Above Code Building Programs

What Makes them Work,
Residential Programs

Introduction

- Eric Makela
- Michelle Britt
Keys to an Effective Above Code Program

- Stakeholders involvement in the decision making process,
- Established goals
- Implementation, integration and staffing,
- Incentives, and
- Communication, Partnerships, and Education.

Stakeholder Involvement in the Decision Making Process
Green Building Task Force

Established in December of 2007 with members from the residential and commercial sectors:

- American Institute of Architects
- North Texas Homebuilder's Association
- The Real Estate Council
- QUOIN
- Hispanic Contractor's Association
- US Green Building Council - North Texas Chapter
- Dallas Independent School District
- Urban Forest Advisory Committee
- Other Industry & Business leaders, and
- City Staff

Developed recommendations for:
- Components of the green building program
- Implementation steps
- Training and education programs for the building industry

www.dallascityhall.com
Goals

Eagle County, Colorado:
The intent of the EcoBuild program is to encourage cost-effective sustainable building methods to create durable, energy efficient structures that conserve natural resources, promote the efficient use of building materials, and improve indoor air quality.

A Quantifiable, Agreed Upon Goal

Green Building Task Force

Summary

The Task Force recommends a two-phase implementation strategy for the Green Building program requirements for all private developments in Dallas.

Phase 1, which will start on October 1, 2009, focuses on energy efficiency and water conservation requirements for all residential and commercial developments.

Phase 2, which will start on October 1, 2011, focuses on expanding the initiatives for new buildings into a comprehensive green building standard requirement.

Within each Phase, the Task Force outlines a proposed implementation plan for each.
A Quantifiable, Agreed Upon Goal

Envisioned Future

“Dallas is Carbon Neutral by 2030 and is the Greenest City in the US”

Program Goal
To improve air quality, reduce water use and improve transportation and land use through green building strategies

First Milestone
From the US Mayors Climate Protection Agreement, achieve a 7% reduction in greenhouse gas emissions from 1990 levels by 2012

Implementation, Integration and Staffing,
## Scottsdale

**Green Home Rating Checklist**

**New Construction, Major Remodels & Additions**

**September 2005 Release**

<table>
<thead>
<tr>
<th>Entry Level</th>
<th>Advanced Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Make all mandatory measures and adjust rating for house size (p. 2 – 7).</td>
<td>- Make all mandatory measures and adjust rating for house size (p. 2 – 7).</td>
</tr>
<tr>
<td>- Accumulate 50 - 99 points from the rating checklist (p. 8 – 29).</td>
<td>- Accumulate 100 or more points from the rating checklist (p. 8 – 29).</td>
</tr>
</tbody>
</table>

### Summary of Rating Categories

1. **Site**
   - Electrical Power, Lighting, Appliances
   - Exterior Elements
   - Plumbing System
   - Heating
   - Roofing
   - Roofing Performance
   - Structural Integrity
   - Interior Finishes
   - Heating, Ventilation, & Air Conditioning
   - Interior Windows

### Category **Mandatory Measures**

1. **Site**
   - Protect all exterior entrances from direct summer sun exposure (east, west, south) with canopies or overhanging elements.
   - The use of shading strategies in these areas will reduce heat island effect and maintain a cooler transition between ceiling and outside (e.g., overhangs, shade, sunshades, tree). For overhanging elements, see Scottsdale shade sizing table.

2. **Energy Rating Performance**
   - Building designed to be at least 15% above IECC (International Energy Conservation Code) or obtain Energy Star for Homes certification.
   - An Energy Performance Analysis is a part of the design process that combines energy consumption with both the interior and exterior, ensuring buildings that are economically more energy efficient by design perspective. The analysis also provides a detailed plan for construction, therefore allowing any elements that will improve energy efficiency to be understood.

3. **Thermal Envelope**
   - Building has a continuous thermal barrier, which is clearly indicated on drawings, indicating locations to facilitate proper insulation. Air and thermal barrier must align and be continuous.

4. **Water Use Efficiency**
   - All plumbing fixtures and appliances shall meet or exceed ASHRAE 180-2001 requirements for water use efficiency.

5. **Material Selection**
   - All building materials, materials, and equipment must be installed per code and manufacturer's instructions.

6. **Innovative Design**
   - Innovative design features shall be considered in the design process to provide energy efficiency and comfort.

### Verification

- Interior Windows
- Interior Finishes
- Roofing
- Exterior Elements
- Electrical Power, Lighting, Appliances
- Plumbing System
- Heating
- Roofing
- Roofing Performance
- Structural Integrity
- Exterior Elements
- Electrical Power, Lighting, Appliances
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- Roofing Performance
- Structural Integrity
- Interior Finishes
- Heating, Ventilation, & Air Conditioning

*Rev. 3/10/07*
Implementation – No Integration

The Above Code Project
Gets VIP Treatment

Implementation – Integrated

The benefits of integration are significant:
- Cross training of personnel
- Balancing the work load
- Streamline the process for both staff and applicants, and
- “Normalizing” the better building practices.
Implementation – Integrated Problems? A Solution

Incentives

- Time
- Money
- Marketing
- Education
Time

Fast Track Plan Review

- Chandler, AZ
- Pima County, AZ
- Scottsdale, AZ and
- Albuquerque, NM.

Money

Financial Incentives…and Disincentives

- Chandler, AZ
- Eagle County, CO
- Seattle, WA
Education

Marketing

Meeting the requirements of the Scottsdale Green Building Program, Desert Sky Development uses the "Integra Wall System" in this Scottsdale mountain home. Desert Sky Development offers their custom home clients the choice of masonry or traditional wood framed construction.

Courtesy Mike Frat Real Estate, Scottsdale
Communication, Partnerships, and Education

Courtesy City of Seattle

Communication
Voluntary or Mandatory?

Approximately half of the above code programs in the SWEEP region are mandatory.
The USGBC definition of Green Design:

- To significantly reduce or eliminate the negative impact of buildings on the environment and on the building occupants, green building design and construction practices address: sustainable site planning, safeguarding water and water efficiency, energy efficiency, conservation of materials and resources, and indoor environmental quality.

From the City of Seattle:

**Definition of Sustainable Building**

Sustainable (green) building is an integrated framework of design, construction, operations and demolition practices that encompasses the environmental, economic, and social impacts of the built environment. Green building practices recognize the interdependence of the natural and built environments, and balance social and human needs with conservation, integrating the “three P’s” of sustainability—People, Planet, and Prosperity.

Residential Programs

- Reduce Carbon Emissions through
  - Community Energy Conservation
  - Building Energy Conservation
  - Waste Reduction
Program Elements

- Building Size
- Site Selection
- Landscaping
- Water Conservation
- Energy Conservation
- Materials and Resources
- Indoor Environmental Quality
- Operation, Maintenance and Owner Education

Layout of the Program

City of Scottsdale
Green Home Rating Checklist
New Construction, Major Remodels & Additions
September 2006 Release

Plan Check #
Building Permit #
GB Total Points

Project or Owner's Name -
Project Address -
Designer Name -
Builder Name -

Use this rating worksheet to qualify projects under the Green Building Program for new, and major remodels of existing homes, and additions. Projects that can be qualified for more than three stories is eligible with a separate means of access (minimum of 2nd floor). (IBC Section R701.2)

All building system components, materials, and equipment must be installed per code and manufacturer's instructions.

<table>
<thead>
<tr>
<th>Entry Level</th>
<th>Advanced Level</th>
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<tbody>
<tr>
<td>1. Site</td>
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</tr>
<tr>
<td>2. Structural Elements</td>
<td>2. Structural Elements</td>
</tr>
<tr>
<td>5. Thermal Envelope</td>
<td>5. Thermal Envelope</td>
</tr>
<tr>
<td>6. Interior Finishes</td>
<td>6. Interior Finishes</td>
</tr>
<tr>
<td>8. Interior Finish</td>
<td>8. Interior Finish</td>
</tr>
<tr>
<td>15. Foundation</td>
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</tr>
</tbody>
</table>

Summary of Rating Categories

1. Site
2. Structural Elements
3. Electrical, Fueling, Lighting, Appliances
4. Energy Efficiency
5. Thermal Envelope
6. Interior Finishes
7. Heating, Ventilation, & Air Conditioning
8. Interior Finish
9. Innovative Design
10. Hero Products
11. Hero Doors, Windows
12. Plumbing
13. Wood
14. Exterior Finish
15. Foundation
16. Innovative Design
Program Element – Building Size

Buckeye, Arizona: House size adjusts overall points required
- Establishes 3000-3500 ft² residence as point neutral
- Dwellings under 3000 ft² of conditioned space earn one point for every 100 ft² under 3000 ft²
- Dwellings over 3500 ft² of conditioned space lose one point for every 250 ft² over 3500 ft²
Program Element – Building Size, General Impact

Reno, Nevada: House size adjusts overall points required
- House size adjusts points balance, establishes 2501-4000 ft² as point neutral
- $\leq 1000$ ft² earns 15 pts
- $\leq 1500$ ft² earns 12 pts
- $\leq 2000$ ft² earns 9 pts
- $\leq 2500$ ft² earns 1 pts
- $> 4000$ ft² – every 100 ft² requires 1 additional point in the site design and development, and optional points

<table>
<thead>
<tr>
<th>Size</th>
<th>Site</th>
<th>Lndscp</th>
<th>Water</th>
<th>Energy</th>
<th>MatRes</th>
<th>EQ</th>
<th>OM</th>
</tr>
</thead>
</table>

Program Element – Building Size

Boulder, County: House size adjusts minimum energy efficiency
- New Construction
  - $<1000$ ft²  HERS index of 85
  - 1001-3000 ft²  HERS index of 60
  - 3001-4000 ft²  HERS index of 40
  - 4001-5000 ft²  HERS index of 25

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</tr>
</thead>
</table>
Size Matters, A lot

Size Matter, A lot

Size Site Lndscp Water Energy MatRes EQ OM

Size Site Lndscp Water Energy MatRes EQ OM
## Site Selection

- Options include
  - Avoid environmentally sensitive areas
  - Select infill site
  - Select greyfield site
  - Select brownfield site
  - Select site with access to public transportation and bike paths

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## Site Development and Landscaping

From Buckeye, AZ - Both Mandatory Requirements and Options to Select

- Mandatory
  - Protect east, west and southern entrances from southern sun
  - 80% landscaping is xeriscaping

- Options include
  - Permeable hardscape
  - Solar orientation
  - Shaded outdoor living area
Site Selection and Landscaping

- Pima County, Arizona adds other options:
  - Location: outside conservation land, Infill development, access to public transportation and services, within LEED ND or Enterprise Green Community
  - Exceeding open space requirement
  - Maximizing density
  - Minimizing lot disturbance, retain topsoil
  - Minimizing heat island effect
  - Native and low-water plant selections
  - Non-toxic fertilizers and pest management plans

Site Selection and Landscaping

Nearby Eagle County adds other options:

- Residential option include
  - Minimize area of impact
  - Reuse fill
  - Reduce irrigated turf, use drip where appropriate
  - Water efficient landscaping
  - Deciduous trees shading
Water Conservation

- Options include
  - Offset new water use in the city
  - Building water use reduction – plumbing, appliances, and fixtures
  - Use water efficient, native, and regionally appropriate landscaping
  - High-efficiency automatic irrigation
  - Rainwater channeling and/or harvesting
  - Wastewater technology

Water Conservation - Indoors

- National Program, or Home Grown?
Energy Conservation – Building Structure

- Percent above the IECC
- Energy Star
- HERS Index

Energy Conservation – Building Structure

- Benefits and Limitations of Specifying Compliance as a Percent above the IECC

Size | Site | Lndscp | Water | Energy | MatRes | EQ | OM

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Size | Site | Lndscp | Water | Energy | MatRes | EQ | OM
Energy Conservation – Building Structure

- Benefits of a HERS Index
  - Comprehensive
  - Verifiable
  - Flexible by House Size
  - Tied to the IECC

HERS Index – Adjust for house size
HERS Index – Energy Star

Boulder County, Co

- <1000 ft² HERS index of 85
- 1001-3000 ft² HERS index of 60
- 3001-4000 ft² HERS index of 40
- 4001-5000 ft² HERS index of 25
- >5001 ft² HERS index of <10

Required HERS Index, Adjusted for Size

- Reasonable Goal, or Pie in the Sky?
Albuquerque, NM – Two Programs

- Mandatory Energy Conservation Code
- Voluntary Green Path

Compliance with the 2006 IECC with the following amendments:
- Cool roofs required
- Low-E required on North, East and West facing fenestration
- R-19 required in walls
- R-21 required in raised floors
- Reduced slab-edge insulation to R-5 for unheated slabs but requires R-10 insulation to be installed under heated slab
- Minimum 90% gas furnace efficiency
- Minimum 15 SEER A/C efficiency
- Minimum 8.2 HSPF Heat Pump efficiency
- Ventilating fans required to be Energy Star Labeled
- HVAC piping to be insulated to an R-4 ≤ 2" and R-6 > 2" in diameter
- Limits use of electric resistant space and water heat
- Increases EF requirement for water heating from current NAECA minimum
- Energy Star labeled light fixtures for 70% of interior lighting
- Energy Star labeled appliances when provided.
- Thermal By-pass Checklist required
Albuquerque, NM – Based on LEED

- Voluntary
  - Achieve Gold, or
  - Achieve Silver with 21.5 points in Energy, or
  - Build Green New Mexico Gold

Materials and Resources.

- Reduce
- Reuse
- Recycle
### Section 2: Resource Efficiency

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Points Available</th>
<th>Points Earned</th>
<th>Verification Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Use of low V.O.C. adhesives, paints and interior finishes</td>
<td>3</td>
<td>3</td>
<td>Manufacturer's spec sheet or third party testing program</td>
</tr>
<tr>
<td>2.2 Use of low V.O.C. adhesives, paints and interior finishes</td>
<td>3</td>
<td>3</td>
<td>Manufacturer's spec sheet or third party testing program</td>
</tr>
<tr>
<td>2.3 Use of low V.O.C. adhesives, paints and interior finishes</td>
<td>3</td>
<td>3</td>
<td>Manufacturer's spec sheet or third party testing program</td>
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### Section 5: Indoor Environmental Quality

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Points</th>
<th>How to Verify</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.1</td>
<td>Install sealed combustion appliance or space and water heaters</td>
<td>5</td>
<td>Builder spec sheet</td>
</tr>
<tr>
<td>5.1.2</td>
<td>Install fuel-fired mechanical-draft combustion equipment for space and water heating</td>
<td>4</td>
<td>Builder spec sheet</td>
</tr>
<tr>
<td>5.1.3</td>
<td>Closed vent liquid fuel appliances for space and water heating</td>
<td>2</td>
<td>Builder spec sheet</td>
</tr>
<tr>
<td>5.1.4</td>
<td>Install electric water heater, sealed combustion gas furnace, sealed wood stove, or sealed wood stove, or</td>
<td>6</td>
<td>Builder spec sheet</td>
</tr>
<tr>
<td>5.1.5</td>
<td>Use non-V.O.C. products containing formaldehyde or its derivatives, or</td>
<td>6</td>
<td>Builder spec sheet</td>
</tr>
<tr>
<td>5.1.6</td>
<td>Detached garage</td>
<td>4</td>
<td>Plans</td>
</tr>
<tr>
<td>5.1.7</td>
<td>Ensure that the garage area and living area provide continuous exhaust</td>
<td>4</td>
<td>Builder spec sheet</td>
</tr>
<tr>
<td>5.1.8</td>
<td>Ensure that the garage area and living area provide continuous exhaust</td>
<td>8</td>
<td>Manufacturer's spec sheet or third party testing program</td>
</tr>
<tr>
<td>5.1.9</td>
<td>Use non-V.O.C. materials for water supply lines</td>
<td>8</td>
<td>Specifications</td>
</tr>
<tr>
<td>5.1.10</td>
<td>Use non-V.O.C. materials for water supply lines</td>
<td>8</td>
<td>Specifications</td>
</tr>
<tr>
<td>5.1.11</td>
<td>Use non-V.O.C. adhesives for water supply lines</td>
<td>8</td>
<td>Specifications</td>
</tr>
<tr>
<td>5.1.12</td>
<td>Use non-V.O.C. adhesives for water supply lines</td>
<td>8</td>
<td>Specifications</td>
</tr>
</tbody>
</table>

### Indoor Air Quality – Minimize Pollutants
### Indoor Air Quality – Manage Potential Pollutants

<table>
<thead>
<tr>
<th>Size</th>
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</table>

#### 6.2 Manage potential pollutants generated in the home

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PTS</th>
<th>HOW TO VERIFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2.1 Vent kitchen range hood to the outside with a damper.</td>
<td>7</td>
<td>Consult spec sheet.</td>
</tr>
<tr>
<td>6.2.2 Provide mechanical ventilation at a rate of 7.5 cfm per person + 7.5 cfm and controlled automatically or continuously with manual means or for ASHRAE 62.2. The ventilation equipment may be points also available in section 3.2.4 for HRV and ERV.</td>
<td>7</td>
<td>Consult spec sheet.</td>
</tr>
<tr>
<td>A. Exhaust or supply fans, or</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>B. Balanced exhaust and supply fans, or</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>C. When installing forced air systems, install a HRV or HRV with ERV in the attic.</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>6.2.3 Install ERV filters on central air or ventilation systems. Filters must be easily accessible to homeowners.</td>
<td>6</td>
<td>Specifications and ERV filters.</td>
</tr>
<tr>
<td>6.2.4 Install HRV filters on central air or ventilation systems. Filters must be easily accessible to homeowners.</td>
<td>6</td>
<td>Show access to plans and installation certified by builder.</td>
</tr>
<tr>
<td>6.2.5 Install hard-wire to control whole-house humidification system.</td>
<td>4</td>
<td>Builder certified.</td>
</tr>
<tr>
<td>6.2.6 Install radon risk assessment system or infrastructure to facilitate future mitigation of radon mitigation system. The more stringent requirement between a local building code and this provision shall apply.</td>
<td>6</td>
<td>Builder spec sheet.</td>
</tr>
<tr>
<td>6.2.7 Verify all exhaust fans meet design specifications after installation.</td>
<td>9</td>
<td>Host party test report.</td>
</tr>
</tbody>
</table>

#### 6.3 Moisture management (air, rainwater, plumbing)

<table>
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<tr>
<th>ITEM</th>
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<th>HOW TO VERIFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.1 Central bathroom exhaust fan with a timer, humidity or moisture sensor.</td>
<td>6</td>
<td>Consult spec sheet.</td>
</tr>
<tr>
<td>6.3.2 Install vapor barrier directly under slab (6 mil) or on crawl space floor (8 mil). In crawl spaces, extend poly sheet wall and after with plenum and framing, or dewater proof wall below grade. Joists tapered 2%.</td>
<td>8</td>
<td>Consult spec sheet.</td>
</tr>
<tr>
<td>6.3.3 Protect unused moisture sensitive materials from water damage through jute in-time delivery, during construction.</td>
<td>6</td>
<td>Builder's material management protocol or plan.</td>
</tr>
<tr>
<td>6.3.4 Keep plumbing supply lines out of reinforced walls enclosing these slabs.</td>
<td>6</td>
<td>Plumbing Plan.</td>
</tr>
<tr>
<td>6.3.5 Use permeable epoxies over concrete. Use vapor barrier or other coating that completely prevents condensation.</td>
<td>4</td>
<td>Builder's specs.</td>
</tr>
</tbody>
</table>

### Owners Manual

1.6 Owner's Manual

What good are energy efficient appliances and good windows if you don’t know how to operate them? An Owner’s Manual can consist of a simple binder with the operation instructions, for all major systems installed in the house. For examples of Owner’s Manuals, please contact the High Country Conservation Center at (970) 868-5703.

An owner’s manual, which includes the operation instructions of all mechanical systems and energy saving systems installed in the home, shall be provided to the homeowners. Many mechanical systems require professional service and this should be indicated in the owner’s manual. *Not required for Multi-Family*.

**Compliance:** Expected  (Final)
The Next Frontier – Existing Home Ratings

Questions?