City Council
November 10, 2008
Proposed Building Code Changes

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Building Regulations and Climate Action Plan Goals

- Building greenhouse gas reductions are needed to meet CAP goals.
- Buildings account for more than 3/4 of Boulder's greenhouse gas emissions
- U.S. buildings produce more CO2 emissions than any other country except China.

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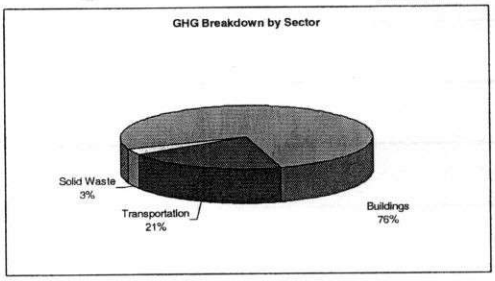
Greenhouse Gas Breakdown



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Aligning Building Regulations and CAP Goals

Progress to Date:

- Residential Green Building and Green Points implemented February of 2008.
- Energy efficiency improvement of 30 to 75% for new residential construction.
- Interest developed for commercial above-code energy efficiency program.

Proposed Code Update Goals

- **Commercial energy efficiency increases of 30%.**
- **Require energy efficiency modeling for large-scale commercial projects.**
- **Improved energy efficiency for residential additions/remodels.**
- **Residential addition threshold for new construction energy efficiency.**

Commercial Energy Efficiency Proposals

IECC Amendments

Proposed Commercial Energy Efficiency Amendments

- 30% more energy efficient than the 2006 IECC.
- Energy efficiency modeling for buildings larger than 20,000 square feet.
- Distribution of requirements for core and shell buildings.
- Applies to affected areas of remodeled buildings and systems.

Above-Code Energy Efficiency Costs

- The average cost is between 2 to 4%.
- Smaller building costs likely higher…up to 10%.
- Costs diminish as experience is gained.

Residential Energy Efficiency Proposals

Terminology

- Green Building and Green Points (GBGP)
- Home Energy Rating System (HERS)
- International Energy Conservation Code (IECC)

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Residential Energy Efficiency Proposals

- Improved energy efficiency requirements for additions/remodels.
- New construction energy efficiency requirements based on size of addition/remodel.
- Air Sealing verified through testing.

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Residential Addition/Remodel Energy Efficiency Compliance Methods

- Total area must be considered and two compliance methods are available:
  - HERS Method
  - IECC Method

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New and Addition/Remodel Construction Comparison

Area in Square Feet	New Construction	Addition/Remodel HERS Method	Addition/Remodel IECC Method
Up to 3,000	70 HERS	100 HERS	15% above
3,001 to 5000	60 HERS	85 HERS	30% above
5,001 and greater	35 HERS	70 HERS	50% above

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HERS Example

- A 1500 s.f. house proposes an addition of 1200 s.f.
- Total area is less than 3,000 s.f.
- A HERS of 100 is required. Air leakage is accounted for in the HERS program.

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IECC Example

- 1,500 s.f. existing house with a 1,200 s.f. addition.
- ResCheck shows energy efficiency of just the addition 15 percent above code.
- Air leakage rates verified at project completion.

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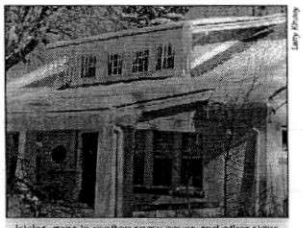
Importance of Air Sealing



Icicles, gaps in rooftop snow cover, and other signs of heat leakage are useful indicators that help home energy professionals improve the energy efficiency of existing homes.

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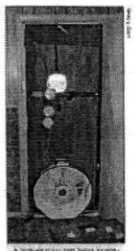
IECC Air Sealing Requirements

Natural Air Change per Hour (NACH) between 0.5 and 1 attain 0.5 NACH.

NACH rate >1 then improve by 50 %.



A blower door test helps energy professionals assess and improve a home's energy performance.

Addition/Remodel New Construction Thresholds

Total Proposed Conditioned Floor Area:	New construction threshold (percentage of existing area)
500 to 3,000 s.f.	100 %
3,001 to 5,000 s.f.	50 %
5,001 s.f. and up	25 %

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Addition Examples

Tier	Addition Category	New Construction
Up to 3,000	1,500 existing 1,500 addition 3,000 total	1,500 existing 1,800 addition 3,300 total
3,001 to 5,000	2,400 existing 1,200 addition 3,600 total	2,400 existing 2,000 addition 4,400 total
5,001 and up	4,800 existing 1,200 addition 6,000 total	4,800 existing 1,500 addition 6,300 total

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Cost Example

- The 2007 Energy Home Makeover in Boulder:
  - Total cost per square foot: $30/s.f.
  - Improvements to thermal envelope $19/s.f.
    - Without windows $4/s.f.

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Additional Code Changes

- 2006 IBC Modifications
- 2008 NEC Adoption and Modifications

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2006 IBC Administrative Changes and Electrical Code Adoption

- IBC Section 105 Plan Review & Permit Expirations.
- NEC adoption notable changes include:
  - Ground fault protection commercial kitchens & outdoors
  - Arc-fault protection all residential receptacles
  - Conductor de-rating on roofs
  - Tamper-proof residential receptacles

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Board and Public Feedback

- Environmental Advisory Board
- Landmarks and Planning Boards
- Residential and Commercial public meetings
- Boulder Green Building Guild
- Architects and Planners of Boulder
- Planning and Development Services Advisors

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Changes in Response to Public Feedback

- Multi-family projects may use ResCheck.
- Exception added for unaltered building shell.
- Additional air sealing criteria added.

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Proposed Changes at 2nd Reading

- Amend Ordinance 7621 (attachment B)
  - Clarification of new construction threshold language for addition/remodels.
  - Clarification of language describing air infiltration limits.

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Staff Recommendations

- Adopt ordinances for IBC and NEC with Jan. 5, 2009 effective date.
- Adopt the amended IECC ordinance with a March 2, 2009 effective date.
- Amend Ordinance 7621 as proposed with a planned effective date of March 2, 2009.

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Questions or Comments?

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