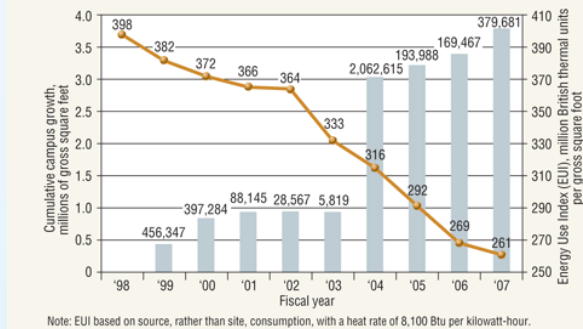


# The Next Big Things: New Opportunities for Energy Savings in the Commercial Sector

Steven Nadel, ACEEE  
2013 EER Conference




I'm reducing my  
plug load energy

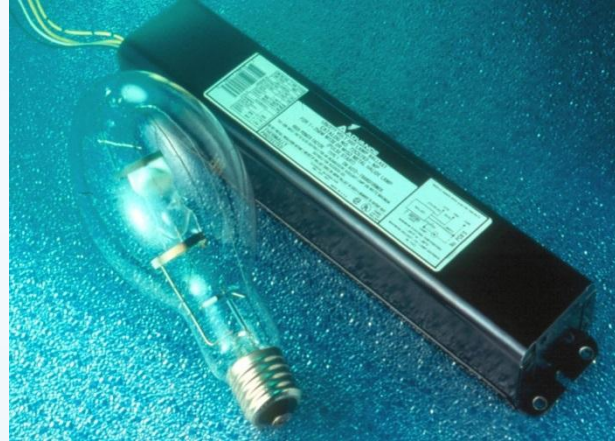


Help MIT Walk the Talk On  
Energy and the Environment

**Flip the switch!**

 Please turn off your lights when not in use.  
For more information go to [mit.edu/efc/energy](http://mit.edu/efc/energy)

# Today's Commercial Programs



# Large Opportunities for the Future

- Intelligent buildings
- Lighting design
- Next generation HVAC
- Leverage building codes
- Miscellaneous loads
- Worker behavior
- Deep retrofits



# Intelligent Efficiency

## **People-Centered Efficiency (Real-Time Feedback):**

Providing real-time information and management tools that enable consumers, building operators, manufacturers, and other users to lower their energy consumption in response to changing information.

## **Digital Energy Management (Automation & Optimization):**

Using sensors, controls, and computer software to automate business processes or building operations in order to optimize energy use. This bypasses much of the need for people to respond.

## **Substitution with Energy-Saving ICT Services (Dematerialization):**

Shifting behaviors, services and structure of the economy in ways that displace more energy-intensive activities to reduce energy usage.

**Crosscutting Intelligent Infrastructure:** Together, all IE approaches enable more integrated, smarter and more reliable infrastructure: power grids, smart cities, transportation, and communications networks

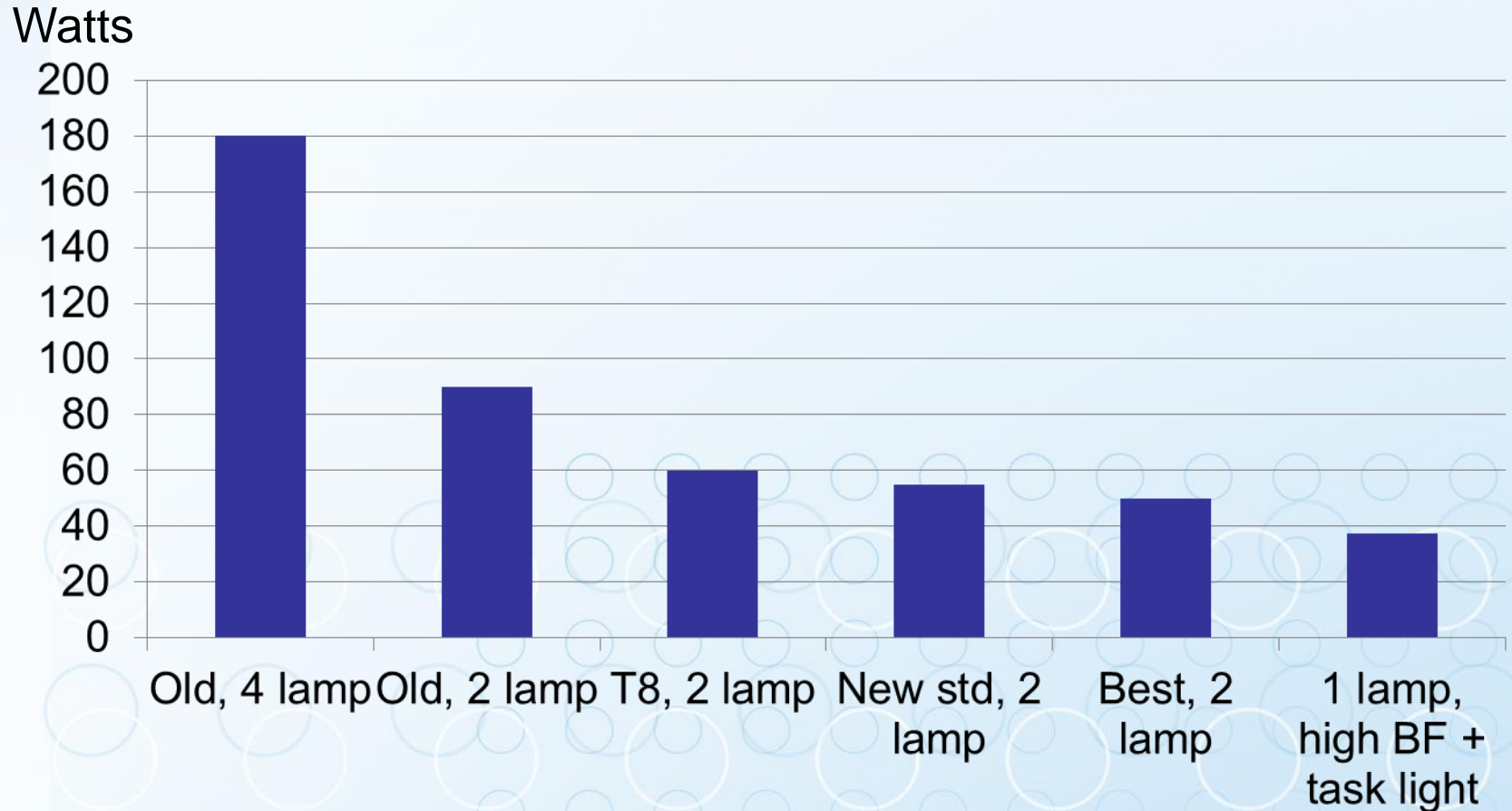


# Intelligent Efficiency in Buildings

- Use data and sensors to identify problems, then solve them
- NRDC study of 3 ~Energy Star offices using OnSite achieved 13% average savings. Other vendors report similar results

	Square Feet	2012 Occupancy	KWH Used		Study Period Savings	
			2011	2012	%	\$
<b>1707</b>	109,926	302	1,965,135	1,516,274	23%	\$ 58,352
<b>1828</b>	332,928	928	5,590,937	5,227,183	7%	\$ 47,288
<b>1909</b>	239,128	462	5,197,305	4,327,589	17%	\$ 113,063
		<b>Total</b>	<b>12,753,377</b>	<b>11,071,046</b>	<b>13.2%</b>	<b>\$ 218,703</b>

# Fluorescent Fixture Comparison



# Lighting Design

- Move to one-lamp fixtures
- Task-ambient design
- Tunable ballasts
- Can influence lighting design at the time of tenant fit-out



# Lighting Controls

- Occupancy sensors
- Photosensors -- daylight dimming



## LED Lighting

- Directional (reflector) lamps a substantial opportunity





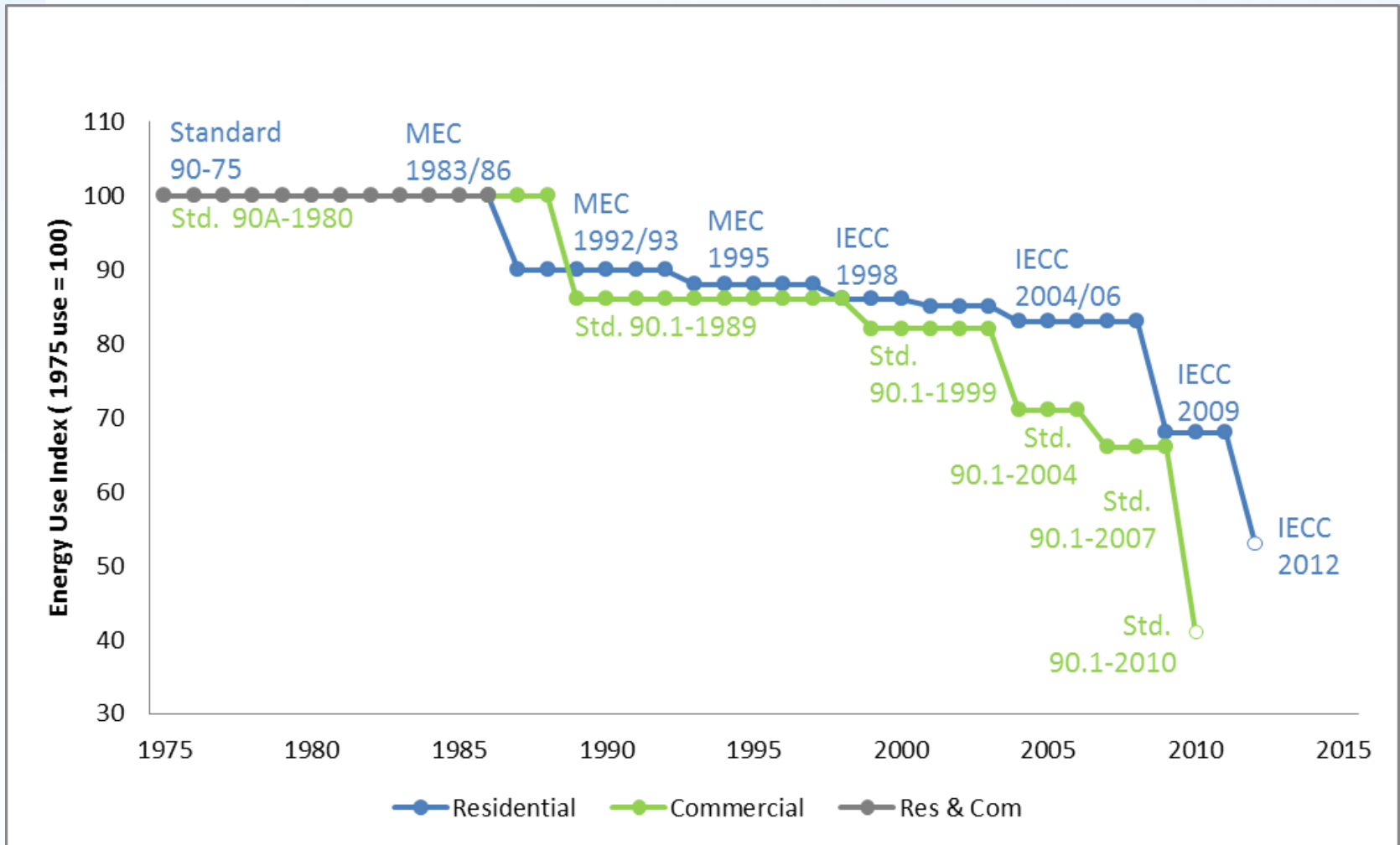
# HVAC Systems



- High IEER rooftop systems – DOE Rooftop Challenge for IEER >18
  - Daikin/McQuay and Carrier have products
- O&M – ETO a leader
- Chillers:
  - Optimize entire system. PG&E has “Cool Tools”
  - Use water cooled, not air-cooled
- Condensing gas boilers



# History of Building Code Revisions in the United States



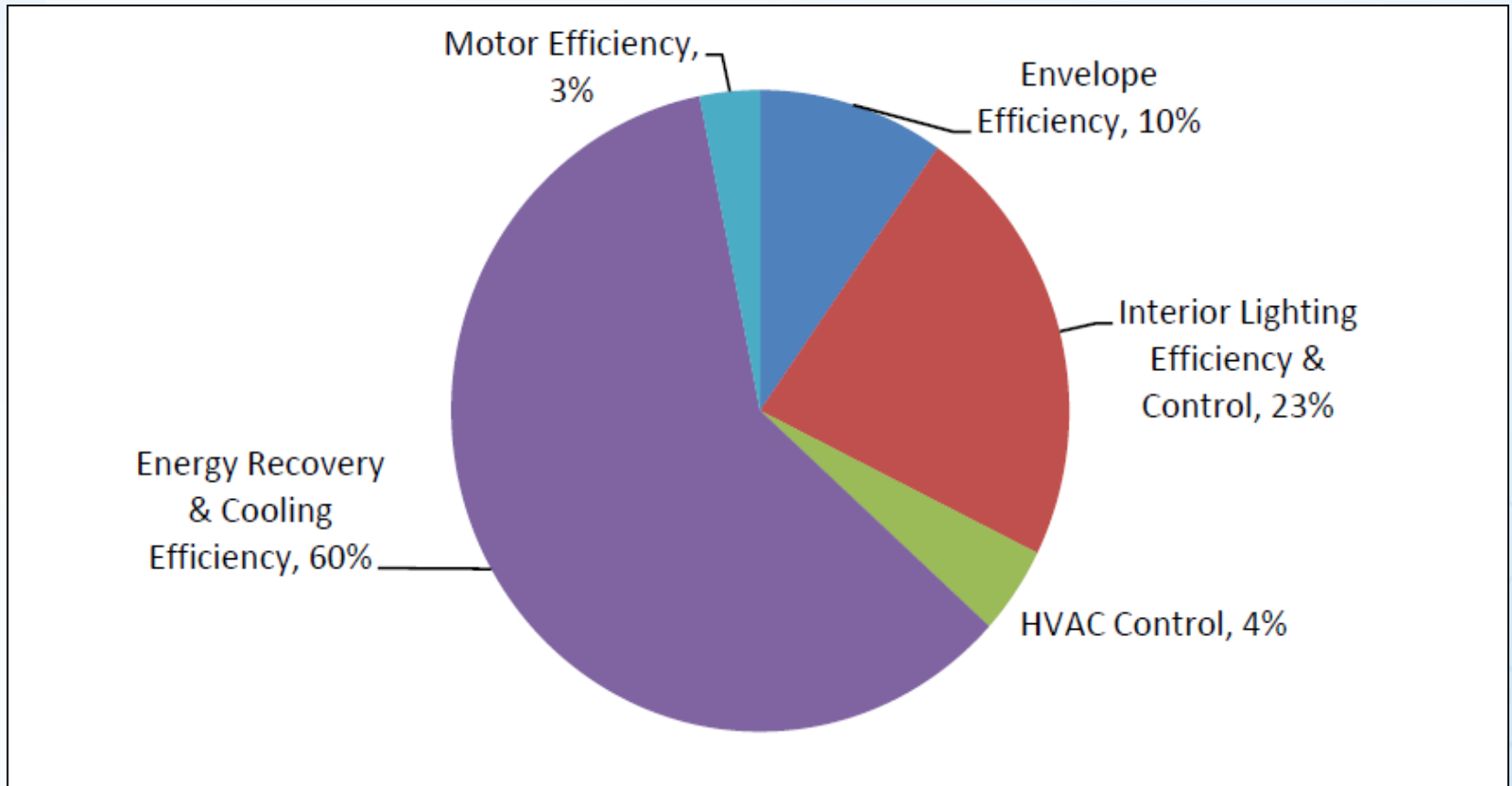
# Building Code Savings Opportunities



- Adopt latest codes – 90.1-2010 (soon 2013) and IECC 2012
- Promote reach codes thru new construction programs and local codes
  - Massachusetts a good model
- Improve code implementation
- More states are allowing utilities to receive credit where they are active

# New York Code Compliance Study

## Commercial Lost Savings by Building Component

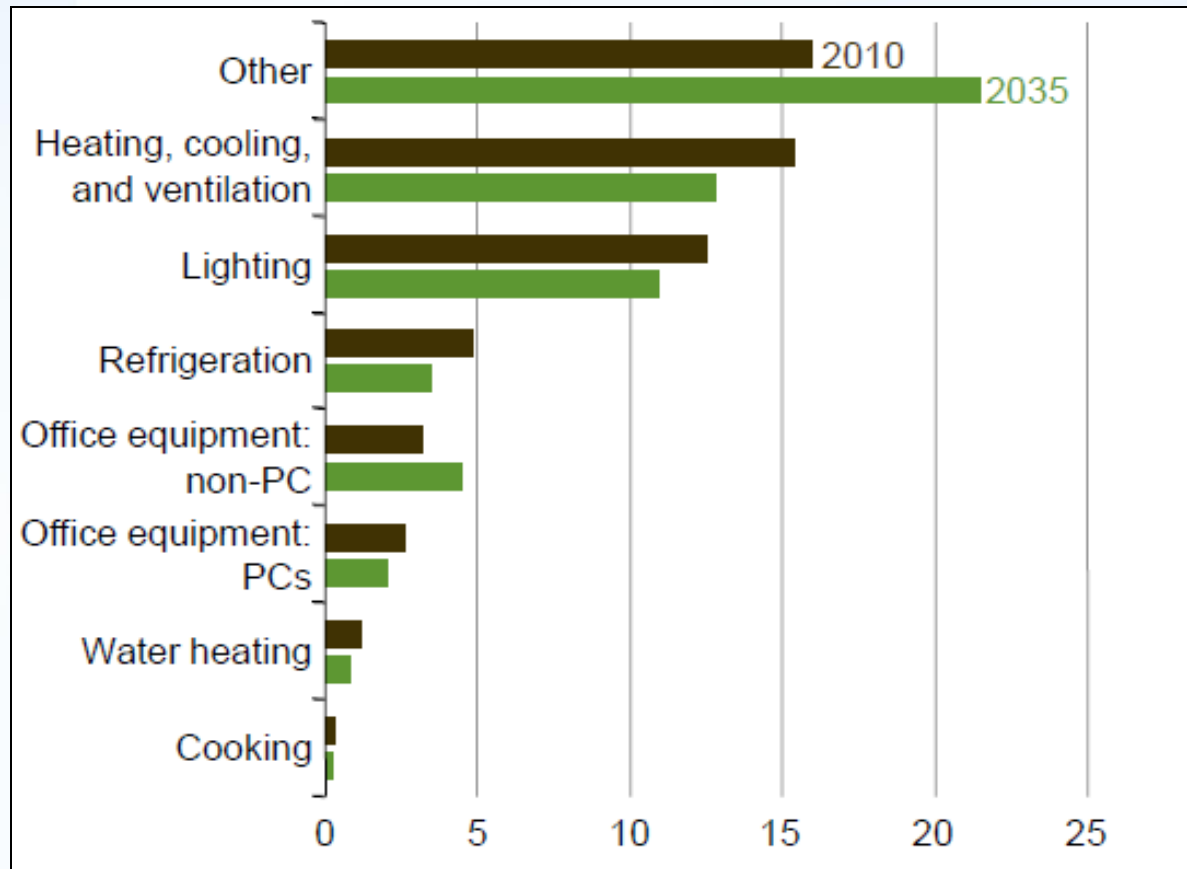




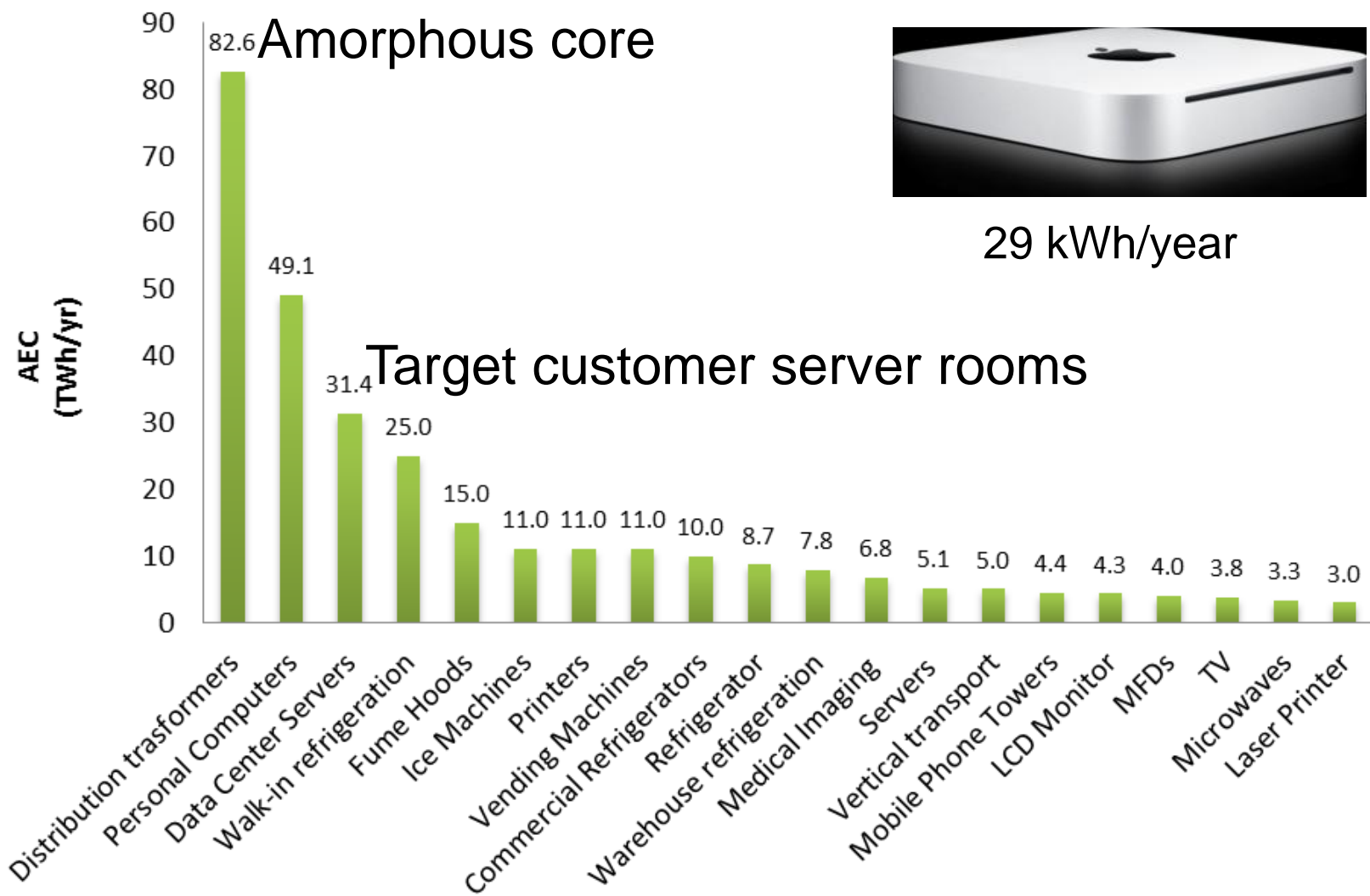
# Opportunities for Future Code Improvements



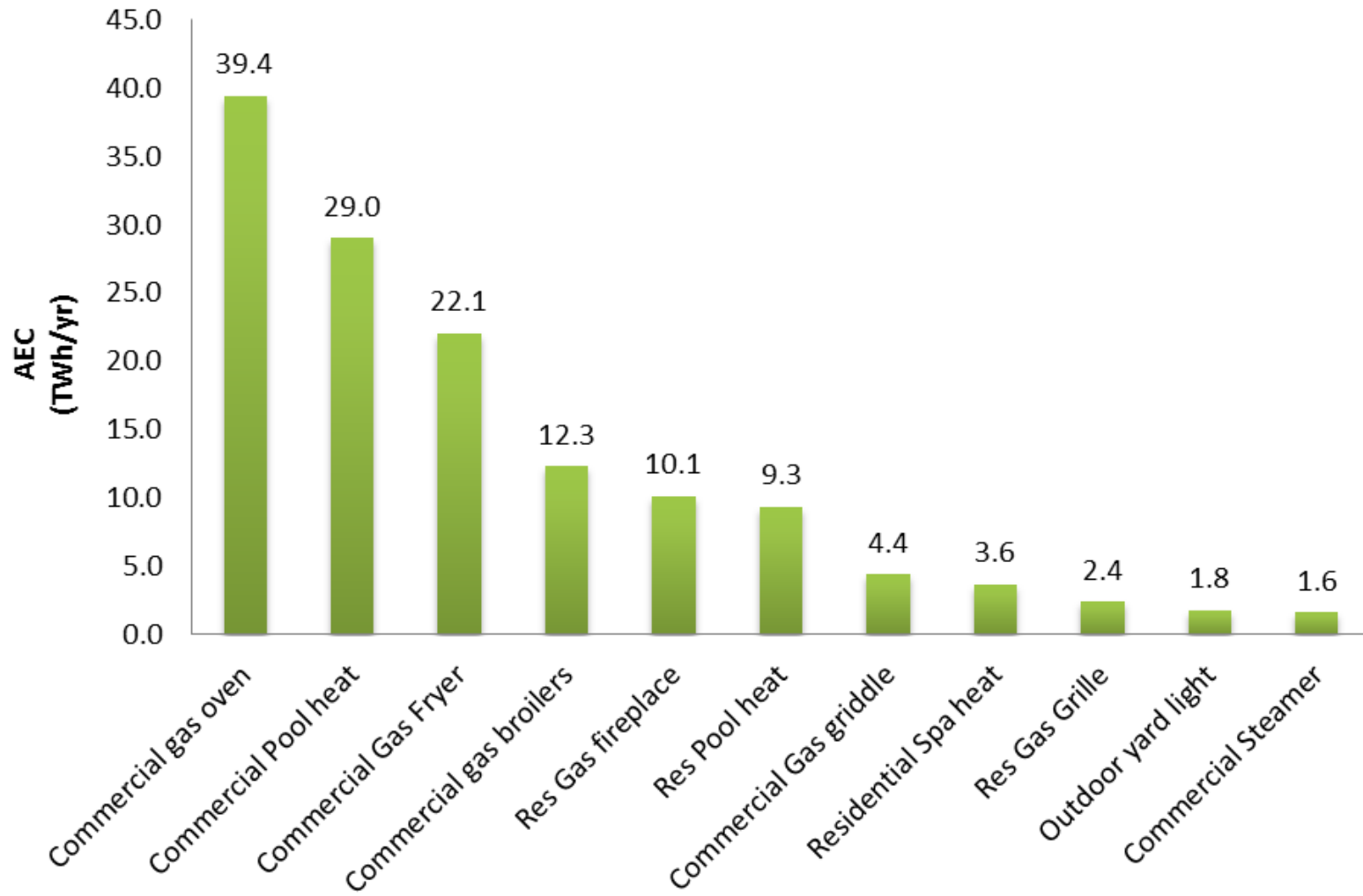
# Change in Commercial Electricity Consumption (2010-2035, kBtu/sf)



# Top 20 Commercial MELs



## Top Gas MELs

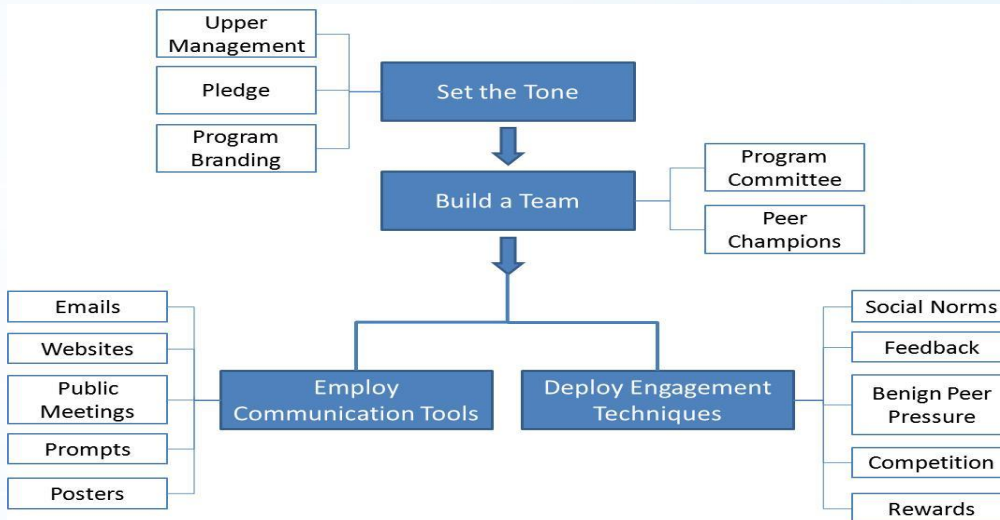




# Influencing Behavior in the Commercial-Sector

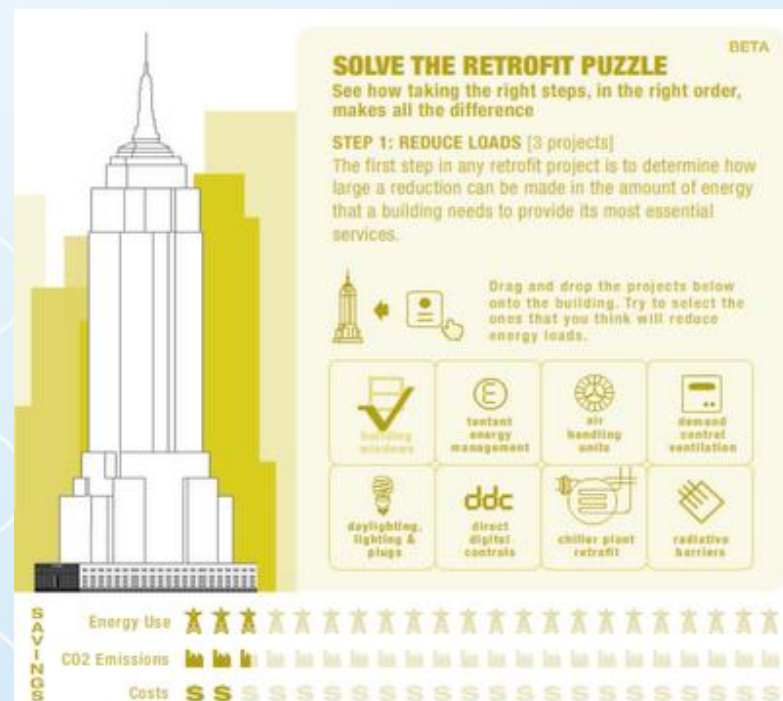
	U.S.	Canada
Government	"Green the Capitol" at U.S. House of the Representatives	Behavior Campaign in a Provincial Government Building
Government-Owned Utility		"Conservation Action!" at BC Hydro
Public Research University-Owned Hospital		"TLC-Care to Conserve" at University Health Network of University of Toronto
Historical, Landmark Building	"Tenant Energy Management Program" at Empire State Building	

Savings of 4%, 4%, 5% & 12% documented

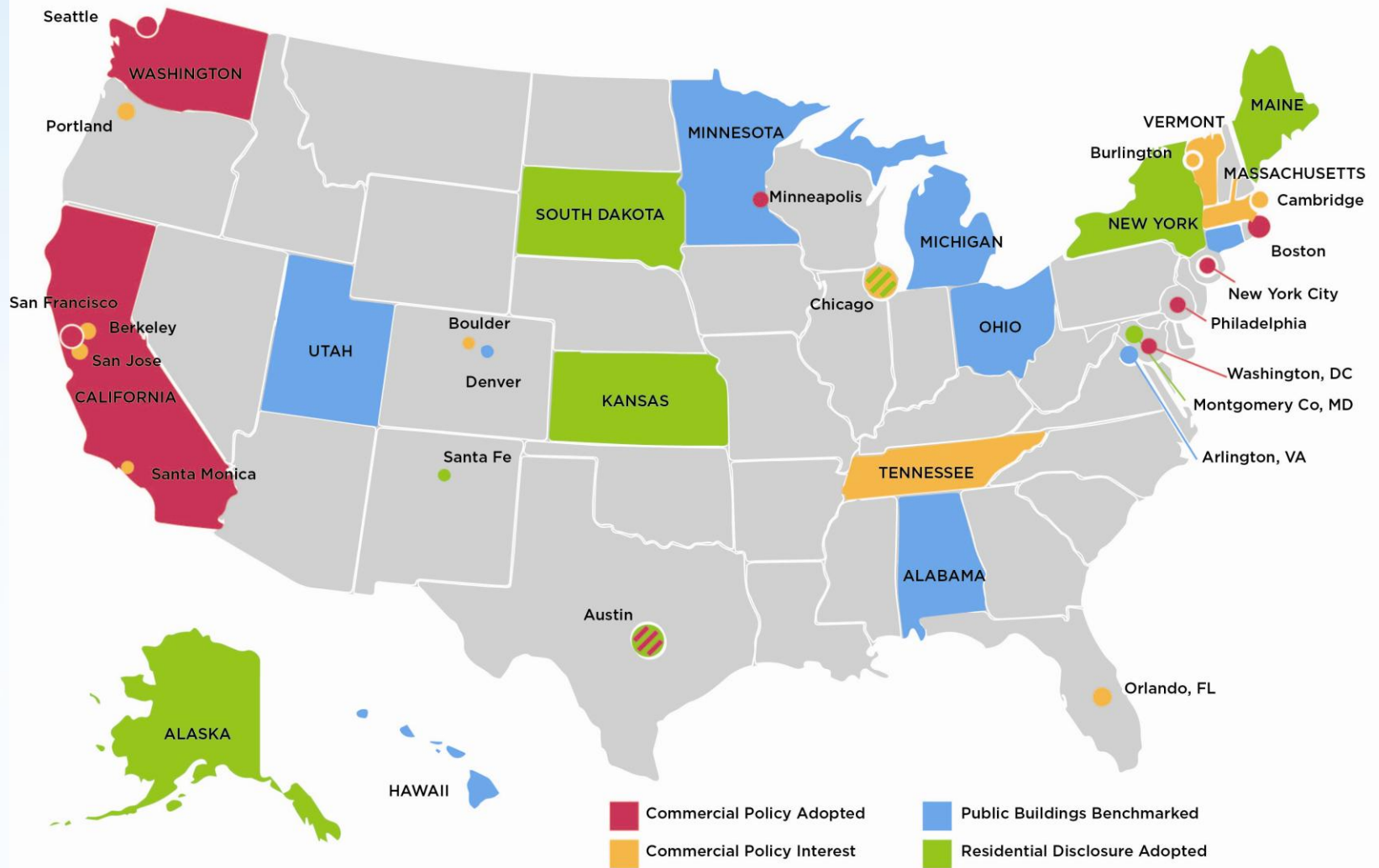


# Commercial Retrofits

- Look for buildings that are doing major retrofits to modernize
- For other buildings, develop a multi-year plan and do in stages
- Leverage building benchmarking and disclosure



# U.S. Building Benchmarking and Disclosure Policies



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# NStar Memorandum of Agreement

- Target top 150 customers who represent 50% of sales
- Multiyear MOUs with mutual commitments to address individual customer needs – now have 15
- After 2 full years saving ~180 GWh/year (statewide goal to save 1500 GWh in 2 yrs)
- Customized incentives, capped at portfolio average
- MIT Efficiency Forward – 3 year effort to save 15%





# Vermont Energy Efficiency Challenge



- Targets 300 largest customers; asked them to commit to 7.5% savings goal over 2 years
- Provide TA, incentives
- Change discussion to “what will we do this year”
- 69 participants
- As of 4/13, 16 companies had met or exceeded Challenge goal and 13 companies were close

# Contact Information

Steven Nadel

[snadel@aceee.org](mailto:snadel@aceee.org)

202-507-4000

[www.aceee.org](http://www.aceee.org)

