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"Decoding the Code"
understanding the workings of Building Code for energy conservation and PlaNYC2030 Goals

Michael Bobker
Building Performance Lab
CUNY Institute for Urban Systems

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Overview

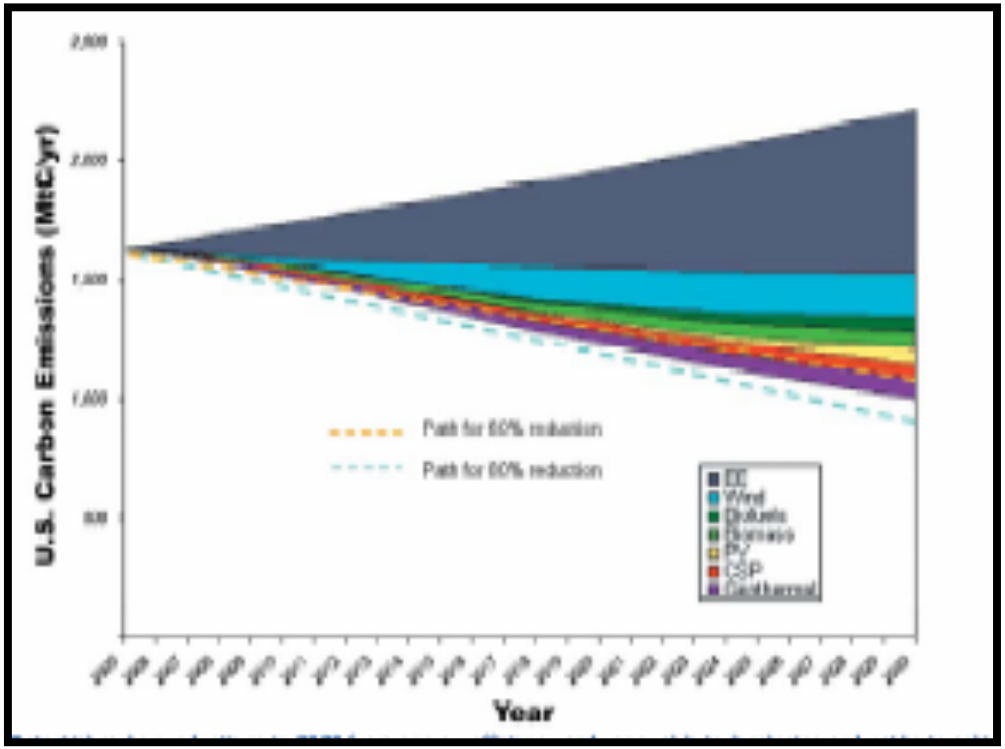
- What's the challenge and the objective?

- Estimating the likely impact of NYC's new 2007 Building Code on the city's energy use

- How Building Code is structured and how it works regarding energy conservation

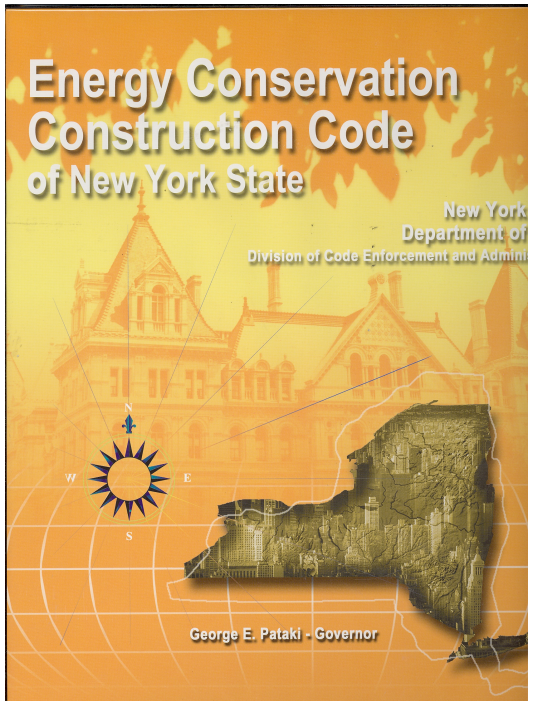
PlaNYC2030 carbon/energy challenge

- "30 x 30"
  - really much more aggressive than that
  - 30% from 2005
  - With BAU growth factored in, close to 60% carbon reduction
- Energy efficiency the largest wedge



NYC 2007 Building Code and Energy Conservation

- **specific requirements referenced to NYS Energy Conservation Construction Code (NYSECCC)**
- **NYSECCC based on ICC Energy Conservation Code (residential) and ASHRAE 90.1 (commercial)**
  - **Prescriptive and Performance paths**
  - **ASHRAE 90.1: Energy-cost Budget Method, based on computer modeling**
- **Triennial revision cycle**



How much impact from Building Code?

- Depends on how stringent BC (or the inter-related set of codes) becomes

How much impact from Building Code?

- ASHRAE's actual improvements in 90.1 have lagged behind goals

ASHRAE Standard 90.1 History and Projection of Energy Reduction

YEAR of 90.1 Release	MBTU/SF	% Reduction from Previous Release	% Reduction from 1999 Standard
1999	53.3		
2001	51.6	3.8%	3.8%
2004	47.0	11.1%	11.8%
2007	44.0	6.6%	17.5%
2010	36.0	13.2%	32.5%
2013	30.0	16.7%	43.7%
2020	18.0	40.0%	66.2%
2025	10.0	44.5%	81.2%
2030	Net Zero	100%	100%

Source: Holness ASHRAE Journal 2008

How much impact from Building Code?

- Building Code comes into play at new construction and alterations
- How much impact BC has is a function of how much construction activity
  - and how BC is applied to that construction
- Most construction is alteration work
  - NYSECCC 50% rule

Important elements of energy use are *not covered by design and building code*

- Plug loads
- Appliances
- Computers and data center equipment

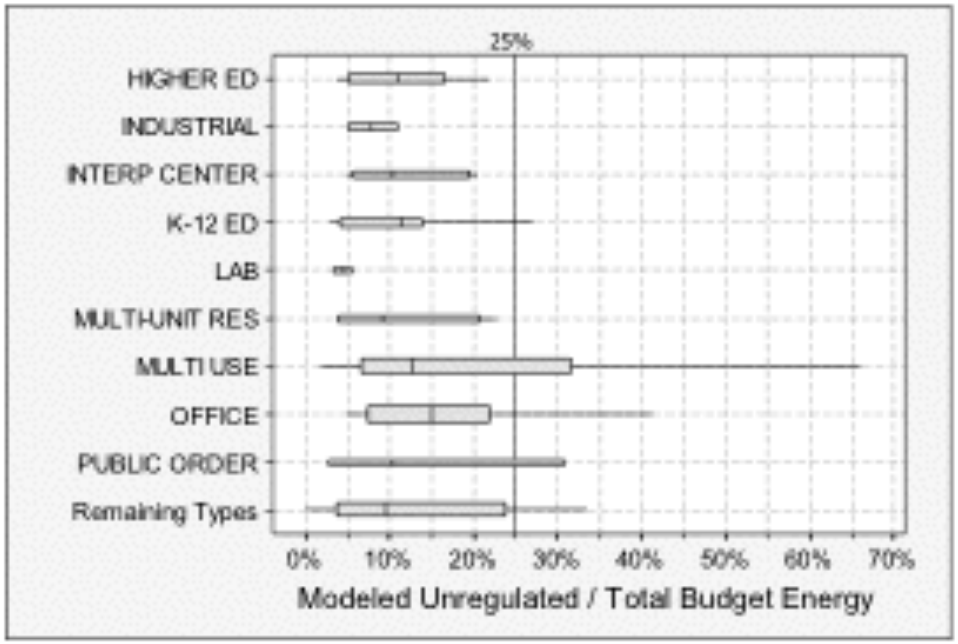


Figure 30: Plug Loads as a Percent of Total Baseline
From 2006 review of all LEED-NC v2 energy modeling
Boxes show the range of values between the 75th and 25th percentiles.

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A spreadsheet exercise

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Sample SF	Total Square Footage	Annual % Construction	Annual Construction, SF	CBECS Energy Use MBTU/ per SF	Energy Use Reduction (%)	Energy Reduction (MBTU/SF)	Annual Savings, MBTU
Commercial	**1,031,600,000**	2%	20,632,000	90	25%	22.5	464,220,000
Office	616,000,000		-	92.6			
Retail	215,600,000		-	na			
Industrial	200,000,000		-	89.5			
			-				-
Institutional	**868,400,000**	2%	17,368,000	96	20%	19.2	333,465,600
K-12 Schools			-	98			
Hospital s			-	99			
Universities			-	96			
Public Assembly			-	96			
Municipal Buildings			-	99			
							-
Residential	**3,300,000,000**	2%	66,000,000	110	15%	16.5	1,089,000,000
"Single Family" Homes	1,650,000,000			110			
Multifamily	1,650,000,000			100			
Total	**5,200,000,000**		104,000,000				1,886,685,600

annual red	MBTU	2.E+09
MBTU to BTU	1,000	2.E+12
time period	2030 - 2008 =	22
reduction over period		4.E+13
% of 2030 target		23.3%

Study Findings

- Building Code impacts limited
  - 15-25% of the PlaNYC2030 goal
- Why?
  - Limitations in the BC process
  - Uncertainties in construction activity and code compliance
- Can “yield” from this policy tool be improved?

Using Building Code to do better

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- "Learning Curves"
  - LEED - how cities are using it
  - ASHRAE 90.1 and 189 – towards "zero net energy"
  - "30% Solution"
    - Energy Efficient Codes Coalition, the Building Codes Assistance Project & the ICC
    - Architecture2030
- An interesting kicker: relationship of requirements to incentives

BC based on design, not actual performance

- A design may not perform as expected

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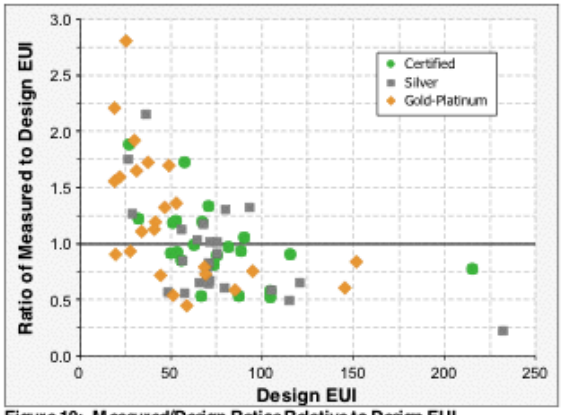

Figure 19: Measured/Design Ratios Relative to Design EUI

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- **Even if initial performance meets expectations, no check on persistence over time**

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BC based on design, not actual performance

- Existing Buildings not covered (except when undergoing alteration)
  - exceptions via specific local laws -- DOB does have power to regulate existing building conditions

- Another kicker: *Could a very demanding Building Code actually become a disincentive to undertaking alterations?*

Conclusions

- Importance of the triennial revision process
- Improve the design profession's modeling capacity and accuracy
- Close the 50% loophole
- Report real energy performance on an on-going basis

Thank You

Michael Bobker

Building Performance Lab
CUNY Institute for Urban Systems

michael_bobker@baruch.cuny.edu