
Step-By-Step Retrofit Process

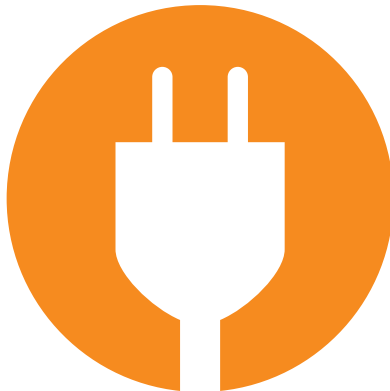











TABLE OF CONTENTS

	About this Toolkit	3
THE STEP-BY-STEP RETROFIT PROCESS		
	1 Review Portfolio	4
	2 Secure Funding	5
	3 Select Property	6
	4 Select Audit Protocol	7
	5 Select Auditor and Conduct Audit	8
	6 Determine Final Scope of Work and Select Contractor to Complete Renovation	10
	7 Conduct Quality Assurance and Verification (QA&V)	12
	8 Monitor Utility Use	13
	9 Management, Operations and Maintenance	15
	Overview of the Multifamily Retrofit Toolkit	16
	Credits	18
	Acknowledgements	19

ABOUT THIS TOOLKIT AND THE STEP-BY-STEP RETROFIT PROCESS

Housing preservation, reliable and lower operating costs, improved indoor environmental quality, and reduced carbon emissions: all these benefit multifamily housing properties through retrofit.

Knowing how to select prime candidates for retrofit, though, along with aligning funding sources, selecting an audit protocol, ensuring proper implementation, and evaluating results is daunting for many portfolio managers. This toolkit distills Enterprise's experience retrofitting multifamily affordable housing into the critical steps necessary for success. What follows is a roadmap for multifamily housing owners, investors, and developers which outlines a comprehensive, cost-effective approach to retrofit.

How to Use the Toolkit

This step-by-step process can be used in three ways:

- **Portfolio Approach** - Assists you in developing an action plan to increase the efficiency of your portfolio through selective application of retrofits and related tools
- **Project Approach** - Assists you in taking one project through a streamlined, cost effective, efficient retrofit process
- **Midway through process and/or near completion** - Use as a toolkit at any point during the retrofit process in order to make smart and cost-effective decisions

The 9 Stages of the Retrofit Process with Resources

The resources provided here guide you through the stages of upgrading your portfolio or property. Each stage has specific directions with tools to assist you.

Location of the Toolkit

The documents, attachments and links referred to in this document can be found at: www.enterprisecommunity.org/retrofittoolkit

STEP-BY-STEP RETROFIT PROCESS

1 Review Portfolio



Use benchmarking to understand the energy use of your portfolio and guide decisions on capital upgrades.

To identify buildings with the greatest potential for energy, water efficiency and capital improvements, first benchmark your portfolio for operating expenses. Work with property management staff to collect and then input 12 months of historic utility consumption data in an online energy benchmarking and management tool. These tools compare your buildings to a national sample of similar buildings, helping you identify and select the least efficient properties in your portfolio and set priorities for use of your limited staff time and investment capital. You will ultimately be able to track changes in energy use over time for single buildings or groups of buildings, and track cost savings throughout the process. EPA Portfolio Manager, linked below, is a free online tool to help you get this process underway.

H Attachment
Benchmarking Tools – *includes links to:*

[EPA Portfolio Manager](#)
[EnergyScoreCard](#)
[WegoWise](#)

2 Secure Funding



Identify potential sources of capital for your portfolio improvements

The timeline from identification of a financing strategy to securing funding for retrofit upgrades can be complicated and can vary dramatically from a few months to one year depending on the funding sources. Which funding sources are available to you and your specific building portfolio will often guide your retrofit decisions. It is important to ask the right questions up front to ensure each property is appropriately matched with the capital to perform a retrofit. Enterprise has created a tool, the Financial Decision Tree, to assist owners in making funding decisions, along with the list of important questions below:

- What are the local, state and federal incentives or subsidies available for retrofits?
 - What are the trends and higher-than-average utility expenses for the portfolio?
 - What are the properties' partnership agreements, loan agreements, and audited financials for refinancing or recapitalization potential?
 - What are the properties' regulatory agreements or requirements?
 - Who are the point staff to present financial analyses for approvals?
 - Are there complete capital needs assessments to estimate retrofit costs for financial analysis?
-

Attachment

Financial Decision Tree

Link

[Database of Energy Efficiency & Renewables Incentives & Rebates](https://www.enterprisecommunity.org/retrofittoolkit)

3 Select Property



Identify buildings with the greatest potential for energy, water efficiency and capital improvements.

On average, 20-25% energy savings can be achieved if retrofits are implemented on buildings poised for major systems upgrades. Informed by the portfolio utility benchmarking and financial analysis, use the threshold screening criteria and Property Screener tool below to prioritize your properties as good retrofit candidates.

- Building is older than 10 years
- Owner pays all bills (master metered)
- High energy intensity or Home Heating Index (HHI)
- High utility cost (spending over \$1,000/unit a year)
- High maintenance/repairs costs for HVAC equipment
- Inefficient heating or cooling systems, appliances, lighting, or water fixtures (older than 10 years)
- Major piece of equipment slated for replacement within three years
- Available operating cash flow to payback retrofit improvements
- Property is positioned for recapitalization or refinance in the near term

Attachment

R Property Retrofit Screener

4 Select Audit Protocol



Select the appropriate protocol based on the funding source to obtain an investment grade audit.

Owner's objectives, funder/lender requirements and utility company rebate requirements will all influence the decision of which audit protocol to use. Enterprise has created two audit protocol standards that will yield an investment grade report: Use the Energy and Water Audit Protocol if the property can only finance energy and water upgrades. Use the Green Capital Needs Assessment Protocol if the property needs capital and energy/water upgrades and is in a position to refinance or resyndicate. Clearly state to your auditor your objectives as owner as well as the exact report parameters your funding source(s) requires:

Documents

Energy and Water Audit Protocol

Green Capital Needs Assessment Protocol

A - R Attachments

All attachments

▶ Link

[Audit Examples](#)

5 Select Auditor and Conduct Audit



Obtain a quality auditor and final report with this guidance on auditor credentials and through a nationally screened list of Technical Assistance Providers.

An auditor will work directly with the owner to obtain 12-24 months of historical utility data, schedule an on-site property inspection, gain access to residential units for inspection, and schedule interviews with maintenance staff and the property manager. The preliminary audit report should come in a format agreed upon by the owner and should, at minimum, include recommendations for energy-efficiency, water conservation, capital improvements and indoor air quality improvements based upon the auditor's energy modeling, on-site inspections, resident and staff interviews, and analysis of the building's past performance. Select an auditor through a Request For Proposal process; the criteria below provide guidance for auditor qualifications. The Technical Assistance Database linked below provides a list of nationally screened TA providers, including multifamily energy auditors.

Criteria to select an auditor:

- Ability to follow the Enterprise audit protocols with templates, and create report using these materials
- Experience in energy auditing and physical needs assessments for multifamily housing
- Experience using the energy modeling software and diagnostic testing prescribed in the referenced audit protocol
- Experience assessing feasibility of renewable energy installations
- Experience conducting financial analysis and cost estimates that generate investment-grade level information (replacement reserve, life cycle cost, simple payback, SIR analysis)
- Evidence of a qualified team to execute all components (i.e., CNA Provider, Energy Auditor, Energy Modeler, Architect, etc.)
- Sufficient capacity to complete the scope of work
- Ability to perform post-retrofit inspections as per the Quality Assurance and Verification Measures Guidelines (optional)

STEP-BY-STEP RETROFIT PROCESS

Step 5 continued:

We recommend that the auditor or team has the following certifications:

- Building Performance Institute (BPI) multifamily analyst
 - Certified Energy Manager (CEM)
 - Licensed mechanical engineer
 - Licensed electrical engineer
 - Energy modeler
 - General contractor
 - Certified Green Building Professional
 - Home Energy Rating System (HERS) Rater
 - Retro-commissioning agent
 - Renewable energy expert
 - Licensed architect
 - Financial expert
 - Integrated Pest Management professional
-

▶ **Link**

[Technical Assistance Provider Database](#) – includes vetted GCNA Providers

6 Determine Final Scope of Work and Select Contractor to Complete Renovation



Work with the auditor and team to tailor the final retrofit scope of work based on the audit report and available financing. Hire a high-quality contractor to establish construction framework that ensures installed measures meet the audit report specifications.

The owner's team (property manager, asset management staff and possibly general contractor, trades, architect, engineer) provides feedback on the financial and physical feasibility of the audit report's proposed measures. Once the owner's team has completed a Bid Set including drawings, engineering calculations and product specifications that meet the auditor's performance criteria, a general contractor and/or trades can provide pricing. Often the contractors will have suggestions or revisions based on actual field conditions or code requirements. These revisions can be incorporated into the set of drawings that is submitted to the Building Department for permitting. The Building Department may provide another round of revisions that will need to be incorporated into the final Permit Set of construction documents.

It is critical to hire a high-quality, experienced contractor to draft a comprehensive scope so that the measures as installed meet the equipment and performance specifications outlined in the audit report. This will help to guarantee that the predicted savings are realized. Enterprise has created a Construction Flow Chart that outlines a more comprehensive construction process to ensure the whole team verifies that the retrofit upgrades are specified and installed properly. Below are steps to determine the final scope of work to include in the construction process:

- 1 Meet with auditor, property management, asset management and operations & maintenance staff to review the audit results
- 2 Evaluate the auditor's recommended measures, factoring in any capital reserve planning
- 3 Evaluate the auditor's recommendations in light of any plans to refinance and/or resyndicate

STEP-BY-STEP RETROFIT PROCESS

Step 6 continued:

- 4 Calculate any collateral costs associated with each measure that are not factored into the auditor's costs (i.e., removal/disposal of existing equipment, resident impact/relocation, disturbance of asbestos/lead paint)
- 5 Translate the final retrofit scope into construction documents

Attachments

- P** Construction Flow Chart
- Q** Construction Management Checklist

7 Conduct Quality Assurance and Verification (QA&V)



Hire a third party to conduct Quality Assurance and Verification to ensure retrofit measures are installed properly and that predicted savings are realized.

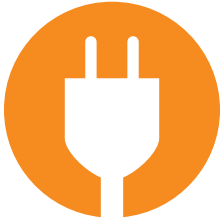
It is recommended that the owner hire a third party to conduct quality assurance and verification (QA&V). These third-party QA&V tests will verify that the renovations improved the building's condition according to plan. The Enterprise QA&V Guidelines by Measure Table outlines the testing and reporting activities to be completed. Consider engaging the same consultant as QA&V Provider that conducted the building's initial audit. What to consider when choosing a QA&V Provider:

- Experience in energy auditing and providing QA&V services to multifamily housing
- Evidence that a team is assembled to carry out the various components prescribed in the QA&V Guidelines by Measure
- Sufficient staff and/or team capacity according to the project's location and expected timeframe
- Ability to provide competitive pricing

N Attachment
Quality Assurance and Verification Guidelines by Measure

▶ Link
[Technical Assistance Provider Database](http://www.enterprisecommunity.org/retrofittoolkit)

8 Monitor Utility Use



Perform ongoing monitoring of utility usage to ensure that projected savings are realized.

Energy benchmarking and management tools will help you:

- Evaluate how actual savings compare to predictions post-retrofit
- Monitor the ongoing health of your portfolio
- Manage operating costs as energy prices fluctuate

With knowledge of ongoing operating expenses, you can strategically plan to manage buildings that are highly inefficient, incorporate better practices for average buildings, and replicate practices employed in efficient buildings. Regular and standardized energy data collection plays an important role in portfolio management. The Residential Energy and Water Data Collaborative (REWDC) has found tracking of utility consumption data to be important for a number of reasons which are discussed at length in their white paper (LINK: <http://www.enterprisecommunity.com/servlet/servlet.FileDownload?file=00P30000009w72REAQ>). These include:

- Establishing performance benchmarks
- Identifying cost-effective improvements
- Influencing lending and investment decisions
- Supporting policy and regulatory changes
- Proving value for building owners beyond cost savings
- Engaging property owners and residents in realizing utility cost savings from green behavior, measures and improvements

STEP-BY-STEP RETROFIT PROCESS

Step 8 continued:

Enterprise created a template data collection form to align your portfolio with an online benchmarking and energy management tool. The links below direct you to a selection of online benchmarking systems to help you ensure your portfolio's sustained health.

Attachments

- G** **Utility Release Form**
- H** **Benchmarking Tools** – *includes links to:*

[EPA Portfolio Manager](#)

[EnergyScoreCard](#)

[WegoWise](#)

9 Management, Operations and Maintenance



Ensure that management practices, ongoing maintenance and resident actions support the optimal performance of the newly installed green features.

Sustaining efficient building operations is a challenging task and requires coordinated effort in all aspects of housing operations, from management to maintenance staff. Often, additional 5-10% savings can be achieved without physical building changes, but through better building operations and maintenance processes and resident education and empowerment. Enterprise O&M and Resident Engagement Tools will assist you in identifying behavior-based portfolio and building challenges, as well as best practices to improve operations and maintenance practices and effective ways to engage residents. The Enterprise “Training in a Box” tools include resources to help residents and staff understand the purpose and operations of the new features in their buildings. Using these templates will ensure that ongoing maintenance staff and resident behavior support optimal performance of the newly installed green features. At all costs, adopting portfolio-level utility management strategies along with staff and resident behavior best practices, should be prioritized.

Links

- ▶ [Resident Engagement Training in a Box](#)
- ▶ [Green Leader Toolkit](#)
- ▶ [Operations & Maintenance Training in a Box](#)

General data collection process:

Data Collection

- Collect 12-24 months of historical consumption data
- Input property information and data into specified format
- Gather utility logins and authorizations
Set up ongoing utility data retrieval or manual entry
- Enter information on recent upgrades

Initial Benchmark and Training

- Analyze historical usage
- Use energy software provider to train users

Ongoing Monitoring and Reporting

- Establish internal utility tracking and review process
- Address data issues as needed
- Establish annual energy performance reviews
- Establish portfolio utility performance tracking

OVERVIEW OF THE MULTIFAMILY RETROFIT TOOLKIT

The Multifamily Retrofit Toolkit is composed of a variety of different parts – which are listed below. These resources can be found at www.enterprisecommunity.org/retrofittoolkit

Documents

The main toolkit is made up of four core documents:

- Step-By-Step Retrofit Process
 - Energy and Water Audit Protocol
 - Green Capital Needs Assessment Protocol
 - Frequently Asked Questions
-

Attachments

Referenced within the documents are these supporting attachments:

- A** Green Capital Needs Assessment Summary Table
- B** On-Site Visit Guidelines
- C** Site Visit Preparation
- D** Potential Operations & Maintenance Problem Worksheet
- E** Inspection Worksheet
- F** Equipment Specifications Worksheet
- G** Utility Release Form
- H** Benchmarking Tools
- I** Diagnostic Testing Guidelines
- J** Energy & Water Analysis Guidelines
- K** Energy Modeling Reporting Requirements
- L** Energy Modeling Input Assumptions Table
- M** Integrated Pest Management Guidelines
- N** Quality Assurance & Verification Guidelines
- O** Financial Decision Tree
- P** Construction Flow Chart
- Q** Construction Management Checklist
- R** Property Retrofit Screener

OVERVIEW OF THE MULTIFAMILY RETROFIT TOOLKIT

Links

Referenced within the documents are links to important resources:

- ▶ [Database of Energy Efficiency & Renewables Incentives & Rebates](#)
- ▶ [Technical Assistance Provider Database](#)
- ▶ [Fannie Mae Green Refinance Plus Program](#)
- ▶ [Enterprise Utility Allowance Resource Guide](#)
- ▶ [National Center for Healthy Housing Resource Library](#)
- ▶ [Green Capital Needs Assessment Example](#)
- ▶ [Housing Partnership Networks \(HPN\) Group Buying Program](#)

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Referenced within the documents are additional toolkits which support the Retrofit Process:

- ▶ [Resident Engagement Training in a Box](#)
- ▶ [Green Leader Toolkit](#)
- ▶ [Operations & Maintenance Training in a Box](#)

CREDITS

About Enterprise Green Communities

Enterprise Green Communities is the first national green building program focused entirely on affordable housing. Launched by Enterprise in fall 2004, Green Communities is designed to help developers, investors, builders and policymakers make the transition to a greener future for affordable housing.

Visit www.enterprisecommunity.org/green to learn more about Enterprise Green Communities.



About Enterprise

Enterprise is a leading provider of the development capital and expertise it takes to create decent, affordable homes and rebuild communities. For more than 30 years, Enterprise has introduced neighborhood solutions through public-private partnerships with financial institutions, governments, community organizations and others that share our vision. Enterprise has raised and invested more than \$11.5 billion in equity, grants and loans to help build or preserve nearly 300,000 affordable rental and for-sale homes to create vital communities. Enterprise is currently investing in communities at a rate of more than \$1 billion a year. Visit www.enterprisecommunity.org to learn more about Enterprise's efforts to build communities and opportunity.

ACKNOWLEDGEMENTS

The Enterprise Multifamily Retrofit Toolkit was overseen by the Enterprise Green Communities team. Special thanks to all the Enterprise staff who provided valuable input.

We also thank Dana Bourland for her early oversight and vision in the creation of this toolkit. Many thanks to Fran Hereth for her technical oversight and expertise in the creation of each protocol and associated tool, and for the many technical assistance providers who thoroughly reviewed each component.

Special thanks to Worldstudio for design and to the local Enterprise markets for coordinating the development of the tool. Any errors in this report are the sole responsibility of Enterprise.

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