

# GHI Community Upgrade Pilot Program Town Hall Meeting – January 23, 2011

## Agenda

- Opening welcome by GHI President, Suzette Agans
- Group Activity to collect and collate questions/concerns (15 minutes)
- TOPIC 1. Why We Need a Community Upgrade (5 minutes)  
*Presented by Steve Skolnik (GHI Member and Buildings Committee Member)*
- TOPIC 2. The Pilot Program and Why We Need it (5 minutes)  
*Presented by Jim Cohen (GHI Member and Buildings Committee Chair)*
- TOPIC 3. What is Happening Now in the Pilot Program (5 minutes)  
*Presented by Joe Wiehagen (Energy Engineer, NAHB Research Center)*
- Top 10 questions/concerns presented and answered (30 minutes)
- Door prizes
- More Q&A as needed until 4:00PM
- Concluding remarks and next steps

# Why We Need a Community Upgrade

- Critical infrastructure is wearing out.
- There are serious issues concerning livability
- The Replacement Reserve Program will cover some things, but not all.
- Doing nothing is not an option.



*"Greenbelt Homes, Inc. is a cooperative that provides quality homes for our members and fosters opportunities for community."*

*"We will maintain, protect and enhance the assets of our cooperative... while preserving the financial stability and sustainability of our cooperative community."*

[ Excerpts from the GHI Mission Statement ]

# Community Upgrade Goals

[ Mission Statement for the Community Upgrade, as drafted by the Buildings Committee ]

**GHI desires to undertake a capital improvements program with the following goals:**

1. Reduce overall energy consumption and costs in the dwelling units
2. Improve member comfort and 'livability'
3. Emphasize use of sustainable, environmentally friendly energy sources, technologies, and products where economically feasible
4. Reduce overall life cycle costs, including preventive and corrective maintenance, for heating and domestic hot water systems
5. Implement the program while maintaining the unique and historic nature of the Greenbelt community

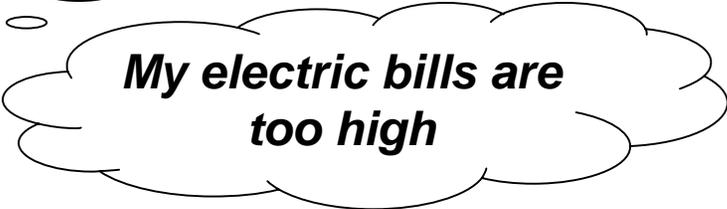
# Concerns About Comfort and Costs

The most frequent complaints, as logged by the GHI Maintenance Department and reported in our recent member survey (to which nearly 700 Members responded), are



***I'm cold / there's  
not enough heat***

→ Only 18% said their homes are always warm enough in winter.



***My electric bills are  
too high***

→ 77% keep their homes cooler in winter than is comfortable, to avoid higher utility bills.



***My block home has  
mold and mildew***

→ Only 24% of the block home respondents are satisfied with the humidity levels in their homes.

# Replacement Reserves Program (RRP)

## Overview

- GHI created a Replacement Reserve Fund in 1987.
- Members contribute monthly as part of their coop fees.
- The fund covers future replacement of major components as their service life expires.
  - “Service life” is the expected useful life as identified by the industry and/or manufacturer, e.g. windows are listed at 25-years.
  - Replacement Reserves planning is for existing components only.
  - It does nothing to address improvements or upgrades.
- With help from replacement reserve planning experts, GHI periodically reviews and updates the RRP based on industry standard data and methodology.
- Fund balance at the end of 2010 was ~\$7.9 million
- There is also an addition maintenance reserve fund for members in the Addition Maintenance Program.

# Replacement Reserves Program (RRP)

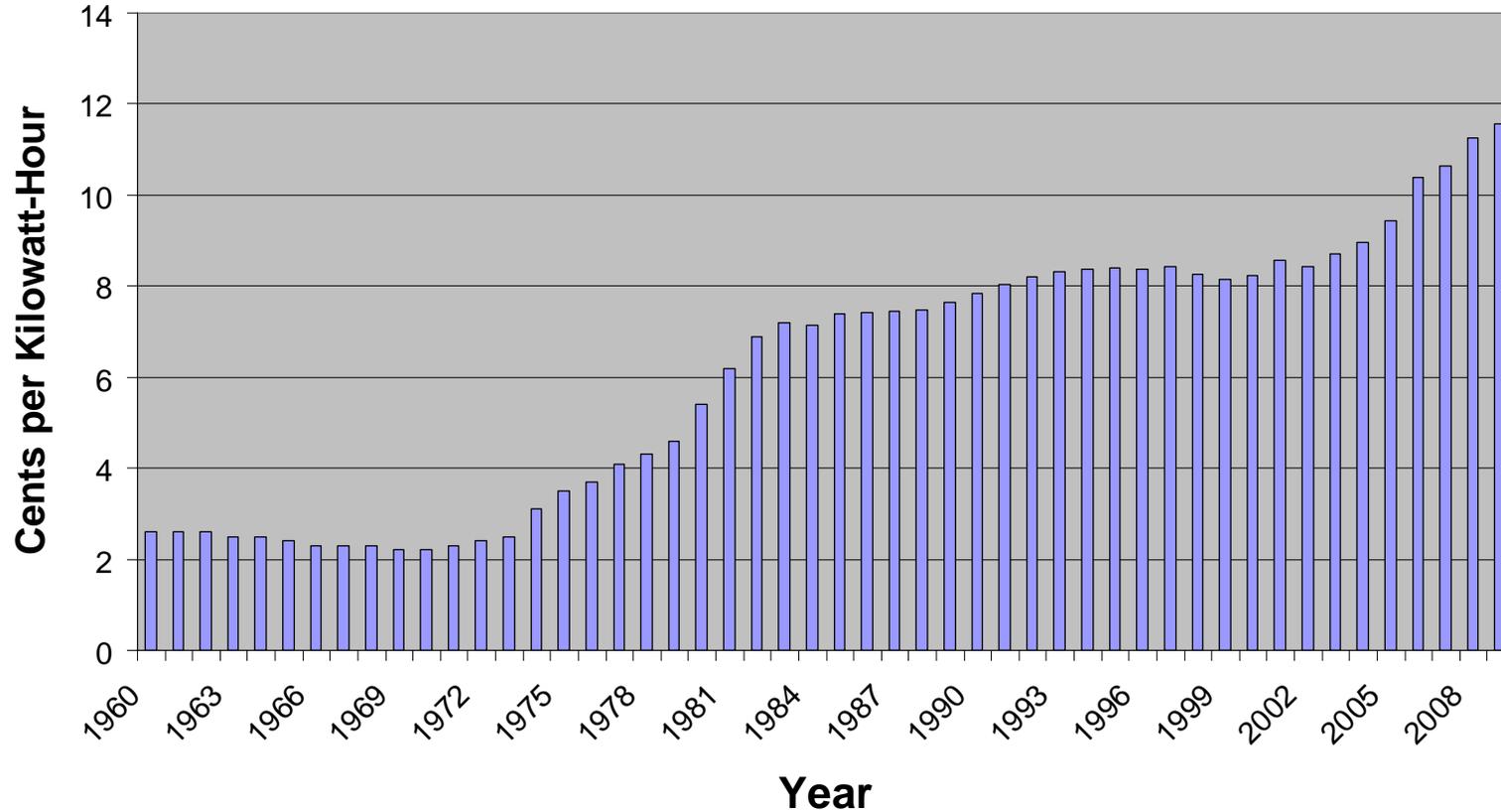
## Coverage for Upgrades Being Considered\*

<b>Funded under RRP</b>	<b>NOT included in RRP</b>
Replacement windows	Correct and improve crawlspace insulation
Replacement doors	Correct and improve crawlspace vapor barrier
Replacement waste piping (frame homes)	Insulate block home exterior walls
Replacement baseboard/ceiling heaters	Insulate frame and brick home attics
Replacement siding (frame homes)	Install heat pump or other technologies to replace baseboard heaters
	Install storm doors
	Heat pump domestic water heater
	Energy recovery ventilation system (or bathroom exhaust fan with auto control)
	Sealing and caulking to reduce air infiltration (all homes, especially frames)

*\*Note: There are other building components included in the RRP, which are not being considered a part of the Community Upgrade Program, e.g., roofs, gutters and downspouts, hot water heaters, etc.*

# Energy Costs Continue to Rise

Average U.S. Retail Prices of Electricity, 1960-2009



**Maryland has higher average electric costs than all of the either other states in its region.**

U.S. average for 2010: 11.6 cents per KWH

Maryland average for 2010: 14.6 cents per KWH

Sources: U.S. DOE, Energy Information Administration ( <http://www.eia.gov/abouteia/> )

# Opportunities and Benefits

## offered by a Community-wide Upgrade

- Use new, better equipment to make the homes more energy efficient
- Take advantage of government incentives
- Take advantage of economies of scale (buying in quantity)
- Use less energy and address other environmental concerns as we design improvements
- Lower monthly energy costs for members
- Improved comfort in our homes
- Lower costs for the upgrades that we need
- Lower costs for ongoing maintenance needs, when components are standardized across the community)
- Doing our part to mitigate environmental issues

# Difference between this Upgrade and the “Rehab” of the late ’70s to early ’80s

- The “Rehab” was *reactive* – the work had to begin quickly because PG County inspectors had condemned the original oil-fired boilers that provided all the heating.
- Alternatives being considered now are more technologically advanced than the choices that were available 30 years ago.
- Because we have more time, this Community Upgrade will be *proactive* – with careful planning and a Pilot Program to:
  - ☑ Test and verify the *actual* performance and energy cost savings of the energy efficiency upgrades being considered.
  - ☑ Get the experience we need concerning the mechanics, challenges, and *actual* costs of performing the upgrades.
  - ☑ Determine what needs to be done in the community-wide upgrade to minimize disruption and member inconvenience.

# Why We Need the Pilot Program

To make good choices for the Community Upgrade, we need to know the actual costs and energy savings that we can count on for our particular types of homes.



[ Photo from Greenbelt Museum web site - <http://greenbeltmuseum.org/> ]

In addition to providing Members with reliable cost and benefit information, the Pilot Program, as a “microcosm” for the community-wide upgrade, will also:

- reveal challenges for installation and maintenance in our homes;
- help us work out important logistics for the community-wide upgrade (e.g. how handle storage in attics);
- teach us how minimize disruption and inconvenience to Members during construction;
- help us get the loan we will need for the community upgrade.

# Advantages of the Pilot Program

(Why prior studies and modeling aren't enough)

<b>Prior industry studies and Modeling CAN</b>	<b>What the Pilot Program will do, that Modeling CANNOT</b>
Estimate energy used in the homes	Verify energy used in the homes
Compare different generic systems	Compare specific combinations of components that we are considering
Provide rough estimates of energy savings from upgrades	Provide actual energy savings from upgrades
Provide rough estimates of life cycle costs and payback periods for upgrades	Provide actual installation costs
	Provide a real basis for estimating maintenance costs
	Provide life cycle costs and payback periods that we can be confident in
	Reveal installation issues specific to GHI homes
	Reveal issues related to operating and maintaining the new components
	Establish best practices for planning and implementing the Community Upgrade

# Pilot Program Phases and Timeline

- Phase 1: Collect baseline data for pilot homes (Fall 2010 – Fall 2011)
  - NAHB-RC conducted walkthroughs and energy audits for each pilot home.
  - NAHB-RC and NREL designed a monitoring program, purchased, and installed equipment for measuring each home's temperature, humidity, and energy use at frequent intervals.
  - During Phase 1, homes retain their current baseboard heaters and building envelopes so that we can establish a baseline from which to compare the upgrades.
- Phase 2: Install / test building envelope upgrades (Fall 2011 – Fall 2012)
  - Upgrades for all pilot homes expected to include air sealing, insulation, bathroom ventilation, Energy Star rated windows and doors, and crawlspace improvements.
  - For insulation upgrades in the block homes, two alternative forms of exterior siding will be tested. For insulation upgrades in the frame homes, existing exterior siding will be replaced.
  - In conjunction with the interior upgrades, waste water piping in the frame homes will be replaced.
  - During Phase 2, the baseboard heaters remain in place, so that we can see the difference in energy use and member comfort that the building envelope upgrades make by themselves.
- Phase 3: Install / test heating system upgrades (Fall 2012 – Fall 2013)
  - Information from the data collected in Phase 2 will help us to determine the appropriate sizing for heating (and possibly cooling) systems to test in Phase 3.
  - Alternative systems will be tested to determine actual energy savings provided by the systems themselves (over and above the Phase 2 upgrades) and realistic payback periods for our homes.
- Recommendations for the Community Upgrade presented to the Membership (Fall 2013)

# Activities Leading Up to the Pilot Program

- Sustainable Design and Practices (SDP) Ad Hoc Committee recommended that critical building envelope upgrades become the Coop's responsibility. (2006)
- Greener Greenbelt Initiative (GGI) Charrette had a buildings focus group to examine ways of increasing comfort and lowering energy costs in GHI homes. (Fall 2007)
- Following the GGI Charrette, the GHI Board created the Buildings Committee. (2008)
- Buildings Committee survey of Members generated an enormous 43% response, and clearly revealed dissatisfaction with comfort in the homes. (2009)
- Upon recommendation of the Buildings Committee, GHI hired Ardently Green, a home energy consultant, to perform energy audits and analyze 6 homes using energy modeling. Their study resulted in estimates of energy savings, cost, and payback periods for several alternative combinations of upgrades. They recommended that GHI conduct a pilot program to test the model results. (2009)
- Buildings Committee interviewed potential partners to provide expert technical support for a pilot program through a grant from the U.S. Department of Energy under the "Building America Program", and with approval from the GHI Board, selected the National Association of Home Builders Research Center (NAHB-RC). (Spring 2010)
- NAHB-RC was awarded a 3-year grant from the U.S. Department of Energy to support GHI in its efforts to design an effective community-wide energy upgrade, by conducting the Pilot Program. (Summer 2010)

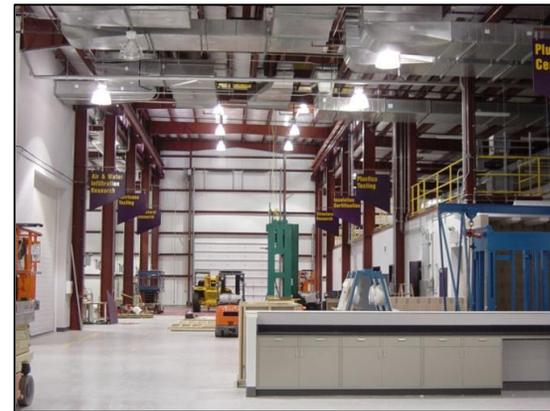
# Criteria Used to Select the Pilot Homes

- Included rows would have four units (since they are simpler and less expensive to test than longer rows).
- There would be 7 rows – 2 frame, 2 brick and 3 block, for a total of 28 units. The reason we wanted 3 block rows is because they have special wall insulation challenges and we want to test alternatives.
- All four units in each pilot row were to be occupied, with none for sale.
- All homes in the rows would have baseboard heating systems, since it is difficult to measure the benefits of new heating system alternatives if the homes have already had heating system upgrades.
- Each row would have between 0 and no more than 3 additions.
- Participating members were not be planning to move or be away for extended periods of time during the pilot period. Also, the number of persons living in the home would remain constant for the pilot's duration.
- All members in the row would agree to participate in the pilot program.

# Partnership with NAHBRC and NREL



The NAHB Research Center's mission is to promote innovation in housing technology to improve the quality, durability, affordability, and environmental performance of homes and home building products.



At NREL, we are working hard to get technologies into the market faster than ever. At the same time, we are continuing to help identify and break down the structural barriers that are preventing advanced energy technologies from being adopted quickly and easily.



# DOE's *Building America* Program

- Private/public partnership sponsored by U.S. Department of Energy (DOE)
- Research & development to find energy-efficient solutions for new and existing housing
- Develop technical pathways to improving the energy performance of homes
- Existing Homes Energy Performance Goal for 2011: 30% reduction in current energy use



### Whole-House Approach Benefits Builders, Buyers, and the Environment

**The Program**  
The U.S. Department of Energy's (DOE) Building America Program is reengineering new and existing American homes for energy efficiency, energy security, and affordability. Building America works with the residential building industry to develop and implement innovative building energy systems—innovations that save builders and homeowners millions of dollars in construction and energy costs. This industry-led, cost-shared partnership program has the following goals:

- ✓ Reduce average whole-house energy use by 30%–90% and reduce construction time and waste
- ✓ Improve indoor air quality and comfort
- ✓ Integrate clean onsite power systems leading to Zero Energy Homes
- ✓ Increase the energy efficiency of existing homes by 20%–30%.



**Building America Performance Goal**  
(Average Whole-House Energy Savings)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

**MORE EFFICIENT** →

Typical Local Construction

Building America New Housing Energy Efficiency Goal

02719001

*A multi-year goal of Building America is to reduce energy use by an average of 30%–90% compared to typical local construction. By 2016, production-ready systems will be developed that increase efficiency by 40% and that add an additional 10% in energy savings through the use of onsite power systems.*



Warren Grid, NREL/P008743

Prefabricated wall panels over assembly at the Meadow View community in Longmont, Colorado. McGraw Enterprises is the builder partner (IBACOS).



www.iaqvi.com/ibacos

U.S. Department of Energy  
Energy Efficiency and Renewable Energy  
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

**Building Technologies Program**

# *Building America* Integration



- Remodel/construct “high performance homes” that are
  - Energy efficient
  - Durable
  - Comfortable
  - Healthy to live in
- Design/implement energy efficient solutions
- Work through implementation issues
  - Technical product/system designs
  - Details
  - Process (quality management)
- Conduct simulations/analyses
- Determine most cost-effective retrofits

# NAHBRC/NREL Support to the GHI Pilot Program

- Assess the current state of energy, durability and indoor environmental performance
  - Walkthrough
  - Homeowner questionnaire
  - Measurements
- Monitor the actual energy use over project phases
  - Indoor temperature and relative humidity
  - Whole house and heating energy use
- Analyze options for improving performance
  - Technology investigation
  - Simulation analysis
  - Cost/performance analysis
- Participant support – THANK YOU!