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# Frequently Asked Questions

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Note: The attachment referred to in this section can be found at [www.enterprisecommunity.org/retrofittoolkit](http://www.enterprisecommunity.org/retrofittoolkit)

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## 1. WHAT IS A GREEN CAPITAL NEEDS ASSESSMENT?

The Green Capital Needs Assessment (GCNA) Protocol is a tool that Enterprise and Recap Advisors (<http://www.on-site-insight.com>) developed to help integrate green retrofits into the capital improvement, modernization and financial planning processes routinely undertaken by multifamily owners. The GCNA Protocol predicts the return-on-investment from energy efficiency expenditures, evaluates the optimal timing of investments based on life-cycle-cost analyses and provides a savings-to-investment ratio calculation. These metrics help owners and lenders evaluate individual measures and select the package of measures that best meets the various and sometimes competing goals of a retrofit project.

The GCNA not only looks at energy and water conservation measures but includes green alternatives to all the standard components to be replaced (e.g., cabinets and flooring).

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### Document

#### Green Capital Needs Assessment Protocol

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### Links

► **Green Capital Needs Assessment Example**

[http://www.on-site-insight.com/files/GCNA\\_Thumbnail.pdf](http://www.on-site-insight.com/files/GCNA_Thumbnail.pdf)

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## 2. WHEN IS THE OPTIMAL TIME TO RETROFIT A BUILDING?

The optimal time to retrofit a building varies depending on:

- Available funding/financing
- Condition of the existing building
- Available building reserves
- Plans for refinancing and/or recapitalization
- Cashflow
- Available capital reserves

Retrofit work can be implemented to take advantage of time-limited funding (e.g., utility rebates/incentives) for plug-and-play components such as lighting and plumbing fixtures.

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More comprehensive, whole-building retrofits can be integrated into properties that are being refinanced and/or resyndicated. Proceeds from the refinancing can pay for the retrofit improvements. The loan principal amount, debt service coverage and loan-to-value ratios can be adjusted to factor in the added loan proceeds generated from the energy savings.

Ideally retrofit work is proactively integrated into the capital improvement planning for an entire portfolio driven by a whole-building approach rather than being triggered by one-time funding that results in a fixture-by-fixture, building-by-building, “chase-the-money” approach.

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### Link

► **Fannie Mae Green Refinance Plus Program**

<http://portal.hud.gov/hudportal/documents/huddoc?id=GreenRefiPlusFactSheet.pdf>

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### 3. WHAT IF MY BUILDING IS INDIVIDUALLY METERED?

In individually metered buildings the financial savings generated by energy/water conservation measures installed in the units will accrue to the residents rather than to the owner who paid for them. This mismatch of investment and benefits is called the split incentive.

One approach to overcoming the split incentive challenge is to lower the standard HUD utility allowances and increase rents based on the utility savings. The savings can be shared between the owner and the residents. An energy-efficiency based utility allowance (EEBUA) can be based on actual utility data or on an energy consumption model for a specific building.

In California, 20 Public Housing Authorities have adopted EEBUAs which lower the utility allowance for both new construction and rehab projects.

The California Energy Commission worked with the affordable housing community and the California Tax Credit Allocation Committee to support the development of an energy modeling tool to more accurately project residents’ actual utility costs in a specific building. A link to this tool, known as the California Utility Allowance Calculator, is provided below.

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In addition, Enterprise created a *Utility Allowance Resource Guide*. The purpose of this resource is to increase awareness by affordable housing developers, building owners, public housing authorities (PHA) and housing finance authorities (HFA) about adopting, establishing and offering utility allowance options supportive of energy-efficiency investments in new construction and rehabilitation projects.

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### Attachment

#### Utility Release Form

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### Link

#### ► Enterprise Utility Allowance Resource Guide

<http://www.practitionerresources.org/cache/documents/675/67588.pdf>

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#### 4. HOW DO I KNOW WHICH AUDIT PROTOCOL TO USE?

Owner's objectives, funder/lender requirements and utility company rebate requirements will all influence the decision on which audit protocol to use. The American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) defines three levels of audits:

- Level 1-Walk-Through Analysis
- Level 2-Energy Survey and Analysis
- Level 3-Detailed Analysis of Capital-Intensive Modifications

An Investment Grade Audit represents a fourth level of audit (see link to Enterprise Energy and Water Audit Protocol listed below). An Investment Grade Audit is used by loan underwriters to determine if energy and water conservation measures generate sufficient savings to make payments on a loan that finances all, or some portion of, the improvements.

Early on in the process it's important to talk with everyone involved to ensure that the selected audit protocol will address both the owner's objectives and the funders' requirements.

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### Documents

**Energy and Water Audit Protocol**

**Green Capital Needs Assessment Protocol**

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### 5. HOW DO I KNOW WHICH RETROFIT MEASURES WILL BE MOST COST-EFFECTIVE FOR A PARTICULAR BUILDING?

An Energy Audit analyzes a building's energy and water usage and recommends retrofit measures which will most effectively reduce usage while preserving and even improving the health, safety, durability and comfort of the building.

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Tiered improvements are outlined below:

**Short-term payback (less than three years)** These “low-hanging fruit” measures include:

- Lighting, appliances, boiler controls and weatherization
  - Replace standard T12 fluorescent bulbs with T8s
  - Replace fluorescent magnetic ballasts with electronic ones
  - Install energy-efficient appliances
  - Install boiler controls
  - Weatherize the building including insulating, caulking and weather-stripping
- 

**Medium payback (3-5 years)**

- Replace incandescent and fluorescent exit signs with LED (Light Emitting Diode)
  - Replace standard incandescent with CFL (compact fluorescent lamps)
- 

**Longer-term payback** These measures are more capital-intensive such as:

- System equipment replacement, windows
- Domestic hot water heaters
- Space heating boilers
- Air conditioners
- Heat pumps
- Chillers
- Windows
- Renewable systems such as solar domestic hot water and solar photovoltaic

One general rule for the “loading order” of improvements is to install all energy efficiency improvements prior to installation of any renewable systems. This reduces the overall demand on the solar pv or solar thermal system and, thus, the cost of the system.

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## 6. HOW CAN A GREEN RETROFIT IMPROVE THE INDOOR AIR QUALITY (IAQ) AND HELP CREATE A HEALTHIER LIVING ENVIRONMENT FOR THE RESIDENTS?

The overall living environment can be improved for residents and staff by incorporating the following measures:

- Improved ventilation system to increase fresh air supply and distribution
- Installation of energy-efficient kitchen and bathroom fans that exhaust to the outdoors
- Sealing the building envelope to control moisture and pest intrusion
- Integrated Pest Management Program (IPM)
- Rubber walk off mats

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The National Center for Healthy Housing has developed Seven Principles of Healthy Homes which include keeping a home:

- dry
- clean
- pest-free
- ventilated
- safe
- contaminant-free
- maintained

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### Link

- ▶ **National Center for Healthy Housing Resource Library**  
<http://www.nchh.org/Resources.aspx>

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### 7. WHAT QUALIFICATIONS SHOULD AN AUDITOR HAVE?

A multi-disciplinary team with multiple qualifications is usually required to complete all the necessary energy audit tasks. The chart below, adapted from the “*HERCC Audit Specifications Template for Multifamily Existing Buildings*” (3.e), outlines energy audit tasks and suggests minimum qualifications.

Tasks	Qualifications
<ul style="list-style-type: none"> <li>• Energy modeling and utility data analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Certified Energy Plans Examiner (CEPE)</li> </ul>
<ul style="list-style-type: none"> <li>• Whole building energy audit and recommendations</li> </ul>	<ul style="list-style-type: none"> <li>• Building Performance Institute (BPI)</li> <li>• Multifamily Analyst, Certified Energy Manager (CEM)</li> </ul>
<ul style="list-style-type: none"> <li>• Combustion appliance safety</li> </ul>	<ul style="list-style-type: none"> <li>• BPI Building Analyst</li> </ul>
<ul style="list-style-type: none"> <li>• HVAC system efficiency and balancing (including duct testing)</li> </ul>	<ul style="list-style-type: none"> <li>• HVAC subcontractor,</li> <li>• Mechanical Engineer</li> </ul>
<ul style="list-style-type: none"> <li>• Central domestic water heating and Distribution system efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Plumbing or boiler contractor license</li> <li>• Mechanical Engineer</li> </ul>
<ul style="list-style-type: none"> <li>• Assess Building for water efficiency, resource Conservation and IAQ measures</li> </ul>	<ul style="list-style-type: none"> <li>• LEED AP</li> <li>• Mechanical Engineer</li> </ul>
<ul style="list-style-type: none"> <li>• Feasibility analysis of renewable energy systems</li> </ul>	<ul style="list-style-type: none"> <li>• State Solar Rebate Program approved licensed contractor, Mechanical Engineer, Electrical Engineer</li> </ul>
<ul style="list-style-type: none"> <li>• Analyze financial data and construction costs</li> </ul>	<ul style="list-style-type: none"> <li>• Construction Cost Estimator</li> <li>• Licensed General Contractor</li> </ul>
<ul style="list-style-type: none"> <li>• Energy audit and recommendations for non-residential spaces &gt;20% floor area</li> </ul>	<ul style="list-style-type: none"> <li>• ASHRAE II auditor</li> </ul>
<ul style="list-style-type: none"> <li>• Commissioning and retro-commissioning</li> </ul>	<ul style="list-style-type: none"> <li>• Commissioning agent</li> </ul>
<ul style="list-style-type: none"> <li>• Operations and Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• BPI Multifamily Building Operator, National Affordable Housing Management Association (NAHMA) Green Building Operator, LEED EBOM</li> </ul>



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### 8. HOW MUCH DOES AN AUDIT COST?

A typical walk-through audit costs less than \$5,000. ASHRAE Level II-III to Investment Grade Audits can range from \$8,500 to \$10,000.

- Factors that impact the total cost of an audit include:
  - Size and number of buildings in the project
  - Complexity of the space heating/cooling, ventilation and domestic hot water systems
  - Scope of the required diagnostic testing
  - Total number of units to be inspected—dependent on sampling required
- 

### 9. HOW CAN I CREATE A PLAN TO RETROFIT MY WHOLE PORTFOLIO OVER TIME?

Owners can use a centralized database to adopt a thorough, in-depth, systematic approach to prioritizing and scheduling energy upgrades for all the buildings throughout an entire portfolio based on:

- Building vintage; completion dates for original construction and any rehabs
  - Building type
  - Equipment type and vintages
  - Financing structure
  - Solar exposure
  - Rebate/incentive opportunities
- 

Once these data are input for each building, the owner's team can determine which of the following upgrade approaches is appropriate for each building:

- Tune-up
- Prescriptive
- Whole-building

And based on the financing and rebate/incentives information input into the model, timing recommendations can be included.

Asset Management can integrate this retrofit assessment results into their overall capital needs planning. Plans to retrofit an entire portfolio or even multiple buildings allow owners to take advantage of economies of scale (e.g., bulk purchasing).

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#### **Link**

- ▶ **Housing Partnership Networks (HPN) Group Buying Program**  
<http://www.housingpartnership.net/enterprises/group-buying/>

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### 10. WHAT METRIC CAN I USE TO COMPARE AND RANK MULTIPLE PROPERTIES IN A PORTFOLIO?

Once preliminary screening criteria have been used to identify retrofit candidates (refer FAQ #3), the metrics below can be calculated to provide more in-depth data on a specific property. These metrics also provide effective tools to compare and rank buildings.

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Calculating a building's energy intensity is a valuable indicator of a single building's energy savings potential.

$$\text{Energy intensity} = \frac{\text{Energy consumption}}{\text{Floor area}}$$

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Energy intensity can be expressed in:

- annual BTUs per square foot (BTUs/ft<sup>2</sup>)
- dollars per square foot
- kilowatt-hours/ft<sup>2</sup> (kWh/ft<sup>2</sup>)

This information can be derived from historical utility bills. At a minimum, 12 consecutive months of data is required and 24 months is preferred.

A multifamily building using 80,000 BTUs/ft<sup>2</sup> is probably an excellent candidate for energy efficiency improvements. Energy intensity of 25,000 BTUs/ft<sup>2</sup> indicates a very efficient multifamily building.

The Home Heating Index (HHI) metric provides a means to compare buildings with different climates, energy prices and sizes. HHI is expressed in BTUs per square foot per heating-degree day (HDD)\* (BTU/ft<sup>2</sup>/HDD). In hot climates where the cooling load predominates Home Cooling Index (HCI) is used.

Using these metrics to compare buildings within a portfolio can help identify the under-performing buildings, the “energy hogs”.

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**\*Heating Degree Day (HDD):** each degree that the average daily temperature is below the base temperature (usually 65 degrees) constitutes one heating degree day. As an example, a home in Duluth, Minnesota with 9,724 heating degree days annually requires twice as much fuel compared to an identical home in St. Louis, Missouri, with 4,758 heating degree days.