



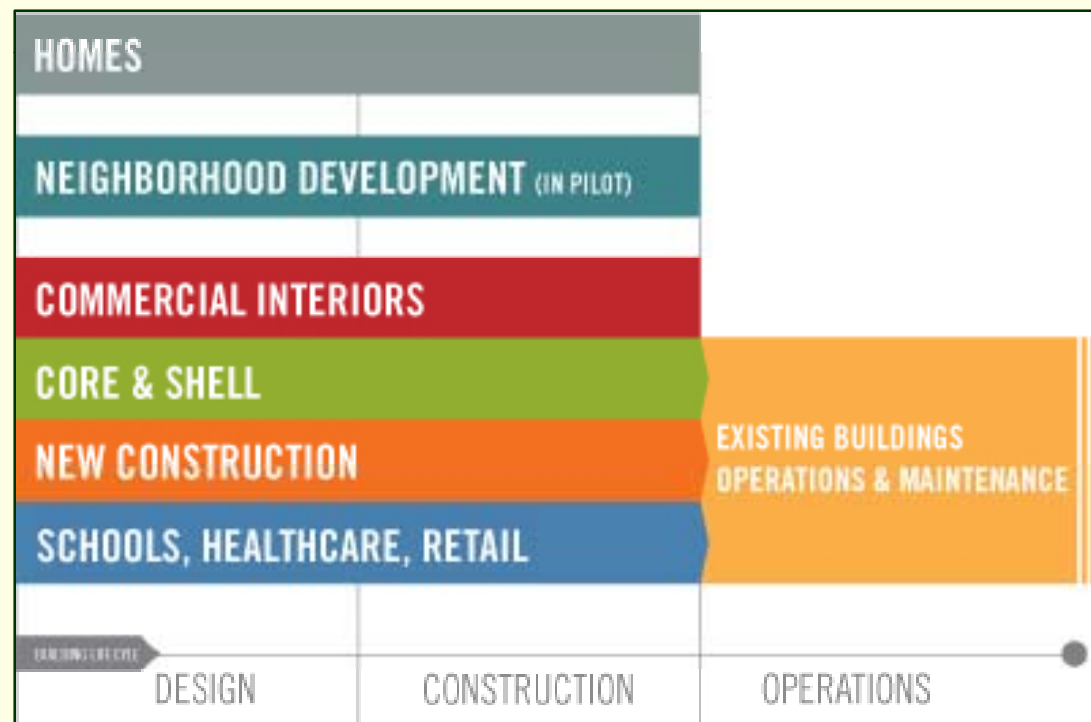
# Green Building for Affordable Housing

Common Ground

November 9, 2009

# Green Building Standards & Certifications

LEED – “Mother” of all green-building standards:



# Green Building Standards & Certifications


## LEED

– International green building certification system, providing **third-party verification** that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most

## International Green Building Councils

- UK
- Australia
- Italia
- Canada
- India
- Brazil

# LEED – Metrics that Matter Most


- Energy savings
-  efficiency
- CO<sub>2</sub> emissions reduction
- Improved indoor environmental quality
- Stewardship of resources and sensitivity to their impacts.

# Sustainable Sites Category:

- Discourages development on previously undeveloped land
- Minimizes impact on ecosystems and waterways
- Regionally appropriate landscaping
- Rewards smart transportation choices
- Controls storm water runoff
- Reduces erosion, light pollution, heat island effect and construction-related pollution.

# Water Efficiency Category

The goal of the Water Efficiency credit category is to encourage:

- Smarter use of water, inside and out
- Water  through more efficient appliances, fixtures and fittings inside and water-wise landscaping outside

# Energy & Atmosphere category

Buildings use 39% of the energy and 74% of the electricity. Encourages a variety of energy strategies:

- Commissioning
- Energy use monitoring
- Efficient design and construction
- Efficient appliances, systems and lighting
- Use of renewable & clean energy
- Other innovative strategies

# Materials & Resources Category

## Encourages:

- Use of sustainably grown, harvested, produced & transported products and materials.
- Promotes reduction of waste, reuse and recycling
- Considers the reduction of waste at a product's source

# Indoor Environmental Quality

*Americans spend about 90% of their day indoors*

- Promotes strategies that improve indoor air
- Provide access to natural daylight and views
- Improved acoustics.

# LEED for Homes - Credit Categories

**Locations & Linkages** - Impacts on the environment related to location of homes and how they fit into the community.

- Encourage building away from environmentally sensitive places.
- Rewards building in infill or on previously developed sites.
- Rewards building near already-existing infrastructure community resources and transit.
- Encourages access to open space for walking, physical activity and time spent outdoors.

**Awareness & Education** – Promote home's green features to maximum effect.

- Encourage home builders and real estate professionals to provide homeowners, tenants and building managers with the education and tools they need to understand what makes their home green and how to make the most of those features.

**Innovation in Design category** - Provides bonus points for projects that use new & innovative technologies and strategies to improve a building's performance beyond what is required by other LEED credits or in green building considerations that are not addressed elsewhere in LEED. Also rewards projects for including a LEED AP on the team to ensure a holistic, integrated approach to development.

**Regional Priority category**- USGBC's regional councils, chapters and affiliates have identified the environmental concerns that are locally most important for every region of the country, and six LEED credits that address those local priorities were selected for each region. A project that earns a regional priority credit will earn one bonus point in addition to any points awarded for that credit.

# Green Building Standards & Certifications

Global Green Energy Star

Built Green Built Smart Natural Step

Evergreen Sustainable Development Standard

Green Communities Sea Green

Living Building Challenge Green Globes

NAHB National Green Building Program

Green Building Initiative CCI

# WA State HTF - ESDS

## Evergreen Sustainable Development Standard

- Apply to all projects w/ HTF after 7/1/08
- Managed by Dept. of Commerce
- Point system with both mandatory and optional "criteria"
- Minimal verification requirements
- Soon to be updated to stay current with WA State Energy Code 2010 revisions
- Modeled on Enterprise Foundation's "Green Communities" program standards.

# Enterprise Green Communities

- Vision of Enterprise's Green Communities is to fundamentally transform the way we think about, design and build affordable homes
- Green Communities is the first national green building program developed for affordable housing. We focus on the use of environmentally sustainable materials, reduction of negative environmental impacts and increased energy efficiency. And we emphasize designs and materials that safeguard the health of residents and locations that provide easy access to services and public transportation.

# Enterprise Green Communities

- Result in high-quality, healthy living environments
- Reduce utility and maintenance costs associated with single and multifamily housing
- Enhance residents' connection to nature and promote more active lifestyles
- Protect the environment by conserving energy, water, materials and other resources
- Advance the health of local and regional ecosystems by reducing negative impacts on air quality, wetlands, waterways and undeveloped land
- Reduce global warming impact and depletion of natural resources

- Green Communities Criteria represent the first national framework for healthy, efficient, environmentally smart affordable homes.
- Criteria was developed by Enterprise in partnership with:
  - Natural Resources Defense Council
  - American Institute of Architects
  - American Planning Association
  - National Center for Healthy Housing
  - Southface Energy Institute
  - Global Green USA
  - Center for Maximum Potential Building Systems
  - Experts associated with the US Green Building Council

# *Stay Tuned!*

"The next generation of Enterprise Green Communities will be the catalyst for unprecedented energy, environmental and health benefits to hundreds of thousands of families in neighborhoods across America."

Charles R. Werhane, President and  
CEO, Enterprise Community  
Investment Inc.

# Green Communities Report: “Incremental Costs, Measurable Savings”

- One of few national studies to attempt to quantify cost-benefits of complying with green development standard
- Using sampling of 27 projects w/ 1,640 units
- At date of report – 360 projects w/ 16,000 units developed w/ Green Communities standard.
- Report focuses on cost effectiveness of green criteria adopted.
- Does not try to quantify other established benefits including resident health, economic and environmental.

## “Incremental Costs, Measurable Savings”

- **“In summary, estimated lifetime savings exceed the initial costs of incorporating the Enterprise Green Communities Criteria into affordable housing. The Criteria offer health, economic and environmental benefits by addressing integrated design, location, site improvements, water conservation, energy efficiency, materials that benefit the environment, healthy living environments, and operations and maintenance of affordable housing”**

# Cost Benefits

- From a strictly financial standpoint, the projected “lifetime” utility cost savings—averaging \$4,851 per dwelling unit
- Discounted to today’s dollars—are sufficient to repay the average \$4,524 per-unit cost of complying with the Enterprise
- In summary, estimated lifetime savings exceed the initial costs of incorporating the Enterprise Green Communities

## Cost Benefits – cont.

- Meeting the Enterprise Green Communities Criteria yields striking savings in utility costs, especially when compared to the cost of implementing the Criteria's energy and water conservation measures.
- These savings make the cost of implementing the Criteria (\$4,524) financially attractive.
- When considering the benefits revealed in our study, the average cost per dwelling unit to incorporate the energy and water criteria was \$1,917, returning \$4,851 in predicted lifetime utility cost savings (discounted to 2009 dollars).

# Study Methodology

- Our calculation of lifetime savings took into account the useful life of various improvements, anticipated increases in energy and water/sewer costs of nearly 5%, and a present value discount factor of 6% to express utility cost savings in 2009 dollars.
- The predicted savings from actual usage were based on a subset of 10 projects for which Enterprise had access to utility usage data for a one-year period.

# Study Highlights

- Implementing the following conservation measures produced dramatic utility cost savings:
  - Building to Energy Star standards or better
  - Installing all energy improvements with a 10-year or better payback for mod-rehab projects
  - Installing Energy Star appliances
  - Installing Energy Star lighting
  - Individually metering electricity for rental dwelling units (except supportive housing) to encourage conservation
  - Installing water-conserving appliances and fixtures

**Table 1.2: Actual Cost Savings from Meeting Green Communities Criteria**

	Actual Average Lifetime Savings from Energy and Water Conservation Measures (10 projects) <sup>1</sup>	Actual Average Lifetime Savings from Optional Renewable Energy Criteria Only (1 project)
Utility savings per home/rental unit	\$4,851	\$5,034
Utility savings per square foot	\$5.43	\$5.17
Internal rate of return	17%	3%
Simple payback period (years)	8	40

<sup>1</sup>Ten of the 27 projects provided energy utility data; of those, five provided actual water billing data. An additional two projects of the 27 also provided water billing data but not energy utility data.

# Methods to Evaluate Health Economic & Environmental Benefits

- LCA – Life Cycle Assessment
  - Cradle to grave
- Carbon Calculation
  - Tonnage of GHG produced/reduced
- Health Metrics
  - Eliminate persistent toxins
  - Indoor air quality
  - Precautionary principle

## Third Party Certifications



The Pharos Project seeks to define a consumer-driven vision of truly green building materials and establish a method for evaluation that is in harmony with principles of environmental health and justice. The Project's foundation is a partnership, pairing those who use building materials with those who study the products' impacts on health and the environment.

## Pharos at a glance

Products are scored for progress toward ideals in 16 categories

Sector	Category	Goal	Indicators
Health & Pollution	IAQ/User Exposure	Eliminate content and emissions that may endanger the health of building occupants and neighbors	Use phase VOC emissions, TVOC content, IAQ certification programs, chemical of concern content
	High Hazard Toxics	Eliminate the use or creation of persistent, bioaccumulative, toxic, and/or untested chemicals	cradle-to-cradle use, production and content of chemicals of concern (POPs, PBTs, halogenated compounds, carcinogens, reproductive toxicants, mutagens, endocrine disruptors, highly acute toxicants and untested chemicals)
	Global Warming	Eliminate creation of climate changing gases	cradle-to-gate global warming gas emissions
	Air Quality	Eliminate criteria pollutant releases to the air	in development
	Water Quality	Eliminate criteria pollutant releases to the water	in development
Environment & Resources	Renewable Materials	Utilize only refurbished or recycled materials or sustainably harvested bio-based materials	Reused, refurbished, salvaged, recycled, agricultural, and forestry content, GMO free, organic and sustainable certifications. Product and packaging.
	Embodied Energy	Minimize total energy use	cradle-to-gate embodied energy
	Renewable Energy	Utilize or produce energy only from sustainable, renewable sources	manufacturing and cradle-to-gate renewable energy use and projects, offsets, supply chain projects,
	Embodied Water	Minimize water use	cradle-to-gate water use, water conservation projects
	Solid Waste	Eliminate the generation of waste	in development
	Habitat Restoration	Extract and harvest raw materials in a fashion that protects and restores sensitive habitats	in development
Social & Community	Occupational Safety	Protect the safety, health, and well-being of the workers who produce the products	worker injury violations, training, safety audits, public reporting, worker committees, safety engineering & design program supply chain work
	Consumer Safety	Minimize inherent hazards to consumers in products	in development
	Fairness & Equity	Provide fair compensation and non-exploitative conditions with equal and equitable opportunities for all workers	forced & child labor, discrimination in hiring & worker practices, benefits, living wage, union interference, involvement in countries with bad labor practices, supply chain practices, diversity in workforce & governance, diversity tracking, workforce engagement, labor policy
	Community Contributions	Actively contribute to the overall welfare and sustainability of affected communities	in development
	Corporate Leadership	Provide transparency and leadership in reporting and improving corporate impact on environment, health & social justice	violations of worker safety, waste & discharge regulations & treaties, EMS, sustainability report, political activity, leadership in: green chemistry, innovative manufacturing, supply chain management & environmental stewardship

# Methods to Evaluate Financial Benefits

- **Simple payback** — the estimated number of years of utility cost savings required to pay back the initial incremental costs of the green improvements
- **Lifetime utility cost reductions** — an estimate of the present value of future savings
- **Internal rate of return (IRR)** — the percentage return on investment in energy- and water-saving improvements, represented by the estimated future utility cost savings

# Simple Payback

- **Simple payback** — estimated number of years of utility cost savings required to pay back the initial costs of the green improvements.
- Unlike lifetime savings and internal rate of return methods, does not account for the useful life span of improvements or cost of capital to finance the improvements.
- Conservation measures with short payback periods— (five years or less)—are typically good investments, because the useful life spans of most all building components are at least **10 yrs**, and the simple payback is **20%** or more annually.
- On the other hand, a more detailed analysis is required to decide whether measures with longer payback periods are sound investments.

# Lifetime savings

- Calculate both predicted and actual annual energy and water savings.
- Factor in estimated annual increase in energy costs & annual increase in water/sewer fees.
- Determine expected useful life of energy conservation measures.
  - Boilers/furnaces – 15 yrs
  - H-performance windows – 20 yrs
  - Insulation – 50 yrs
- Results in estimate of future utility costs & savings over the life span of measures.
- Use discount rate (6%) to express in current dollars.

# Internal Rate of Return (IRR)

- The estimated internal rate of return (IRR) of individual criteria is calculated similar to lifetime cost savings, though expressed as a percentage
- This is the method typically used by investors to determine the benefits of making a particular investment or alternative investments. In this report, the IRRs are indicators of the relative benefits of making decisions to adopt individual Green Communities Criteria, based on the average IRRs of the projects surveyed

# Tracking Costs

- Enterprise GC is including survey tool in the green development plan template.
- Understanding costs & associated lifetime savings critical to sharing knowledge across the affordable housing sector.
- Even with a mandatory requirement for both green development plan & an integrated design process, the developers participating in our survey did not routinely track the costs of green measures.
- Determining the average cost of meeting the Criteria (\$4,524) is significant, given difficulty in acquiring this data from survey participants.

# **This Evaluation Effort Has Revealed a Few Very Important Yet Simple Conclusions.**

- Tracking the costs of green measures is not standard practice.
- Tracking the cost-effectiveness of green measures is not standard practice.
- The Enterprise Green Communities Criteria are cost-effective.

# Other Lessons Learned

- This evaluation effort has reinforced the importance of integrating green measures into the design process early.
- This ensures that all agreed-upon measures are appropriately documented in the plans and specifications, and follow an intentional, rigorous commissioning process.
- A well-established and ongoing integrated design process appears to deliver significant benefits.
- when measures required in the Criteria are included in the plans and specifications of a project, 95% of the time those measures would be installed in the building

# Commissioning, Testing, Post Construction Assessments.

- While we continue to value the importance of an integrated design approach, *we are now equally, if not more, focused on the commissioning, performance measurement, and testing necessary to realize the expected benefits.*
- Over a building's entire lifespan, we must pay careful attention to routine performance testing.
  - Engaging residents and homeowners in the green goals of the housing project.
  - Residents can play a critical role by exercising proper maintenance and conservation practices.
  - Maintaining a healthy living environment through use of non-toxic cleaning supplies and other best practices.

# Integrated O&M & Occupancy Green Asset Management

- Extending the integrated design process into the asset management of the building is essential.
- Engage the professionals responsible for operation and maintenance as well as those working in the building. It is critical that everyone understands the green goals that were designed into the building and their respective roles in achieving expected performance levels.

# Links (to resources)

- Enterprise Green Communities
  - <http://www.enterprisenextgen.org/>
- LEED/USGBC
  - [www.usgbc.org/DisplayPage.aspx?CMSPageID=124](http://www.usgbc.org/DisplayPage.aspx?CMSPageID=124)
- EPA-DOE Energy Star programs
  - <http://www.energystar.gov/index.cfm?c=home.index>
- Database of State Incentives for Renewables and Efficiency
  - <http://www.dsireusa.org/>
- Architectural Energy Corporation
  - [http://www.archenergy.com/products/rem/rem\\_rate/](http://www.archenergy.com/products/rem/rem_rate/)
- Saving Water Partnership
  - <http://www.savingwater.org/business.htm>

# More Resources/Links

- Minnesota Pollution Control Agency
  - <http://www.pca.state.mn.us/oea/greenbuilding/products.cfm#standards>
- American Council for Energy Efficient Economy
  - <http://www.aceee.org/altsites/index.htm>
- Northwest Energy Efficiency Alliance
  - <http://www.nwalliance.org/>
- Healthy Building Network
  - <http://www.healthybuilding.net/index.html>
- WSU Energy Program
  - <http://www.energy.wsu.edu/>
- Building Green
  - <http://www.buildinggreen.com/menus/subtopics.cfm?TopicID=4>

*And Finally.....*

BE WARY OF SIMPLISTIC  
ANSWERS  
TO COMPLEX QUESTIONS

## **Discussion** - Isn't our primary mission to build more units of housing for those in need?

- Poverty and health
- Lower utility costs
- Smart site selection – reduce transportation costs
- Promoting more active healthy lifestyles
- Maximize benefits of public dollars
- Convenient justification for higher unit costs compared w/ market rate development