

# Energy Efficiency: Reducing Pollutant Emissions and Improving Public Health

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Energy Symposium  
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# Southwest Energy Efficiency Project (SWEET)

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- ❑ Public interest organization promoting greater energy efficiency in AZ, CO, NV, NM, UT, and WY
- ❑ Founded in 2001, based in Boulder, CO
- ❑ Programs focused on improving energy efficiency in the utility, buildings, industry and transportation sectors
- ❑ Funding provided by charitable foundations and governmental entities

# Energy Efficiency Basics

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- Energy efficiency = doing more with less
- Efficiency measures include CFLs, ENERGY STAR appliances, better building insulation, efficient windows and HVAC systems, high efficiency motors, control systems, etc.
- Efficiency typically costs 2-4 cents per kWh saved, 1/4 to 1/2 the cost of supplying electricity from any type of power source
- Most consumers (homes, businesses, etc.) can save 20% or more very economically

# Energy Efficiency and Pollutant Emissions

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- ❑ Energy efficiency reduces the consumption of electricity, thereby reducing operation of fossil fuel-based power plants
- ❑ Reducing power plant operation lowers SO<sub>2</sub>, NO<sub>x</sub>, particulates, HG, and CO<sub>2</sub> emissions
- ❑ Lower pollutant emissions improves public health by lowering mortality and morbidity, which are real (but externalized) costs
- ❑ Reduces the cost for compliance with clean air standards

# Hidden Costs of Energy – NAS study published in Nov. 2009

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- ❑ Health and other damages from air pollution emitted by coal-fired power plants in 2005 - \$62 billion (3.2 ¢/kWh)
- ❑ Health and other damages from air pollution emitted by vehicles in 2005 - \$56 billion (1.3 ¢/mile driven for light vehicles)
- ❑ Damages from criteria pollutants only!
- ❑ Other studies that include costs associated with mercury, other air toxics, and CO<sub>2</sub> emissions estimate much higher total costs

# Full Life Cycle Costs of Coal-based Electricity – Paul Epstein et. al. 2011

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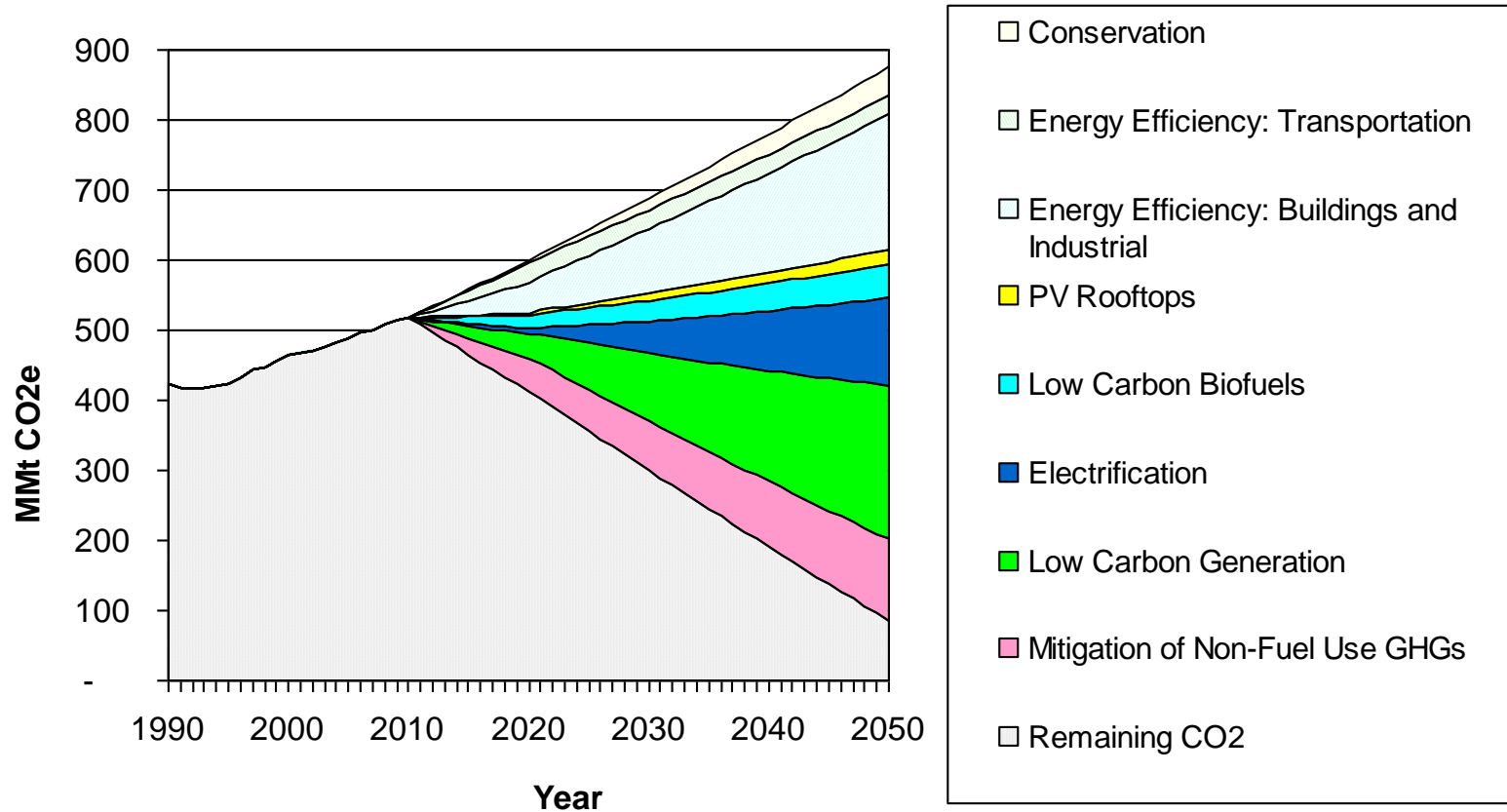
- Health costs in Appalachia - \$75 billion/yr
- Healthcare and early deaths due to air pollution (mostly PM<sub>2.5</sub>)- \$187 billion/yr
- Climate change damages - \$21-\$216 billion, best guess - \$64 billion (\$30/ton of CO<sub>2</sub>)
- Other costs - \$19 billion
- Total - \$345 billion = 17.8¢/kWh (range of 9.4-26.9¢/kWh)

Source: Annals of New York Academy of Sciences 1219 (2011)

<http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2010.05890.x/pdf>



# How to Achieve an 80% Reduction in CO<sub>2</sub> Emission in California by 2050?



Source: Energy and Environmental Economics, Inc. (E3)



# Why Emphasize Energy Efficiency as Part of a GHG Emissions Reduction Strategy?

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- ❑ Facilitates deep emissions reductions
- ❑ Reduces need for other more costly emissions reduction options
- ❑ Saves money which can offset the cost for other emissions reduction measures
- ❑ Frees up power plant capacity which can be used to convert a large fraction of the light duty vehicle fleet to electricity

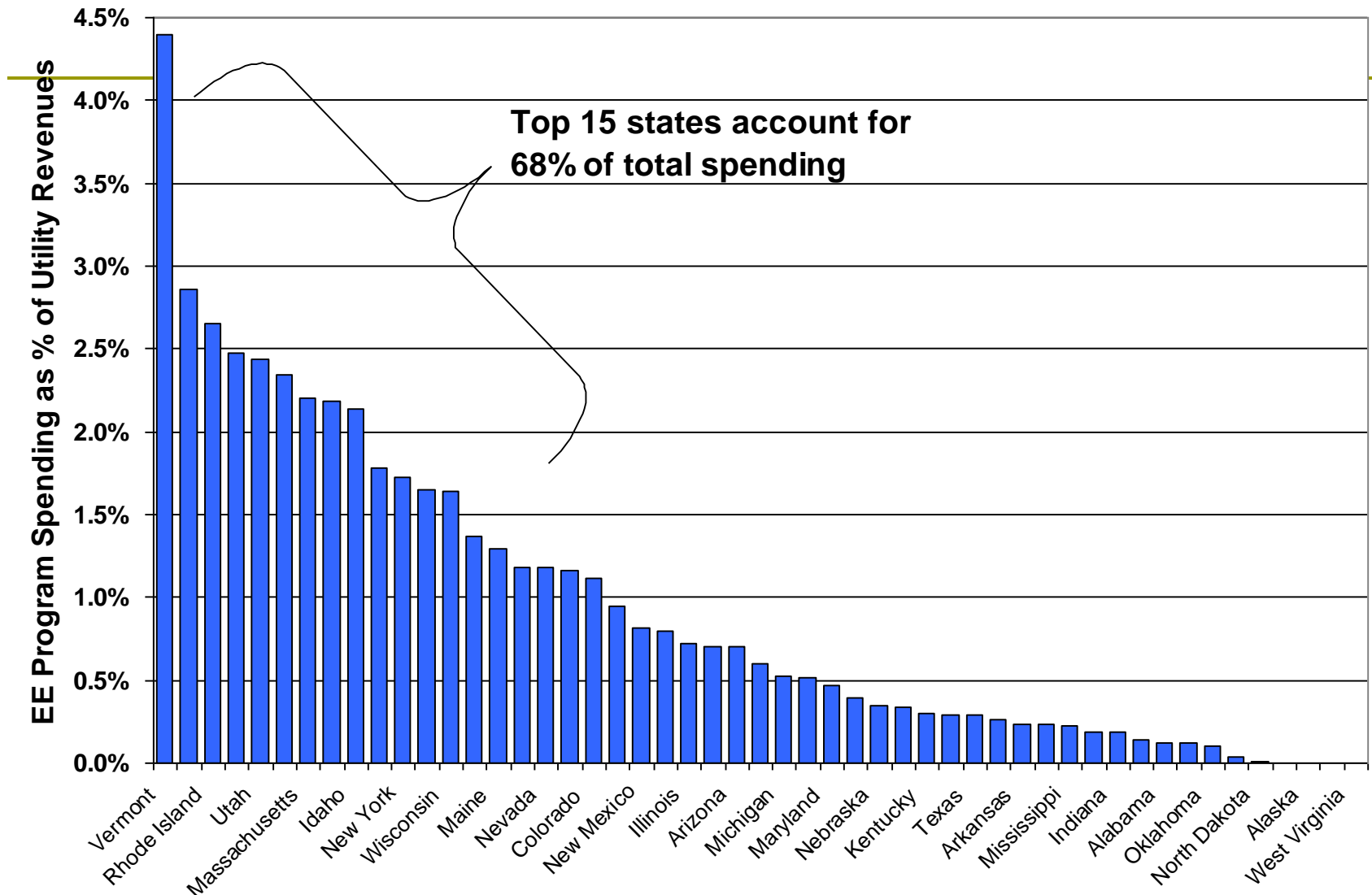
# Energy Efficiency Strategy #1:

## Utility Energy Efficiency Programs

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- ❑ Electric utilities (or third party program administrators) spent \$5.4 billion on energy efficiency programs in 2010, double the level of spending in 2007
- ❑ Gas utilities spent \$1.1 billion on energy efficiency programs in 2010
- ❑ Leading electric utilities spend 3-5% of their revenues on efficiency programs and reduce electricity use by 1.0-1.5% per year (10-15% after 10 years of effort)
- ❑ Excludes savings from codes and standards

# Ratepayer Funding for Energy Efficiency - 2009



Source: American Council for an Energy-Efficient Economy (ACEEE)

# Energy Efficiency Strategy #2: Appliance Efficiency Standards

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- National appliance standards first adopted in 1987, expanded in 1992, 2005, 2007
- Appliance standards now cover ~50 products ranging from refrigerators to fluorescent lamps to industrial motors
- Appliance standards reduced national electricity use ~7.5% and peak power demand by 72,000 MW in 2010
- By 2020, new and existing standards could cut national electricity use by 15%

# Examples of Appliance Standards

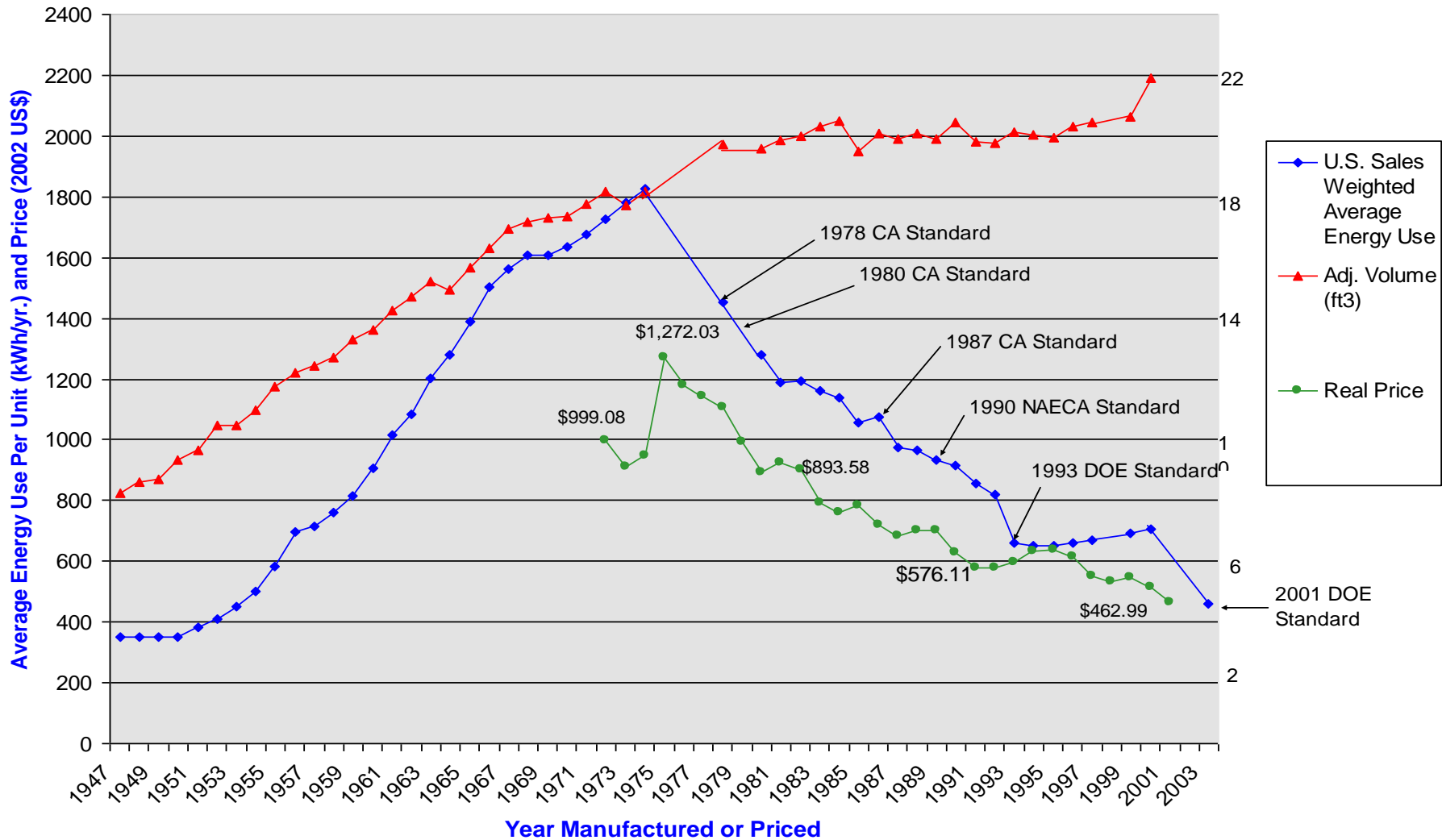
## Impacts

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- ❑ New refrigerators sold today use half as much electricity on average compared to models sold 20 years ago
- ❑ New clothes washers use far less energy and water compared to older models
- ❑ New air conditioners use 1/3 less energy



# U.S. Refrigerator Energy Use v. Time with Real Price



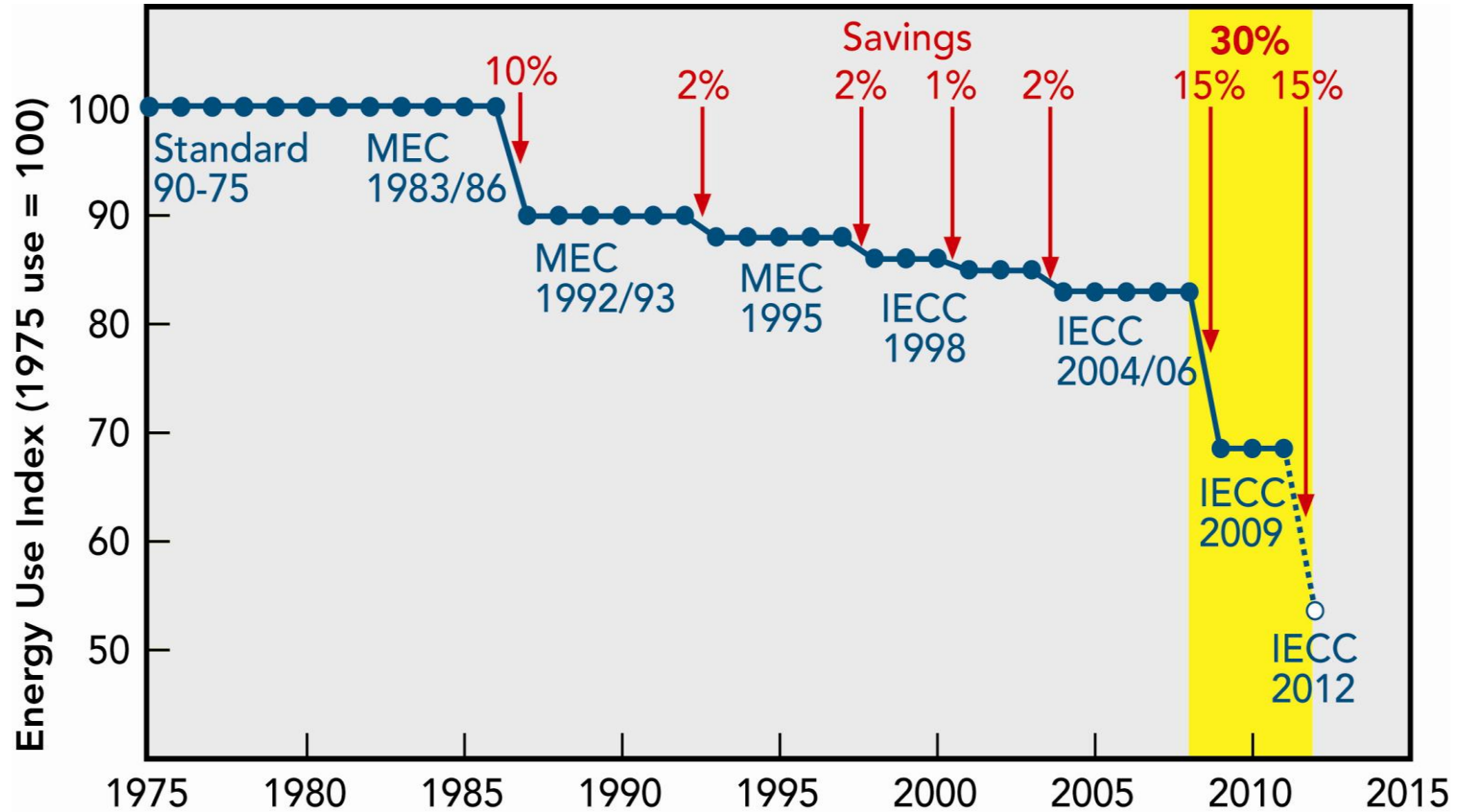
# Energy Efficiency Strategy #3:

## Building Energy Codes

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- ❑ Minimum energy efficiency requirements for new or renovated homes and commercial buildings
- ❑ Adopted at the state or local level
- ❑ Usually based on the model International Energy Conservation Code (IECC) which is updated every 3 years
- ❑ Builders can choose to meet either prescriptive requirements or overall performance requirements
- ❑ Important to enforce codes and train code inspectors, builders and contractors

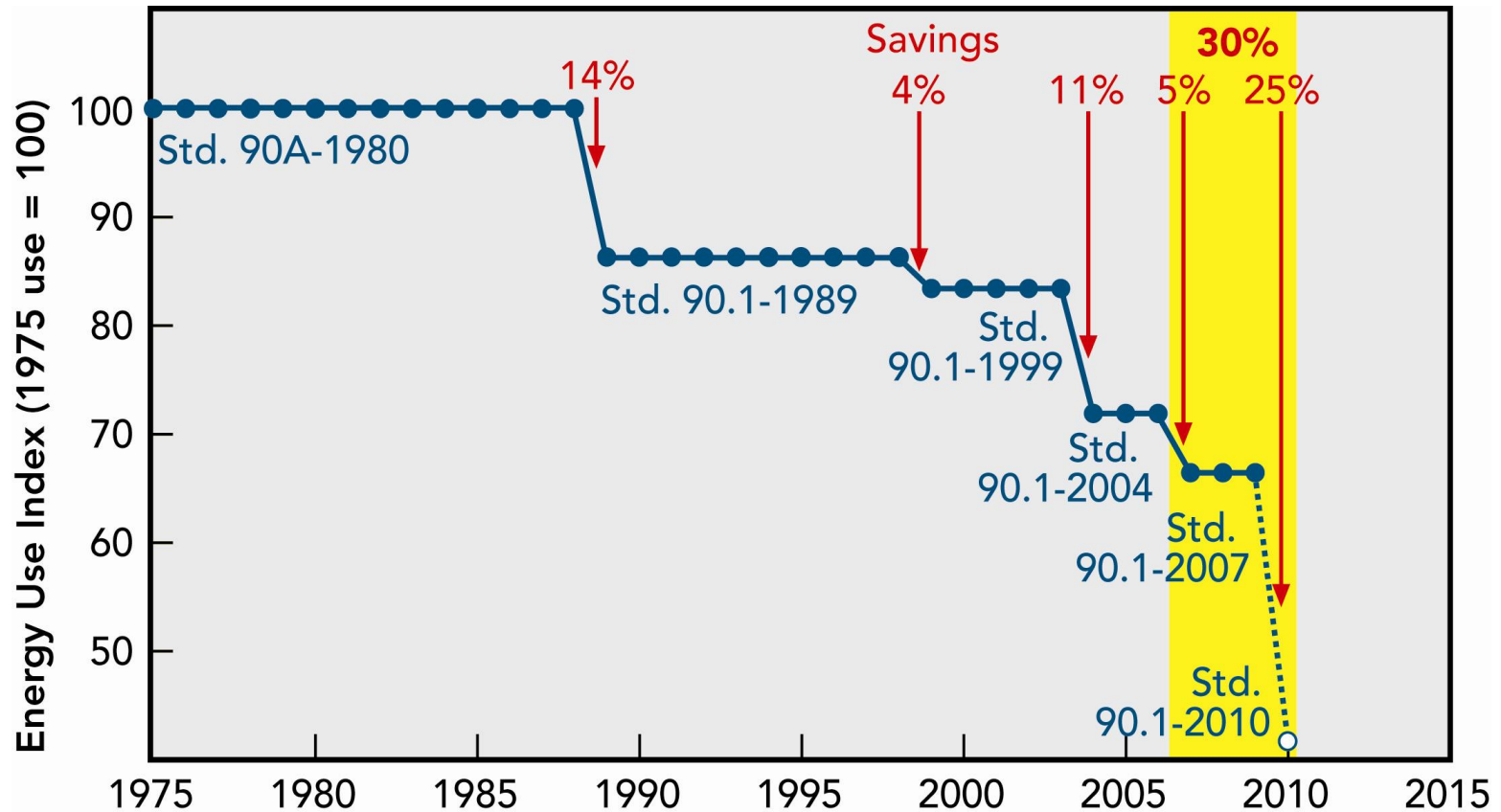
# History of Residential Building Model Energy Codes



Source: Building Energy Codes Program, U.S. DOE



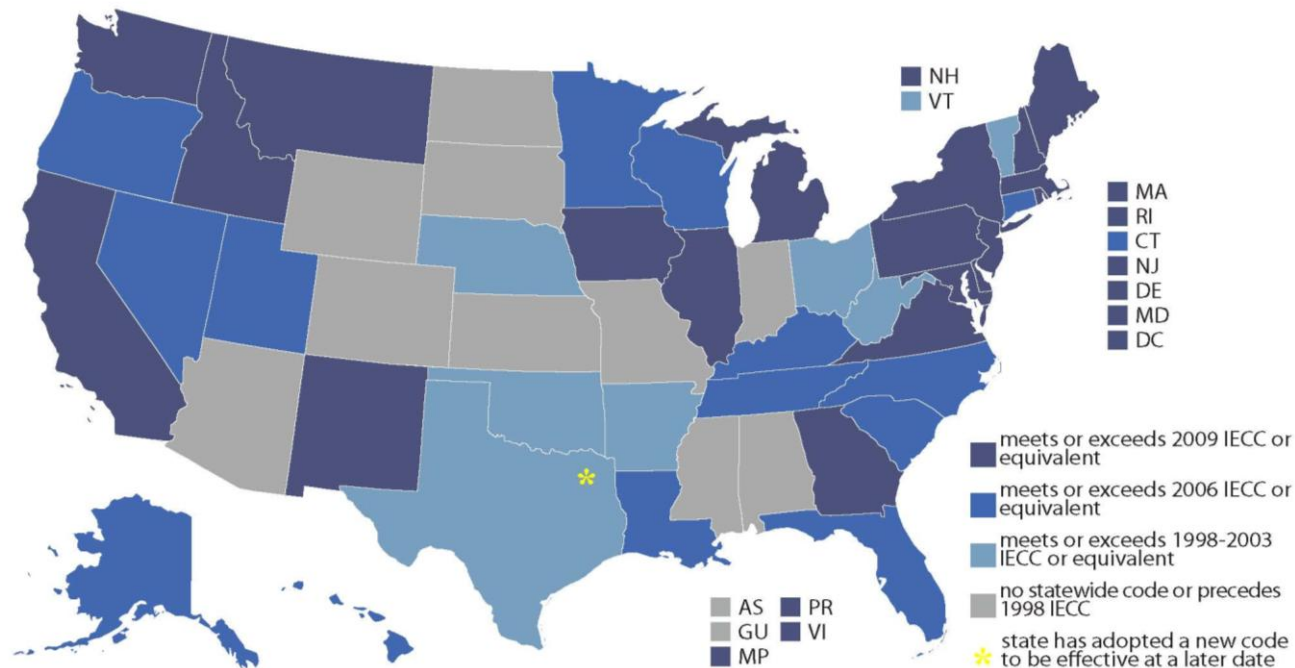
# History of Commercial Building Model Energy Codes



Source: Building Energy Codes Program, U.S. DOE

# Status of Residential Building Codes

## Residential State Energy Code Status AS OF APRIL 1, 2011



 **BCAP** Dedicated to the adoption, implementation, and advancement of building energy codes  
Get all the most up-to-date code status maps and other valuable resources at [www.bcap-ocean.org](http://www.bcap-ocean.org)

NOTE:  
These maps reflect only mandatory statewide codes currently in effect.

# Last but Not Least: Don't underestimate the power of the polluters!

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Happy Earth Day to someone  
who I'm fairly sure thinks global  
warming is a myth.

someecards



# **SWEEP:**

*Dedicated to More Efficient Energy Use in the Southwest*

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Resources available online at:

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

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