Buildings and Sustainability: Roles of Codes

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Commercial Codes and Standards

CODES

77 MCEC
83 MEC
86 MEC
89 MEC
92 MEC
93 MEC
95 MEC
98 IECC
00 IECC
01 IECC
02 IECC
03 IECC
NFPA 5000
06 IECC
09 IECC

STANDARDS

90-1975
90A-1980
90.1-1989
Codified 90.1-1989
90.1-1999
90.1-2001
90.1-2004
90.1-2007

Developed by ASHRAE

FEDERAL

10CFR 435 FEDCOM 0
10CFR 434 FEDCOM I
10CFR 434 FEDCOM II

ASHRAE 90-1975

Being the first attempt at an Energy Standard – It got a number of important things wrong, especially as far as commercial buildings were concerned.

- Residential and Commercial in one standard -- wrong
- Envelope was a function of degree-days -- wrong
- Restricted glazing area (10-15%) -- wrong
- Reduced ventilation which later created IAQ problems and pushed buildings to All Air/VAV systems
- Was very prescriptive in nature and not very flexible

Building Energy Performance Standard 1978-82

Was the first attempt at an energy performance standard for buildings, it was far ahead of its time. The AIA Research Corporation did much of the research in developing the BEPS Standard. However, it failed because of the:

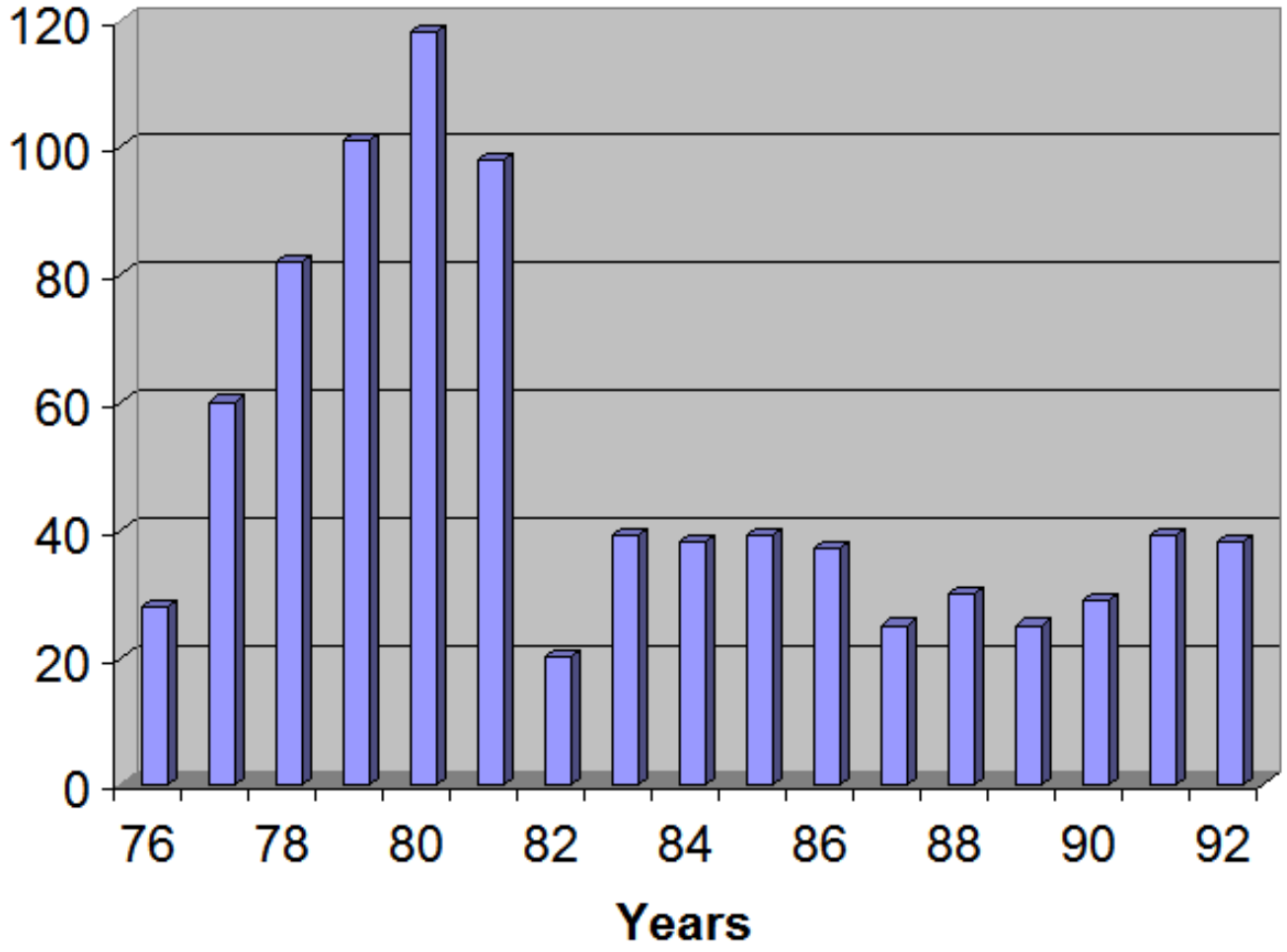
- Lack of government commitment, lost funding
- Site vs. source energy issues were never resolved
- Complexity of performance simulation (DOE 2 required at that time a mainframe computer for analysis)

Building Energy Performance Standard (BEPS) - 1980

State	SMSA	Clinic	Community Center	Gymnasium	Hospital	Hotel/Motel	Multifamily High Rise	Multifamily Lov Rise	Nursing Home	Large Office	Small Office	Elementary School	Secondary School	Shopping Center	Retail	Theater/ Auditorium	Warehouse
Minnesota	Minneapolis	142	109	144	335	180	140	110	175	123	117	122	138	198	155	157	93
Missouri	St. Louis	133	110	136	353	175	128	112	163	119	109	105	128	192	150	149	72
Washington DC	D.C.	127	107	129	353	169	120	109	164	115	104	96	121	185	144	142	63
Florida	Miami	152	142	161	406	203	133	147	201	140	125	103	141	219	179	178	41
Texas	Dallas	131	116	136	358	175	119	119	171	120	107	94	124	190	152	150	50
California	San Diego	114	103	117	364	158	104	106	153	107	92	75	107	172	134	128	40
Oregon	Portland	119	98	120	353	161	116	99	154	108	97	91	115	176	135	131	66
Massachusetts	Boston	125	101	126	338	165	121	102	159	111	102	99	121	181	140	139	72

Units: Source Energy in kBtu/ft^2-yr

DOE/OBT Budget -- $ Millions, constant 1982

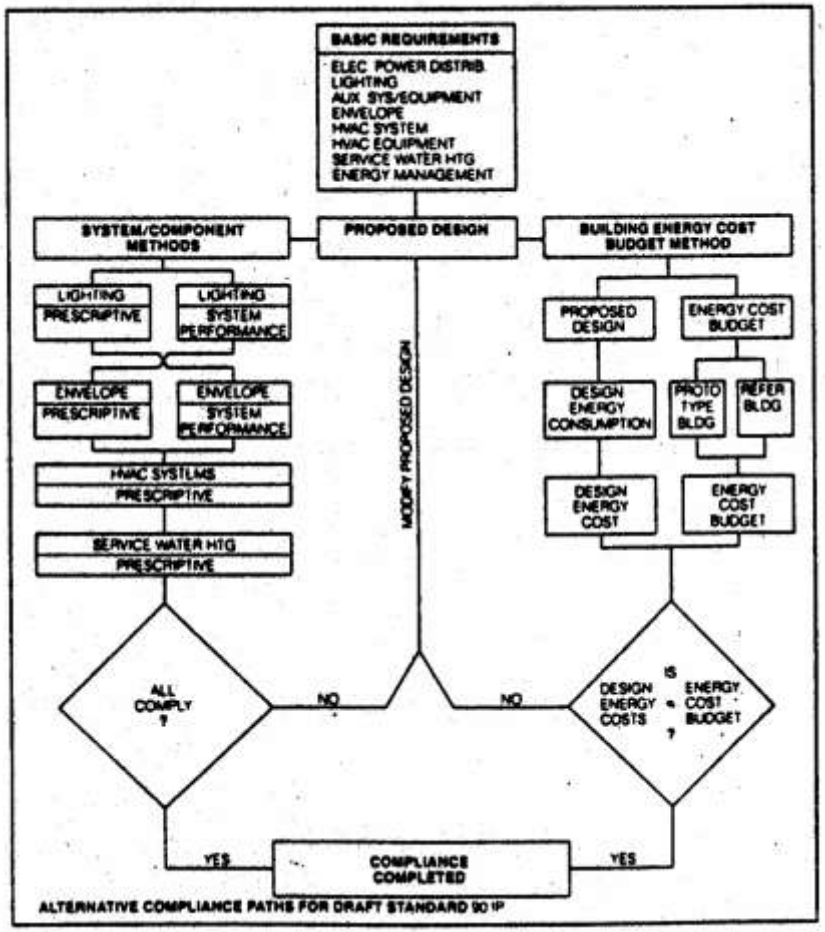


ASHRAE 90.1-1989

Attempted to introduce a performance track into a prescriptive standard

- Corrected many of the problems with 90-75
- Divided the standard into commercial (90.1) and residential buildings (90.2)
- Envelope was a function of internal loads
- Was more flexible & less prescriptive than 90-75
- Complexity was overcome with computer tools (for envelope and lighting) and a whole building energy modeling approach (ECB) was added

ASHRAE 90.1-1989



ASHRAE 90.1-1999

Built on the ASHRAE 90.1-1989 Standard, attempted to better integrate the performance track into the standard

- Made the building envelope more stringent
- Made HVAC equipment efficiency more stringent
- Made improvements to the whole building energy modeling approach (ECB)

ASHRAE 90.1-2004

Built on the ASHRAE 90.1-1999 Standard, created an approximate 10% improvement over previous version

- Significant improvement in lighting efficiency
- Made the building envelope more stringent
- Made HVAC equipment efficiency more stringent
- Made improvements to the whole building energy modeling approach (ECB) and introduced an informative performance based modeling approach (Appendix G)

ASHRAE Appendix G

TABLE G3.1 *(Continued)* Modeling Requirements for Calculating Proposed and Baseline Building Performance

No.	Proposed Building Performance	Baseline Building Performance
4.	**Schedules**	
	Schedules capable of modeling hourly variations in occupancy, lighting power, miscellaneous equipment power, thermostat setpoints, and HVAC system operation shall be used. The schedules shall be typical of the proposed building type as determined by the designer and approved by the *rating authority*. **HVAC Fan Schedules.** Schedules for HVAC fans shall run continuously whenever spaces are occupied and shall be cycled on and off to meet heating and cooling loads during unoccupied hours. **Exception:** Where no heating and/or cooling system is to be installed and a heating or cooling system is being simulated only to meet the requirements described in this table, heating and/or cooling system fans shall not be simulated as running continuously during occupied hours but shall be cycled on and off to meet heating and cooling loads during all hours.	Same as Proposed Design. **Exception:** Schedules may be allowed to differ between *proposed design* and *baseline building design* when necessary to model nonstandard *efficiency* measures, provided that the revised schedules have the approval of the rating authority. Measures that may warrant use of different schedules include, but are not limited to, lighting controls, natural ventilation, demand control ventilation, and measures that reduce service water heating loads.
5.	**Building Envelope**	
	All components of the *building envelope* in the *proposed design* shall be modeled as shown on architectural drawings or as built for existing building envelopes. **Exceptions:** The following building elements are permitted to differ from architectural drawings. (a) All uninsulated assemblies (e.g., projecting balconies, perimeter edges of intermediate floor slabs, concrete floor beams over parking garages) shall be separately modeled. Any other envelope assembly that covers less than 5% of the total area of that assembly type (e.g., exterior walls) need not be separately described provided that it is similar to an assembly being modeled. If not separately described, the area of an envelope assembly shall be added to the area of an assembly of that same type with the same orientation and thermal properties. (b) Exterior surfaces whose azimuth orientation and tilt differ by less than 45 degrees and are otherwise the same may be described as either a single surface or by using multipliers. (c) For exterior roofs, the roof surface may be modeled with a reflectance of 0.45 if the reflectance of the *proposed design* roof is greater than 0.70 and its emittance is greater than 0.75. Reflectance values shall be based on testing in accordance with ASTM E903, ASTM E1175, or ASTM E1918, and the emittance values shall be based on testing in accordance with ASTM C835, ASTM C1371, or ASTM E408. All other roof surfaces shall be modeled with a reflectance of 0.30. (d) Manual fenestration shading devices such as blinds or shades shall not be modeled. Automatically controlled fenestration shades or blinds may be modeled. Permanent shading devices such as fins, overhangs, and light shelves may be modeled.	Equivalent dimensions shall be assumed for each exterior envelope component type as in the *proposed design*, i.e., the total gross area of exterior walls shall be the same in the *proposed* and *baseline building designs*. The same shall be true for the areas of roofs, floors, and doors, and the exposed perimeters of concrete slabs on grade shall also be the same in the *proposed* and *baseline building designs*. The following additional requirements shall apply to the modeling of the *baseline building design*: **(a) Orientation.** The *baseline building performance* shall be generated by simulating the building with its actual orientation and again after rotating the entire building 90, 180, 270 degrees, then averaging the results. The building shall be modeled so that it does not shade itself. **(b) Opaque assemblies.** Opaque assemblies used for new buildings or *additions* shall conform with the following common, lightweight assembly types and shall match the appropriate assembly maximum U-factors in Tables 5.5-1 through 5.5-8: • Roofs – Insulation entirely above deck • *Above-grade walls* – Steel-framed • Floors – Steel-joist • Opaque door types shall match the proposed design and conform to the U-factor requirements from the same tables. • Slab-on-grade floors shall match the F-factor for unheated slabs from the same tables. Opaque assemblies used for *alterations* shall conform with 5.1.3. **(c) Vertical Fenestration.** Vertical fenestration areas for new buildings and *additions* shall equal first in the *proposed design* or 40% of gross above-grade wall area, whichever is smaller, and shall be distributed uniformly in horizontal bands across the four orientations. Fenestration U-factors shall match the appropriate requirements in Tables 5.5-1 through 5.5-8 for the applicable vertical glazing percentage for U_{fixed}. Fenestration solar heat gain coefficient (SHGC) shall match the appropriate requirements in Tables 5.5-1 through 5.5-8 using the value for $SHGC_{all}$ for the applicable vertical glazing percentage. All vertical glazing shall be modeled as fixed and shall be assumed to be flush with the exterior wall, and no shading projections shall be modeled. Manual window shading devices such as blinds or shades shall not be modeled. The fenestration areas for envelope *alterations* shall reflect the limitations on area, U-factor, and SHGC as described in 5.1.3. **(d) Skylight and Glazed Smoke Vent.** Skylight area shall be equal to that in the proposed building design or 5% of the gross roof area that is part of the *building envelope*, whichever is smaller. If the skylight area of the proposed building design is greater than 5% of the gross roof area, baseline skylight area shall be decreased by an identical percentage in all roof components in which skylights are located to reach the 5% skylight-to-roof ratio. Skylight orientation and tilt shall be the same as in the proposed building design. Skylight U-factor and SHGC properties shall match the appropriate requirements in Tables 5.5-1 through 5.5-8. **(e) Roof albedo.** All roof surfaces shall be modeled with a reflectivity of 0.30. **(f) Existing Buildings.** For existing *building envelopes*, the *baseline building design* shall reflect existing conditions prior to any revisions that are part of the scope of work being evaluated.

ASHRAE 90.1-2007

Built on the ASHRAE 90.1-1999 Standard, created an approximate 15% improvement over that version

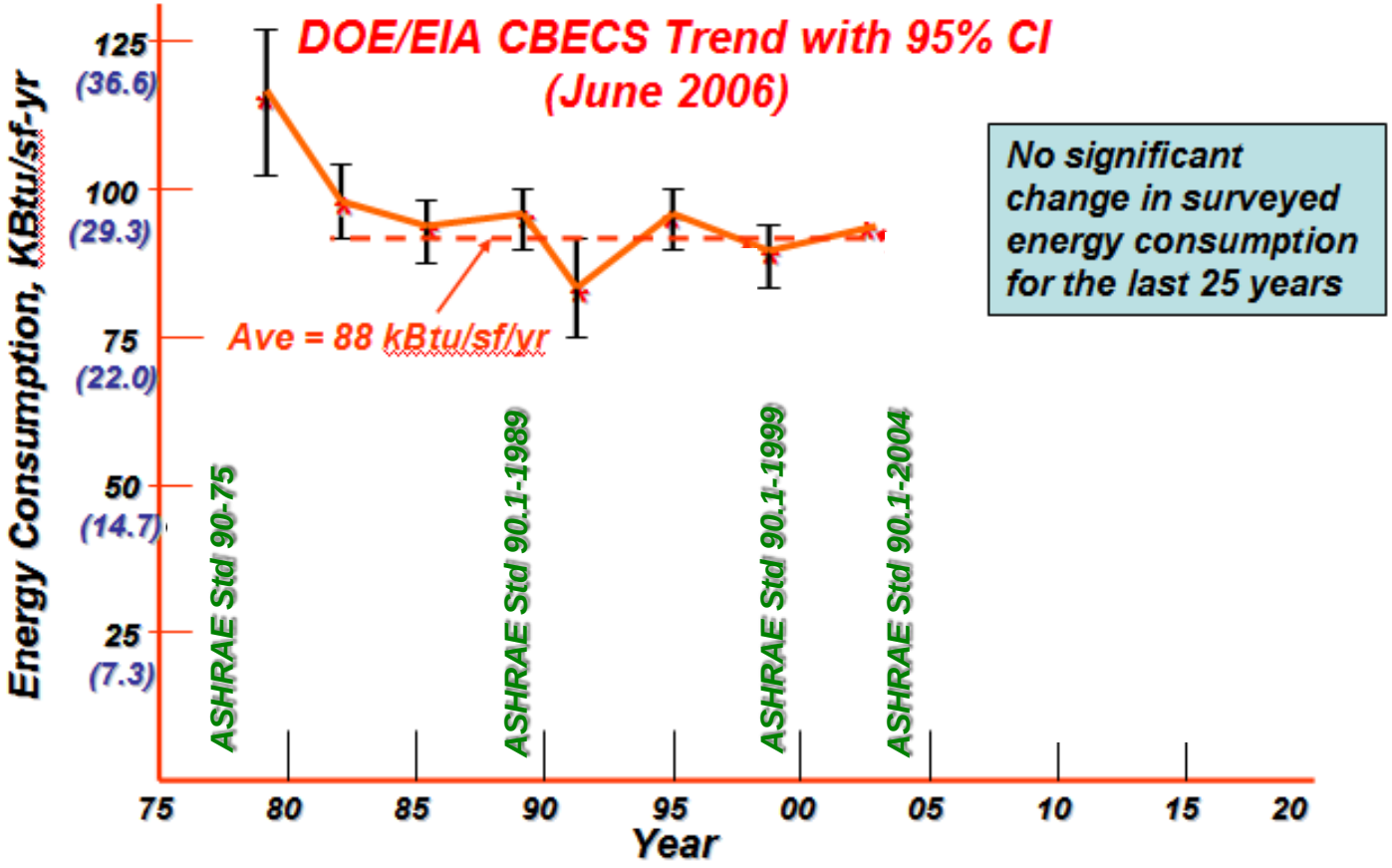
- Made the building envelope more stringent
- Made HVAC equipment efficiency more stringent
- Made improvements to the whole building energy modeling approach (ECB) and the informative performance based modeling approach (Appendix G)

We have had 30 years of Energy Standards

We have to ask the question:
How well have these standards performed?

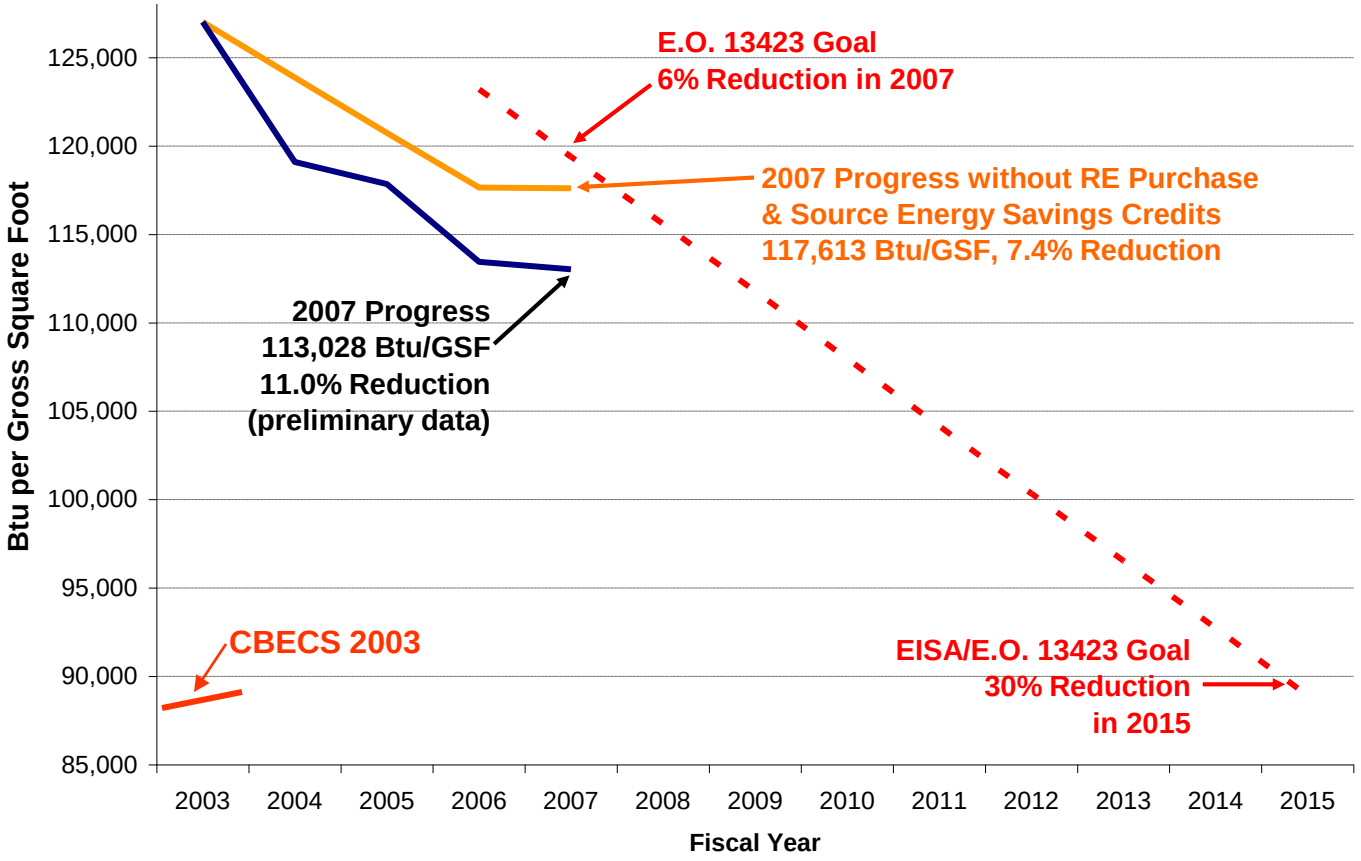
DOE/EIA has a database called the Commercial Building Energy Consumption Survey (CBECS) which we can use to measure this.

Commercial Building Energy Consumption for the last 30 years



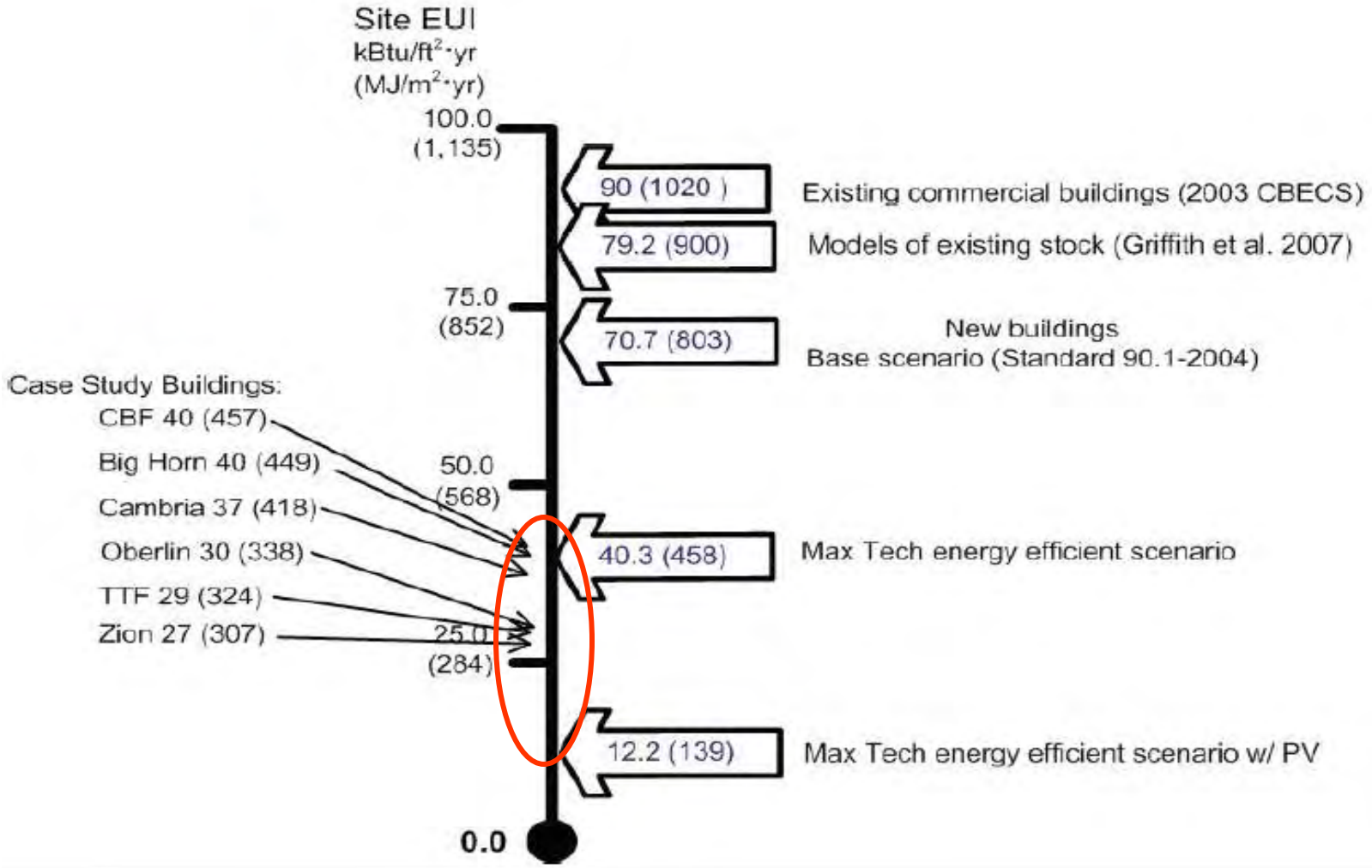
Source: after James E. Woods, Ph.D., P.E.

EISA/EO 13423, For All Federal Facilities

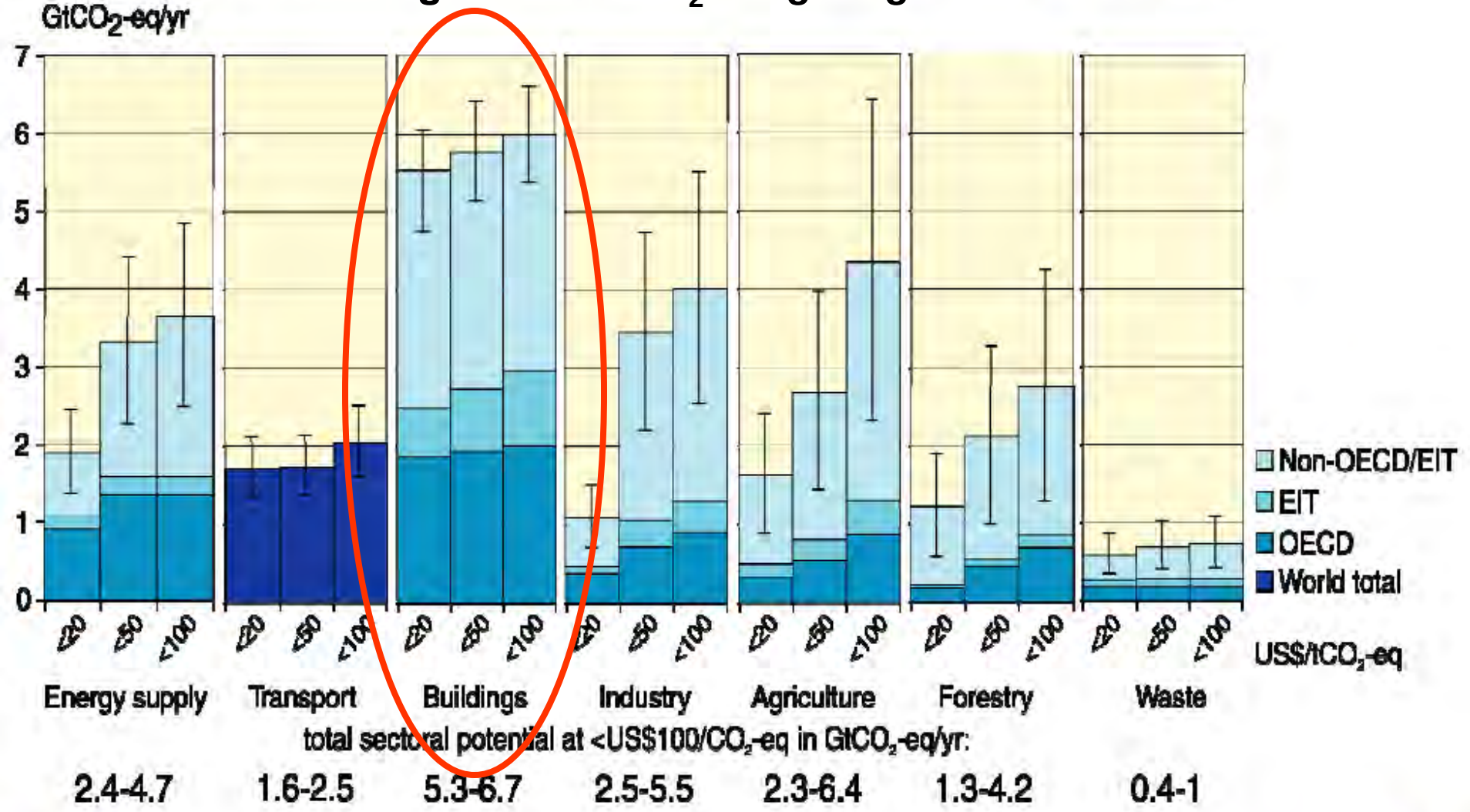


(source: GSA 2007)

How low can we go?



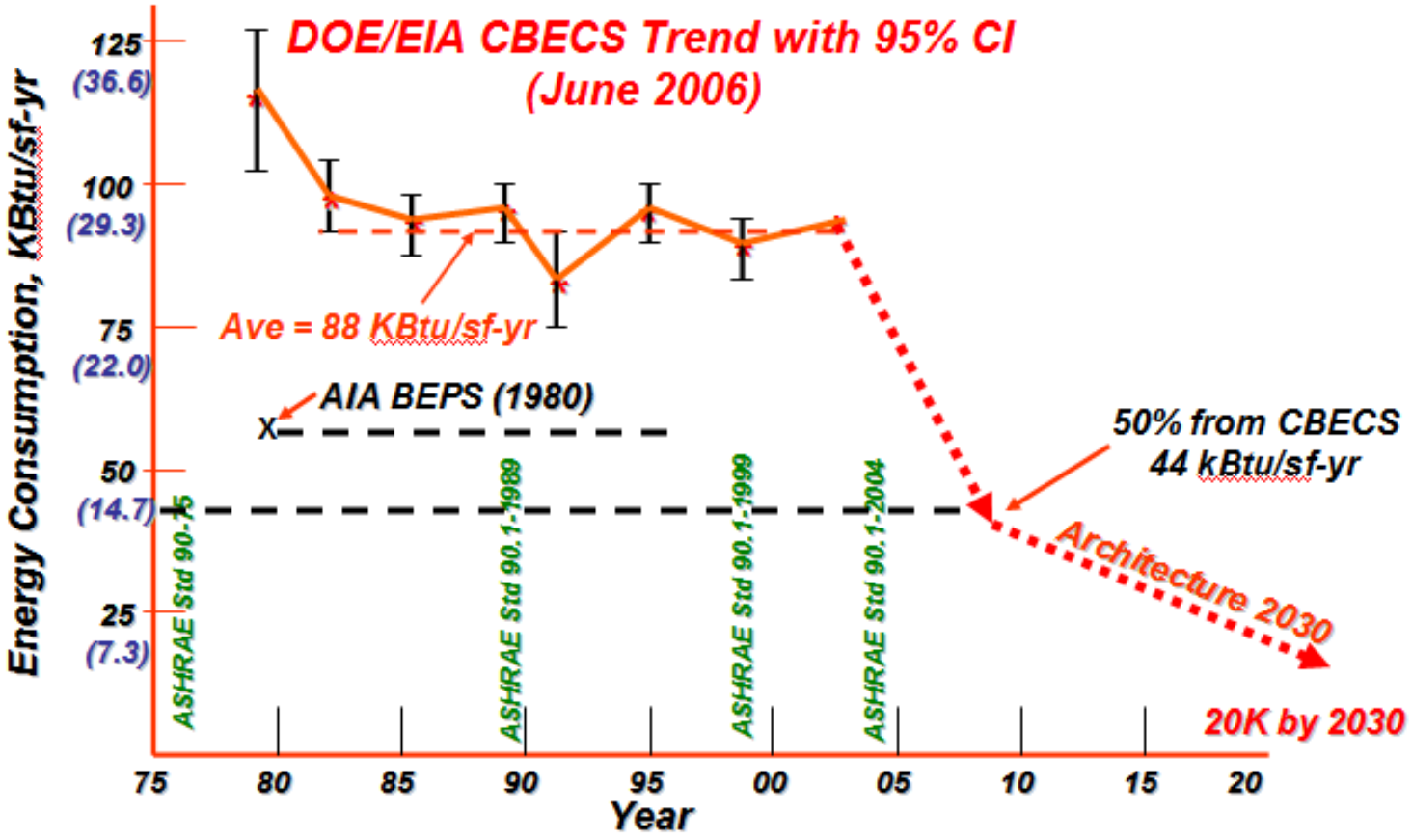
The Building Sector's CO_2 Mitigating Potential for 2030



Setting Benchmarks - Architecture 2030

Year	Percentage Reduction
Today	50
2010	60
2015	70
2020	80
2025	90
2030	100 (Carbon Neutral)

Where do we need to get over the next 22 years



Source: after James E. Woods, Ph.D., P.E.

What we can learn from this experience

The ASHRAE approach has not worked particularly well.

A purer performance approach would have worked better.

We now have a building performance database that we can use as a benchmarking tool.

Global warming concerns (in a carbon cap & trade based system) will be driving the next generations of codes, will be using CO_2 and not energy as the metric.

It will be a challenge to get to zero net energy or carbon neutral buildings by 2030.

Any approach will have to measure the entire environmental impact of a building, i.e., be sustainable.

LEED® for New Construction 2009

For 1st Public Comment

LEED 2009

- Structure will be very similar to the present LEED NC 2.2.
- Will be more stringent than LEED NC 2.2.
- Is a recognized brand and has considerable support.
- Now has 100 rather than 69 points.
- Now has regional bonus points.
- Uses energy and not CO_2 as a metric.
- Slow uptake only has 1800 certified buildings in 8 years.
- Not a true consensus document, not an ANSI approved document and it can't be codified.
- LEED buildings are not truly third party certified (does not meet ISO criteria) and does not have on-site verification.
- Completed USGBC review and will be published winter 2008 and go into operation January 2009.

BSR/ASHRAE/IUSGBC/IESNA Standard 189P

Public Review Draft

ASHRAE® Standard

Proposed Standard 189, *Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings*

First Public Review (May 2007)
(Complete Draft for Full Review)

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed addendum, use the comment form and instructions provided with this draft. The draft is subject to modification until it is approved for publication by the ASHRAE Board of Directors and ANSI. Until this time, the current edition of the standard remains in effect. The current edition of any standard may be purchased from the ASHRAE Bookstore @ http://www.ashrae.org or by calling 404-636-8400 or 1-800-527-4723 (for orders in the U.S. or Canada).

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AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
1791 Tullie Circle, NE Atlanta GA 30329-2305

ASHRAE Standard 189P

- 189 is a minimum Green Building Standard and not a rating system (can be used by both LEED and Green Globes).
- The International Code Council plans to codify it.
- Will use existing Building Inspectors for Certification.
- Uses CO_2 as one if its performance metrics.
- Dual prescriptive/performance paths reduces the need for extensive calculations.
- Sets a high level of performance – 30% better then ASHRAE 90.1-2007 (~50% better then 90.1-1999).
- Present level of environmental performance equals LEED high silver (under LEED NC 2.2.)
- Completed second public review and will need to go out for a third public review, publication fall/winter 2009.

GREEN BUILDING INITIATIVE

GBI Proposed American National Standard 01-2008P: ***Green Building Assessment Protocol for Commercial Buildings***

FIRST PUBLIC REVIEW DRAFT

This Standard –GBI Proposed American National Standard 01-2008P—provides a method of assessing commercial building projects in relation to commonly valued environmental and efficiency outcomes. This Standard is an assessment tool and does not purport to instruct users on the appropriate design, standards, applicable laws, codes or regulations for their building project(s). The use of the Standard does not establish, expressly or implicitly, the appropriate standard of care of licensed design or other professionals nor the appropriate duties and responsibilities of design, construction, or operations personnel.

The Green Building Initiative™ (GBI) does not guarantee or warrant the actual performance of any building project as a result of (1) the use of this Standard, or (2) a particular level of assessment obtained through the use of this Standard, whether through self-assessment or through the use of a third-party assessor. The Standard has been developed and structured to provide a general assessment tool for various attributes of building projects, as outlined in the Standard. The Standard is not a design tool or a quality or performance assurance system. Building project systems, technology, construction processes, design methodologies and best practices are constantly evolving and no building performance assessment system or tool, including this Standard, can account for these changes or the site-specific variances and limitations associated with individual building projects. The use of this Standard does not serve as a substitute for the work and advice of knowledgeable, licensed design and other professionals; skilled construction personnel; building operators; and dedicated building owners.

GBI makes no representations about the results to be obtained from using the Standard. GBI, to the fullest extent permitted by law, disclaims all warranties of any kind, whether express of implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose and non-infringement.

Information on the ANSI approved procedures used to develop this standard can be found at www.thegbi.org/commercial or by calling 1-877-GBI-GBI1. To submit comments on this draft standard, please use the Comment Form and follow the Instructions provided with the draft standard.

www.thegbi.org • CORPORATE OFFICE: 2104 S.E. Morrison, Portland, OR 97214
Phone: 877-GBI-GBI1 (877-424-4241) • Fax: 503.961.8991 • Email: info@thegbi.org

ANSI

ANSI/GBI Green Building Rating Standard

- ANSI/GBI is a Green Building rating system, very similar to the Green Globes system (web based).
- The ANSI process will make it a Standard and could be codified by the International Code Council.
- Use third part verifiers, could use local Building Inspectors.
- Uses CO_2 as one if its performance metrics.
- Dual prescriptive/performance paths reduces the need for extensive calculations.
- Sets a high level of performance very closely to Architecture 2030.
- Present level of environmental performance surpasses LEED-NC 2.2 will probably be very close to LEED-2009.
- Presently out for second public review, expected publication fall 2009.

GAAS:538:08
For Immediate Release:
Thursday, July 17, 2008

Contact: Aaron McLear
Rachel Cameron
916-445-4571

Gov. Schwarzenegger Issues Statement on Nation-Leading Green Building Code

Governor Arnold Schwarzenegger today issued the following statement on the California Building Standards Commission vote to adopt the nation's first statewide green building code:

"By adopting this first-in-the-nation statewide green building code, California is again leading the way to fight climate change and protect the environment. This is literally a groundbreaking move to ensure that when we break ground on all new buildings in the Golden State we are promoting green building and energy efficient new technologies. Cars and buildings are two of the leading users of energy – we're already addressing cars, and these new building standards will ensure that California remains at the forefront of reducing our carbon footprint and conserving valuable natural resources while also protecting our economy. We have already committed to making our state-owned buildings more green and energy efficient and this statewide code will reduce greenhouse gas emissions, improve energy efficiency and conserve water in all new buildings.

"With today's action, California continues to lead the nation and I commend the hard work of the Building Standards Commission to adopt the first-in-the-nation statewide green building standards."

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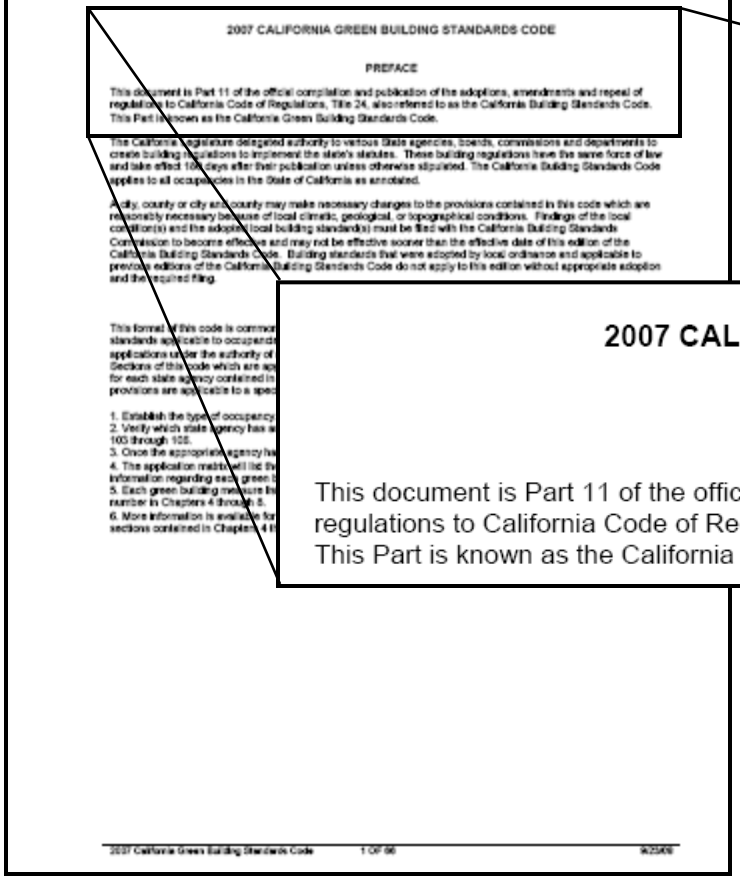


2007 CALIFORNIA GREEN BUILDING STANDARDS CODE

PREFACE

This document is Part 11 of the official compilation and publication of the adoptions, amendments and repeal of regulations to California Code of Regulations, Title 24, also referred to as the California Building Standards Code. This Part is known as the California Green Building Standards Code.

2007 California Green Building Standards Code 1 OF 66 9/23/08

2007 CALIFORNIA GREEN BUILDING STANDARDS CODE

PREFACE

This document is Part 11 of the official compilation and publication of the adoptions, amendments and repeal of regulations to California Code of Regulations, Title 24, also referred to as the California Building Standards Code. This Part is known as the California Green Building Standards Code.

California PUC's Application of AB32 to Buildings

4 BIG BOLD Energy Efficiency Strategies

Commercial New Construction

- All new commercial construction in California will be zero net energy by 2030.

Residential / Small Commercial HVAC

- Heating, Ventilation, and Air Conditioning (HVAC) industry will be reshaped

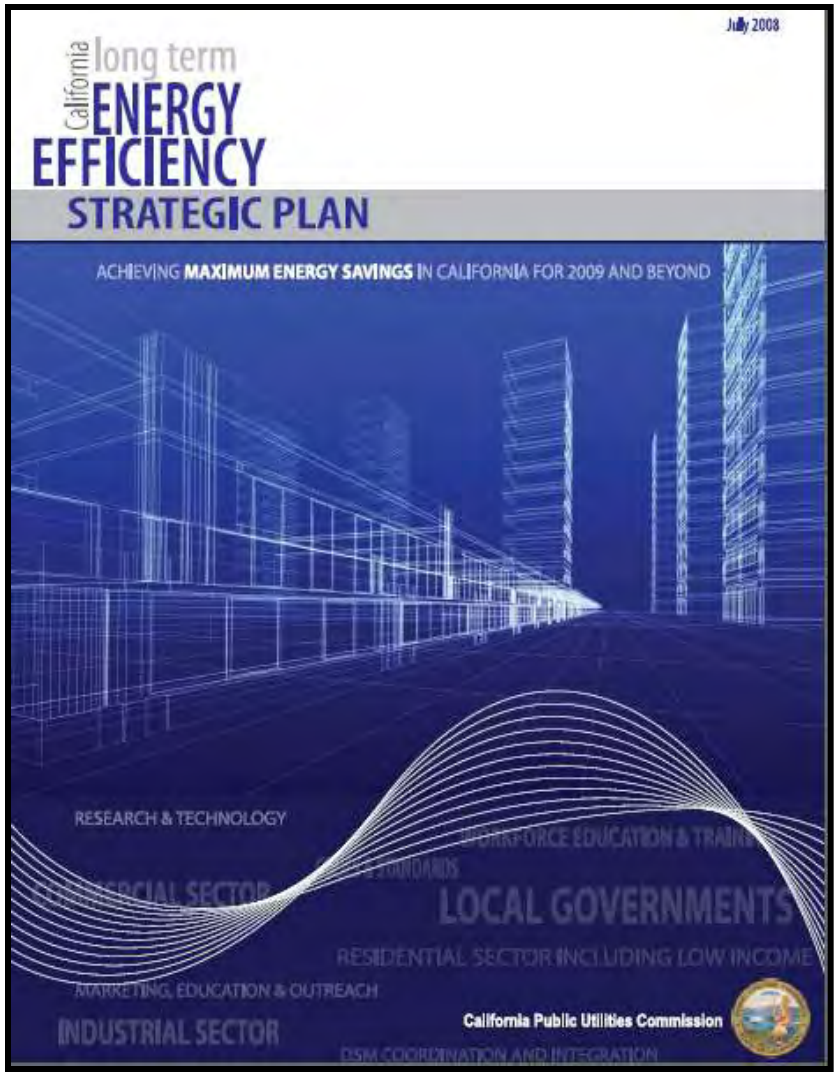
Residential New Construction

- All new residential construction in California will be zero net energy by 2020.

Low- Income Energy Efficiency

- All eligible low-income homes will be energy-efficient by 2020

Grueneich, 2008



Developing a Greenhouse Gas Tool for Buildings in California:

Methodology and Use

September 10, 2008

Prepared by:

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Energy and Environmental Economics, Inc.

NEWS

- *Environmental Building News* (October 2008)
- Features
- What's Happening
- Product News & Reviews
- BackPage Primers
- Opinion
- GreenSource Magazine
- *EBN* Archives

What's Happening from **Environmental Building News**
October 1, 2008

PRINT EMAIL

Energy-Use Reporting Mandated in California

A law requiring annual energy-use reporting for all California's nonresidential buildings takes effect in January 2009, and the state Department of General Services has been working closely with utilities to streamline the reporting process. Beginning in 2010 owners of commercial buildings must disclose their energy usage and Energy Star rating to potential buyers, leasers, and financiers. The legislation, which is similar to a European Union (EU) requirement that took effect in 2006–7, was signed into law in October 2007.

While this law does not directly require public disclosure of the energy performance of individual buildings, as mandated by Washington, D.C.'s new Clean and Affordable Energy Act (see *EBN* Vol. 17, No. 9), real-estate listing services are likely to include it. "My expectation is that for most buildings it will actually be made public," reported Douglas Mahone, principal of the consulting firm Heschong Mahone Group.

DISCUSSIONS

There are no comments for this page yet.

Log in to add comments

RELATED ARTICLES

Regulations Demanding Actual Data Are Leapfrogging LEED
EBN: From the Editors - October 2008

More related articles

RELATED GREEN DESIGN

Target Finder

* REQUIRED

Select a target rating and/or compare your Design Energy to the target.

1. Facility Information

*Zip Code: 20515
Facility Name: Small Office Building
City: Washington, DC
State:

2. Facility Characteristics

*Select Space Type(s) for this project.

[Space Types]

Office — Delete

*Gross Floor Area	*Operating Hours/Week	*Workers on Main Shift	*Number of PCs	*Office Air-Conditioned	*Office Heated
21000 Sq. Ft.	50 Hours	50	50	50% or more	50% or more

3. The Target[1]

Target Rating: Select
Or
Energy Reduction Target: 50%

*Choose the design target and select "**View Results**" to display associated energy use for the target.

TARGET FINDER

PRINT | FREQUENTLY ASKED QUESTIONS | CONTACT US | HELP

Target Energy Performance Results

The design **must** achieve a rating of 75 or higher to be eligible for "Designed to Earn the ENERGY STAR". **View Statement of Energy Design Intent** for project summary.

View

NOTE: Assumptions are 82% electricity and 18% % Natural Gas. The Target & Top 10% energy use for this facility are calculated based on the typical fuel mix in the zip code specified.

Target Energy Performance Results (estimated)			
Energy	**Design**	**Target**	**Top 10%**
Energy Performance Rating (1-100)	N/A	93	90
Energy Reduction (%)	N/A	50	45
Source Energy Use Intensity (kBtu/Sq. Ft./yr)	N/A	97.9	107.5
Site Energy Use Intensity (kBtu/Sq. Ft./yr)	N/A	33.4	36.6
Total Annual Source Energy (kBtu)	N/A	2,055,078.9	2,256,625.5
Total Annual Site Energy (kBtu)	N/A	700,402.7	769,092.9
Total Annual Energy Cost ($)	N/A	$ 22,605	$ 24,822
Pollution Emissions			
CO2-eq Emissions (metric tons/year)	N/A	90.7	99.6
CO2-eq Emissions Reduction (%)	N/A	50%	45%

Building Carbon Performance Standard (BCPS) - 2008

ASHRAE Climate Zones	Small Office	Medium Office	Large Office	Primary School	Secondary School	Hospital (Acute Care or Children's	Hotel (Economy & Budget)	Hotel (Midescale w/ Food & Beverage)	Hotel (Upscale)	Medical Office	Residence Hall / Dormitory	Supermarket / Grocery	Warehouse (Unrefrigerated)	Courthouse	Bank / Financial Institution	Retail	Strip Mall
1A	13.57	15.97	21.26	8.16	8.61	31.59	13.76	10.95	14.70	14.46	10.25	56.61	4.86	16.93	16.93	17.30	20.80
2A	12.75	15.12	20.35	7.86	8.29	31.50	13.42	10.75	14.33	13.26	10.10	49.50	4.86	16.09	16.09	16.84	20.35
2B	13.33	15.71	20.94	8.27	8.73	30.77	14.26	11.29	15.05	14.10	10.76	53.36	5.24	16.66	16.66	17.44	20.94
3A	12.53	14.92	20.15	7.87	8.27	31.15	13.84	11.01	14.60	12.85	10.34	46.45	5.05	15.88	15.88	16.97	20.45
3B-CA	10.60	13.01	18.25	6.68	7.05	33.30	9.93	8.55	11.55	10.53	8.62	34.11	3.94	13.94	13.94	14.95	18.42
3B-other	13.91	16.31	21.55	8.66	9.13	30.06	15.13	11.80	15.74	15.00	11.33	57.19	5.69	17.26	17.26	18.07	21.55
3C	10.94	13.31	18.52	7.09	7.46	31.71	12.06	9.91	13.15	10.90	9.47	34.86	4.58	14.26	14.26	15.64	19.12
4A	12.85	15.21	20.42	8.28	8.72	29.59	15.23	11.88	15.66	13.23	11.57	46.27	6.08	16.15	16.15	17.78	21.23
4B	12.65	15.04	20.24	8.14	8.56	30.03	14.83	14.79	15.24	12.99	11.19	45.28	5.77	15.98	15.98	17.46	20.95
4C	12.02	14.28	19.66	7.89	8.33	29.94	14.58	11.49	15.03	12.12	11.21	39.45	5.65	15.35	15.35	17.19	20.49
5A	13.20	15.57	20.70	8.62	9.08	28.17	16.29	12.51	16.20	13.70	12.77	47.13	7.33	16.49	16.49	18.47	21.90
5B	13.14	15.48	20.65	8.71	9.07	28.64	16.44	12.65	16.40	13.62	12.71	46.20	7.05	16.42	16.42	18.46	21.88

Units: Carbon Use Intensity (CUI) lbs-CO2/ft2-yr

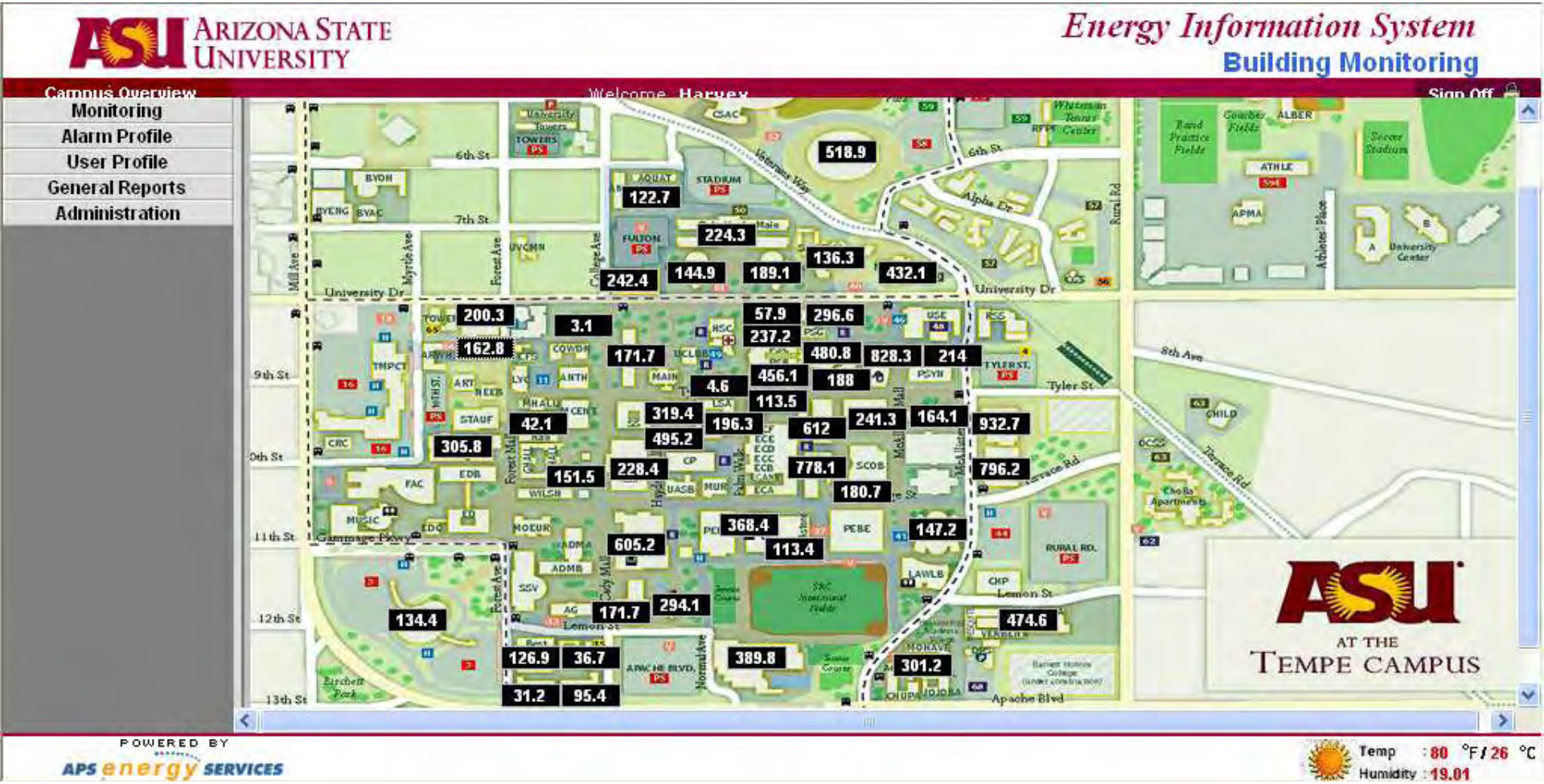
Energy Certificate

Building Energy Performance >	As built:
Certificate type: FULL Building Type: Office Whole or part of building: Whole building	*Asset Rating*
Very energy efficient A B C D E F G *Not energy efficient*	B
Asset rating method: UK National Standard 2004	Calculated
Operational rating method: UK Office Tailored Benchmarks 2002	
Units used: kg CO_2 per sq m of net area per annum >	48
Occupancy level: Square metres net lettable area per person	14
Equipment heat gain level: Watts per square metre net	12
Weekly occupancy hours: Hours per week	59
Heating performance ratings	ABCDEFG
HVAC performance ratings (cooling, fans and pumps)	ABCDEFG
Lighting performance ratings	ABCDEFG
Management rating (for in-use performance only)	
Internal Environmental Quality Risk level	

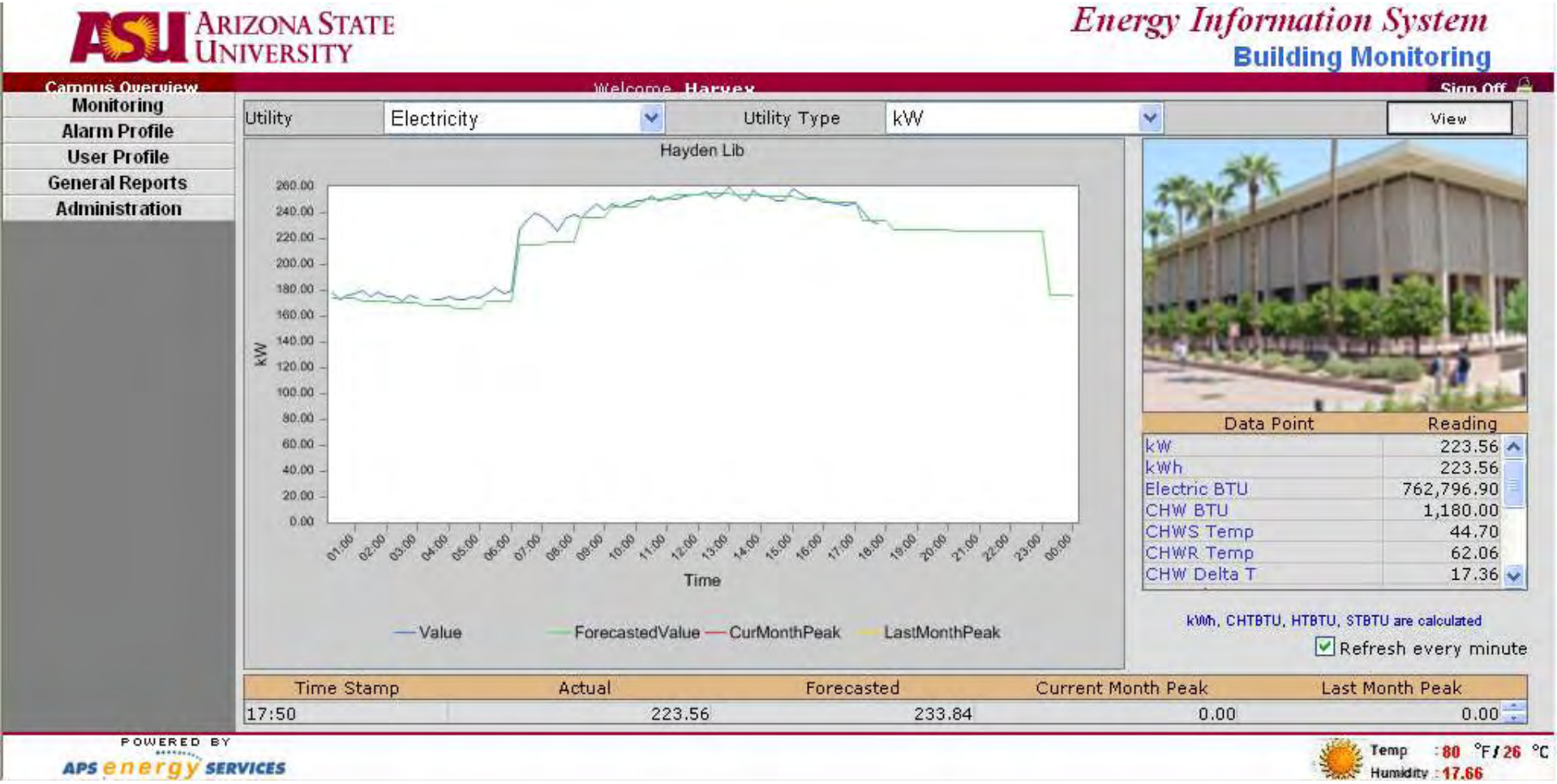
Further information can be found in the Energy Log Book

GB 2007

ASU's Current Campus Energy Information System



Typical Campus Building Profile



ASU Campus Metabolism
ARIZONA STATE UNIVERSITY

Current Temp: 79.3 °

23:08 - Thursday,5 June 2008

GIOS BUILDING:
Resource Usage

All Usage | Heating | Cooling | Electricity | Renewable Resources | Total Resources

Building Floor Area: **44,450 sq ft.**
Occupancy: **242**
Use:**Office**

Current

Heating

Cooling

Electricity

Renewable Resources

0
mmBTU/hr
(Million British Thermal Unit)

0
TON
(Cooling Ton)

21.1
kW
(Kilowatt)

Coming Soon

kW
(Kilowatt)

ASU Campus Metabolism
ARIZONA STATE UNIVERSITY

Current Temp: 79.5 °

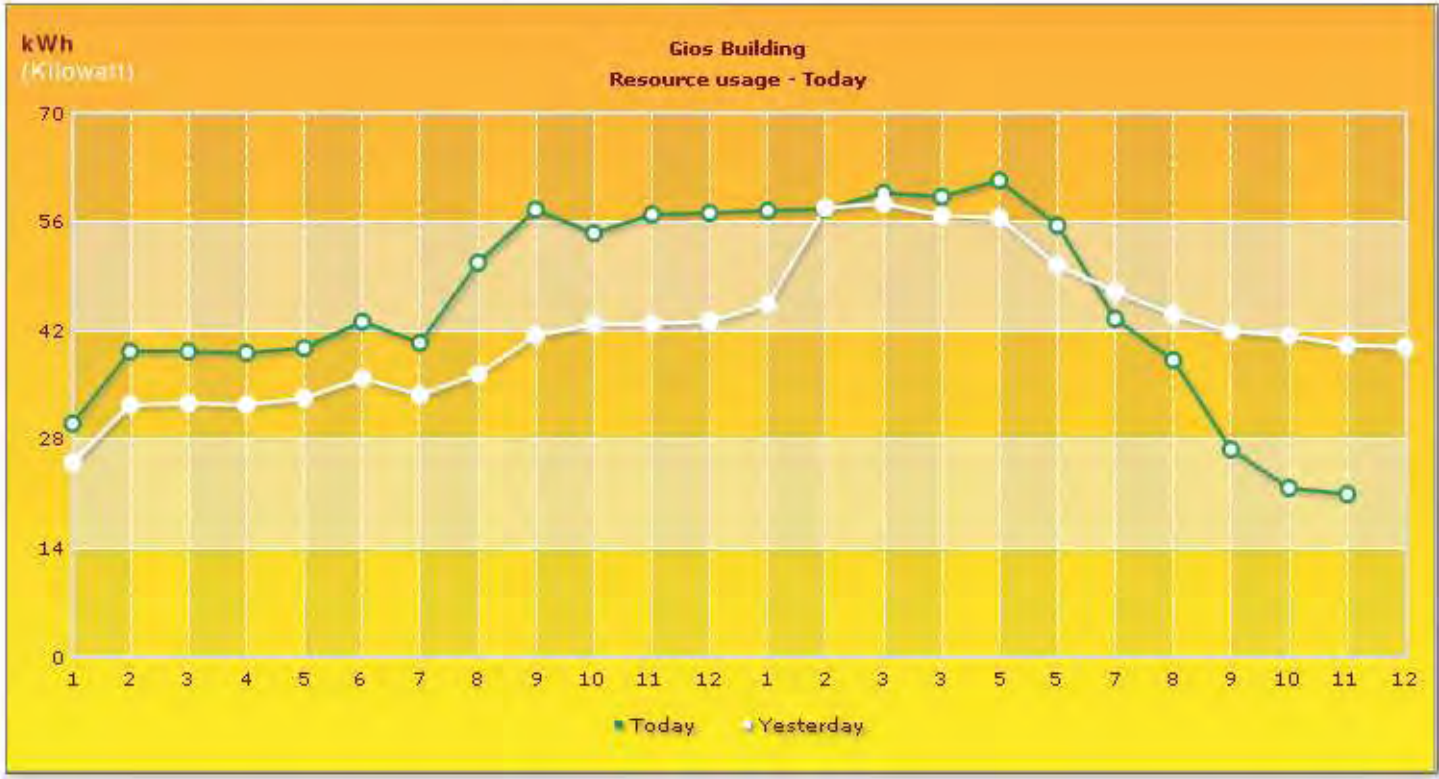
23:04 - Thursday,5 June 2008

GIOS BUILDING:
Resource Usage

All Usage | Heating | Cooling | Electricity | Renewable Resources | Total Resources

Current | Today | This Week | This Month

Building Floor Area: 44,450 sq ft.
Occupancy: 242
Use:Office



http://cm.asu.edu

Conclusion

The next generation of codes will be performance oriented.

The entire environmental impact of a building will need to be considered, will moved from a point based system to a life-cycle based system.

New tools will be available for benchmarking and measuring performance.

Reporting of performance will be mandated and transparent.

In a carbon cap & trade world, not meeting performance will result in economic penalties.

Thank You

For more Information Contact:
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