tracking is a process of continuous improvement. The four steps in Figure 1 show the fundamental process for tracking, analyzing, diagnosing, and resolving issues related to building performance, such as with heating, ventilation, lighting and water use. Building performance should be tracked on an ongoing basis and incorporated as part of standard processes.

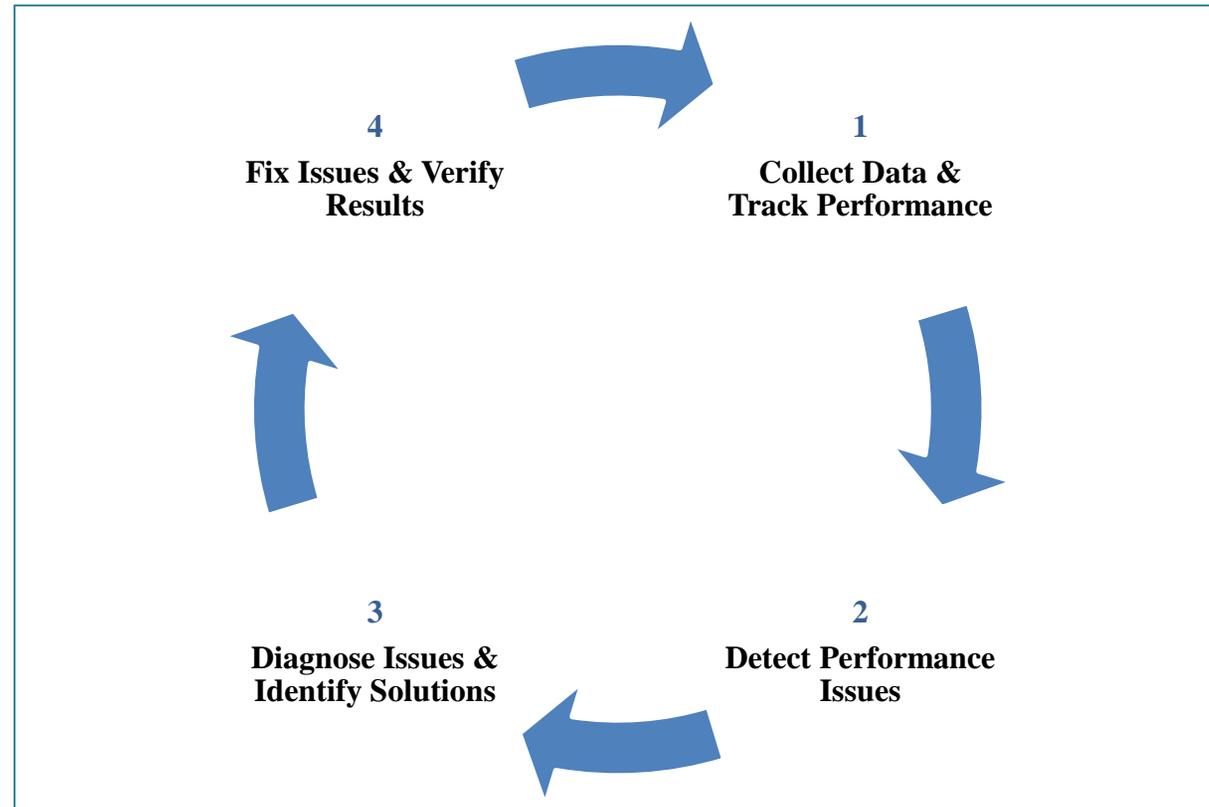


Figure 1: The Four Steps of Building Performance Tracking

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What are Building Benchmarking and Performance Tracking?

- What does the term “building benchmarking and performance tracking” mean?
- What are the reasons for heightened awareness around building performance tracking?
- What are the essential elements of a building performance tracking strategy?

Building performance tracking is the process of gathering and analyzing utility data from a building. Performance tracking is part of a long term strategy for supporting continuous improvements and maintaining gains in energy efficiency of building systems. Better performance of building systems results in increased comfort for tenants and reduced costs for building owners and tenants.

Data collection will result in a variety of performance metrics ranging from heating, electric and water usage. There are a variety of methods and tools available to accomplish this task. This guide will outline the HPD requirements to accomplish this process along with the associated reporting requirements.

Once building utility data has been gathered, owners/ managers can analyze this data and compare utility usage to similar buildings to assess relative performance of the building. This process is known as **benchmarking**. Benchmarking can be a useful tool to identify areas of potential improvement in building operations and prioritize investments in a portfolio.

In developing the *HPD Benchmarking and Performance Tracking Protocol*, HPD has attempted to automate much of the labor-intensive data collection and analysis often associated with this process. In addition, there will be technical assistance available through the approved benchmarking services providers. Reporting requirements have also been aligned with existing annual reporting requirements. Compliance with the HPD benchmarking protocol will facilitate compliance with NYC’s Local Law 84, and will satisfy the data collection and monitoring requirement for buildings required to comply with the [Enterprise Green Communities Criteria](#).

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Why has HPD implemented performance tracking?

- What are the strategic business and financial reasons for tracking building performance?
- What are the City's overarching policy goals for this initiative?
- What might HPD interaction with building owners and manager look like in the future?

HPD and its development partners are making substantial investments in communities across the five boroughs. With the launch of [Housing New York](#) in May 2014, the City intends to produce or preserve 200,000 units over ten years. To ensure that the City's investments in affordable housing remain financially viable over the useful life of buildings, HPD is implementing a building benchmarking and performance tracking initiative.

In September 2014, the City published [One City Built to Last](#) which laid out a pathway for New York City to achieve an eighty percent reduction in greenhouse gas emissions from a 2005 baseline by 2050. To gauge progress toward this important goal, building emissions across New York City's diverse building stock need to be tracked.

In connection with these efforts, HPD is incorporating additional tools to assist in managing and monitoring the portfolio of affordable housing financed by the City. There is a strong correlation between buildings in financial distress and buildings with poor energy performance. Having the capability to analyze long term building performance data from buildings in the HPD portfolio provides HPD with possible points of interaction with building owner/managers, to assist in improving the performance of vulnerable buildings and maintain long term financial viability.

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The Business Case

In implementing this benchmarking and performance tracking requirement, HPD is promoting best practices in building management in the affordable housing sector. Some of the direct benefits include:

- Electric, gas, oil and water cost savings
- Higher net operating income (NOI), and asset value
- Increased tenant satisfaction
- Better reporting to all stakeholders

In October 2012, the United States Environmental Protection Agency published a study from over 35,000 building, which found that buildings that consistently benchmark energy performance save energy¹. Buildings saved a total of 7% over the three year period from 2008-2011(Figure 2).

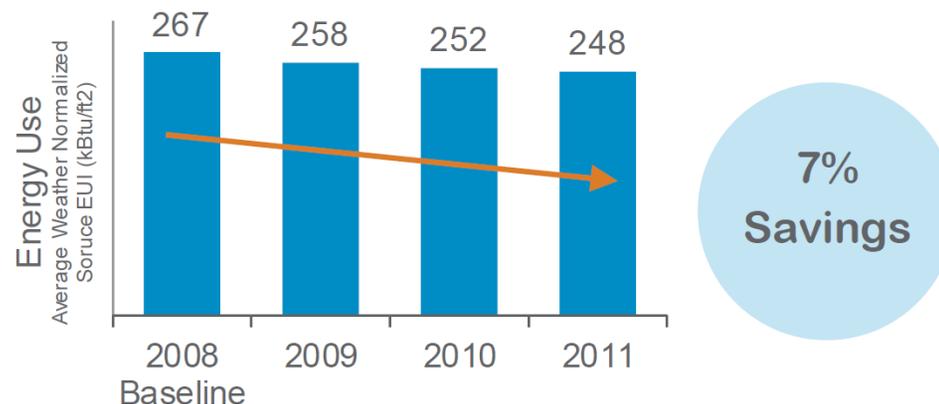


Figure 2: Energy Savings in Portfolio Manger

Reductions in operating expenses of a rental building increase its net operating income (NOI). Increases in NOI increase the value of a building and increase long-term financial viability. Because affordable housing has limited ability to increase rents relative to market rate housing, reducing operating expenses is often the most viable way to increase NOI. An increase in NOI also increases the amount a building can borrow to assist in financing future capital repairs or building retrofits.

¹ EPA Benchmarking and Energy Savings.
https://www.energystar.gov/sites/default/files/buildings/tools/DataTrends_Savings_20121002.pdf

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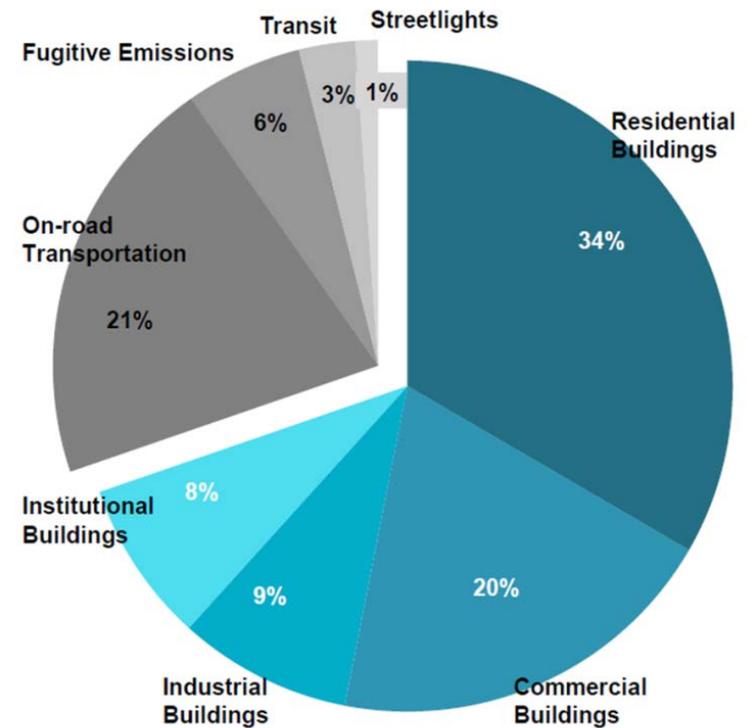
In 2013, total emissions in New York City were 48.02 million metric tons of carbon dioxide equivalent (MtCO₂e). Of the total emissions, buildings accounted for more than 70 percent (Figure 3). With the launch of *One City Built to Last* in September 2014, the City intends to reduce greenhouse gas emissions (GHG) by 80 percent by 2050 (80 by 50).

Measured relative to the 2005 baseline, New York City is seeking to achieve an annual reduction of 47.29 MtCO₂e by 2050 as articulated in *One City Built to Last*. Buildings are projected to contribute 60 percent of the required reduction, with the power and transportation sectors accounting for the remaining 40 percent in approximately equal measure, with minor contributions from solid waste.

Through *Housing New York* the City is endeavoring to produce or preserve 200,000 units over ten years. Under “business as usual” the footprint of 200,000 units is approximately one million metric tons of carbon dioxide equivalent annually². HPD has an opportunity to make a visible contribution to the greenhouse gas reduction goals of New York City.

The main goals of this building benchmarking and performance tracking initiative are to:

- Help build capacity on the building owner/manager level to better understand utility usage, compare performance to similar buildings, and identify potential improvements to energy efficiency
- Create a reliable system for HPD/HDC to capture building performance data on an ongoing and consistent basis
- Help the City evaluate progress towards emissions targets laid out in the 80 by 50 goal.



Source: New York City Mayor’s Office of Sustainability
Figure 3: New York City Greenhouse Emissions by Sector

² 16.4 M MtCO₂e from housing sector from *Inventory of New York City Greenhouse Gas Emissions, November 2014* divided by 3.4 M housing units, *2014 Housing Vacancy Survey* multiplied by 200,000 units from *Housing New York* equals 964,706 Metric tons CO₂e annually

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Capacity Building

Many owner/ managers do not currently have a **Management Framework** in place to support improvements in operations through building performance tracking. This section describes the basic elements of a strong management framework and why it is important.

Management Framework

- Why does a strong management framework matter?
- What are the building blocks of a strong management framework?

A management framework is the structure that guides building performance tracking. It encompasses both the people within the building performance tracking team and the processes that guide action, communication, priorities, needs, incentives, goals, resources, time, and training for the team. This section highlights specific elements of a best practice management framework that supports building performance tracking.

Why Does a Strong Management Framework Matter?

Having a best practice management framework is critical to getting the greatest benefit from performance tracking tools. A management framework defines the environment in which building operators and owners use these tools, and it ensures they have the guidance needed to extract, interpret, and act on the data gathered.

Typically, the greatest obstacles to building performance tracking are the lack of necessary staff time and resources to turn data collected into actions that improve the building's efficiency. As a result, investment in performance tracking tools can be a net financial loss unless there is the dedicated staff time and protocols for action. Establishing a management framework will support the need for trained staff to make information actionable.

Building Blocks of a Management Framework

This section lists some of the steps building owners can take to build a strong management framework for tracking building performance. While these steps are recommended, it is important for building owners to survey existing management practices in their buildings and work with their staff to build upon them. Rarely is there a need to overhaul current processes; most owners can simply revise them to focus more on energy and system performance.

The following steps are important for implementing a strong management framework:

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1. Carve out resources
2. Identify the champion and team members
3. Set quantifiable performance goals
4. Consider incentives to motivate staff
5. Determine accountability of team members
6. Include performance tracking language in contracts

Carve out resources

Building owners should allocate resources to invest in performance tracking tools and the labor hours to use the tools. Building performance tracking is a long-term strategy, so incremental investments year-to-year may be the right approach to getting started.

It is critical that the performance tracking team, especially building operators, have enough time and resources to monitor performance, identify anomalies, and take follow-up action to correct problems. Staff must review and act on performance data on a regular basis, and with adequate training so the full capabilities of the tools are realized. Sufficient time should be budgeted for these needs in order to fix the problems that are uncovered.

Identify champion and team

Having an internal energy champion and designated team allows building performance tracking to be more intentional, and promotes coordination across building staff and management. Clearly defining the roles and responsibilities of each team member works to eliminate confusion and focus each person's efforts. Figure 4 illustrates the range of options available when establishing the building performance tracking team.

Internal Resources	External Resources
In-house energy manager and operations and maintenance (O&M) staff	Third-party service contractor (O&M service contractor, tool vendor)
Property manager, asset manager, or building owner	Existing building commissioning (EBCx) provider
Occupants	Technical consultants

Figure 4: Building Performance Tracking Team Members

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Include both senior management and O&M staff on the building performance tracking team. Management presence will ensure buy-in for the building performance tracking program, while O&M staff provide on-the-ground insights to base building performance tracking in the realities of building operation. Support from external parties, such as benchmarking service provider, can alleviate the burden of labor associated with data collection from in-house O&M staff while offering valuable expertise in building performance tracking.

Set performance goals

If an organization or business has top-down mandates to reduce energy or improve sustainability, building performance tracking can directly support those efforts. If there are no pre-existing targets, then goals should be set based on energy use, cost, or the ENERGY STAR benchmark. Some examples of energy and sustainability goals are:

- Reduce energy use by 2 percent every year
- Reduce electrical and fuel use by 20 percent in 4 years
- Achieve an EPA ENERGY STAR rating of 75

Consider incentives to motivate staff

Leading building managers have found staff incentives to be a critical piece of their overall performance tracking strategy. Bonuses and recognition can help motivate best practices. Some examples include:

- Tie internal and third-party staff bonus payments to system and energy performance
- Create company-wide recognition for staff and occupant efforts to save energy
- Give occupants web access to energy dashboards, and introduce actions they can take to cut energy use. Display this information in public areas.
- Involve tenants in periodic audits of apartments
- Email bulletins or scorecards to employees on building performance

Determine accountability of team members

Create a flow of information about building performance up and down the management chain. Operators should report to senior-level managers on their successes in finding problems and identifying solutions, while managers should guide operators on what areas to prioritize based on the company's overarching goals. Well-defined reporting procedures help ensure accountability and drive action. For example, integrating building performance tracking with work order systems will drive issues identified towards resolution. Reporting protocols also provide an avenue for collecting and publishing the positive results of building performance tracking.

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Include performance tracking language in contracts

When possible, insert specific building performance tracking goals into real estate transaction documents and contracts with O&M service providers. Property Management Agreements present another opportunity to root building performance best practices in contract language. For example, contracts could require:

- Energy performance benchmarking with a specified software platform
- Established processes and responsibilities around building commissioning
- Training of operators, property managers and other staff on energy management
- Defined expectations for engaging with tenants to unlock additional paths toward energy efficiency

The management framework described in this chapter offers a foundation for owners and managers to engage in implementation of an effective strategy to implement an energy reduction plan.

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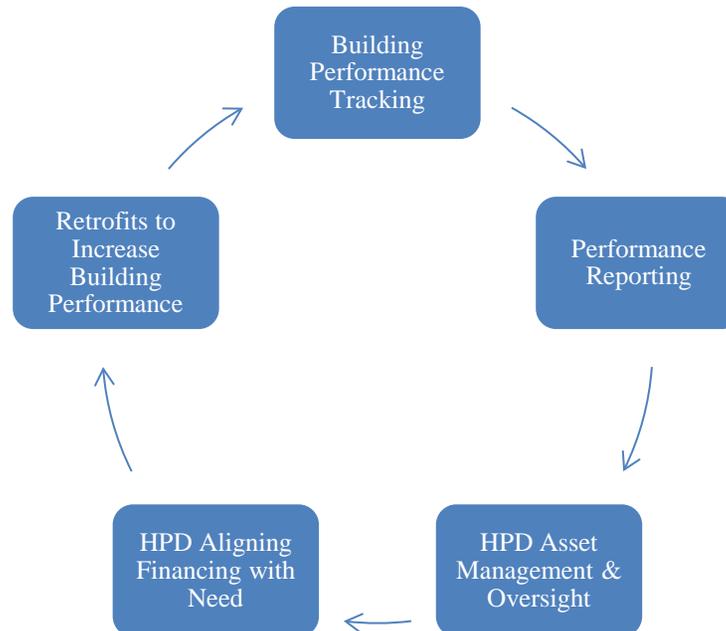
Proactive interaction with building owners/managers

Historically the City prioritized lower total development costs over minimizing long term operating costs when financing the development of affordable housing. However, since the launch of its green building policy in January 2011 HPD has taken a more holistic approach to development and building management by requiring compliance with the *Enterprise Green Communities Criteria*. As part of this ongoing green building initiative, HPD’s building benchmarking and performance tracking requirement will standardize the way data is collected from buildings financed by HPD, while allowing some flexibility to building owner/managers on how to accomplish the goals established by the City.

A robust benchmarking initiative with a high degree of active participation will help the City better support owner/managers in building management and evaluate progress toward the energy reduction goals of New York City. Through better reporting of building performance, HPD can assist in directing financing toward buildings in need of systems repair/ upgrades or more substantial building retrofits.

Building performance tracking will provide opportunities for HPD to interact with buildings in decline, and assist in improving performance long before a building enters financial distress or unduly deplete building reserves.

Figure 4: Building performance tracking cycle



Section 2: Basic Framework

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Basic Framework

This section describes the basic framework and requirements for the *HPD Benchmarking Protocol*. Building owner/managers, benchmarking providers and HPD project managers should reference the procedures outlined in this section for compliance with HPD building benchmarking and performance tracking requirements. This section will cover:

- The HDC/HPD Qualified Benchmarking Provider list
- Benchmarking account setup procedure
- Technical assistance with account setup
- HPD loan closing requirements with respect to benchmarking
- HPD reporting requirements

The overall framework of the *HPD Benchmarking Protocol* relies on automated data collection provided by benchmarking software providers, who have been qualified through an RFQ process with the New York City Housing Development Corporation (HDC). These qualified providers will (1) assist owner/managers in the initial setup process, (2) facilitate compliance with reporting requirements, and (3) act as a resource to assist owners in improving building operations.

These qualified software platforms will provide building owner/managers with regularly updated monthly building performance information, which building managers and operators can use to make more informed decisions regarding building operations and investments. In addition, with the assistance of the benchmarking provider, owners will be required to upload the information gathered through the qualified benchmarking software platform to [U.S. Environmental Protection Agency ENERGY STAR Portfolio Manager®](#). This data transfer process will coincide with the Local Law 84 reporting deadline of May 1st annually to avoid adding a separate reporting deadline.

HPD will utilize Portfolio Manager® as a data aggregation tool to allow for analysis across multiple benchmarking software platforms. Refer to Figure 5 for an overview of the HPD benchmarking protocol structure.

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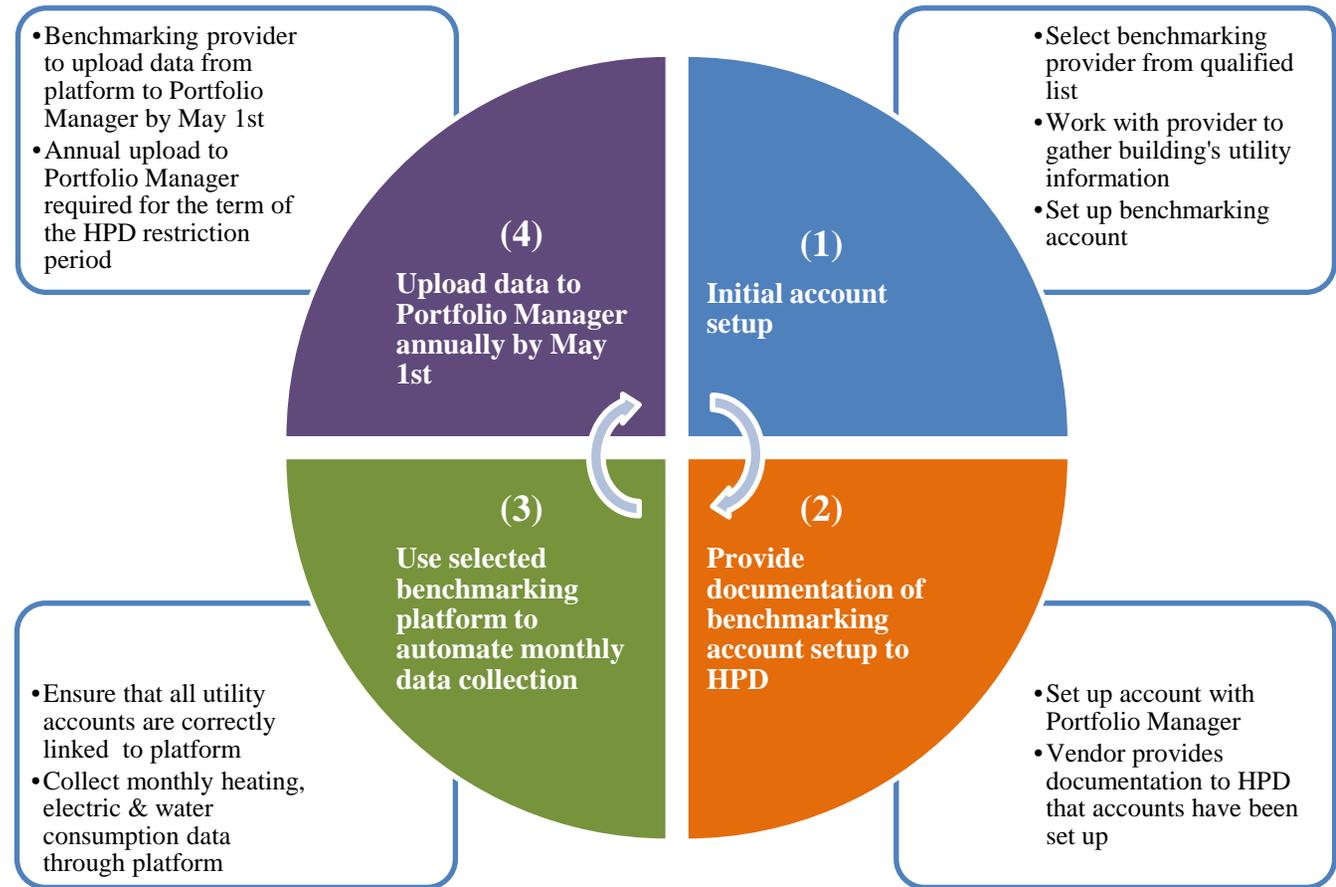
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Figure 5: Overview of HPD benchmarking protocol structure



This process is initiated by the building owner and facilitated by the selected benchmarking provider. While the building owner is responsible for implementation of any mandated building benchmarking requirement, it is the responsibility of the benchmarking service provider to provide technical assistance to facilitate this process.

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Roles and Responsibilities

Role of HPD Project Manager

HPD project managers will inform potential borrowers about the benchmarking requirements for a given project. The benchmarking and data gathering service is provided through an annual subscription fee, paid by the project. The benchmarking requirement will remain for the term of the restriction period governed by the HPD regulatory agreement. Respective Assistant Commissioners will provide guidance with respect to underwriting. The basic steps involved in the process are as follows:

1. HPD feasibility analysis: program verifies project's ability to pay for benchmarking.
2. Benchmarking requirement: project manager informs prospective borrower of the requirement and refers to [qualified provider list](#).
3. Document compliance: project manager collects benchmarking setup form supplied by benchmarking provider.
4. Legal requirement: language is inserted into the commitment letter and regulatory agreement to document benchmarking requirement as a condition of financing.
5. Construction loan closing: project loan closing refers to benchmarking setup form to document compliance.
6. Permanent conversion: for projects that undergo permanent loan conversions, the Conversions Unit collects updated benchmarking setup form supplied by benchmarking provider.

See Figure 6 & 7 for process workflow on existing buildings and new construction.

Role of Borrower

The benchmarking requirement will be a condition of HPD financing. It is the responsibility of the borrower to contract with a qualified benchmarking provider. In the case of existing buildings, the project should be set up in the selected benchmarking software platform prior to loan closing. In new construction projects, the benchmarking account should be setup at TCO. In addition, the building account should also be established in Portfolio Manager when the "primary benchmarking account" is initially set up. The borrower is responsible for compliance with the benchmarking requirement for the term of the restriction period, and is responsible for retaining a qualified benchmarking service provider for this purpose.

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Role of Benchmarking Service Provider

The benchmarking service provider is tasked with facilitating the setup of the benchmarking process along with necessary data entry, technical assistance to the borrower and quality assurance of the process. Primary tasks include:

1. Set up a building/project in the benchmarking software platform, which includes relevant data entry.
2. Set up an account for the building/project in ENERGY STAR Portfolio Manager if not already established.
3. [Share](#) the building account in Portfolio Manager with the **NYC Affordable Housing** account in Portfolio Manager.
4. Provide documentation to HPD project managers to evidence completion of the initial setup process by supplying the Benchmarking Setup form (see attached sample).
5. On an annual basis prior to May 1st of each year, upload the information gathered by the primary benchmarking software platform to Portfolio Manager. Reasonable efforts must be made to ensure quality of data uploaded to Portfolio Manager, and in the due course of data collection during the year for oil heated buildings.
6. Provide reporting outside of the software platform to the senior staff of the organization about building performance on at least a quarterly basis.
7. Assist building management teams in understanding building performance data.
8. Assist HPD/HDC in generating reports on building performance on a portfolio wide scale.
9. Provide annual non-compliance report to HPD/HDC.

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Qualified Provider List

The New York City Housing Development Corporation (HDC) issued a rolling [Request for Proposals](#) on August 7th, 2015 for Benchmarking Software Providers, which is being used by HPD.

As a condition of financing, building owners seeking financing from HPD are required to contract with one of the providers from the qualified list. This requirement will remain for the term of the HPD restriction period as stipulated in the respective regulatory agreement. HPD has requested that providers scale pricing with the size of a building, which will increase viability for smaller buildings. In cases where small building size makes benchmarking cost-prohibitive, the respective HPD financing program will conduct a feasibility analysis to determine the viability of a benchmarking requirement. Any mandated benchmarking requirement will be represented in the financing commitment letter and the regulatory agreement for the project.

Typically, benchmarking software providers charge a fee on a per building basis for the basic data collection and benchmarking service. Additional fees may be assessed based on the scope of services needed by a building owner. HPD is requiring some data assurance services from the benchmarking providers, and annual data transfer from the selected benchmarking platform to U.S. Environmental Protection Agency ENERGY STAR Portfolio Manager®. Although a building owner is required to benchmark via a qualified provider for the term of the HPD restriction period, an owner is not required to maintain a single provider for the restriction period. Building owners are free to change providers as long as the new provider is on the qualified provider list. All providers are required to provide the requested scope of services as outlined in the HDC RFQ issued on August 7, 2015.

Approved benchmarking software platforms must have a streamlined or automated data upload protocol to US Environmental Protection Agency ENERGY STAR Portfolio Manager® on an annual basis at a minimum. Approved firms should have the U.S. Environmental Protection Agency ENERGY STAR® Automated Benchmarking System (ABS) partner designation. For additional details visit: http://www.energystar.gov/ia/partners/spp_res/neprs/abs_design_overview_v3.4.pdf

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Required Services

Approved benchmarking software providers will be required to provide automated data collection from utility companies for heating, electric and water usage to be used in whole building benchmarking. In the case of oil heated buildings, a streamlined process for intake of oil consumption data should be in place.

Firms will be required to assist owner/ managers in the initial setup of the benchmarking account with the software platform. Such duties may include, but are not limited to:

- Gathering building information such as:
 - Building square footage
 - Building characteristics (units, floors, construction etc.)
- Gathering utility account information
- Assistance with data entry of building information into the software platform
- Ensuring quality reporting
- Coordination with HPD/HDC project managers

Qualified software should have the ability to document pre and post retrofit building performance data. Software should be able to retroactively capture historic utility data for at least 12 months on initial setup. Tenant level utility usage is required for 100 percent of the tenant population in a project. Qualified software platforms should provide reporting for tenant usage to Portfolio Manager® through one of the following options:

1. Aggregate actual usage of 100 percent of tenants provided through utility company
2. 100 percent tenant utility accounts directly tracked through the software platform
3. Representative sample of tenant utility accounts directly tracked through the software platform and extrapolated to generate an estimate of total tenant utility usage
 - a. Representative sample size should provide a confidence level of 95% with a precision of 12%, indicated on the HUD table, page 7:
<http://portal.hud.gov/hudportal/documents/huddoc?id=15-04hsgn.pdf>

Firms will be required to notify HPD in writing when the initial benchmarking setup process has been completed. Outstanding issues that may pose challenges to the accuracy of the benchmarking report should be called out in the notification.

Firms will be required to transfer benchmarking information to U.S. Environmental Protection Agency ENERGY STAR Portfolio Manager® initially before HPD loan closing, then by May 1st of every subsequent calendar year for the term of the restriction period as stipulated in the regulatory agreement required by the respective HPD financing programs. Qualified software platforms must provide functionality for buildings to be sorted by financing programs provided through HDC and HPD. HDC/HPD anticipates approximately 450-600 buildings financed per year.

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Account Setup

An essential component of benchmarking is collecting accurate information for the building. Before engaging with a benchmarking provider, gather as much of the information as possible that will be needed for data entry into the selected benchmarking platform. Various providers may have their own templates in place to assist in the information gathering and account setup within the selected benchmarking platform. In general, the type of information that will be requested to set up a benchmarking account with a provider is outlined in the section below.

Building Information for Benchmarking

Building Information	Description
Property name	
Address	
Gross floor area	Gross building square footage including conditioned and unconditioned space. The accuracy of this number is very important because it is used in a variety of performance metrics. Inaccurate measurements of gross square footage can materially skew benchmarking results. It is recommended that the building footprint be manually measured, as the square footage on file with the City may not be accurate for the purposes of benchmarking.
# of floors	Number of floors above grade; various software platforms may account for basement space in different ways
# of units	
# of bedrooms	Used in metrics like hot water usage
# of residents	
Year built	
Cooling fuel	Typically tenant paid electric
Heating fuel	Primary heating fuel; typically owner paid
Hot water fuel	Primary heating fuel; typically owner paid
Cooking fuel	Primary fuel used for cooking in apts.; typically tenant paid
Who pays for cooling, heating, hot water, electric	
Utility meters	Account numbers and utility types for all meters tracked in the benchmarking platform along with who pays for a given meter
Online account access	User name and passwords for online utility access

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Online Utility Account Setup

The qualified benchmarking software providers are required to have automated data gathering functionality. This is often accomplished by linking the benchmarking software with the online building utility account through the utility provider's website. The automated data collection process is dependent on having this online account with the utility provider set up and active. Building owner/managers should ensure that online accounts are established with utility providers, and ensure that the user names and account passwords are readily accessible.

Oil Heated Buildings

Typically, oil suppliers do not maintain electronic access to usage information. Some large suppliers may provide this functionality, but in general the oil supplier market is comprised of numerous small businesses that don't provide web access to consumption and purchase information.

Oil consumption information may have to be manually compiled from invoices and uploaded to the selected benchmarking software platform. Benchmarking providers should have templates in place to streamline the data intake process for oil heated buildings. Building owner/managers should plan on making documentation of oil consumption information, in the format required for benchmarking, a standard part of operations on at least a quarterly basis. Approved benchmarking providers are required to provide assistance with data entry into the benchmarking software for oil heated buildings.

Assistance with Data Entry

The qualified benchmarking software providers are required to offer technical assistance in initial account setup with a selected benchmarking software platform. Depending on the individual needs of the building owner/manager, services will be available to assist in the initial account setup.

Ensuring Quality Reporting

Building benchmarking and performance tracking are valuable tools in efficient operations and maintenance strategies for building owners and managers. Because this process is designed to be largely automated from year to year, it is important to verify that information is pulled from accurate sources. Meter information should be correctly linked in the benchmarking software platform and manually entered/uploaded information, such as oil usage data, should be reviewed for accuracy by the building manager and benchmarking provider.

By May 1st of every year of the HPD restriction period, information is required to be transferred from the "primary benchmarking platform" to EPA Portfolio Manager®. This step is necessary for data aggregation across all qualified benchmarking software providers, to enable data analysis by the City.

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Qualified benchmarking software platforms will have a streamlined or automated data upload protocol to US Environmental Protection Agency ENERGY STAR Portfolio Manager® on an annual basis at a minimum. Qualified benchmarking software providers will have the U.S. Environmental Protection Agency ENERGY STAR® Automated Benchmarking System (ABS) partner designation. For additional details visit: http://www.energystar.gov/ia/partners/spp_res/neprs/abs_design_overview_v3.4.pdf

Benchmarking providers will be required to facilitate this process and ensure that benchmarking information being uploaded into Portfolio Manager® has been reviewed for accuracy and viability.

Typical Pitfalls in Benchmarking Account Set up

When engaging with a qualified benchmarking provider to initially set up a benchmarking account, building owners/managers should be aware of typical errors and issues that frequently arise in the process and make every effort to resolve before engaging a provider.

Meter mapping errors:

Know what a part of the building an electric meter covers; the common area, the whole building or multiple buildings.

Miss-match between boiler and domestic hot water system type:

Space heating type is listed as a hot water boiler and the domestic hot water system is listed as a steam heat exchanger. This combination of building equipment characteristics would be questioned.

Missing accounts at dual fuel properties:

Commonly either the natural gas or oil account is left off when two fuels are used for space heating. In addition, properties that recently convert to gas often forget to provide the past year of oil data.

Commercial spaces included or not included:

It is common that properties do not initially indicate if space heating, domestic hot water and or electricity is provided to a commercial tenant from the house meter.

Square footage or number of unit errors:

When average unit square footage is examined a common error is the unit size is either much smaller or larger than comparable properties which leads to questions on the square footage and unit count provided.

Utility account logins:

If Con Edison accounts are set up, it is common that building personnel working on benchmarking do not know the logins, or if the login covers multiple buildings.

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Loan Closing Requirement

Building benchmarking and performance tracking is a condition of financing for HPD loan programs. This requirement will run with the term of the HPD restriction period. It is the responsibility of the building owner to ensure that a qualified benchmarking provider is contracted every year for the required term. HPD does not require a sole provider for the term of the HPD financing, but contracted benchmarking providers must be selected through the HPD/HDC qualified provider list.

Benchmarking providers are required to provide documentation of completed benchmarking account setup through completion and submission of the *Notification of Benchmarking Account Completion Setup Form*. This form should be submitted to the respective HPD project manager to satisfy compliance with the HPD benchmarking loan closing requirement. Refer to Figure 6 and 7 for a process flow summary of the HPD loan closing with respect to the benchmarking requirement for existing buildings and new construction respectively.

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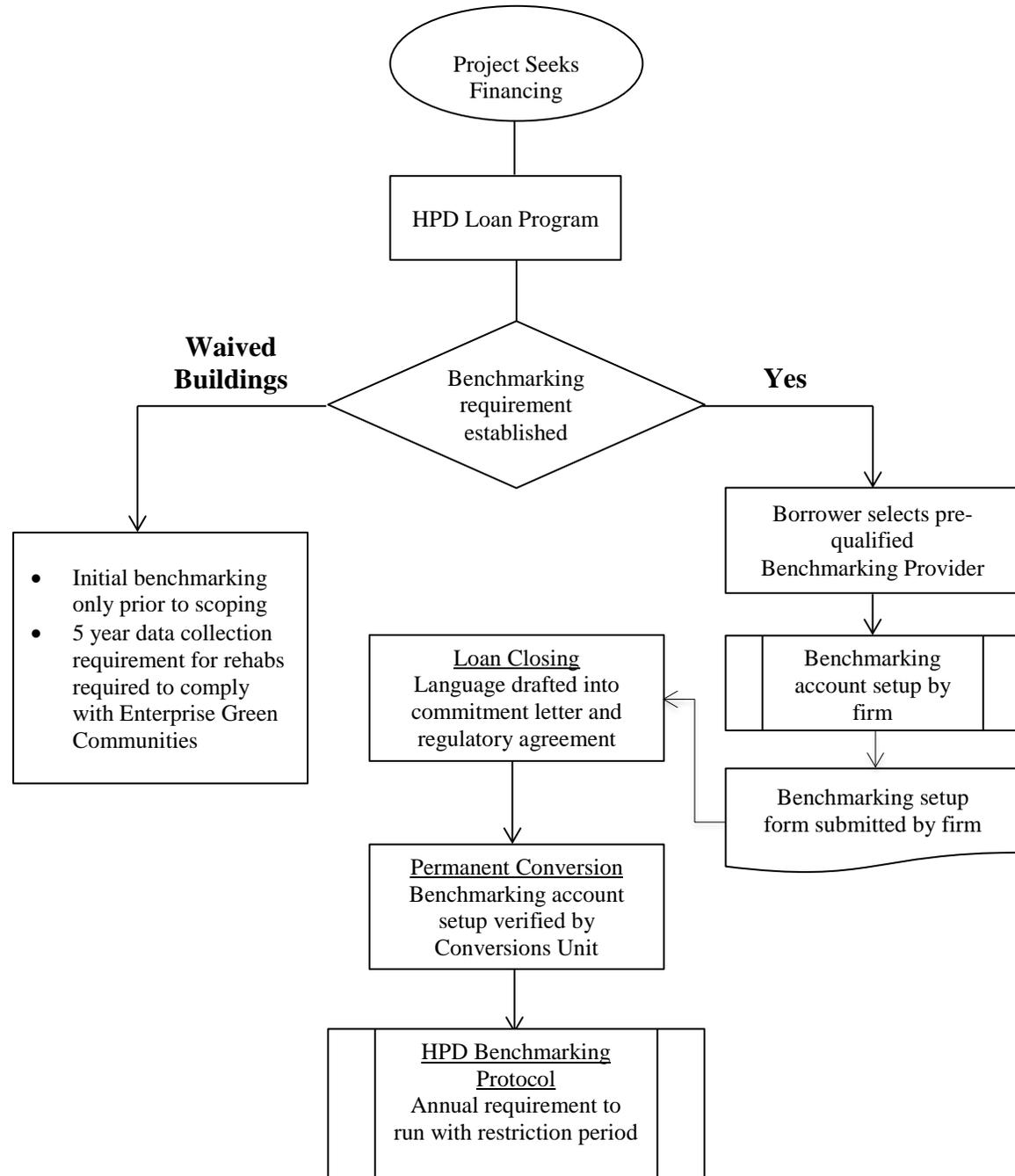
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Figure 6: HPD Loan Closing Flow Summary for Existing Buildings



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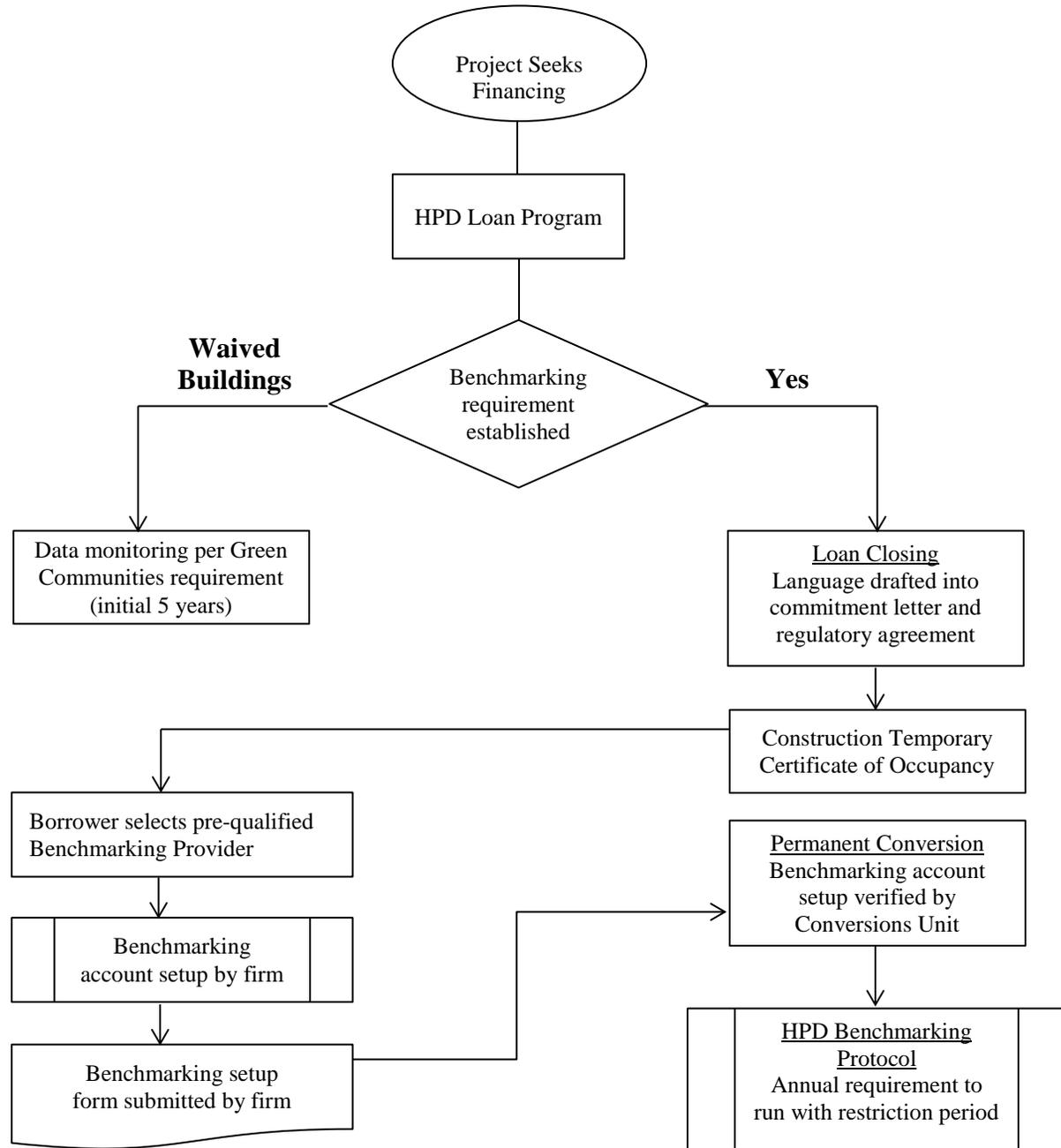
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Figure 7: HPD Loan Closing Flow Summary for New Construction



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Reporting Requirements

Quality reporting is essential to the success of any building benchmarking and performance tracking effort. Building owners and managers need to have confidence in the quality of the data presented in order to make appropriate decisions regarding building operations. HPD reporting requirements are intended to minimize any additional burden attributed to the HPD benchmarking requirement. The benchmarking requirement is viewed as crucial tool in building capacity at the building level to enable building managers and operators to meet the vital task of building energy management.

This section will address:

- Monthly data gathering
- In platform reporting
- Annual data upload to Portfolio Manager®
- Email notification of non-compliance
- Filing notification of annual HPD deadline
- Email performance reporting

Monthly Data Gathering

At the core of the HPD benchmarking initiative is the concept of automatic data retrieval made possible by technology developed by the benchmarking providers qualified through the HDC benchmarking software provider RFQ. These benchmarking software platforms alleviate much of the tedium associated with collecting the relevant utility information for building benchmarking and performance tracking. Because this process is largely automated after the initial account setup, it is of paramount importance that the information used to set up the benchmarking account be accurate. While the benchmarking providers will offer some technical assistance in setting up the account in the selected platform, it is up to the building owners to ensure that the information shared with the benchmarking provider is accurate and error free. If an error is detected after the initial account set up, the building owner/ manager should coordinate with the benchmarking provider to correct the error. Refer to page 27 for typical errors made during account set up.

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In Platform Reporting

After a benchmarking account has been setup, the benchmarking software will pull the utility usage from the utility provider's web site via the online account that was set up with the utility provider. This information is compiled on a monthly basis and linked to a dashboard within the system which displays various performance metrics on heating, electric and water usage.

Qualified providers attempt to make this building performance information approachable to building owners and managers. The information provided by the dashboards within the selected software platforms will inform building managers and operators on the actual performance of a building system, such as boiler operation, as displayed in the building's heating index. The in system dashboards will also rank building performance against similar buildings so managers can gauge the relative efficiency of their building and start to prioritize improvements in building operations.

Qualified software platforms must provide functionality to HPD for buildings to be sorted by financing programs for reporting purposes. HPD should have a "master account" access on a read only basis. HPD anticipates approximately 450 buildings financed per year.

HPD Financing Programs

HPD New Construction

- Extremely Low & Low-Income Affordability (ELLA)
- Mixed-Middle Income Program (M2)
- Mixed Income (Mix & Match)
- Neighborhood Construction Program
- New Infill Homeownership Opportunity Program

HPD Preservation

- Green Housing Preservation Program
- Housing Preservation Opportunities Program
- HUD Multifamily Program
- LIHTC Year 15
- Multifamily Housing Rehabilitation Program (HRP)
- Participation Loan Program (PLP)

Property Disposition and Finance

- Affordable Neighborhood Cooperative Program
- Multifamily Preservation Loan Program
- Small Homes Rehab – NYCHA
- Third Party Transfer

Special Needs Housing

- Senior Housing Affordable Rental Apartments
- Supportive Housing - New Construction
- Supportive Housing - Rehab

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Annual Data Upload to Portfolio Manager®

In order to aggregate building performance information across all of the possible qualified benchmarking software providers, HPD requires that information within the selected benchmarking software be transferred to [EPA ENERGY STAR Portfolio Manager®](#) on an annual basis.

Buildings that are required to comply with [Local Law 84](#) (LL84) will be familiar with this process. HPD financed buildings will be required to comply with LL84 through selection of a qualified benchmarking provider from the HDC/HPD qualified provider list. Figure 8 outlines the annual compliance process:

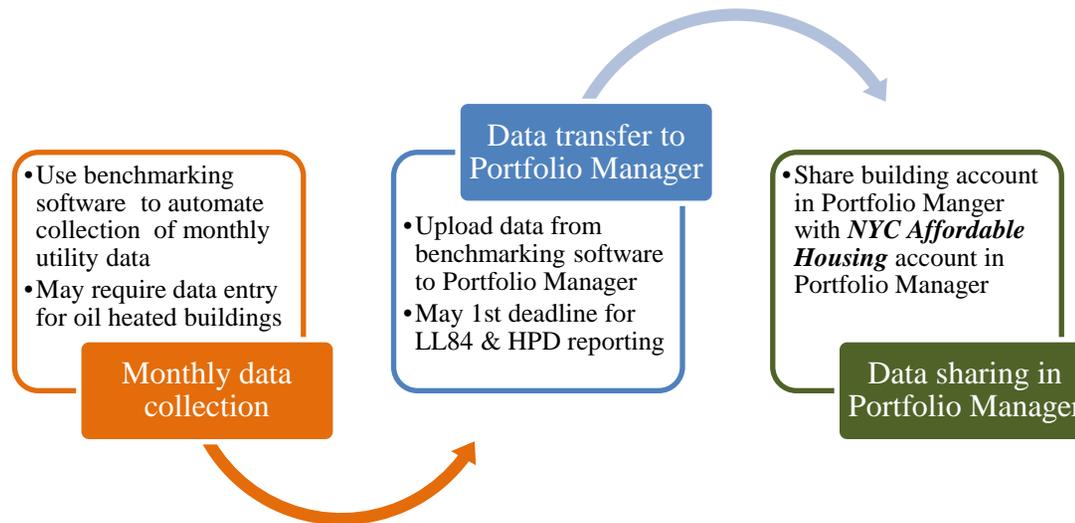


Figure 8: Annual Data Collection and Reporting Cycle

Information will flow from the primary benchmarking software platform, selected from the qualified provider list, to the building account set up in Portfolio Manager. Once the building information has been transferred to Portfolio Manager on an annual basis, it will be [shared](#) with the [NYC Affordable Housing](#) account in Portfolio Manager.

While LL84 currently affects buildings 50,000 square feet and larger, anticipated to be revised to impact buildings starting at 25,000 square feet as of the writing of this document, the HPD benchmarking requirement will affect all buildings financed by HPD regardless of size. Feasibility for small buildings (less than 25 units) will be determined by respective HPD financing programs.

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Email Notification of Non-compliance

While many building owners and managers will respond in the spirit of this initiative and develop capacity to manage energy and water usage in buildings, effective enforcement mechanisms will reinforce frequency and quality of reporting. LL84 has strict fines tied to non-compliance of reporting. While HPD will not impose additional fines for non-compliance, qualified benchmarking providers will be required to notify HPD of buildings that have not comply with the HPD reporting requirements by May 1st. Non-compliance with the HPD reporting requirements may impact future dealings with the Agency. Examples could include payment of incentive management fees and other disbursements from building reserve accounts.

Qualified benchmarking providers should generate and send notifications to HPD at benchmarking@hpd.nyc.gov on an annual basis for all buildings for which a benchmarking account was established, but failed to comply with the HPD reporting deadline of May 1st.

Filing Notification of Annual HPD Deadline

To aid in meeting the annual HPD benchmarking reporting deadline of May 1st, HPD requests that the qualified benchmarking providers build into their respective systems functionality that notify users of the pending deadline. Benchmarking software providers have the flexibility in implementation on how best to accomplish this request, based on feasibility.

Email Performance Reporting

Key decision makers within an organization are often not directly involved with monitoring building performance. There is value in engaging leaders within an organization in a structured way around building performance. This aids in accountability and will help facilitate internal conversations around building performance. Qualified benchmarking providers are requested to email performance results, on at least a quarterly basis, to organizational heads including Executive Directors, Presidents and heads of building management. The information provided should include information consistent with the in-system dashboard and in a format approachable to the intended audience.

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Building benchmarking and performance tracking through monthly utility bill analysis, as described throughout this document, is a great initial step in identifying areas for improvement in building operations. Benchmarking will highlight general areas of concern in building operations, but it will not specifically diagnose problems. For example, building benchmarking could call out an unusually high heating usage for a particular building, but it would not indicate to the manager that the heating control is defective. Benchmarking is the first step into the larger world of building performance tracking.

For building owners and managers that want to go further in their efforts to monitor and diagnose building performance, there are a variety of tools available. Because of a lack of standardized names and terminology in the industry, various manufactures may refer to their technology in differing ways. This section will call out the types of tools available to building owners and managers looking to implement a more advanced building performance monitoring strategy. This is meant as a very general orientation to advanced performance tracking and owners are encouraged to pursue their own research if there is interest.

Building performance monitoring options generally fall into two main categories:

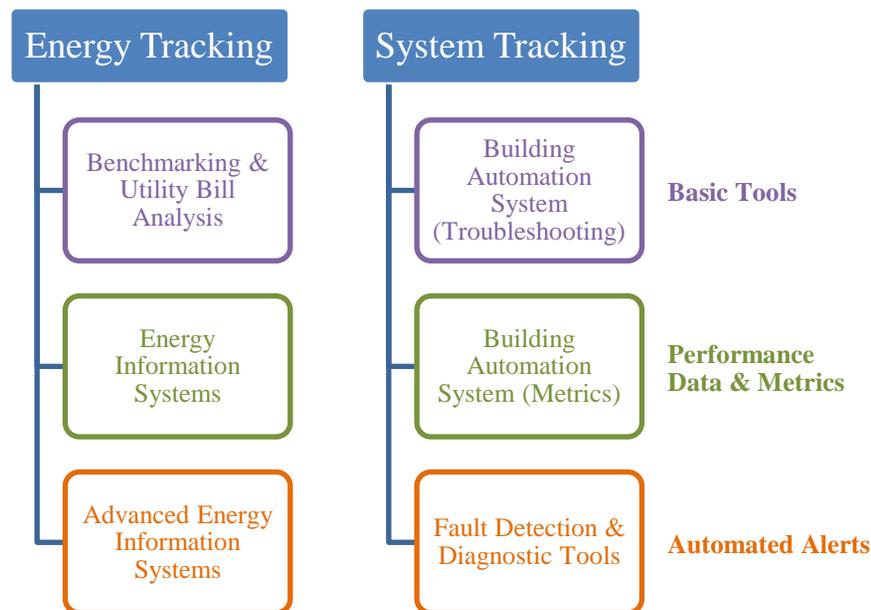


Figure 9: Options in Building Performance Tracking

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Energy Tracking

Benchmarking & Utility Bill Analysis

Monthly utility bill analysis and benchmarking are powerful tools for assessing progress toward goals, prioritizing action, and observing long term trends as part of a high-level performance tracking strategy. However, it is important to understand the limitations of tracking energy use on a monthly basis and to consider what is possible when using tools that can track and display energy use at a higher resolution.

Energy Information Systems

Energy information systems (EIS) are used to store, analyze and display current and historical energy use, typically displaying hour-by-hour data for each meter. EIS provide the capability for the user to analyze energy consumption patterns using a variety of graphical formats. This hourly tracking enables system improvements to be viewed at the meter level, and problems to be more easily and quickly identified.

Energy information systems are predominantly offered as “Software as a Service” (SaaS) and comprise three main elements:

- Energy meter and communications: Data is collected at intervals of between one minute and one hour. These measurements are taken primarily from electric and gas meters, but can also include water use and other system-related data. Tracking whole building consumption is typical, and in some cases submeters may be installed for specific systems. A data acquisition system in the building typically collects information and transmits it to the EIS server.
- EIS server: Commonly managed by the EIS service provider, the host server is the central data storage and analysis tool. Data is aggregated, filtered for errors, analyzed, and archived.
- Web interface: Users can view data in a variety of formats, including graphical dashboard displays that are typically customizable. The web interface can be used for viewing data from an individual building or a portfolio of buildings.

An EIS is a step beyond benchmarking in terms of sophistication, and that sophistication requires a greater level of commitment to management, training, and documented processes. Research has shown the benefits of having an energy champion to ensure best return from investment in tools such as EIS. Without a formalized process the tool can fall into disuse, especially if the champion leaves the company.

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All stakeholders should be involved from the start; an EIS can provide benefits to management, operators, and occupants, so taking a team approach to specifying and installing the EIS is ideal. Allow sufficient time to hone the daily management processes, and set up periodic team meetings (e.g. quarterly/ annually) to review how the processes are working.

An EIS can be a useful tool for supporting a building performance tracking initiative. It will help managers and operators understand the building's energy use characteristics, enable impacts of improvements to be readily viewed, and help ensure the improvements persist through operations over time.

Advanced Energy Information Systems

As described in the previous section, energy information systems (EIS) are proving to be effective in supporting building performance tracking through hourly energy use analysis and visualization. They allow users to view, assess, and respond to energy use patterns in a timely manner.

Advanced energy information systems go beyond those capabilities. These systems incorporate sophisticated energy modeling functionality that can predict typical energy use based on a number of variables, and alert the user if energy use exceeds that prediction.

Advanced EIS tools may encompass all the same features as the EIS. This section only covers the key distinguishing feature of advanced EIS: their energy modeling capability.

Advanced EIS will track energy use at the building's main energy meters or submeters. Additional driving variables that affect energy use are also tracked and analyzed. Outside air temperature, day type (weekend/weekday or day of the week), and hour-of-day are typical, but other variables such as building occupancy levels may also be used.

Over a period of many months to one year, the advanced EIS develops a model to predict typical energy use based on historical energy use data, normalized for the driving variables mentioned above. A comparison of 'typical vs. actual' energy use can then be used to automatically generate alerts when differences occur. Depending on the specific system, alerts may be issued instantly or incorporated into regular reports (eg. a daily report may be emailed to users). Along with the ongoing comparison of expected and actual energy use, advanced EIS can also calculate energy savings relative to a historical baseline and have simple cost savings estimation capabilities.

The key benefit of advanced EIS is that the software automatically generates energy alerts. This feature overcomes three limitations of standard EIS:

- A user may not have time to monitor EIS data regularly
- Staff turnover can result in new operators taking time to re-learn the building's energy use characteristics in order to review the EIS data
- Staff may miss problems using an EIS because they are too subtle to be identified through visual analysis of energy use

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The modeling capabilities of advanced EIS can more accurately forecast near future loads in support of demand response efforts, and also provide improved estimation of energy savings from energy efficiency projects. Advanced EIS capabilities are built around weather-normalized models so that they can compensate for year-to-year fluctuations and give a better assessment of true building performance.

Advanced EIS can continuously compare actual energy use with expected use and multiple baselines. It is important for users to understand the differences in the energy models and to set alerts accordingly.

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System Tracking

Although not very common in smaller residential buildings, some building owners may want to move beyond the basics to system tracking. There are two contrasting options. Using a building automation system (BAS) to track metrics utilizes a tool already familiar to many building operators to provide a summary of BAS data. Installing a fault detection and diagnostic (FDD) tool offers higher levels of sophistication to help operators automatically pinpoint problems with HVAC systems.

Building Automation System (BAS) Metrics

Using the BAS to track key performance metrics is an effective and inexpensive way to manage system performance using a tool that is already installed in many large buildings. Tracking metrics enables users to respond to potential problems quickly and observe long-term improvements gained through energy efficiency projects.

A typical BAS has capabilities far beyond troubleshooting and simple alarms. Using the BAS to track key performance metrics can be an effective and inexpensive way to boil down the thousands of data points that may be tracked into digestible information. This minimizes daily labor resources required and provides a way to track long term building performance improvements.

Metrics tracking is a strategy for boiling down numerous data points that can be tracked into information that can be understood and acted upon. Building operators already review the BAS regularly, so adding this functionality to an already-familiar tool should minimize the additional effort required for operators to track metrics.

Tracking a comfort-related metric is particularly useful, and can provide an opportunity to identify and respond to problems before any occupant complaints are reported. Archiving trends for metrics, along with the data from which they were created, presents a valuable resource for troubleshooting and diagnostics.

Fault Detection and Diagnostics

The previous section described how using a building's BAS to track performance metrics provides a useful high-level view of system performance. Performance metric tracking requires the end-user to manually determine when metrics drift outside normal expectations through periodic evaluation of the data.

Fault detection and diagnostic (FDD) software tools provide a capability beyond the manual judgment required of performance metric tracking. FDD tools utilize system-level performance data to automatically detect problems. Some tools additionally provide diagnostics to help determine the root cause of the problem.

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FDD tools typically rely on performance data from existing BAS points with a few tools requiring the installation of dedicated sensors external to the BAS. Fault detection algorithms can be implemented through publically available BAS programming code or, more typically, in proprietary code built into commercially available tools.

The level to which FDD tools are able to diagnose the root cause of problems varies significantly. Some tools pinpoint the location of the fault without providing specific causes, while others provide the user with a number of potential causes. In either case, additional manual inspection or further analysis may be required to verify the fault and determine its exact cause.

While FDD tools can locate problems and provide suggestions of root cause, human intervention is required to be sure of the cause and to implement the fix. To ensure full benefits from FDD tools, it is recommended that users develop a process to link the information from FDD reports to a building's maintenance management system or to work planning processes.

Given the complexity of modern buildings and FDD technology, it is important to work closely with the FDD tool vendor. The vendor must take the time to understand the configuration of the building and its BAS to anticipate technical challenges. The level of training and support that is provided after installation will also impact the long-term success of the tool.

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Assistance with Building Assessments and Audits

Building benchmarking and performance tracking is a good start in developing a better understanding of your building and lowering operating cost from utilities. Benchmarking and performance tracking will highlight areas of building operations in need of closer attention from building management.

On occasion, building managers may require technical assistance from an energy professional, such as a building auditor, in order to diagnose performance issues and recommend corrective action. A building audit can be a good course of action for a chronically underperforming building. Audits can recommend improvements to O&M procedures and generate scopes of work to improve building performance.

Benchmarking providers qualified through the HDC RFQ have the ability to assist building owners with energy audits. Building owners are encouraged to engage with their benchmarking provider if they feel an audit may be required.

Other resources for energy auditing services include:

[NYSERDA Multifamily Existing Buildings Partners List](#)

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Financing Sources for Building Retrofits

There are a variety of financing programs to assist building owners with retrofits and building upgrades to improve performance and reduce utility costs.

HPD administers multiple financing programs to facilitate the physical and financial sustainability and affordability of privately-owned multifamily buildings throughout New York City.

[HPD Private Site Financing - Preservation](#)

The Housing Development Corporation (HDC) offers a variety of innovative and creative programs with favorable financing terms generally unavailable in the commercial market. Loans can be used for the new construction, acquisition and rehabilitation of housing for people within a broad range of incomes.

[HDC Term Sheets](#)

The Community Preservation Corporation's comprehensive Green Financing Initiative for multi-family property owners combines quick and easy financing solutions with straightforward options for retrofitting existing multifamily buildings to achieve optimum energy efficiency and cost savings.

[CPC Green Financing Initiative](#)

The New York City Energy Efficiency Corporation (NYCEEC) is a non-profit specialty finance company that develops financing solutions to enable projects that save energy or reduce greenhouse gases. NYCEEC's custom-tailored solutions close financing gaps for buildings and clean energy project developers.

[NYCEEC](#)

The Weatherization Assistance Program assists income-eligible families and individuals by reducing their heating and cooling costs and addressing health and safety issues in their homes through energy-efficiency measures.

[Weatherization Assistance Program](#)

The New York State Energy Research and Development Authority, known as NYSERDA, promotes energy efficiency and the use of renewable energy sources. NYSERDA's efforts aim to reduce greenhouse gas emissions, accelerate economic growth, and reduce customer energy bills.

[EmPower New York](#)

[Multifamily Performance Program: Existing Buildings](#)

[Solar Thermal \(Hot Water\) Program](#)

Con Edison's Multi-family Energy Efficiency Program is helping more than 500 properties and 25,000 residents save energy and money.

[Con Edison's Multi-family Energy Efficiency Program](#)

National Grid can help you manage your energy usage through energy efficiency services and incentives.

[National Grid Energy Efficiency Services](#)

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Benchmarking Resources

Portfolio Manager Quick Reference Guide: http://www.energystar.gov/ia/business/multifam_housing/QRG_Multifamily_Housing.pdf

WegoWise: www.wegowise.com

EnergyScoreCards: www.energyscorecards.com

Eneractive Solutions: <http://eneractivesolutions.com/>