Solomon was a Bureaucrat:
Getting Results in the Public Sector

Beyond Code: A Workshop for Colorado’s Mountain Communities

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November 17, 2008
Beyond Code Programs:
Aspen

Context

• What we were up against – challenges in energy use and energy code development
• What we heard – flexibility, off-site mitigation and REMP - The Harvard Award
• What is the balance – buildings as a system. Efficient (Green) building program
• Why not simplify – losing the point system game. AP2030R the synthesis of energy and green
• Wrap it up- The public process, hearings and adoption
Energy Code Work

- IECC Code Development Committee 2000 – 2005
- Committee Chair for IECC 2006
WHY SOLOMON?

Solomon's reign was marked by a constant tension between two conflicting orientations: faithfulness to the God of Israel and fulfillment of the Judaic religious precepts, against pervasive foreign influences that penetrated the kingdom as a result of the obligations imposed by the grandiose nature of the kingdom.

From:
http://jeru.huji.ac.il/eb32s.htm
WHY BUREAUCRAT?

Today’s progressive builder and code administrator challenge is marked by a constant tension between two conflicting orientations: faithfulness to the low first cost goal of production building (HBA) today and “meeting our present needs without compromising the ability of future generations to meet theirs”* while enjoying the results of a healthy built environment.

From: *APECC Resource Guide
What we were up against:

- Nationwide median home is 2,434 square feet
- Aspen and Pitkin County average new home is 4,953 square feet
- 10% are greater than 10,000 square feet of conditioned space
Resort Towns and Development Pressure

• Small local population and big tourist capacity
• Second homeowners that spend limited time in homes – big homes
Hala Ranch

- 56,000 sq. ft.
- 95 acre site
- 15 bedrooms
- 27 bathrooms
- Heated hay barn
- Gas station
- Car wash
- Indoor swimming pool
- Steam room, hot tub, exercise room, racquetball court
- Sewage treatment plant
- Permanent staff of 16 – when owner is in town to more than 50
Citizens and Elected Officials

• 1990 – Citizens’ efforts resulted in a community non-profit being formed to look at more stringent energy code regulations.

  (Essentially in reaction to the 56,000 ft² house being built.)

• **1994** – Community Office for Resource Efficiency (CORE) was created out of the citizens’ efforts.

• **1995** – Elected officials directed the Building Department to regulate “hogs.” At the same time, local utilities offered clean wind power to customers.
Becoming “Progressive Builders”

- Aspen/Pitkin Energy Conservation Code
  Feb. 20, 1996: A result of two years of community effort to regulate energy consumption of a residence from “lot line to lot line” – including outdoor pools, spas and snowmelt systems
  - Prescriptive and trade-off compliance
  - Energy budget for outside uses
  - Education and certification programs
Before APECC
After Round #1
• **2000 and 2001** – REMP implementation seminars offered to builders, architects, and engineers.

• **2001** – REMP collected over $1 million in mitigation fees, $900,000 more than expected.

• **2003** – Two local electric utilities begin purchasing renewable energy.

Now, Holy Cross is ranked first among 930 rural cooperatives and Aspen Electric is ranked first in the nation’s 2000 municipal utilities for their wind share.
What We Heard

REMP

• Our program goes even a step further and requires on-site generation OR collects funds in proportion to energy use for off-site mitigation

• Creates funding for public projects, renewable energy on affordable housing...
The nation’s first energy code to require renewable energy for residential homes

“The stiffest carbon tax in the world.”
(Christian Science Monitor)
Realized Benefits

- Created locate business opportunities
- Lower energy bills in Affordable Housing and Public Buildings
- Five communities adopted similar programs
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Aspen Fire District
What is the Balance

A Lesson Learned

• Focused on energy use for 5 years
• Created potential problems with IAQ and moisture
• Some manifested, most did not
• This inspired the development of the Efficient Building Code
Beyond Code Programs: Aspen
Two Balanced Objectives

Energy conservation
Healthy buildings
Beyond Code Programs: Aspen

Builder’s Guide

“A systems approach to designing and building homes that are safe, healthy, durable, comfortable, energy efficient and environmentally responsible.”

Dr. Joseph Lstiburek
Efficient Building Program

- Primary focus on IAQ and construction materials
- Additional focus on resources, waste reduction, recycling and water use
- Point based – big size means big points
Carbondale’s story

- Early ‘90’s- “Down Valley Trash” formed; evolved into Environmental Board
- ‘95- Built Green program for CO
- ‘98- Roaring Fork Valley Green Building Checklist
- ‘99- RVR Green Checklist
’05- C’dale GHG Emissions Inventory

• “Where are we, and where we need to go?”
• Baseline established from ‘04 numbers
• Municipal 3% of total emissions; 73% of that from wastewater
• Time for a Plan
'06- Energy and Climate Protection Plan- Goals

• Reduce emissions from Town facilities operations by 25% by 2010 through energy efficiency and renewables.
• Reduce community-wide CO₂ emissions by 25% below our 2004 base year by 2012.
• Obtain at least 30% of our energy for heating & electricity from renewable sources by 2015.
Energy Plan Goals II

• Turn emissions reduction efforts into an **economic advantage** by reducing household, business, and local government energy bills; **keeping more money** currently spent on energy flowing **in the local economy**; and investing in existing jobs/creating new jobs tied to sustainable energy.

(80% of $1 spent on utilities leaves community)
Beyond Code Programs: Carbondale

Energy Plan Goals III

• Leverage community investments to obtain 25-50% of non-community funds or significant investment returns to create the new economic activity, through installations of renewable energy production on municipal facilities, homes and businesses.

• Develop a resource-efficient building ethic in Carbondale to serve as a model for other communities.
Energy Plan Methodology

• Lead (LEED?) by example
• Create programs/ remove barriers
• Increase local renewable energy supply
• Cultivate “green” jobs, businesses
• Change the rules!
‘07 Carbondale Efficient Building Program (CEBP)

Intent:

• Encourage cost-effective/ sustainable building methods
• Create durable, energy efficient structures
• Conserve natural resources
• Promote the efficient use of building materials
• Improve indoor air quality
CEBP Overview

• Detailed Design Requirements
• Point System and Checklist - Similar to Aspen/Pitkin Requirements
• Multiple Compliance Avenues
  – REScheck software
  – HERS Index 100 or less
    • Points for achieving HERS Index 80 and HERS Index 70
  – Prescriptive: IECC2003 Compliance
Beyond Code Programs:
Carbondale

CEBP Sections

1. Site/ Water Conservation
2. Recycling/ Reuse
3. Framing/ Materials
4. IAQ- Chemical; Mechanical Systems
5. Energy Compliance
6. Solar Energy- Site
7. Innovation
8. Alternative Points: Cash In-Lieu
9. On-site Renewable Energy And Exterior Use
Renewable and Efficiency Fund (REF)

- Cash-in-lieu option for up to 10% of required points
- Fees (per point) escalate as home size increases (approx. from $250 to $870 per point) - based on avg BTUs for 20 yrs
- Fund used for community efficiency and renewables projects
On-site Renewable Offsets

• **Building Size- Solar Electric required:**
  - 3,000 sf – 1kW
  - 5,000 sf – 2kW
  - 7,500 sf – 3kW
  - 10,000 sf – 4kW

• **Exterior Uses:**
  - 50% offset with on-site renewables required
Fee In-lieu-of Options for Renewables

• Building Size:
  
  3,000 sf = $3,000  
  5,000 sf = $7,500  
  7,500 sf = $13,500  
  10,000 sf = $20,000

• Exterior Uses:
  
  – Cap for fee-in-lieu: $100,000
  – 240,000 kBTU's max
  – Same as Snowmass
Outdoor Energy Use Exemptions

- Snowmelt – 200 sf
- Spa – 64 sf
- Summer Pool – 200 sf
- Winter Pool - N/A
- Heated Garage - N/A
- Pool Covers required
- Temp/Moisture Sensors req'd
Successes

• Easy to use
• Contractors accepting of checklist
• Proactive- early design review
• Inspection load manageable
• Easy to comply
“Good, but…”

- Too easy to comply?
  - plans coming in 15% better than code
  - C’dale REF empty

- Sqft issues- point scale, renewables
The Future..

• Emissions benchmark from 2008 data
  – What will it take to meet Energy Plan goals?
• Code upgrades in ’09
  – Steepen curve for efficiency, on-site mitigation?
  – (De)construction “waste” recycling
• Lighting Ord.- IDA recommendations
• Commercial code
Beyond Code Programs:
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AP
(Aspen Pitkin or Advanced Performance)
2030
Commercial
Residential
Why not Simplify AP2030 Codes

• Blend the energy and efficient building benefits of two programs into one
• Simplified requirements based on three building size tiers or occupancy type
• Balances both energy and “green” building requirements
• Is a mandatory requirement; no compliance no permit
Beyond Code Programs: Aspen

AP2030R

• Addresses building enclosure, IAQ, indoor water use, energy efficiency and renewable energy
• Recycling material waste? Land fill and Environmental Health
• Landscape and irrigation? Parks and Water Department
Results

• Better building enclosures
• More efficient heat sources
• More durable components in new construction
• More on-site renewable installations
Beyond Code Programs: Aspen
EnergyGuide
Gas Boiler
NY Thermal Inc.
Trinity

Compare the Energy Efficiency of this Boiler with Others Before You Buy.

This Model's Efficiency
92.7 AFUE

Energy Efficiency Grade of all Similar Models

Least Efficient
80

Most Efficient
90.6

The Energy Efficiency Rating of this model was not available at the time this guide was published.

The AFUE, Annual Fuel Utilization Efficiency, is a measure of energy efficiency for furnaces and boilers. Only boilers fueled by natural gas are used in this scale.

Natural gas boilers that have higher AFUEs are more energy efficient.

Federal law requires the seller or installer of this appliance to make available a fact sheet or directory giving further information about the efficiency and operating cost of this equipment.

Ask for this information.

THE WORKING VERSION OF AP2030R
Setting a New Standard

• First by example then through codes and policy
• In building technology
• In building technique
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Burlingame Ranch Affordable Housing

• Energy efficient city funded housing project
• Design 40% better than ResCheck (2004 IECC) – EStar score 55
• Score >240 points in EB Program
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**E-Star Home Energy Rating Certificate**

**Address:** 3004 Moly Court #202
**Aspen, CO 81611**

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### Energy Efficient

- **Star Rating:** 5 Stars Plus
- **HERS Index:** 52
- **Use:** Site Visit

### General Information

- **Conditioned Area:** 1807 sq. ft.
- **Conditioned Volume:** 9651 cubic ft.
- **Bedrooms:** 5

### Mechanical Systems

- **Heating:** Fuel fired hydronic distribution, Natural gas, 92.5% EFF.
- **Water Heating:** Integral, Natural gas, 85% EFF.
- **Duct Leakage to Outdoors:** NA
- **Ventilation:** Balanced, H/W, 60 cyts. 110 CFM.
- **Programmable Thermostat:** Yes

### Building Shell Features

- **Ceiling:** NA
- **Insulated Ceiling:** R-15
- **Above Grade Walls:** R-22 R-30
- **Foundation Walls:** 6.0
- **Slab:** R-4.0 Edge, R-15.0 Underslab

### Lights and Appliance Features

- **Percent High Efficiency CFL:** 100.0%
- **Refrigerator:** 4.97 cu. ft.
- **Database Energy Factor:** 0.82

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**Rating Number:** 121495-212-115
**Certified Energy Rate:** Mike Sorensen
**Rating Date:** 12/7/2006
**Rating Ordered For:** City of Aspen

**Estimated Annual Energy Cost**

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This home meets or exceeds the minimum criteria for all of the following:

- **EPA Energy Star Homes**
- **2003 International Energy Conservation Code**
- **2004 International Energy Conservation Code**

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**E-Star Colorado**
**RESNET Accredited Provider**
820 S. Monaco Pkwy #295
Denver, CO 80224
Phone: 303.492.2072
Fax: 303.517.4169

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The Home Energy Rating Standard Disclosure for this home is available from the rating provider.

**RE/MAX – Residential Energy Analysis and Rating Software v1.02**
Beyond Code Programs:
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Observations

• Correctly administered and enforced Codes produce measurable results
• Efficient building practices do not increase cost in smaller homes
• Mandatory programs create a workforce trained for a new energy economy
• Energy savings benefit local economies
Annual Energy Use

Average home
3000 sq.ft.

Monster home
10,000 sq.ft.

Monster home +++
10,000 sq.ft. with Cap on Maximum outside energy
Realized Benefits

• More than 450 homes with solar hot water (about $3,900,000)
• 400 grid-tied PV systems (about $7,200,000)
• Holy Cross Electric leads all rural electric utilities
• Aspen Electric 75% renewable – wind, hydro, PV
Wrap it up!

Taking the Pulse

• Is there a heightened community awareness about development impacts?

• Is there political will & staff buy-in?

If yes, then….
We Can Save You Time

• By consensus, establish standard energy consumption figures for snowmelt, pools and spas or air-conditioning or watering lawns or..
• Develop REMP to create off-site option for renewable energy mitigation
• Educate the City Council, County Commissioners and interested public about REMP
On Site Renewables

• Offer Options: Applicants can choose to produce renewable energy on-site with solar hot water, PV, efficient GSHP or the best option for your location.

• Incentives: On-site renewable energy is credited up to 300% of energy supplied.
How the energy and efficient building codes became acceptable and adopted

- Political will driven by citizen input
- Project champion - on building staff
- Worked with engineers and trades for reasonable and enforceable requirements
- Reviewed the code with developers
- Proactive community education
- Educated elected and appointed officials about changes
Requirements

• Need long term vision: Fiscal conservatives plan for an energy future (it’s an investment not an expense)
• Develop a philosophy about development impacts in your area
• Keep the public informed on the use of funds-implement high visibility projects
• Need political will & staff buy-in
Beyond Code Programs:
Aspen

For more information, contact:
www.aspenpitkin.com

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