

What does it Take to get Real Energy Efficiency?

- **Without making people sick.**
- **Without rotting down the building.**
- **While providing a high level of comfort.**
- **At reasonable cost.**

SystemVision Program

- Goal: To make every home built with public or charitable subsidy at least 30% more energy efficient than typical, code-built homes, while *improving*
 - Health & safety
 - Durability
 - Comfort
 - Environmental Impact

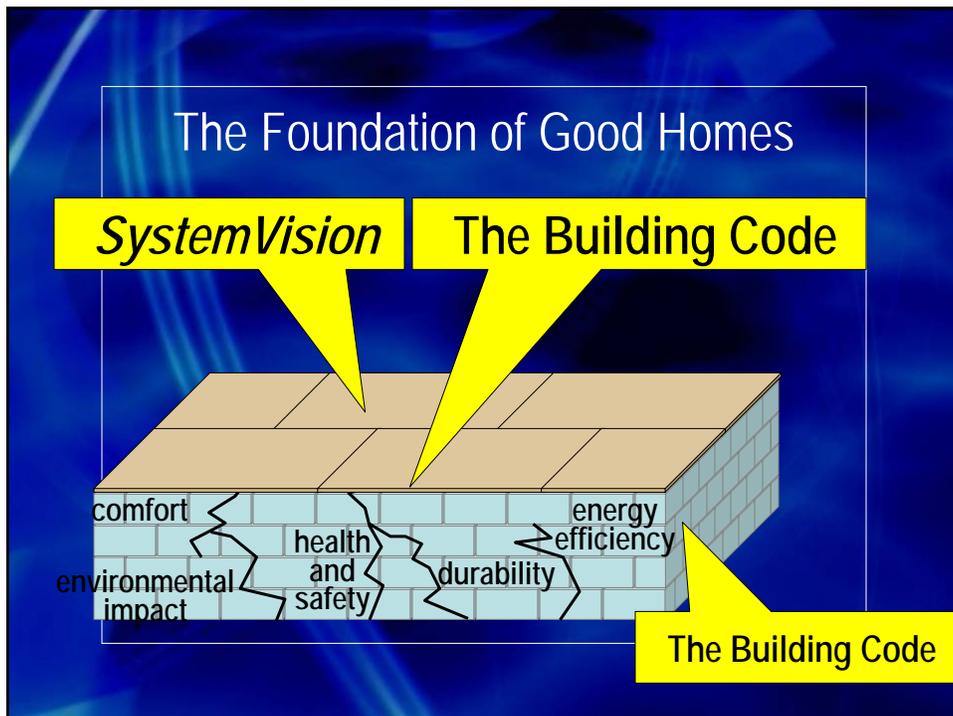
SystemVision Program

- **Not a demonstration project, but aimed at production.**
- **Not a “healthy homes” or “green building” program, but creating a new platform on which to build healthier and greener.**

Goals

- **Institutionalize change, not just demonstration projects**
- **Change processes, not just technology**
- **Develop Infrastructure**

“The Building Code defines the worst house allowed by law.”
-an anonymous architect



The Platform: Do 7 Things Right

- **Build it Tight**
- **Insulate it Right**
- **Size, design, and install HVAC right**
- **Ventilate it**
- **Pressure Balance the House**
- **Manage Moisture**
- **Use Combustion Devices Safely**

The SystemVision Platform for High Performance Homes

- **Energy Star, plus**
 - **Required Ventilation/Moisture Management**
 - **Pressure Balance**
 - **Combustion Safety**
 - **Energy & Comfort Guarantee**

Results to Date (9/1/2007)

- 1407 homes certified/guaranteed [currently 1 per day]
- 45 counties (out of 100)



66 Developers

- 34 Habitat Affiliates
- 16 Community Development Corporations
- 4 Local Governments
- 5 Public Housing Authorities
- 7 Other Nonprofits



Funding

- Initial investment from NC Community Development Initiative
- Ongoing Funding from NC Housing Finance Agency [Home \$]

Multifamily: HUD-Funded Feasibility Study

- Supportive Housing Project in Downtown Durham
- Now, all HFA-funded Supportive Housing



Raleigh: Chavis Heights Hope VI



- First Affordable Multi-family Energy Star Community in NC
- About 175 Units



7 Steps to High Performance Housing

- **Specific Standards, supported with clear specs and scopes.**
- **Design Review**
- **Contractor & Subcontractor Training**
- **On-site Quality Assurance**
- **Performance Testing**
- **Occupant Education**
- **Feedback Mechanism (Bill Guarantee)**

Step 1: Specific Standards Example

- **Each bathroom must have a 50 cfm exhaust fan.**

Vs.

- **Each bathroom must have an exhaust fan that, as installed, moves at least 50 cfm out of the bathroom and terminates on the exterior of the building**

Step 2: Design Review

- **Some architects/designers know this stuff—most don't**
- **Few can do energy modeling**
- **All believe they know how to design for energy efficiency**
- **Specs are often internally inconsistent and lacking necessary detail**

Step 3: Develop Infrastructure

- **31 General Contractors Trained**
- **18 Insulation Contractors Trained**
- **43 Heating/Air Conditioning Contractors Trained**
- **7 Building Performance Contractors Trained**
- **Training follow-up with in-field qc**

Step 4: On-site Quality Control





MISTAKE PROOFING VERIFICATION

FRAMING INSTALLATION Critical Details

Items in **bold** are a requirement of the ENERGY STAR Homes Northwest Program

		GOOD	BAD
PRE-CHECK	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Work site is clean and all safety precautions are taken prior to beginning work		
	* Installer's Signature _____		
	Date _____		
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Bottom plates of all exterior walls and party/common walls (ALL floors), and vertical members at foundation step downs are caulked, gasketed, or glued		
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
There is both a top and bottom plate installed at every knee wall			
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
All knee walls are backed with a rigid material (e.g. wall to attic, skylight shaft, wall to porch roof, staircase to attic)			
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
All dropped ceilings/soffits are capped with a rigid material on the attic side and/or the exterior wall			
5	All shafts/chases are capped		
10	Double wall conditions are backed with rigid material on the exterior side of the interior wall, or are entirely filled with insulation		
11	Work site is clean after work is complete		
Installer Signature _____		print name	signature
Date _____			
Verifier Signature _____		print name	signature
Date _____			
Builder Name _____		Builder's Job #: _____	
This Verification form should be signed and filled out by the Installer and/or Verifier. Signing this form certifies that all Critical Details are correct and are as designated.			

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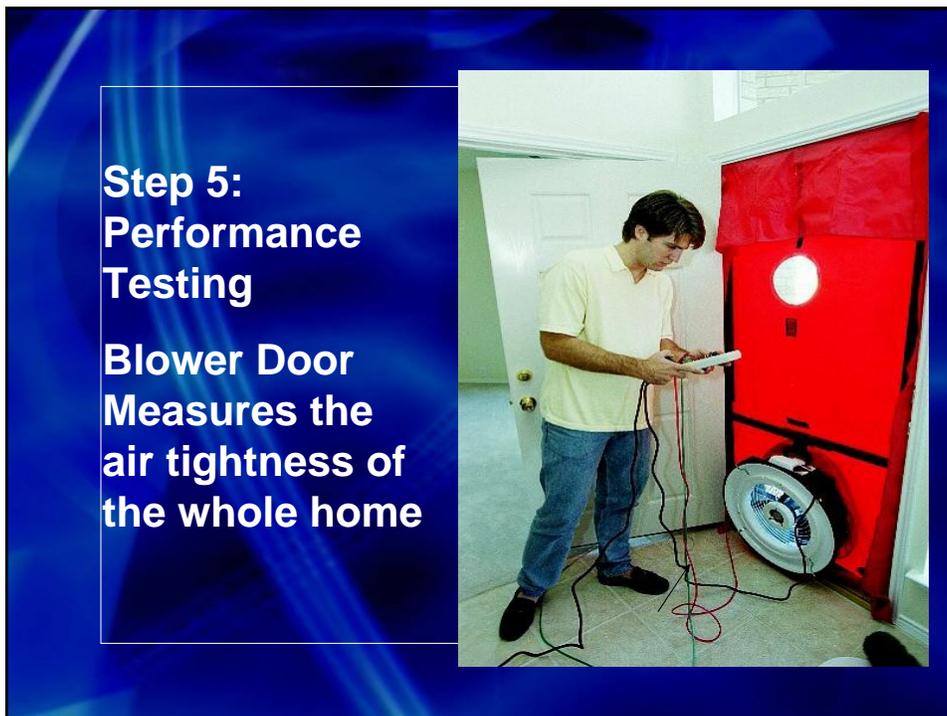


MISTAKE PROOFING VERIFICATION

NORTHWEST ENERGY STAR HOME

		FRAMING INSTALLATION Critical Details		GOOD	BAD	
		Items in bold are a requirement of the ENERGY STAR Homes Northwest Program		✓	✗	
PRE-CHECK	1	Work site is clean and all safety precautions are taken prior to beginning work				
	*	Installer's Signature	Date			
SELF-CHECK	1	Bottom plates of all exterior walls and party/common walls (ALL floors), and vertical members at foundation step downs are caulked, gasketed, or glued				
	2	There is both a top and bottom plate installed at every knee wall				
	3	All knee walls are backed with a rigid material (e.g. wall to attic, skylight shaft, wall to porch roof, staircase to attic)				
	4	All dropped ceilings/soffits are capped with a rigid material on the attic side and/or the exterior wall				
	5	All shafts/chases are capped				
	6	Insulation is installed behind showers, tubs, and fireplaces on exterior, attic, and party walls and rigid sheathing or other supporting material is installed to hold insulation in place				
	7	All floor system cavities between conditioned areas and unconditioned areas (e.g. floor/garages, bonus rooms/attic, cantilevers, porch/floor) are separated by blocking and air sealed				
	8	Overhanging floor cavities are insulated before being enclosed with rigid sheathing. Sheathing is attached to the underside of the cantilever. This can be the exterior finish material if it is continuous and air sealed.				
	9	Gypsum shaft-walls (e.g., common wall, area separation wall) are capped, closed, or sealed at all exterior boundaries (i.e. top and sides) (MULTIFAMILY ONLY)				
	10	Double wall conditions are backed with rigid material on the exterior side of the interior wall, or are entirely filled with insulation.				
	11	Work site is clean after work is complete				
Installer Signature		print name	signature	Date		
Verifier Signature		print name	signature	Date		
Builder Name		Builder's Job #:				
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Duct Blaster

Measures the air tightness of the duct system



Testing Exhaust Fan Flow



Testing Exhaust Fan Flow



Step 6: Occupant Education

- Thermostat Issues
- Doors & Windows
- Covering registers
- System Maintenance/Filters

Step 7: Feedback Mechanism



Energy Savings

- About 30% of Heating & Cooling
- About 15% of total
- Very similar to EPA Phoenix Study:
 - Energy Star = significant improvement
 - Energy Star + Guarantee = even more improvement
- Similar model to Masco's *Environments for Living* program [over 130,000 homes guaranteed] and Tucson Electric Power's guarantee program [over 5,000 homes].

Focus on Processes

- Design Process includes technical review/energy modeling
- Construction Process includes
 - Contractor/Subcontractor Training
 - On-site Quality Control
 - Performance testing/commissioning
- Marketing Process includes Heating/Cooling Bill Guarantee and Comfort Guarantee

Benefits to Communities

- **Reduction in fossil fuel emissions**
- **Job creation, since most of the extra cost to meet our standards is in labor, not material. (Rough estimate: 1 FTE per 50 homes)**
- **Possible Health Benefits**

Health Issues

- **Tighter house =**
 - **Increased moisture potential**
 - **Increased potential of backdrafting, combustion gas spillage, and flame roll-out**

**A Change in 1 Part of the System
May Have Unintended Results
Elsewhere**



**Barriers to Replication in Other
States**



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