
Energy and Water Audit Protocol

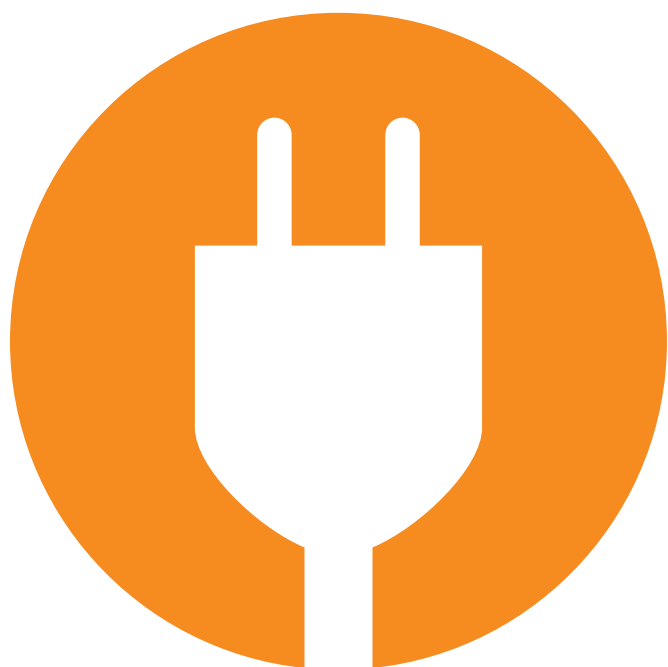


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Note: The attachments referred to in this section can be found at www.enterprisecommunity.org/retrofittoolkit

OVERVIEW

The Enterprise Community Partners **Energy and Water Conservation Audit Protocol** (“the EWCM Protocol”) is a tool that defines the required criteria for an audit to be used by property owners and underwriters. It identifies ways to save the maximum amount of energy and water at a property as cost efficiently as possible with an outcome that results in:

- 1** Reduced operating costs through increased energy and water efficiency
- 2** Healthier living environments by improving indoor air quality for residents
- 3** Decreased carbon emissions by reducing the property’s environmental impact

The EWCM Protocol ensures a quality report by providing templates and guidance to conduct a holistic assessment. The outcome is an investment-grade report that includes rigorous data analysis and financial analysis for each recommended measure. In the end, you’ll know which product to use, when to install it, and how much you will save.

The Energy Audit will include:

- Current Energy Use and Cost
 - Total Reduction in Energy Use and Cost for Recommended Measures
 - Energy and Water Conservation Measures (EWCMs) that could be installed
 - Green Measures (GMs) that improve comfort, indoor air quality, and safety with diagnostic testing results, if needed, that could be installed
 - Life Cycle Cost Analysis and Estimated Useful Life (EUL) for each recommended measure
 - Financial payback of each measure using net present value (NPV), internal rate of return (IRR), savings to investment ratio (SIR), and simple payback
 - Methodology for data collection, energy modeling software and assumptions used to make the projections
 - Qualifications and certifications of all those who worked on the audit
 - Representation that the Audit meets the Enterprise Audit Protocol as defined here
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The main process that constitutes the EWCM Protocol includes:

- On-site visit
- Energy Analysis
- Financial Analysis
- Reporting

This Protocol is derived from the following standards: Building Performance Institute, Inc. Technical Standards for Multifamily Building Analyst (2008); HERS II 2008 Technical Manual; California Title 24–2008; HUD, Energy Conservation for Housing; A Workbook; RESNET, ASHRAE; Fannie Mae Green Refinance Plus; Green PNA (2011)

AUDITOR QUALIFICATIONS

The Protocol requires that auditors perform, at a minimum, the following tasks:

- Energy modeling
 - Building assessment (limited to identifying safety, code and durability issues)
 - ❶ • **Diagnostic Testing Guidelines** (*Attachment I*)
 - Combustion appliance safety testing
 - Feasibility analysis for the installation of renewable energy retrofits
 - Construction cost estimating
 - Financial analysis that generates investment grade level information/data (SIR, LLC and simple payback)
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In recognition that a single firm may not be able to fulfill all the requirements of this audit protocol, multi-disciplinary teams assembled for their complementary skill sets are welcome to apply. Applicants who do not hold these certifications but can prove equivalent training and experience will be considered on a case-by-case basis by Enterprise. Potential team members may include, but are not limited to:

- BPI multifamily analyst
- Certified Energy Manager (CEM)
- Mechanical engineer
- Electrical engineer
- Energy modeler
- General contractor
- Certified green building professional
- HERS rater
- Retrocommissioning agent
- Renewable energy expert
- Architect
- Financial expert

ON-SITE VISIT

Prior to the on-site visit, we suggest that a pre-audit meeting or conference call be conducted with the following parties:

- Auditor and their team members
- Owner (to include property operations and maintenance staff)
- Local jurisdictional staff (optional)

We recommend that the pre-audit meeting occur prior to finalizing the contract for audit services with the owner.

The purpose of the pre-audit meeting is to establish and confirm the understanding of the following variables:

- Diagnostic testing to be conducted
- Any previous PNAs or audits done on the property
- Energy modeling software to be used, and the outcome that will be reported in the final audit document
- Wage rates to be factored into the construction cost estimates
- If any subsidy or incentive funds may be involved in the project, discuss requirements that will impact the audit inspection, testing and written report

The **on-site visit** will take place on the day of the site inspection. The purpose of the on-site visit is to collect all necessary information to conduct an appropriate energy, water, health and environmental analysis, including sufficient information to inform an energy model and financial analysis. The intent is to interview property owners and managers, evaluate the building envelope, assess building airflow, inventory HVAC equipment, identify ventilation system, field verify fan operation, and perform other diagnostic testing.

Attachments

- A** Green Capital Needs Assessment Summary Table
- I** Diagnostic Testing Guidelines

ENERGY MODELING AND ANALYSIS PROCESS

An energy model of the building's pre- and post-retrofit performance shall be completed using utility data, building plans, initial inspection data and diagnostic data collected during the on-site visits. The energy model is used to estimate annual energy consumption, carbon savings and energy cost savings of potential energy conservation measures. Current operating schedules verified on site are to be used for energy and energy cost savings estimates. Software to be used on site shall be either EnergyPro, TREAT or other as approved by Enterprise.

All major assumptions used to develop the energy model and analysis must be clearly stated in the final report. Reporting emphasis should be placed on the assumptions that have the most impact on estimated energy savings. Occasionally, some building features may be inaccessible, such as wall and attic insulation. When certain building features cannot be physically verified, the default conditions should be identified as well as the justification for them.

Attachments

- K** **Energy Modeling Requirements Guidelines**
- J** **Energy & Water Audit Guidelines** provides more details on the energy modeling and analysis process.

ENERGY AND WATER AUDIT REPORT

The auditor shall prepare a written report which will have the following features:

EXECUTIVE SUMMARY

The Executive Summary shall summarize the major findings of the audit, including:

- Basic building characteristics
- Overall physical condition of the building
- Recommended energy efficiency and water conservation measures
- Recommended green measures and other capital improvements
- Cost Estimate to install each recommended measure. Must use RS Means, plus local adjuster, plus Davis Bacon wage rates and verify with available current data from auditor or owner
- An excel spreadsheet of all recommended measures and their costs to accompany the report
- Projected savings from implementing each EWCM both in dollars and KWh and Therm
- Comparison of total projected savings to existing energy use/cost
- Savings to Investment Ratio (SIR) of each measure

ENERGY AND WATER AUDIT REPORT

SITE VISIT BACKGROUND

This section includes information on weather conditions, site visit participants, unit sampling, documents (e.g., as-built plans) and records (e.g., Operations and Maintenance reports provided by the owner).

NARRATIVE

This section shall include a written narrative that describes existing property conditions and organized into the following categories:

- Site systems
- Mechanical/electrical
- Electrical
- Architecture
 - Building exterior
 - Roof systems
 - Building interior common areas
 - Community rooms, kitchens, lobbies, corridors, commercial spaces
- Dwelling units
 - Living area finishes
 - Bathrooms
 - Kitchens
 - In-unit mechanical
 - In-unit electrical

In the narrative, the auditor shall include information from the site visit to verify the building drawings. If the site conditions do not match design conditions, the site conditions shall be used for analysis and reporting (BPI Standard 3.3 Blueprint Evaluation/Site Visit). This section will include information on equipment specifications

F in accordance with **Equipment Specifications Worksheet** (*Attachment F*).

ENERGY AND WATER AUDIT REPORT

RECOMMENDATIONS This section will provide information on each recommended measure and improvement, including but not limited to:

- Description of measures and recommended loading order
- Rationale for recommendation
- Estimated useful life of existing component
- Recommendation for timing of implementing the measure/replacement/improvement
- Identification of how cost estimate was derived (including source of cost information, unit pricing, take-off used)
- In the absence of renewable energy opportunities, explain why these are not recommended
- Non-energy related benefits of the recommended measures such as health and safety, improved indoor air quality and increased resident comfort

A Auditors will present this information in the **Green Capital Needs Assessment Summary Table** (*Attachment A*) that includes the most cost-effective combination of recommended measures and improvements factoring in loading order, available funding, estimated useful life of existing equipment/systems and the property owner's goals.

This section will include the results of the diagnostic testing conducted on site and describe how the test results informed the rationale for the above recommendations. Auditors may also offer recommendations for the retrocommissioning of certain existing equipment based on diagnostic test results.

This section of the report will also include a summary of the combustion analysis testing completed during the energy audit. For all audited dwelling units, include the results of combustion safety testing and identify if action was warranted as a result of the combustion safety testing. Report recommendations to include CO detectors to the extent the dwelling units don't have them installed.

Additional attachment

I Diagnostic Testing Guidelines

ENERGY AND WATER AUDIT REPORT

ENERGY AND WATER COST/BENEFIT ANALYSES

This section shall include the individual cost/benefit worksheets for each recommended energy efficiency and water conservation measure. The worksheets should show implementation cost, energy and water consumption and financial savings, simple payback and incremental payback (as applicable).

PHOTO DOCUMENTATION

This section of the report should include photo documentation of the subject property, specifically targeted toward describing the relevant physical conditions and energy efficiency and water conservation measures.

QUALITY ASSURANCE AND VERIFICATION

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This section shall include a written plan that outlines the recommended process for the visual inspection of all newly installed components, and verification of their performance both at the completion of construction and 12 months thereafter. This plan shall be in accordance with the **Quality Assurance and Verification Guidelines**, (*Attachment N*)

QUALIFICATIONS AND CERTIFICATIONS

This section shall include a description of the qualifications and professional certification of all those who worked to produce the plan.

REPRESENTATION

This section shall include a representation from an officer or owner of the firm conducting the audit that the audit meets the **Enterprise Multifamily Green Retrofit Program Energy and Water Audit Protocol** without exception and that the final audit report has been reviewed for quality assurance purposes by a principal or officer of the firm.