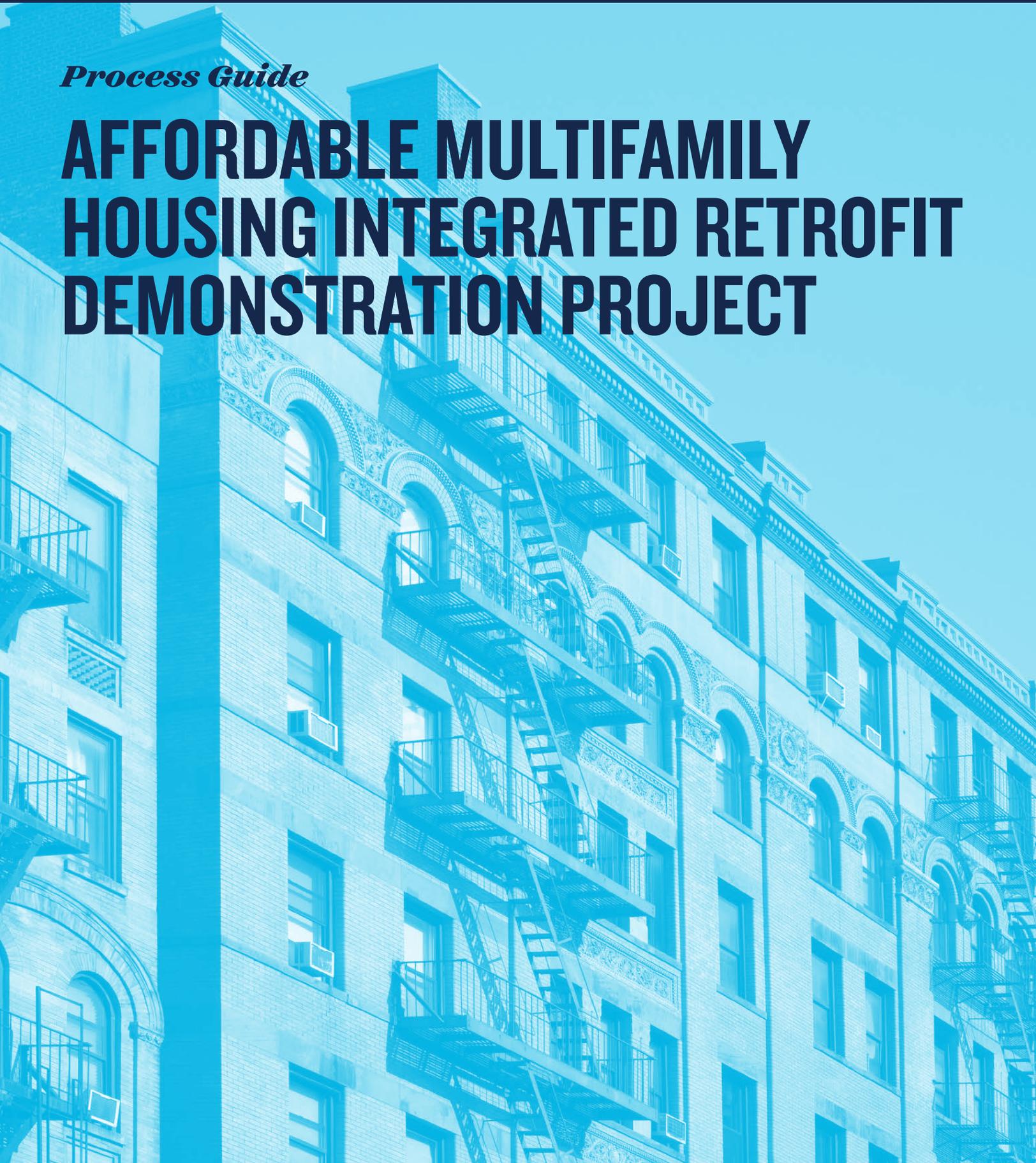




Process Guide

AFFORDABLE MULTIFAMILY HOUSING INTEGRATED RETROFIT DEMONSTRATION PROJECT



Acknowledgments

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About NRDC

The Natural Resources Defense Council is an international nonprofit environmental organization with more than 2.4 million members and online activists.

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Introduction



The Natural Resource Defense Council's Center for Market Innovation partnered with Steven Winter Associates, Inc., to create this Process Guide to help owners, developers, and decision makers consider energy-related repairs and improvements in multifamily affordable housing properties. The Guide is intended to serve as a road map from initial concept

through implementation for multifamily affordable housing owners and is specifically targeted to owners with properties located in New York City and New York State.

The advantages of implementing energy conservation measures (ECMs) have been widely documented in numerous empirical studies; they have been demonstrated to reduce energy and water consumption and significantly decrease total building direct energy and water costs. They can also decrease a building's operating and maintenance costs because energy-efficient equipment requires less time and labor to maintain. In addition to financial benefits, ECMs can enhance residents' comfort and quality of living, resulting in higher tenant retention. And, of course, implementing an energy upgrade has positive effects for the environment.

New York City legislation is bringing energy use and energy improvement options to the attention of building owners through Local Laws 84 and 87. Buildings in New York City of more than 50,000 square feet must submit benchmarking data to the City annually under Local Law 84 (LL84) and conduct an energy audit and retro-commissioning report every 10 years under Local Law 87 (LL87). Even if a building is smaller than 50,000 square feet, energy performance standards are rapidly becoming more stringent. Being proactive about your building's energy performance can help you to stay ahead of the coming changes.

Step 1: Benchmarking

Benchmarking is the process of measuring your building's energy-use intensity (EUI) compared with a portfolio of comparable buildings. All New York commercial buildings, including affordable multifamily buildings, of more than 50,000 square feet are subject to the city's Local Law 84 (LL84) benchmarking requirement and owners of these buildings are already measuring their energy usage. While smaller multifamily buildings are not subject to LL84, owners of these buildings should consider benchmarking as an important preventive maintenance tool to gain control over their energy usage and related utility costs.

A primary benefit of benchmarking is to provide empirical data showing how your building is performing relative to similar buildings. Studies have shown that buildings with low benchmarking scores are good candidates for an energy upgrade and are more likely to realize energy cost savings through energy efficiency. Benchmarking also makes sense because:

- It facilitates operations and maintenance planning by identifying trends and spikes in energy usage, which can lead to energy savings, reduced wear and tear on equipment, lower labor costs, and more.
- It improves the accuracy of energy savings predictions.
- You cannot manage what you are not measuring.

Steps

1. Collect, at a minimum, one year's worth of all utility bills: electricity, natural gas, fuel oil, district steam, water
2. Compile an up-to-date equipment list for the building
 - HVAC
 - Lighting
 - Elevators
 - Pumps and motors
3. Identify all relevant building characteristics:
 - Gross square footage
 - Number of apartments
 - Number of bedrooms
 - Number of floors
 - Year built
 - Metering configuration: master metered, direct metered, or submetered
4. Enter information into a benchmarking tool to record it and learn how your building compares with others—and, if you have multiple buildings, compare the buildings within your portfolio.

BENCHMARKING TOOLS

A number of tools exist to help monitor energy usage and automate the benchmarking process monthly or annually. ENERGY STAR® Portfolio Manager, available at no cost, has all of the necessary basic features for tracking benchmarking data (provided the utility usage information is regularly downloaded or entered); it can be accessed at portfoliomanager.energystar.gov/pm/login.html. There are also several fee-based benchmarking tools that offer various ways to automatically retrieve utility usage and expense information from utility companies. These include WegoWise and EnergyScoreCards.



Step 2: Identifying a Building

If you have more than one building, use your benchmarking results to determine which building(s) are the best candidates for an energy upgrade. As a simple rule, focus on the most wasteful buildings, as indicated by their benchmarking scores. Studies have shown that these buildings offer the opportunity to save the most energy at the least cost. Also consider these additional factors when deciding:

- Is the building going through or about to go through a refinancing process? This is a perfect opportunity to pursue mortgage and unsecured loan products that incorporate potential energy savings into the underwriting, resulting in additional loan proceeds that can be used for energy efficiency upgrades. More and more lenders are offering this type of loan, as described in Step 3, below.
- Are you already planning on replacing major building systems or making other capital upgrades in a particular building? Financial incentives may be available for these upgrades once identified through an energy audit. (An energy audit is a report that includes a list of ECMs derived from testing the performance of the building's systems and equipment. The report also includes a financial projections for each identified measure.)
- Did benchmarking uncover high energy costs in comparison to comparable buildings? Use these results to guide the ECMs evaluated in the energy audit.
- Is your building master metered for electricity? If so, you're a candidate for submetering, when permitted, which can create a significant reduction in electricity usage and result in substantial cost savings.



Step 3: Identifying Potential Funding Sources

Once you have selected a building, begin identifying funding sources for your energy upgrade. These may include internal sources, such as reserves, although for many affordable multifamily buildings, reserves will not be sufficient to cover the capital costs related to an energy upgrade. There are also external sources, such as conventional loans, energy efficiency financing vehicles and utility programs that provide incentives for energy upgrades. Consider:

Rebates	Prescriptive rebate programs for purchasing and installing energy-efficient equipment such as lighting or pumps. Rebates are typically tied to single measures and are offered by utility companies.
Incentives	Programs that provide financial incentives, typically per apartment or per unit of energy saved, for implementing a package of ECMs. Among these are the New York State Energy Research and Development Authority’s (NYSERDA) Multifamily program.
On-Balance-Sheet Financing	Loan programs that underwrite to energy savings, such as: <ul style="list-style-type: none"> • Green Mortgage Loan Programs like Fannie Mae’s Green Preservation Plus Program, • Loans offered by community development financial institutions (CDFIs), and • New York City Energy Efficiency Corporation’s direct loan program. • Property assessed clean energy (PACE) . • “On bill” loans are offered by some utilities, such as PSEG.
Off-Balance-Sheet Financing	Operational funding programs in which owners work with energy service companies as intermediaries to secure financing and pay for capital costs. Examples include: <ul style="list-style-type: none"> • power purchase agreements (PPAs) • Energy Performance Contracts (EPCs) • energy service agreements (ESAs).

BENEFITS OF REBATE PROGRAMS

- Rebate Programs are available to building owners planning to replace equipment at their properties. These programs are well-suited to multifamily owners who do not have capital reserves for capital-intensive projects or whole-building energy retrofit projects. Rebate programs provide funding for certain kinds of equipment replacement and ensure the purchase of more energy-efficient options. Rebate Programs are often identified in ASHRAE Level I audits which typically uncover what types of equipment, such as lights and motors, can be easily replaced with a more energy-efficient option. Rebates in this case are a good option for buildings not able to or not planning on conducting a comprehensive retrofit project.

BENEFITS OF INCENTIVE PROGRAMS

- Incentive programs are financial contributions from utility-funded programs that are typically based on a whole-building approach—a more holistic approach, requiring the implementation of a suite of ECMs rather than just one piece of equipment. Incentive programs can help you evaluate all of your planned energy or water efficiency upgrades to ensure that you maximize the benefits you get out of your investment in capital improvements.
- Incentive program providers add another layer of quality assurance in implementing your chosen ECMS because these providers will inspect the ECMS once installed to ensure they are functioning properly.

BENEFITS OF ON-BALANCE SHEET FINANCING

Loan programs that underwrite to projected savings allow you to monetize energy cost savings to pay for capital improvements.

- These loans can be flexible as to lien priority in the capital stack, and may be structured as secured (collateralized by the property) or unsecured direct loans (fully recourse to the borrower), such as NYCEEC’s direct loan program.

Benefits of Green Mortgage Loan Programs

- Green mortgage loan programs can increase your loan proceeds based on your building’s energy savings potential, as identified in the required ASHRAE Level II energy audit.



- These programs also allow your building to maximize the value of periodically conducted Green Physical Needs Assessments (GPNAs), opening up new doors to unique financing alternatives.
- By making efficiency and clean energy alternatives an integral part of the capital planning process at the pre-design stage, Green Mortgage Loan Programs, enable you to easily identify overlap and synergies of the PNA with ECMs identified in the energy audit.
- GPNAs allow prioritization of capital investments based on concrete financial indicators and potential energy savings.

BENEFITS OF OFF-BALANCE-SHEET* FINANCING

- Off-Balance-Sheet energy sharing vehicles can be a no-capital-down solution.
- These funding vehicles provide for repayment of capital financing under an energy-sharing agreement that may be treated as an operating expense.
- Under many structures, the ownership, maintenance, and savings risks can be shifted to an intermediary, typically an energy service company (ESCO).

*Note: Recent changes to Financial Accounting Standards Board may change the treatment of what has traditionally been considered “off balance sheet”. It is important that you speak with your accounting professional about the tax treatment of these financing vehicles.

Even if implementing energy conservation measures is not feasible at the current time, they can and should be incorporated into your capital planning process. ECMs with shorter paybacks can be phased in using internal resources. More capital-intensive ECMs with typically longer paybacks can be planned for during major financing events. In either instance, ECMs should be prioritized on the basis of their savings potential.

Use the decision tree on page 8 to guide your decision-making process.

Steps

- Talk with your current lenders about your energy upgrade plans and potential financing options.
- Reach out to NYSERDA (if located in New York State) and local utilities about incentive programs.
- For NYC buildings, contact the NYC Retrofit Accelerator or Community Retrofit Accelerator about incentive and financing options.

Resources

New York City

- NYC Retrofit Accelerator
<http://www.nyc.gov/retrofitaccelerator>
- New York City Energy Efficiency Corporation
<http://nyceec.com>
- Green Housing Preservation Financing Program
<http://www1.nyc.gov/site/hpd/developers/private-site-preservation.page>

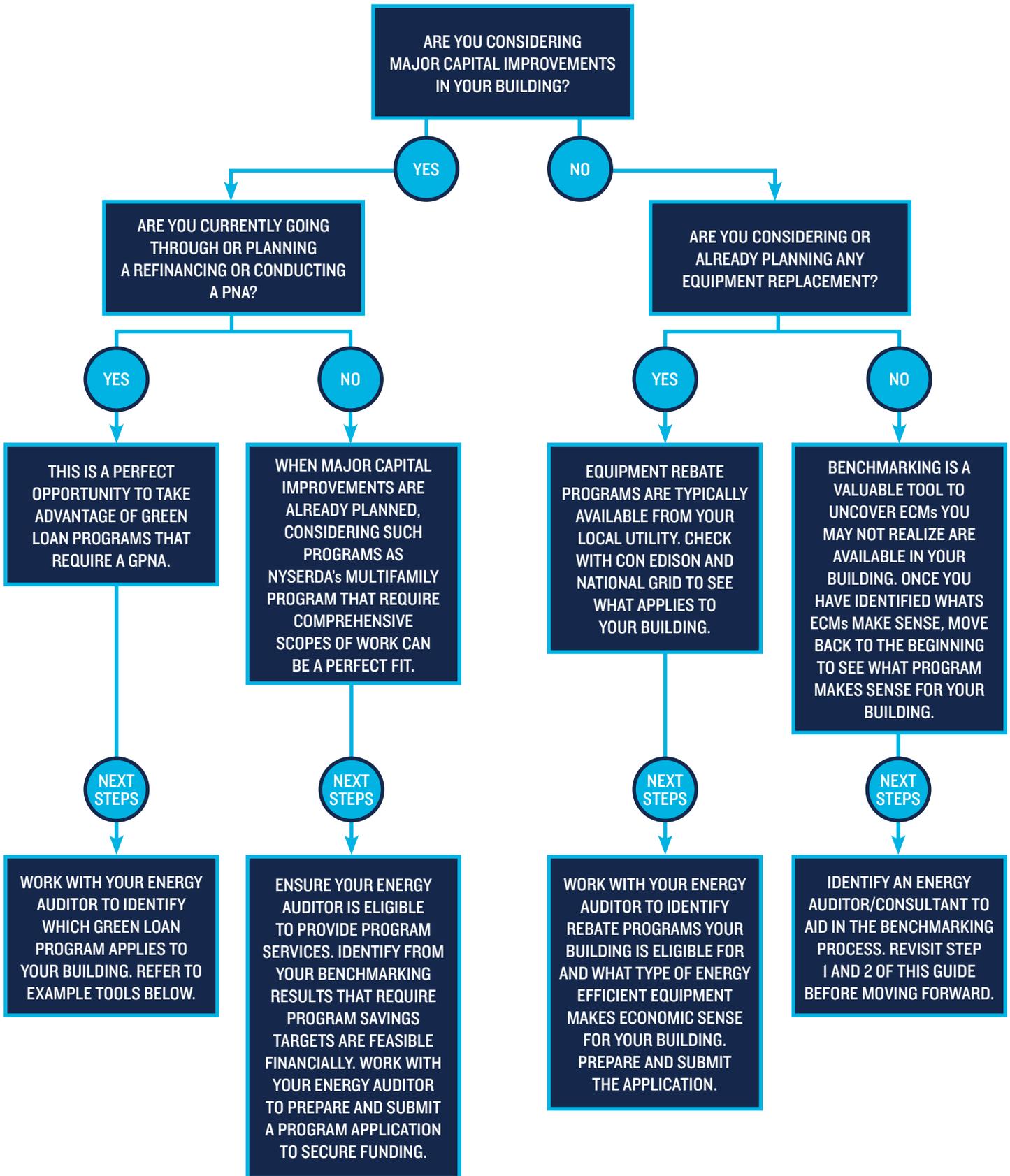
New York State

- Con Edison
http://coned.com/energyefficiency/residential_multifamily.asp
- New York State Energy Research and Development Authority (NYSERDA): <http://www.nyserd.ny.gov>
- National Grid Multifamily Building Incentives
http://www2.nationalgridus.com/multifamilyNYsave.jsp?WT.mc_id=multifamilyNYsave
- RG&E
<http://www.rge.com/UsageAndSafety/usinenergywisely/eeps/multifamily.html>

Nationwide

- Database of State Incentives for Renewables & Efficiency
<http://www.dsireusa.org>
- Weatherization Assistance Program (WAP)
<http://energy.gov/eere/wipo/where-apply-weatherization-assistance>
- Fannie Mae’s Green Refinancing Plus Loans
<http://www2.nationalgridus.com/multifamilyNYsave.jsp>

ENERGY EFFICIENCY RETROFIT DECISION TREE



Step 4: Selecting an Energy Auditor and Audit Protocol

Selecting an energy auditor and the right type of energy audit for your needs depends upon a variety of factors. Below is a list of criteria to consider as you make your decision.

1. Select a qualified energy audit team (use [NYSERDA's Multifamily Building Solutions Network](#) as a guide to obtain bids).

a. Require proof of qualifications, such as:

- Certified Energy Manager (CEM)
- Certified Energy Auditor (CEA)
- High Performance Building Design Professional
- Building Energy Assessment Professional
- Building Performance Institute (BPI) Multi-family Building Analyst (MFBA)
- Professional Engineer (PE)

b. Request references—case studies of energy audits of buildings similar to yours, with achieved energy savings.

c. Make sure the auditor is eligible to participate in whatever financing and/or incentive program you are pursuing.

2. Determine what type of energy audit you need. The various types of reports in order of ascending cost are described below.

a. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Level I

- Commonly referred to as a walkthrough audit
- Typically used for smaller and/or simple buildings
- Includes a brief on-site survey of the building
- Contains savings and cost analysis of low-cost/no-cost energy conservation measures (ECMs)
- Frequently used to identify potential capital improvements meriting further consideration
- Generally used for prescriptive rebate programs

b. ASHRAE Level II

- Identifies all potential ECMs, including all associated costs, annual savings, and simple payback for each measure
- Provides a breakdown of energy use by system and related predicted savings
- Analyzes how resident energy use impacts the building's energy consumption

- Identifies ECMs requiring more thorough data collection and analysis (Level III)
- Typically is required by incentive and green loan programs, such as:
 - NYSERDA (requires an Energy Reduction Plan, or ERP)
 - New York City Department of Housing Preservation and Development (HPD) (requires a Green Physical Needs Assessment, or GPNA)

c. ASHRAE Level III

- Commonly referred to as an investment-grade audit; is conducted only as a follow-on to an ASHRAE Level I or II audit and pertains to capital-intensive investments
- Provides a deeper analysis of capital-intensive measures identified during Level II audit
- Involves in-depth field analysis and more rigorous engineering analysis of identified capital-intensive investments. Measures that typically require Level III analysis include:
 - Combined heat and power (CHP)
 - Heating distribution system conversion
- Unlikely to be needed unless you target more complex capital-intensive measures

d. Green Physical Needs Assessment (GPNA)

- Combines a PNA with an ASHRAE Level II energy audit. Used by Green Mortgage Loan Programs to identify repairs and improvements that make sense as part of a plan to keep the property operating optimally.
- Valuable for buildings pursuing a rehab and refinancing
- Directly aligns with building refinancing timing and provides a unique opportunity for lenders to underwrite potential energy savings

Selection Process Steps:

1. Choose your desired level of energy audit based on:
 - Regulatory requirements, i.e., GPNA's
 - Incentive program requirements
 - Financing program requirements
 - Planned capital-intensive upgrades
2. Obtain bids from energy audit firms that are qualified to participate in whichever program(s) you are pursuing.

Step 5: Conducting the Energy Audit

Once you have selected an energy auditor, your active involvement will be required to get the most value out of the auditor's analysis. The roles and responsibilities of the energy auditor, building owner, and building staff are described below.

Role of the Energy Auditor/Consultant

1. Provides technical expertise on all aspects of building systems and operations
2. Provides thoughtful guidance on each step of the project, keeping in mind the goals of the building owner and staff, potential funding sources, and project time line
3. Identifies repairs and improvements that make financial sense

Role of the Building Owner

1. Maintains active involvement in every step of the process to ensure that the energy auditor/consultant and building staff understand financial constraints, planned capital projects, and general goals for building operations
2. Provides all necessary information for any program and/or loan applications in a clear and timely fashion
3. Provides clear lines of communication between the energy auditor/consultant and building staff for ease of information flow in the energy audit process
4. Is open to innovative energy conservation measures (ECMs) with proven results

Role of the Building Staff

1. Coordinates with the energy auditor/consultant for staff interviews, building access for site inspections, and apartment access
2. Aids in communication with residents
3. Helps determine the operational feasibility of proposed ECMs from the energy audit
4. Provides all necessary building information such as utility data, building drawings, and maintenance logs

The steps involved in conducting an ASHRAE Level II or III energy audit include:

1. **Data collection:** Gather a minimum of 12 months' worth of all utility data, including electricity, fuel, and water.



2. **Site inspection and equipment testing:** Arrange for energy auditor to inspect and test equipment in common areas and in at least 10 percent of the apartments.
3. **Multi-layered benchmarking analysis:** While a single benchmarking score is useful for starting the conversation about which buildings should be targeted for improvement, your auditor will conduct a multilayered benchmarking analysis to home in on which building systems offer the greatest savings potential.

Multilayered benchmarking includes an analysis of:

- base building systems
- baseload energy usage
- heating usage intensity
- electricity usage intensity
- domestic hot water usage intensity
- building age
- weather patterns

4. **Energy modeling:** Your energy auditor will use proprietary software to determine cost-effective ECMs that will reduce energy consumption and save money.
5. **Preparation of written report:** Your energy auditor will prepare a written report detailing your building's current energy usage, and the cost effective ECMs that can reduce energy costs and your building's carbon footprint.

Steps

- Work with your energy auditor to collect the required utility information and schedule the site inspection and testing.
- Keep lines of communication open with your auditor through each phase of the audit process.

Step 6: Reviewing Preliminary Energy Audit Findings

Once your energy auditor has completed a site survey and inspection, collected the required utility data, and conducted a multilayered benchmarking analysis, schedule a time to review the preliminary audit findings with him or her. Prior to holding your meeting, have your auditor prepare a preliminary findings memorandum, which should contain:

Preliminary findings memorandum

1. Benchmarking results
 - Annual energy cost by end use
 - Annual energy usage by end use

2. List of prospective ECMs
3. Recommendations on what ECMs warrant further analysis before audit completion
4. Description of next steps in completing the energy audit

Steps

- Along with management and the maintenance team, provide feedback on what's feasible and desirable for the building.
- Identify which measures, if any, may require additional scoping studies.

Step 7: Finalizing Your Energy Audit and Incentive and/or Financing Program Participation

Finalizing Your Audit

You must finalize your energy audit report in order to use it to secure funding and create an energy management plan for future operation of your building with the selected ECMs. The final energy audit report should contain at a minimum:

1. Narrative summary of each proposed ECM and its benefits
2. Estimated installation cost for each ECM
3. Estimated annual operating cost savings
4. Estimated simple payback
5. Operations and maintenance recommendations and potential savings
6. Health and safety recommendations
7. Renewable energy system feasibility
8. Resiliency measure recommendations (as relevant)

You must meet with the energy auditor and building staff to review the energy audit report and use it as a capital-planning tool. Review of ECMs by you and other decision makers before finalization of the energy management plan (see step 8) is key to any project's success.

Finalizing Your Incentive and or Financing Program Participation

Once your energy audit is complete, work with your energy auditor to finalize your participation in the

program that best suits your needs. Timing in securing funding and scheduling construction can be complicated and can vary dramatically. Some retrofit decisions will be guided by what funding sources are available and what the requirements are for obtaining that funding. Below are important questions to consider when finalizing your participation in an incentive program, rebate program, or financing program:

- Can any of the applicable funding sources be combined? Work with your energy auditor to determine this.
- Is the building held to any regulatory agreements or third-party energy service company (ESCO) agreements that could affect incentive program eligibility? If so, review these terms with your energy auditor to determine whether they affect your building's program eligibility status.
- If you are participating in a green financing program, are there other lenders in the transaction from whom consent is required? Reach out to those parties early on.

Process Recommendations

- Work with your energy auditor to ensure your audit meets the programmatic requirements of the funding source you have chosen.
- Keep your energy auditor engaged in the incentive or financing process to streamline the closing process.

Step 8: Finalizing Your Energy Management Plan

Use your energy audit as the basis for creating an ongoing energy management plan. Energy management plans are road maps designed specifically to maximize your building's productivity while minimizing its energy use. Implementing such a plan can help you realize your goals for reducing energy consumption and simultaneously achieving cost savings.

To finalize your energy management plan, you must work with the auditor and building team to tailor the final ECMs based on the final audit report and available funding source requirements.

An energy management plan should include:

- Operations and maintenance protocols
 1. O&M plans should be updated based on the ECMs to be implemented
 2. Preventive maintenance actions should be incorporated
 3. Equipment lists and manufacturer manuals should be updated and included
- Sequence of operations:
 1. Should be updated to reflect the ECMs to be implemented
 2. Should incorporate Benchmarking information and document login to benchmarking portal if applicable
 3. Should include 1-year, 5-year, and 10-year capital plan for implementing further ECMs
 4. Should incorporate policies for purchasing energy-efficient equipment

Your review of ECMs with other decision makers before finalizing the energy management plan is key to the project's success. Finalizing the energy management plan is a collaborative process.

The roles and responsibilities of the energy auditor, building owner, and building staff are described below.

Role of the Energy Auditor/Consultant

1. Describes in detail what ECMs are being proposed, how much they will cost, the expected time line, and financial and environmental benefits
2. Prioritizes ECMs according to savings, return on investment, and payback
3. Reviews feasibility of different packages of ECMs based on owner/staff feedback
4. Reviews financing and incentive programs available to fund incremental costs

5. Answers technical questions on the nature of the ECMs
6. Provides guidance on the best way to approach the recommended package of ECMs
7. Provides a bid for future services during ECM implementation, such as:
 - a. Construction management services and site inspections
 - b. Design services
 - c. Request-for-proposal (RFP) preparation for vendors and contractors
 - d. Bid leveling
8. Provides guidance on resident engagement techniques to inform building occupants of upcoming upgrades



Role of the Building Owner

1. Reviews the energy audit report and provides feedback on the financial feasibility of the recommended ECMs
2. Provides feedback on the proposed construction schedule and how available funding sources align with this
3. Gives approval for agreed-upon ECMs and outlines expectations for continued services from the energy auditor

Role of the Building Staff

1. Reviews the energy audit report and provides feedback on the operational feasibility of the recommended ECMs
2. Provides feedback on how the proposed ECMs would affect building operations and resident comfort
3. Provides feedback on resident engagement techniques to inform building occupants of upcoming upgrades

Step 9: Implementing Your Energy Management Plan

Once the energy management plan has been finalized, the implementation process begins. Key considerations include:

- Ensuring that all vendors and contractors you engage with are experienced in the type of work they will be undertaking
- Ensuring that your contract with your energy auditor/consultant includes periodic site inspections during construction. These are critical in ensuring adherence to the energy management plan and realization of projected energy savings.
- Keeping the energy auditor involved throughout the construction process to ensure that ECM recommendations are adhered to. Incentive programs typically require this type of third-party verification.

Keep in mind that some members of the project team may have existing, favorable relationships with contractors or vendors. It is important for the whole team to coordinate effectively with all parties involved and respect existing relationships.

Steps

1. Work with your energy auditor to prepare bid specifications and RFPs for implementation of your energy management plan, including:
 - a. Make sure that any incentive program requirements are incorporated into your bid specifications and the contractors/vendors selected are qualified to participate in the applicable Program

- b. Develop a list of potential contractors and vendors by asking your energy auditor for recommendations on potential vendors and/or contractors whom he or she has worked with on past projects that were successful in achieving energy savings
2. Engage a licensed design firm and/or contractor, depending on the ECM, and request their feedback on the proposed ECMs. With the right qualifications, your energy auditor may be able to provide these services. When selecting a design firm and/or contractor you should request qualifications and case studies of similar projects. Once selected, your design firm and/or contractor will provide the following:
 - a. Recommendations regarding potential revisions to the energy management plan based on code requirements and on-site conditions
 - b. Bid set drawing
 - c. Product specifications for each ECM
 - d. All applicable engineering calculations
 - e. Final design and drawings
3. Finalize your construction schedule, paying attention to scheduling requirements of any outside funding sources



Step 10: Updating Your O&M Plan, Staff Training, and Resident Outreach

Updating Your O&M Plan

The energy audit process provides valuable insight into building operations and a learning opportunity for what operations and maintenance upgrades are feasible. Potential O&M energy efficient and green practices include:

1. Ongoing benchmarking of energy and water usage
2. Purchasing policies
 - a. ENERGY STAR lighting and fixtures
 - b. ENERGY STAR laundry equipment lease requirements
 - c. Green cleaning products
3. Monitoring of water leaks
4. Air conditioner unit and sleeve maintenance protocols
5. Integrated pest management (IPM)
6. Smoke-free housing
7. Green cleaning practices
8. Waste reduction and increased recycling
9. Green apartment turnover checklist
10. Checking HVAC controls
11. Checking air sealing at regular intervals
12. Regular checking of utility bill information and benchmarking information for indications of spikes or off-schedule usage

Staff Training

Training operators and managers in energy management—teaching green practices and giving staff a common language to achieve efficiency improvements—is a cost-effective way to realize savings and other benefits from expanded best practices.

Staff should be trained in the following areas:

1. O&M processes
2. Health and safety protocols
3. Benchmarking and using data
4. Purchasing policies
5. Work order requests: Who responds to what?
6. Building operations manual

7. Maintenance log: Who updates it? Who looks at it? What is recorded?

- a. Examples of what to monitor include:
 - i. Water meter activity between 2 a.m.–4 a.m. to uncover potential leaks
 - ii. Daily system monitoring checks such as boiler temperature
 - iii. Resident heat complaints: time and building location
- b. Examples of monitoring systems include:
 - i. Notebook in the maintenance office
 - ii. Open-access spreadsheet
 - iii. Electronic device applications that provide notifications and checklists

EXAMPLE TRAINING TOOLS

1. Multifamily Building Operator Certification, available from the Building Performance Institute (BPI), bpi.org
2. Operations & Maintenance Essentials, available from Green Professional Building Skills Training (GPRO), gpro.org; additional offering: GPRO Post-Training Coaching
3. Local 32BJ Green Super Training Program, available for all Local 32BJ members
4. Customized training: working with your energy audit team to develop training customized to your systems and staff

Resident Outreach

Resident engagement is important to making sure your improvement project realizes its savings goals. Residents need to be provided with their own operating information, and owners and all staff must set an example for behavior in the building. To realize and maintain savings, engagement and training must be constant and consistent.

Before, during, and after construction, open lines of communication mean a smoother implementation process. Important considerations for successful energy retrofit projects and resident engagement include the following:

1. Before the retrofit begins, consider:
 - a. What retrofits are realistic for the building community?

- b. All residents need to be aware of what is changing, how it will affect them in a positive way, and how it will impact the building.
 - i. How will you communicate this?
 - ii. Who will communicate this?
- 2. During the implementation process:
 - a. Give residents advance notice of any changes and need for access.
 - b. Provide a point of contact for questions and concerns.
 - c. Offer information sources on measures such as new thermostats or water conservation.
- 3. When the project is complete:
 - a. Provide residents guidance on how to operate new equipment.

- b. Tell residents how to place work orders and where they can ask questions about the building in general.
- c. Have building staff maintain resident engagement through building signage, regular meetings, continuing conversations around resource conservation, etc.

To ensure successful resident engagement and spur behavior change, consider why anyone would change his or her behavior. Some things to consider when formulating your message to residents on why behavior change and resource conservation are important may include what motivates residents—the opportunity to save money on energy costs, the opportunity to improve indoor air quality and comfort, a concern for the health of their children or grandchildren or an interest in reducing their contribution to climate pollution.

Step 11: Measurement and Verification—Ongoing Benchmarking



Third-party measurement and verification (M&V) of your energy management plan implementation is important because it can verify savings and identify contractor implementation problems if energy usage is higher than expected. Your energy auditor/consultant, incentive program representatives, or outside consultants can perform this service.

Potential M&V tasks to consider integrating into your project:

1. Training for contractors customized to the recommended ECMs, such as air sealing

2. Site inspections during key points in implementation to ensure ECMs are being installed properly
3. Testing during and after implementation to ensure quality of construction. This might include:
 - a. Testing for airtightness in air-sealing projects
 - b. Commissioning of new building systems to ensure proper operations
 - c. Testing of new lighting systems to make sure sensors work properly

Ongoing benchmarking is important to the success and sustainability of your energy management plan once your ECMs have been implemented. Among the key reasons:

1. Benchmarking allows you to verify actual energy savings realized.
2. It is required by some incentive and loan programs.
3. It creates a feedback loop to help identify problems with measures implemented if energy usage unexpectedly increases.
4. It is an inexpensive operating practice that can reduce your O&M expenses in the long run.

Conclusion

Having an energy management plan for a single building or multiple buildings can help to ensure economic stability of the properties, resident comfort, and building durability. The process of creating an effective energy management plan relies on addressing the below considerations.

CHALLENGES AND HURDLES

1. Reliability of energy audit findings: Working with incentive programs and outside funding sources can provide reliable energy audit findings due to program guidelines and review processes that are often stringent. Outside of a program, always make sure your energy auditor/consultant can prove his or her reliability through successful projects that have achieved energy savings and positive client references.

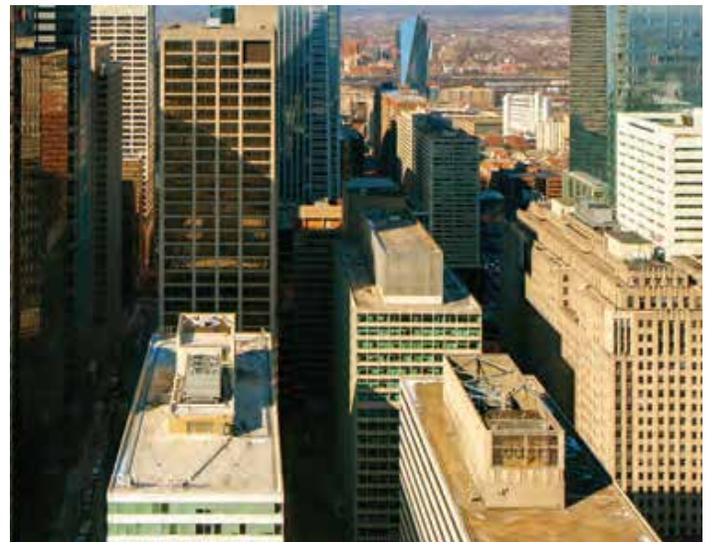
2. Finding solutions to first cost hurdles: The cost of an energy audit can itself be a hurdle. Always investigate potential funding sources for the audit. If possible, start with an ASHRAE Level I audit to determine if taking the next step to a more detailed and more expensive audit (to a Green PNA or level II audit) makes financial sense.

3. Resource and Knowledge constraints (staff time, training, etc.): It's important to work with an energy auditor/consultant who can be a one-stop shop in technical expertise, providing technical and strategic guidance throughout the process. Forming this relationship will help you more easily implement your energy upgrade project—from benchmarking to the energy audit to implementation to staff training and resident outreach.

You don't need to be an expert to embrace or benefit from efficiency and clean energy improvements, as long as you understand a set of key practices:

Best Practices

1. Select a qualified energy auditor/consultant with the appropriate experience, qualifications, and credentials.
2. Require that your energy auditor/consultant keep you continuously informed and reserve time to review findings at the completion of key milestones.
3. Require that energy-saving measures be translated in understandable financial terms that will enable you to make informed decisions.
4. Stay engaged, but rely on your energy auditor/consultant to be your guide and translate findings. You can also evaluate audit results using CMI's open source financial Value Analysis Tool along side your auditor's analysis.
5. Incorporate ECM analyses into regular capital planning events to minimize disruptions and optimize financial efficacy.
6. In your construction budget, provide for measurement and verification activities to ensure project success.
7. Train building staff in energy-efficient building operations, and identify a point person at the building for continuous resident engagement.
8. In your budget, plan for ongoing benchmarking; fees are minimal.
9. Stay apprised of outside funding sources, how they change, and what new sources become available.



Resources

The purpose of this guide is to provide a high-level overview of the basic steps involved in undertaking an energy upgrade, from initial benchmarking through implementation and ongoing maintenance. It is intended to supplement resources that are already available to owners of affordable multifamily housing and associated decision makers.

It is expected that readers will have questions as they absorb the information contained in this guide. The following organizations and entities can further assist you in understanding the details of the process. The list includes government agencies, lending institutions, and consulting/technical firms that can provide valuable technical advice, some for a fee. While the list consolidates key resources that may be helpful, *it is not an endorsement of those organizations.*

1. Retrofit Accelerator

The NYC Retrofit Accelerator should be an owner's first stop. It is a one-stop resource provided by the City of New York to help owners and operators of privately owned buildings reduce operating costs and increase the sustainability of their properties through energy and water upgrades.

<http://www.nyc.gov/retrofitaccelerator>
RetrofitAccelerator@cityhall.nyc.gov

212-656-9202

2. NYSERDA Multifamily

NYSERDA qualifies quality businesses that provide energy efficiency services to multifamily buildings and they also provide incentives to assist owners with technical assistance and construction costs.

<http://www.nyserda.ny.gov/All-Programs/Programs/MPP-Existing-Buildings>
MultifamilyPrograms@nyserda.ny.gov
info@nyserda.ny.gov

518-862-1090
1-866-NYSERDA

Find Multifamily Building Solutions Network in each county in NY:

<http://www.nyserda.ny.gov/Contractors/Find-a-Contractor/Multifamily-Building-Solutions-Network>

3. NYCEEC

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.

<http://nyceec.com/contact-us/>
info@nyceec.com

646-797-4630

4. Con Edison

Con Edison provides incentives and rebates for its customers to perform energy efficiency measures.

<http://commercial.coned.com/incentives-and-rebates/conedci@lmbps.com>

1-877-797-6347

5. National Grid

National Grid provides incentives and rebates for its customers to perform energy efficiency measures.

<https://www1.nationalgridus.com>

Contact information: <https://nationalgrid-newyork.custhelp.com/app/ask/p/22,23,26>

1-800-642-4272

6. RG&E

RG&E provides equipment replacement and rebates designed to reduce electricity and/or natural gas use in apartment and condominium complexes.

<http://www.rge.com/UsageAndSafety/usingenergywisely/eeps/multifamily.htm>

1-800-444-5668

Glossary of Terms

AFMD	Affordable Multifamily Housing Integrated Retrofit Demonstration Project
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
Benchmarking	Continuously evaluating a building's performance and comparing this with its energy usage baseline, or comparing similar buildings to determine performance.
BPI	Building Performance Institute is a standards setting organization for home performance professionals
Direct metering	The use of separate utility meters for common areas and residents. Residents each have a meter and receive a bill for their usage.
Energy Conservation Measure (ECM)	A measure taken in a building to reduce energy usage, such as installation of ENERGY STAR-certified lighting fixtures.
Energy Services Agreement (ESA)	A contract between a property owner and a company that develops, arranges, and funds energy efficiency retrofits. ESAs offer a clearly defined structure for outside capital to invest in the energy savings potential of a building. The ESA provider is paid for the energy savings of a retrofit project.
Energy usage baseline	The amount of energy a building uses during a period of typical operation before ECMs are implemented.
Energy Use Intensity (EUI)	A building's energy use as a function of its size. EUI is expressed as energy per square foot per year—that is, the total energy consumed annually by the building (in kBtu or GJ) divided by the total gross floor area.
Green PNA	An ASHRAE Level II energy audit combined with a standard Physical Needs Assessment.
Incentive programs	Programs that provide financial rewards, typically per apartment or per unit of energy saved, for implementing a package of ECMs.
Master metering	The use of one utility meter or account that captures all energy usage for a building. Residents do not have their own meters and do not receive a bill.
Multilayered benchmarking	A detailed analysis that analyzes systems and other uses such as heating and domestic hot water to show what they are using and costing the building instead of just looking at cost and usage per square foot.
Power Purchase Agreement (PPA)	A financial agreement in which a developer arranges for the design, permitting, financing, and installation of a solar energy system on a property at little to no cost to the property owner. The developer sells the power generated to the host customer at a fixed rate that is typically lower than the local utility's retail rate.
Rebate programs	A program offering money back on the purchase and installation of energy-efficient equipment such as lighting or pumps. They are typically provided by utilities and can be used on single ECMs.
Request for proposal (RFP)	A request for proposal (RFP) is a solicitation, often made through a bidding process, by an individual, agency or company interested in procurement of a commodity, service or valuable asset, to potential suppliers to submit. The RFP presents preliminary requirements for the commodity or service, and may dictate to varying degrees the exact structure and format of the supplier's response.
Return on investment (ROI)	ROI is a performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. ROI measures the amount of return on an investment relative to the investment's cost. To calculate ROI, the benefit (or return) of an investment is divided by the cost of the investment, and the result is expressed as a percentage or a ratio.
Submetering	An arrangement in which a building maintains a master meter from the utility and receives a bulk rate for electricity. A third-party submeter vendor installs meters for each resident, monitors their usage, and issues a bill to each resident on behalf of the owner.