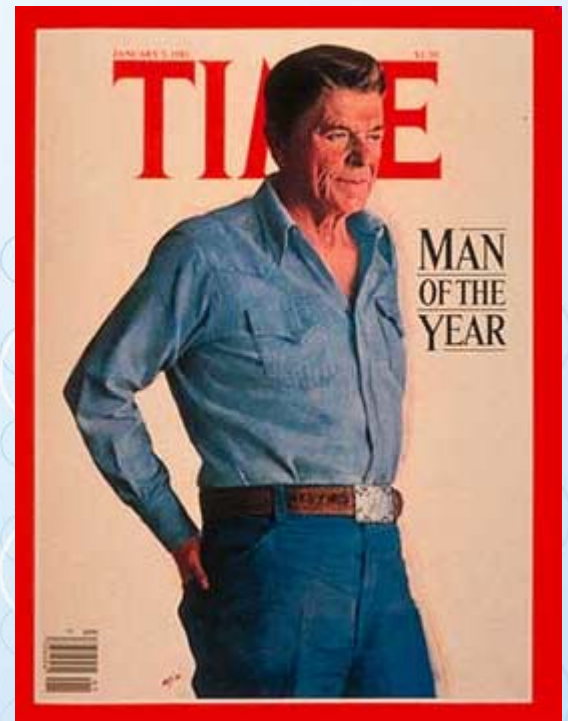
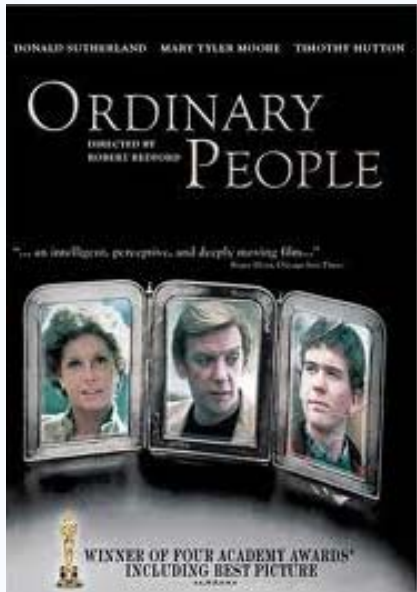
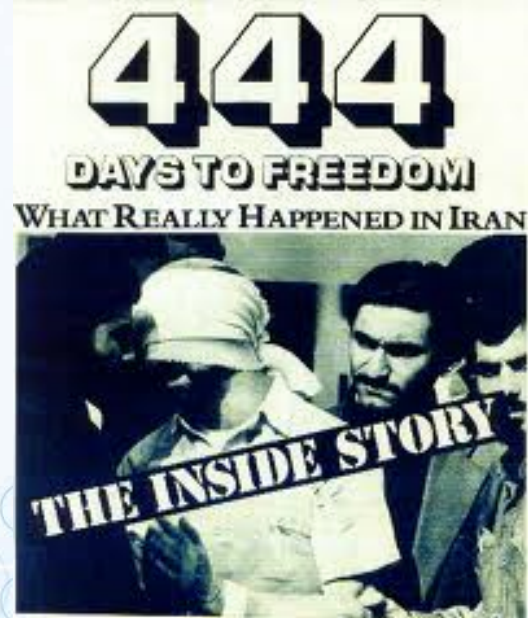


# Energy Efficiency: Needed in 1980, Needed Now

Steven Nadel, ACEEE  
ACEEE Policy & Analysis Conference  
December 2010



# 1980

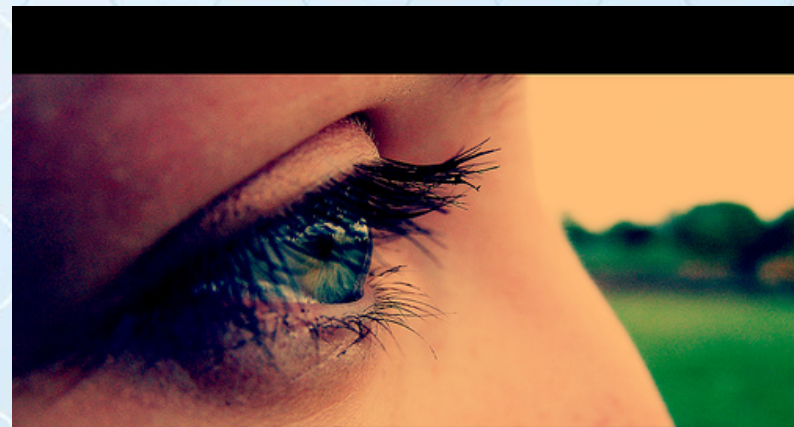


# ACEEE::30

30 Years of Energizing Efficiency

**Much Has Been Accomplished in the  
Past 30 Years...**

**But Much Left to Do**



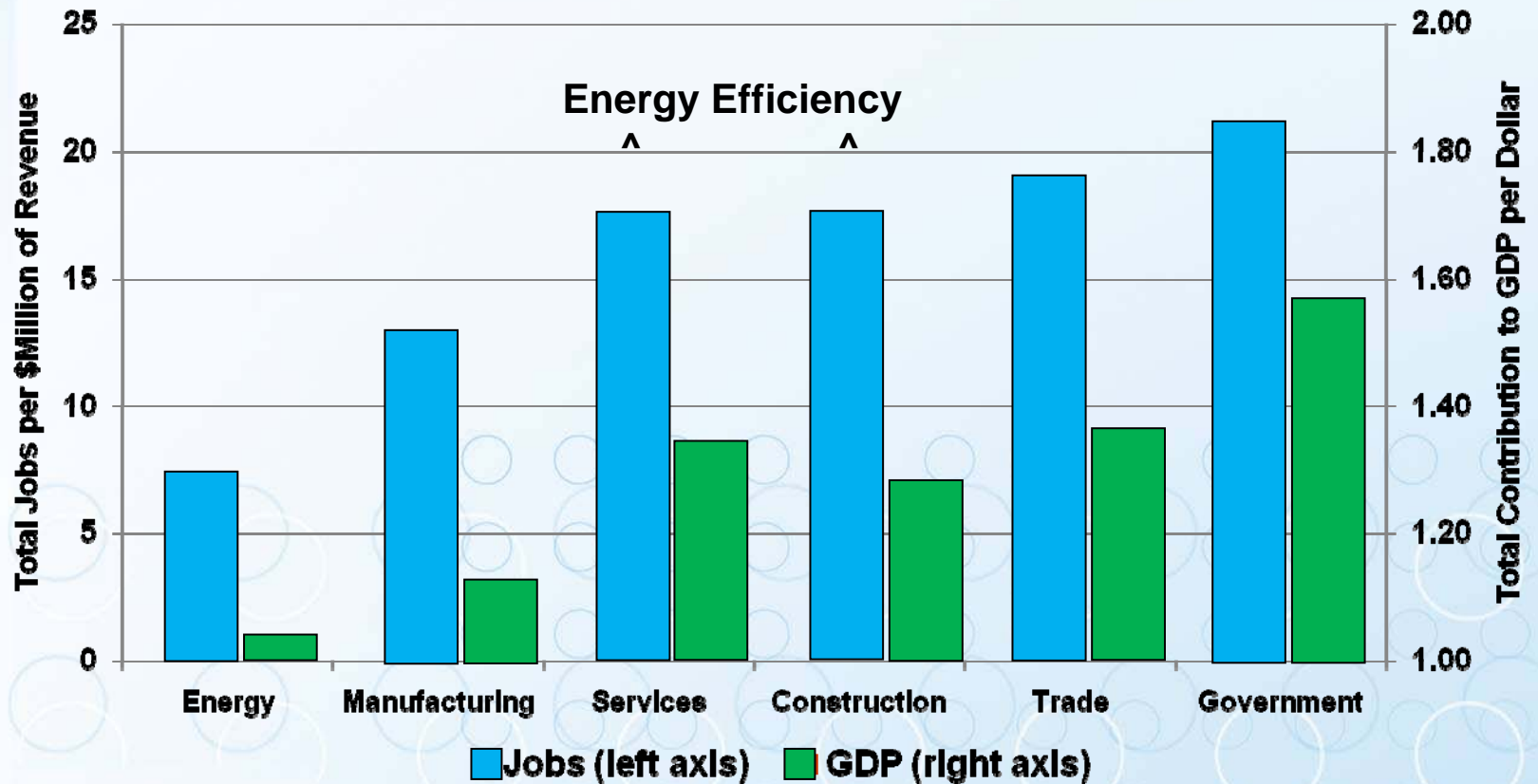


# Why Efficiency?

- Economy
  - Creates jobs
  - Enables growth
  - Improves reliability, reduces price volatility
- Security
  - Reduce imports, vulnerabilities
- Environment
  - Reduce emissions
  - Less damage from energy development



# Energy Productivity Shifts Spending To Greater Labor and GDP Impacts



# Manufacturers of Efficient Equipment



Lennox furnaces & AC,  
Marshalltown, IA  
Rheem AC and Trane  
furnaces, Fort Smith,  
AR



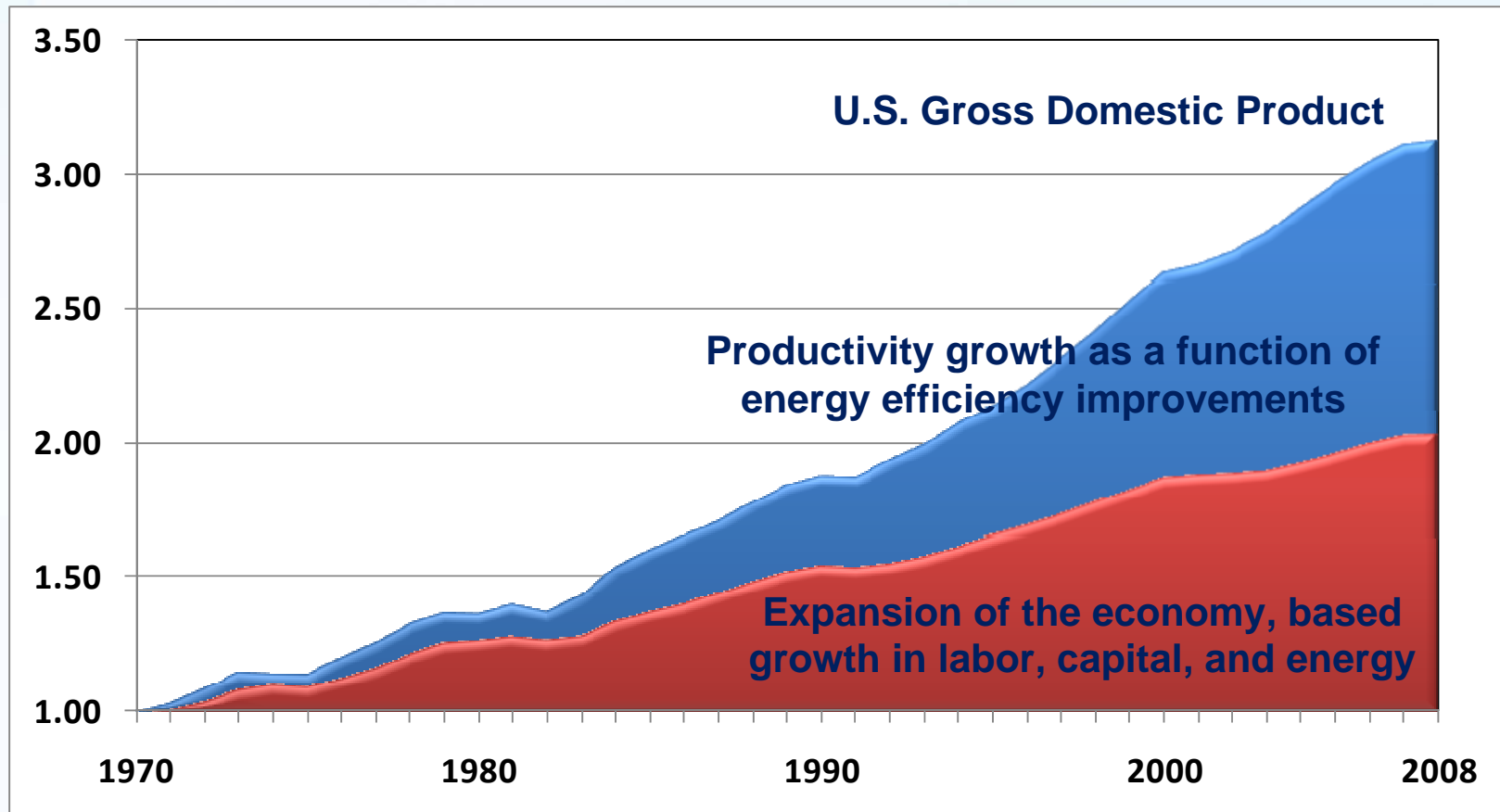
Whirlpool, Amana IA,  
Fort Smith, AR,  
Clyde, and Ottawa,  
OH;  
GE, Louisville, KY



Baldor Motors, Fort  
Smith, AR  
Emerson Motors, St. L.  
and Mena, AR

# U.S. GDP Expansion as a Function of Energy Efficiency Improvements, 1970-2008

GDP Index (1970=1)



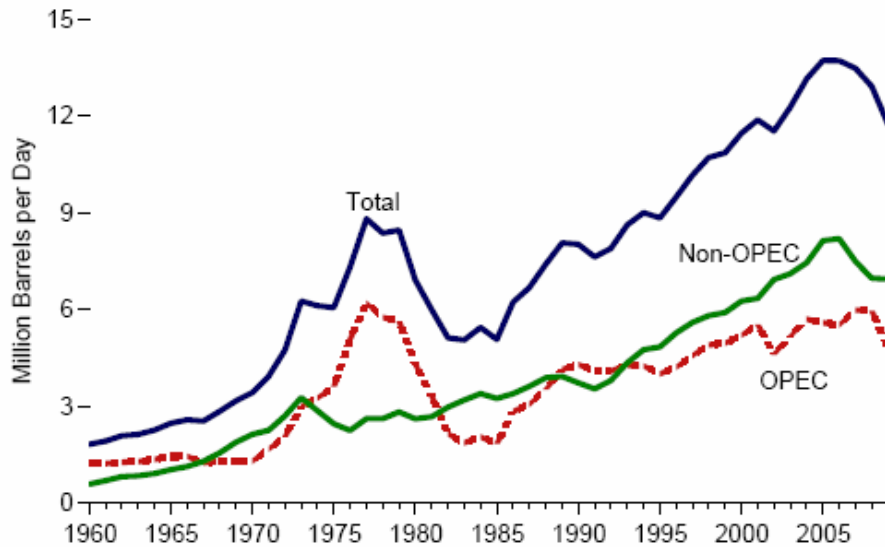
# Key Policies Supporting Chinese Goal to Reduce Energy Intensity 20%

| Energy Policies   | Date Effective | Responsible Agency   |
|---|----------------|--|
| Fuel Consumption Limits For Passenger Cars  | 2004           |  |
| Medium and Long-Term Plan for Energy Conservation   | 2005           | National Development and Reform Commission (NDRC)                        |
| Renewable Energy Law  | 2005           |  |
| Government Procurement Program  | 2005           | NDRC and Ministry of Finance (MOF)                                       |
| National Energy Efficient Design Standard for Public Buildings  | 2005           | Ministry of Construction (MOC)   |
| Eleventh Five-Year Plan   | 2006           | NDRC   |
| The State Council Decision on Strengthening Energy Conservation   | 2006           | State Council  |
| Revised Consumption Tax for Larger, Energy-Inefficient Vehicles   | 2006           | MOF and the State Administration of Taxation                             |
| Reduced Export Tax Rebates for Many Low-Value-Added But High Energy-Consuming Products  | 2006           | MOF  |
| Top-1000 Energy-Consuming Enterprise Program  | 2006           | NDRC   |
| "Green Purchasing" Program  | 2006           | Ministry of Environmental Protection (MEP) and MOF                       |
| Revision of Energy Conservation Law   | 2007           | National People's Congress and NDRC                                      |
| Allocation of Funding on Energy Efficiency and Pollution Abatement  | 2007           | MOF and NDRC   |
| China Energy Technology Policy Outline 2006   | 2007           | NDRC and the Ministry of Science and Technology                          |
| Government Procurement Program  | 2007           | NDRC and MOF   |
| National Phase III Vehicle Emission Standards   | 2007           |  |
| Interim Administrative Method for Incentive Funds for Heating and Metering and Energy Efficiency Retrofit for Existing Residential Buildings in China's Northern Heating Area | 2007           | MOF  |
| Law on Corporate Income Tax (preferential tax treatment for investment in energy-saving and environmentally-friendly projects and equipment)                                  | 2008           | NDRC   |
| Allocation of Funding on Energy Efficiency and Pollution Abatement  | 2008           | MOF and NDRC   |
| Appliance Standards and Labeling  | Various Years  | General Administration of Quality Supervision, Inspection and Quarantine |

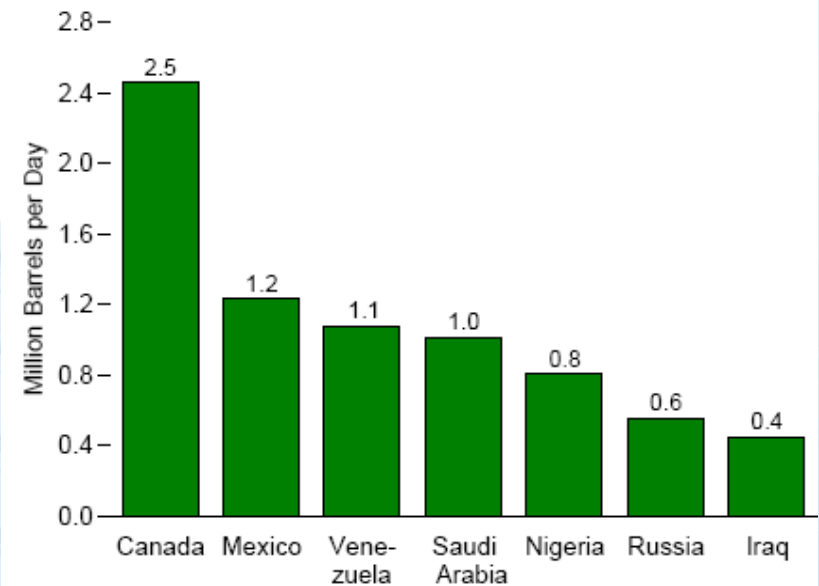


# Oil Imports by Country of Origin

Total, OPEC, and Non-OPEC, 1960-2009



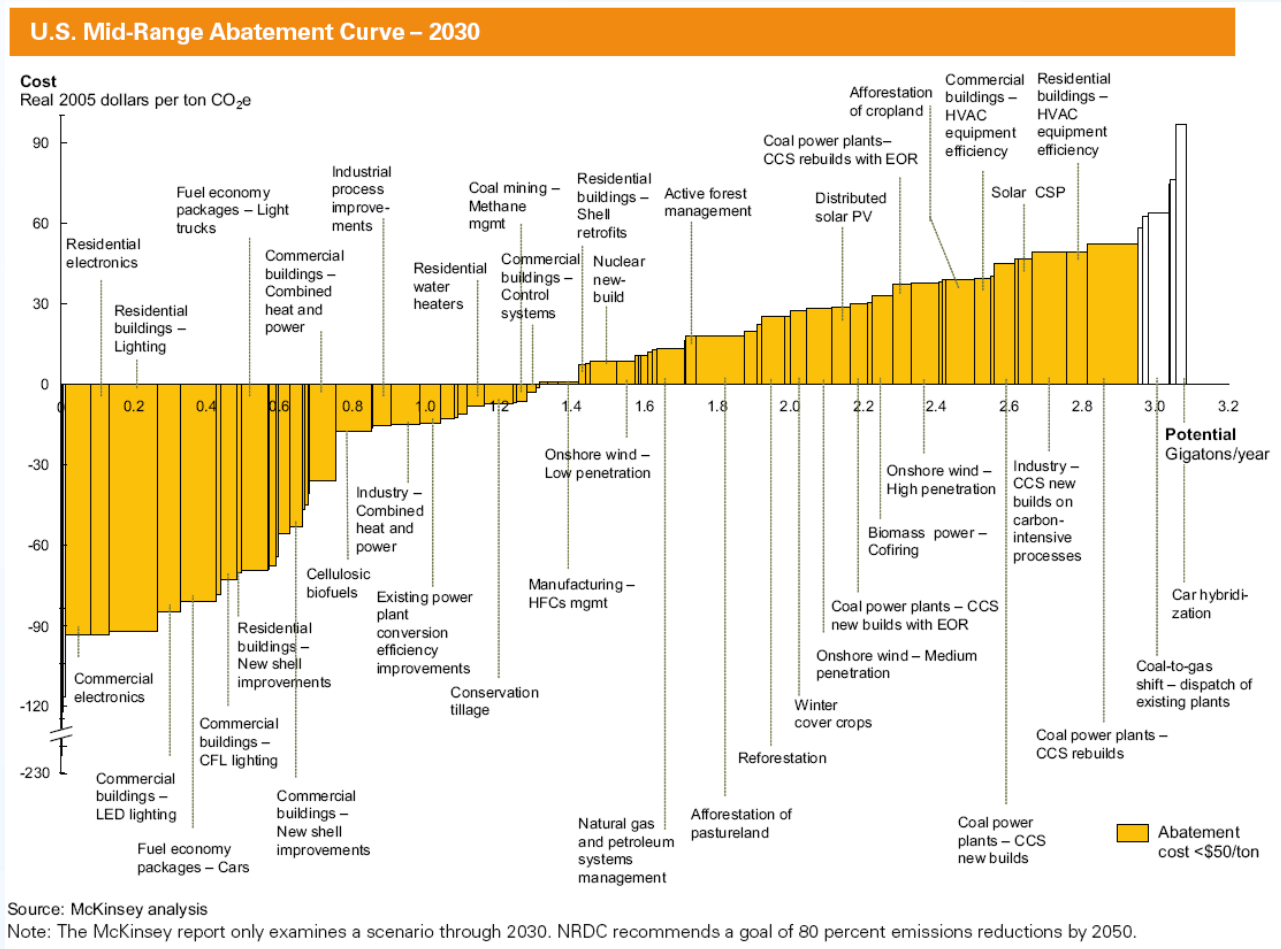
Selected Countries, 2009



Source: EIA, AER 2009



# McKinsey Global's Analysis of Carbon Reduction Potential



# 30 Years of ACEEE Accomplishments

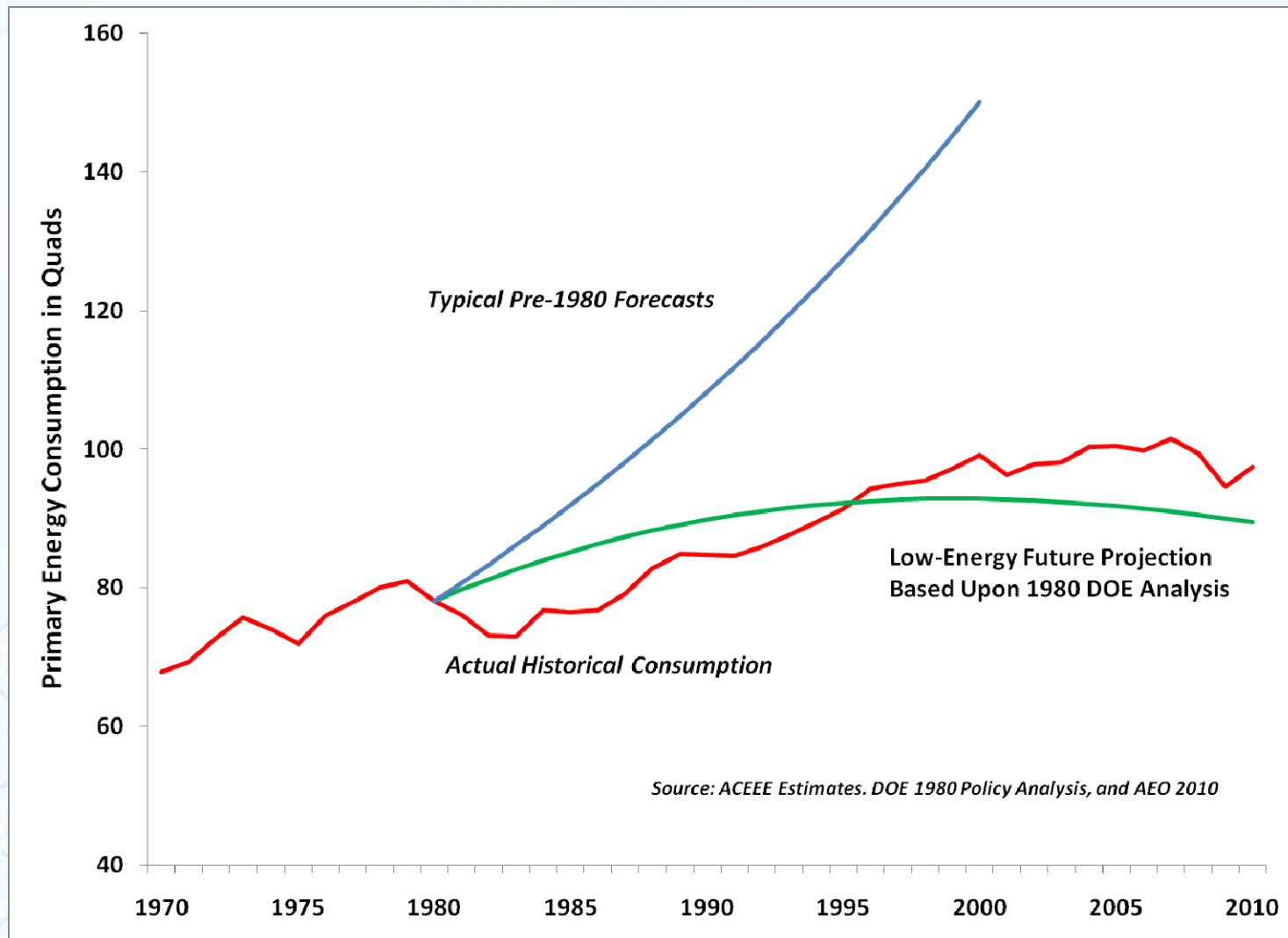
- Hosted over 60 conferences since 1980
- Over 200 research reports published
- Lead negotiator on consensus efficiency standards adopted in 1987, 1988, 1992, 2005 and 2007
- Active in state policy, working in more than 30 states
  - E.g. contributed to legislation in CT, FL, IL, MA, MD, MI, NM, NY, OH, OR, PA, RI, TX, VA, WA, WI
- Major contributor to other provisions in federal and state legislation and regulation



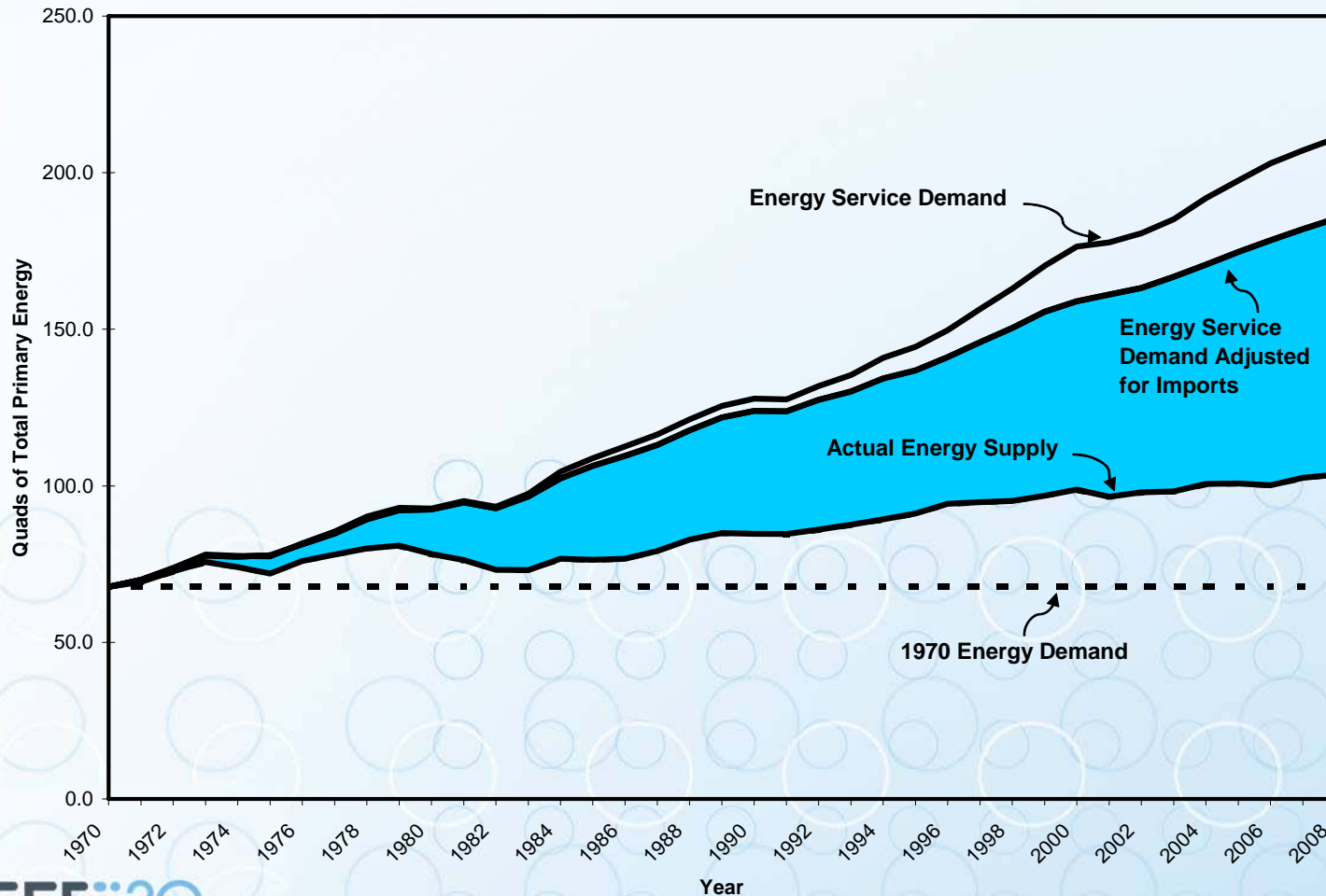


**ACEEE::30**  
30 Years of Energizing Efficiency

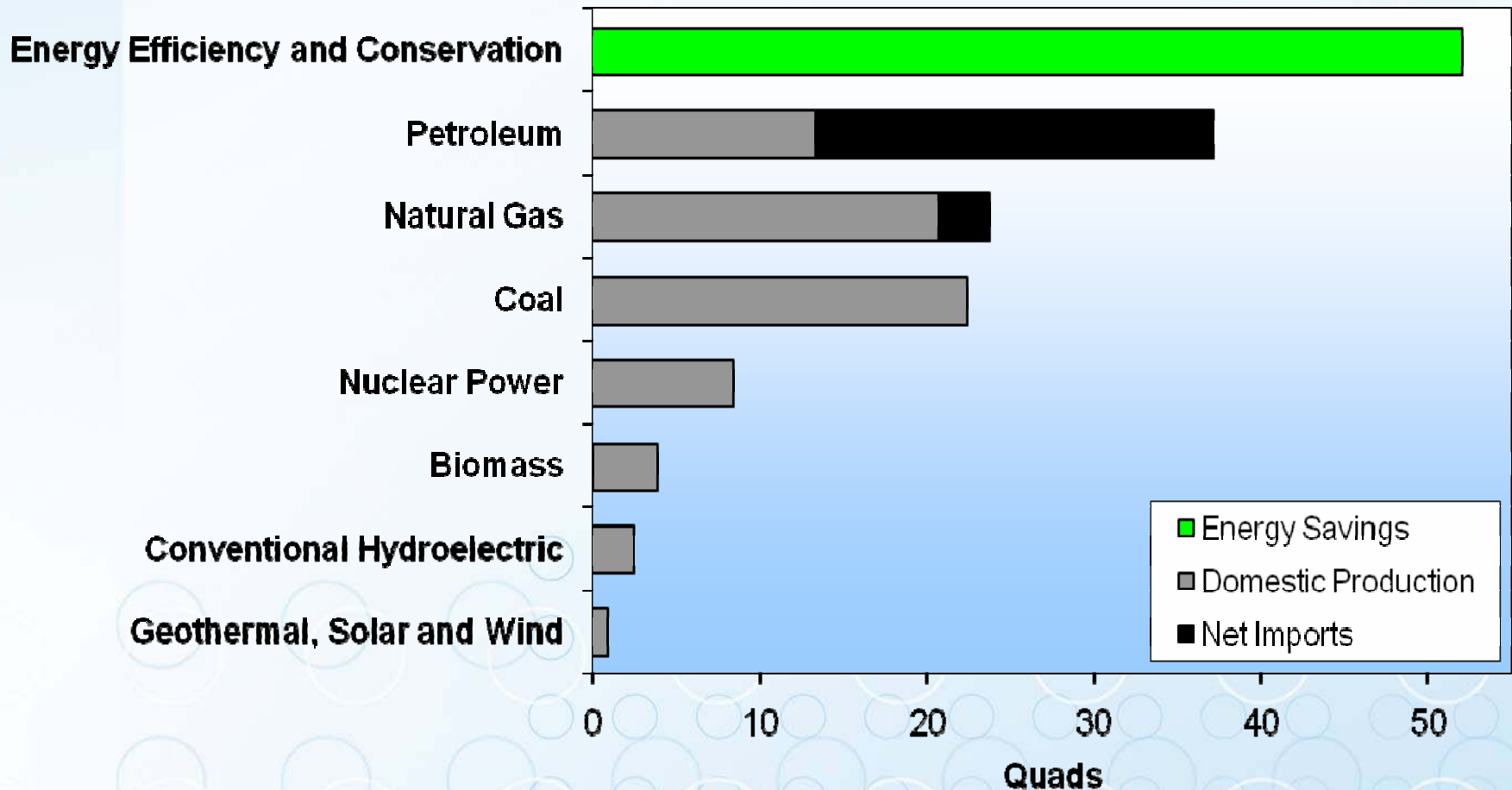
# Projections of U.S. Energy Use



# U.S. Energy Use in Relation to GDP 1970-2008



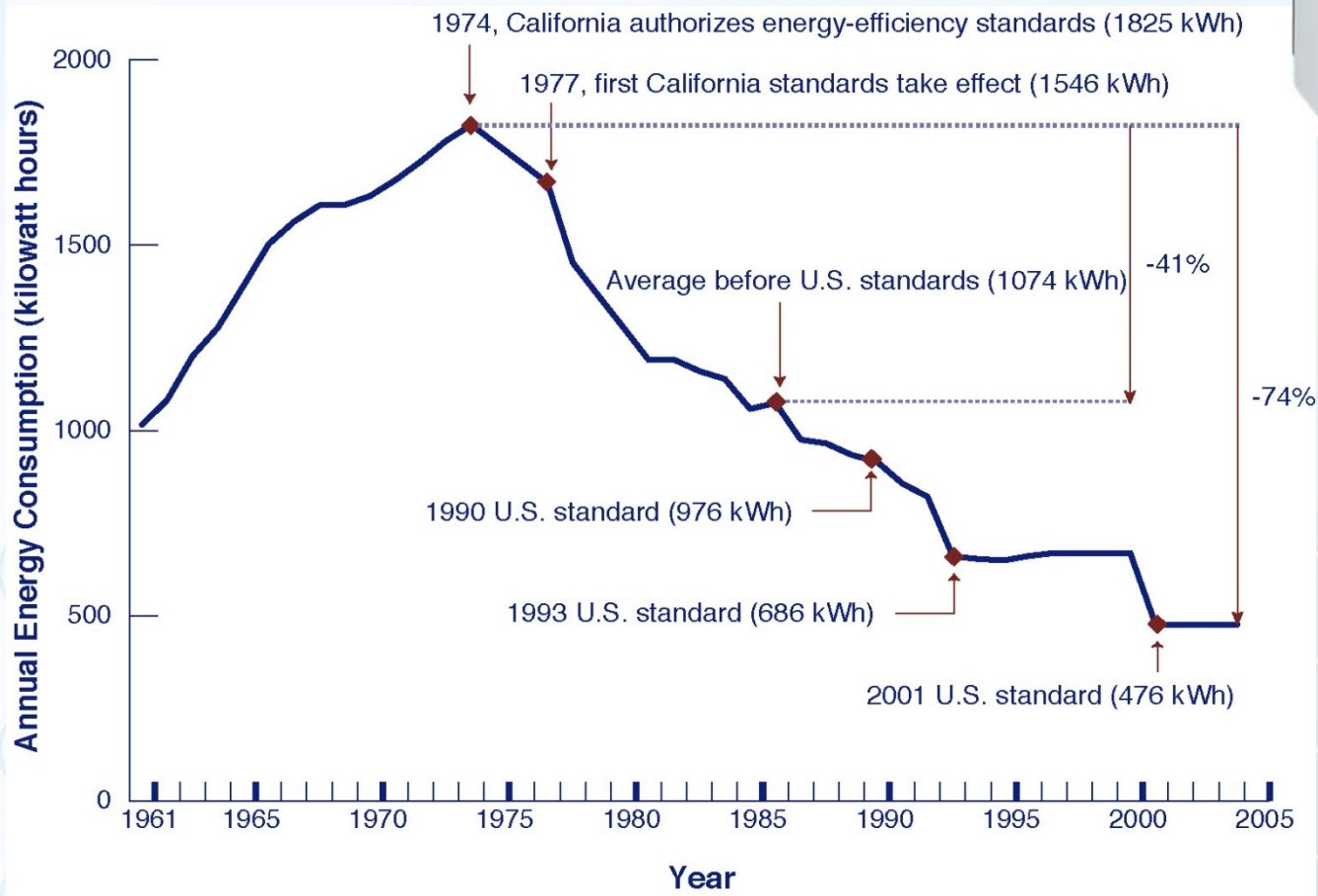
# Energy Efficiency: America's Greatest Energy Resource



Alliance to Save Energy, 2009  
(2008 data)



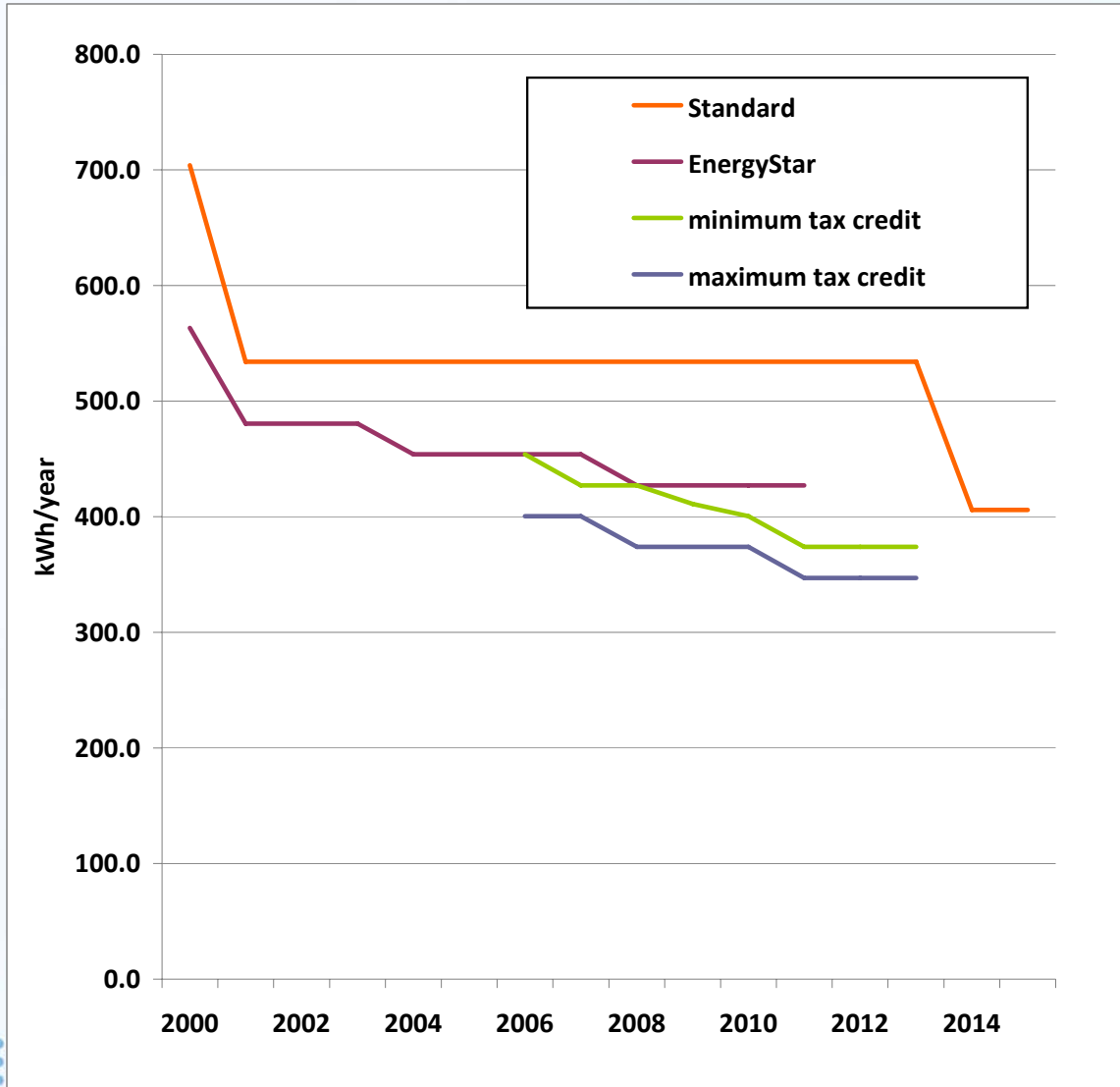
# Impact of U.S. Refrigerator Efficiency Standards



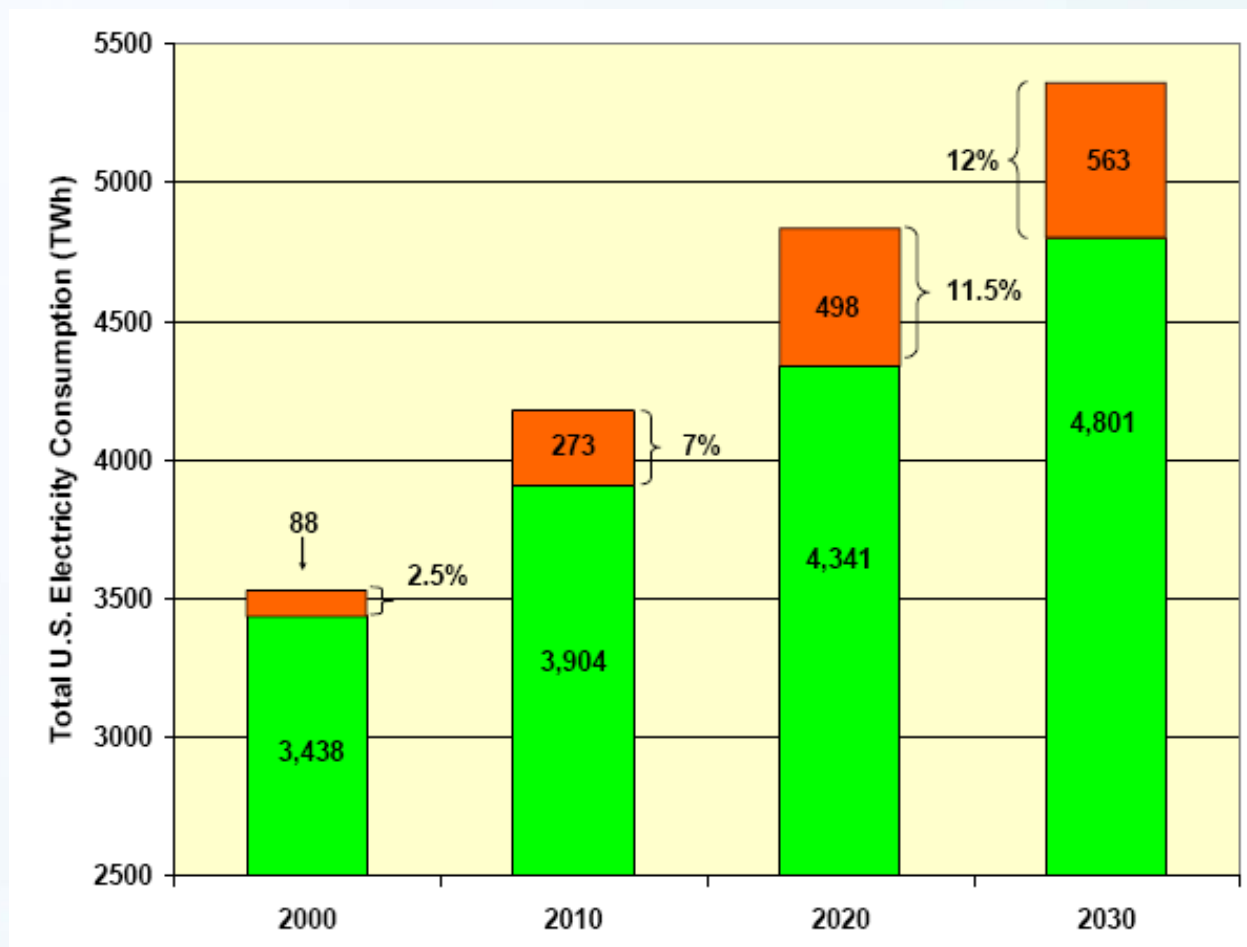
25% savings pending for next revision

# Market Transformation for Refrigerators

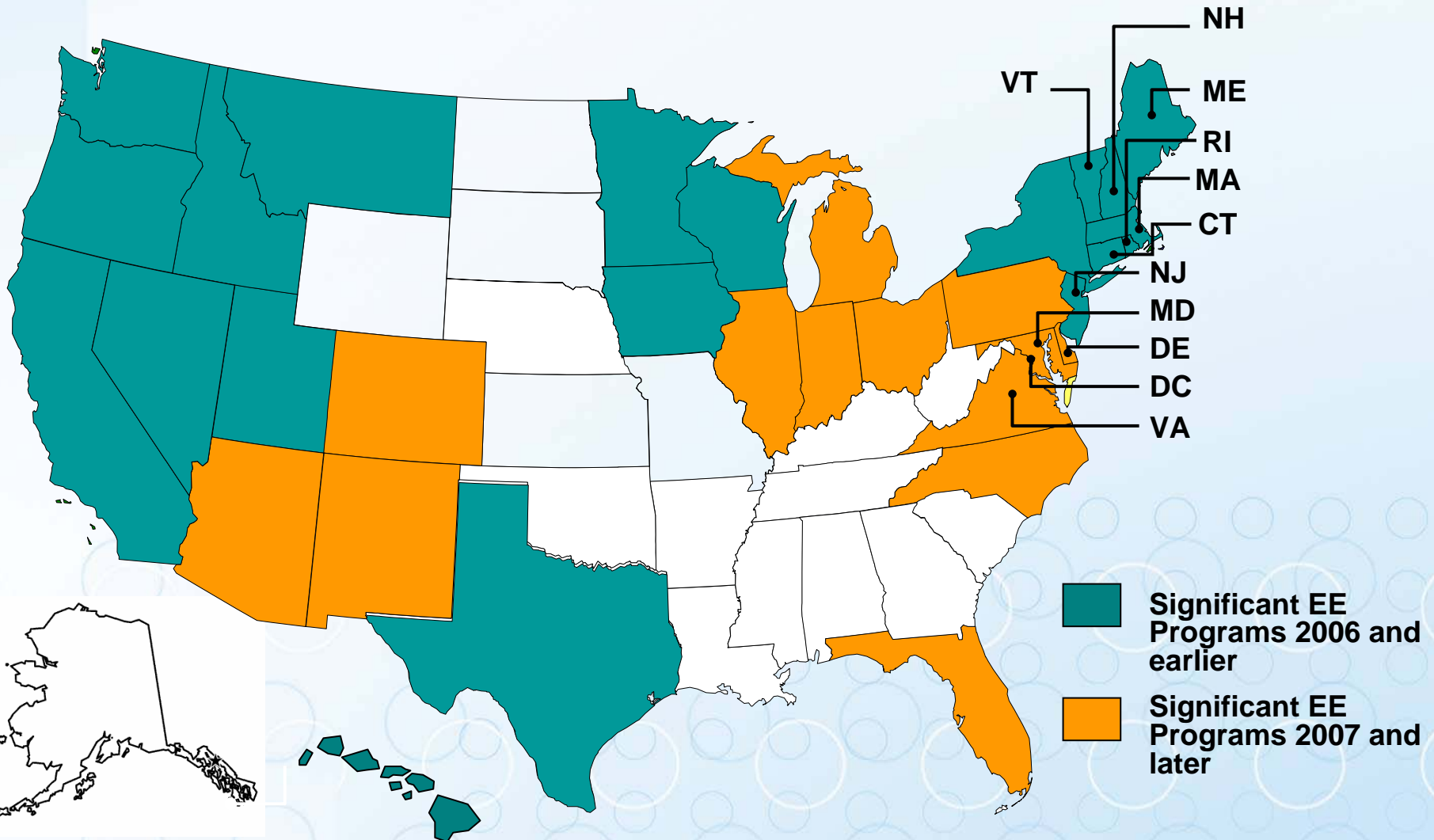
## *Interaction of Standards, Energy Star & Tax Incentives*



# Savings from Existing Appliance Standards Relative to U.S. Electricity Use

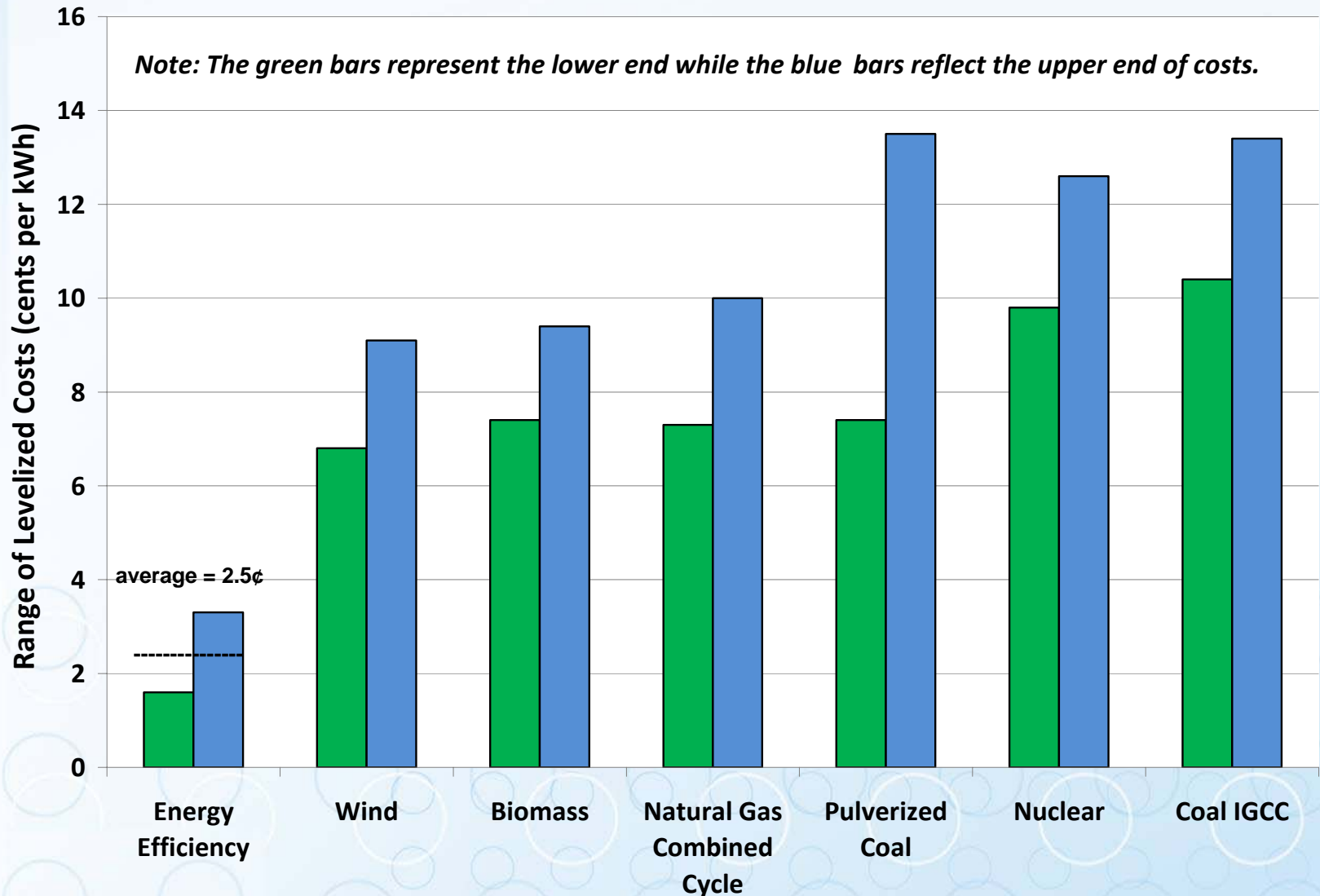


# Utility EE Policies & Programs





# Levelized Utility Cost of Electricity Resources

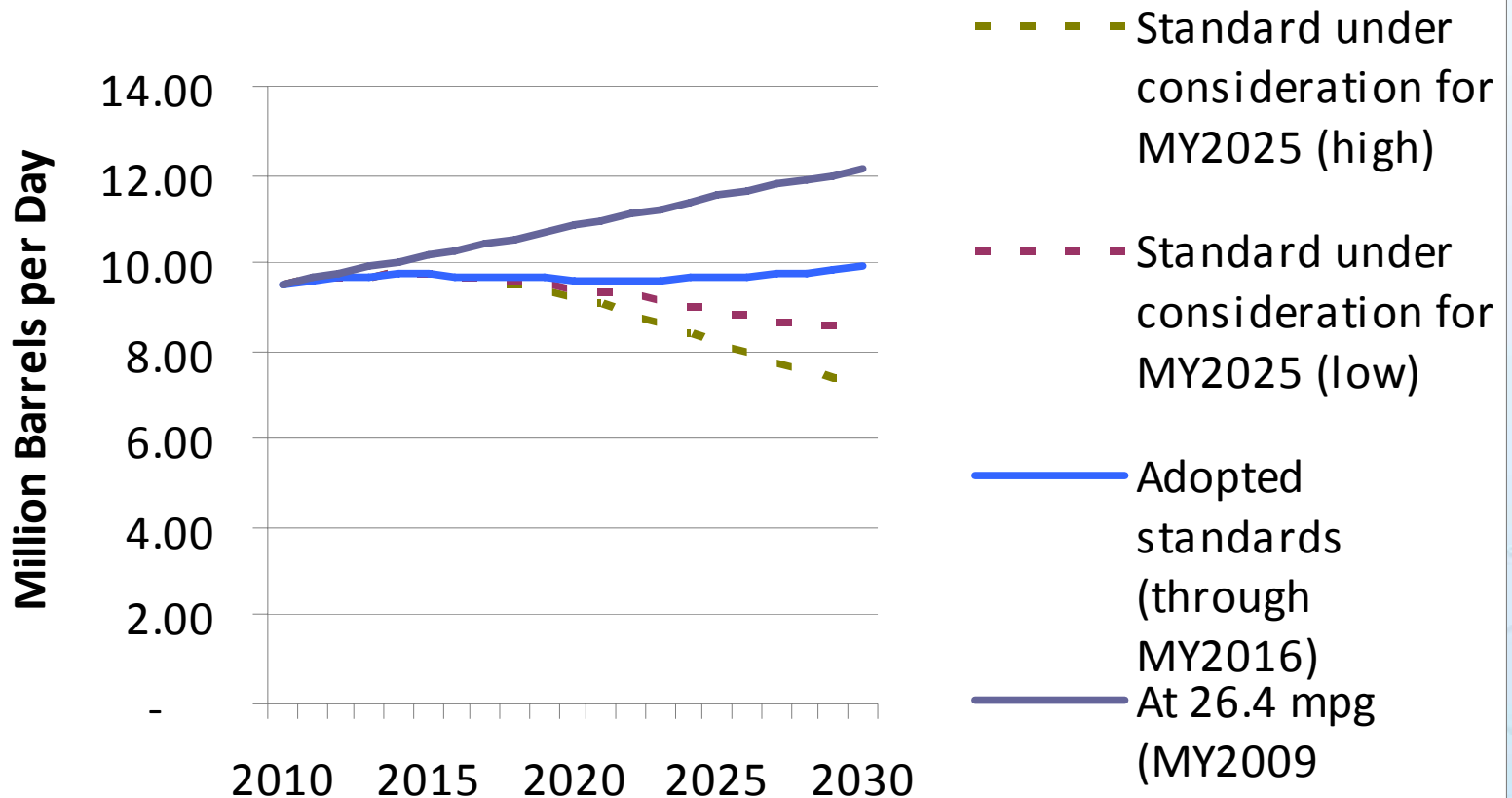


# A Brief History of Residential Codes

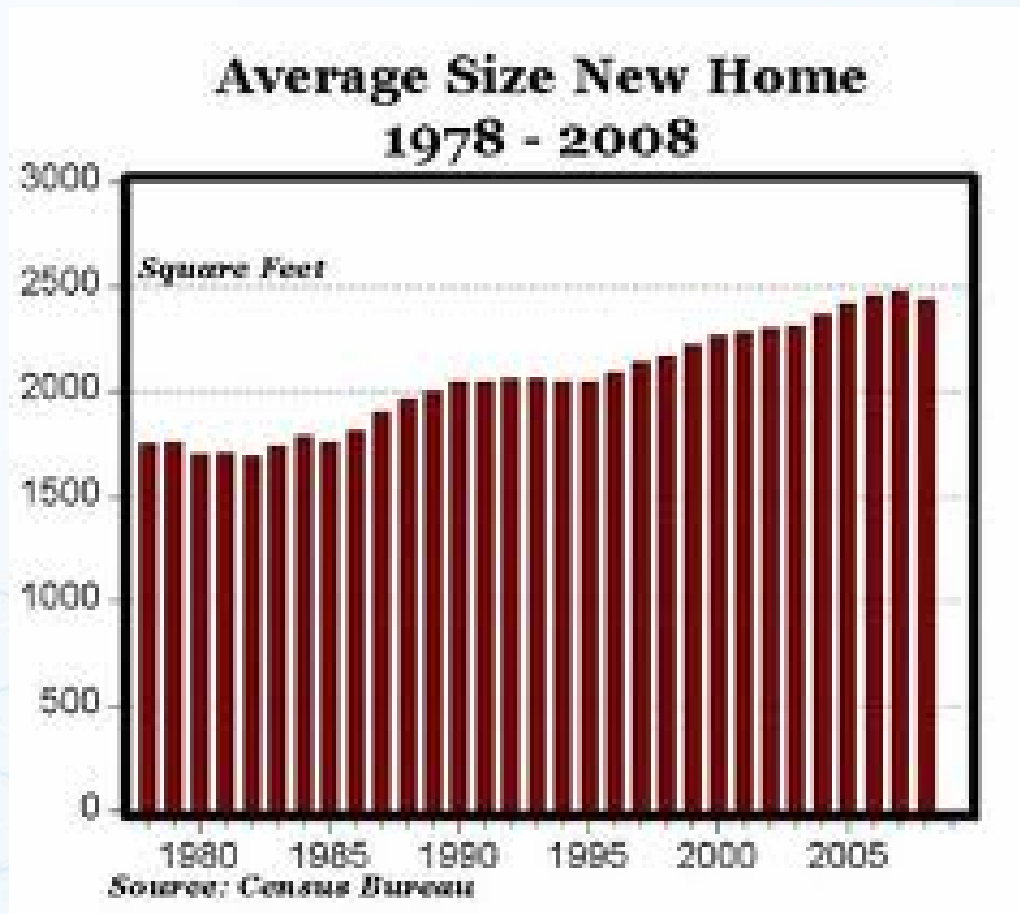


Source: DOE.

# U.S. Gasoline Consumption



# Average U.S. New Home Size



# New Energy Uses





# Looking To the Future

- Next few years



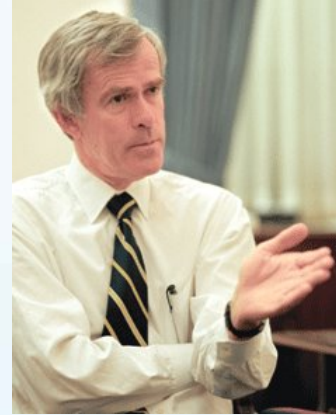
- Next 30+ years



# 112<sup>th</sup> Congress



- Bipartisan items, such as provisions in ACELA
- Something on financing, perhaps part of Fannie/Freddie reform
- Perhaps something on revitalizing manufacturing
- Clean Energy Resource Standard
- Tax incentives



# Efficiency Elements in ACELA

- Consensus appliance and equipment standards
- Improved building codes
- Residential and commercial retrofit authorizations
- Building labeling
- Industrial/building job training & TA – IAC, BTAC
- Programs for industry
- Demand response (House only so far)



# Clean Energy Resource Standard

- Includes renewables, efficiency, nuclear, carbon capture and storage
- Examples – Lugar and Graham bills
- Issues:
  - Numbers – 20% by 2020 or higher?
  - No cap on efficiency
  - Carbon storage vs. “sequestration ready”



# Tax Incentives

- Extend/modify 25C
- Performance-based home retrofits (like Gold Star)
- Improve commercial building tax deduction
- Some possible new items (Bingaman/Snowe)
  - Chillers
  - Advanced motors
  - Homes that save 50% of all energy
  - Expand CHP credit
- Perhaps accelerated depreciation for EE investments





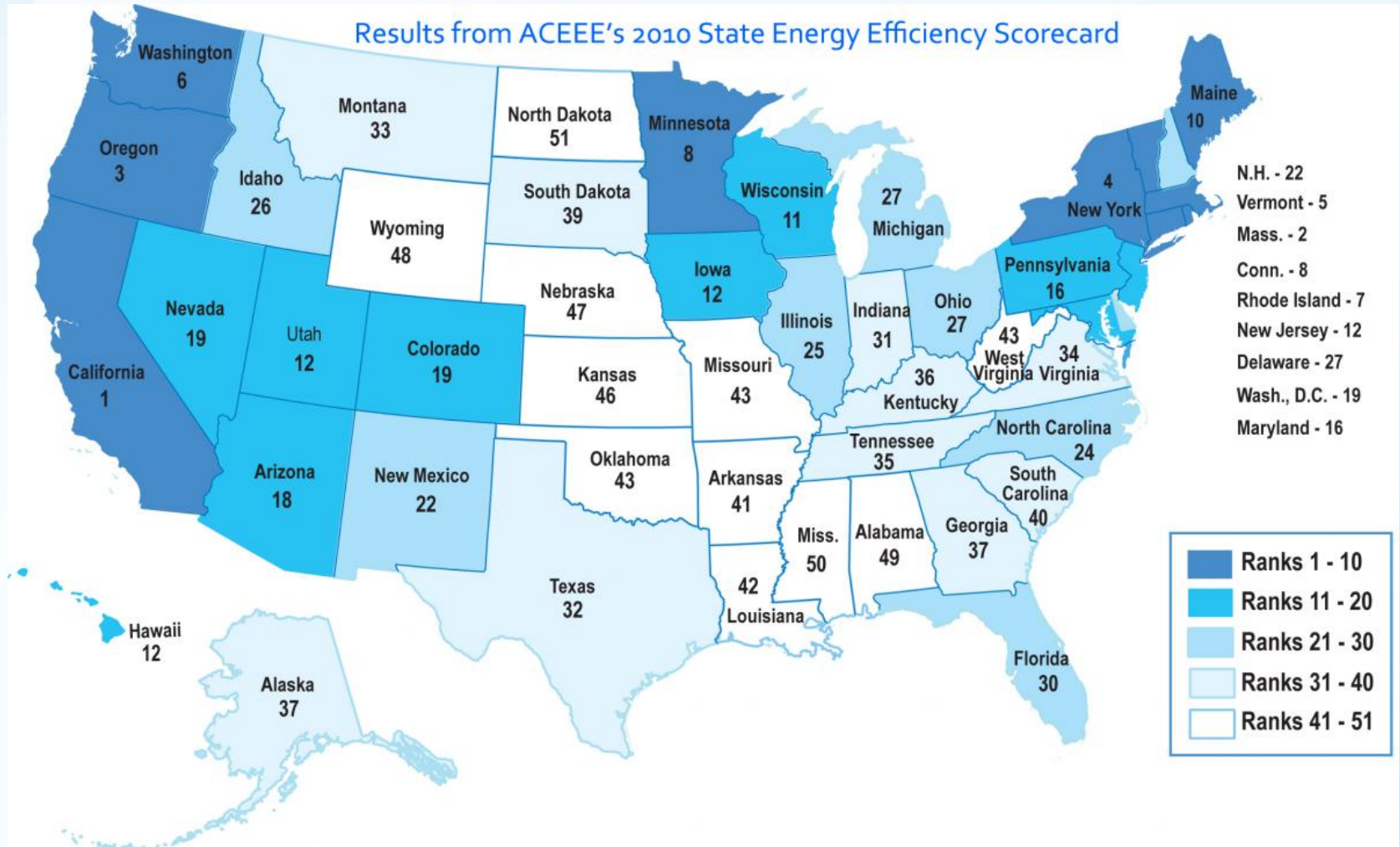
# Revitalizing Manufacturing



- Senators Brown, Stabenow and others introduced IMPACT
  - 2-yr, \$30 billion manufacturing revolving loan fund to improve manufacturing processes and to retool and expand production of clean energy products
- Discussions begun about a bipartisan package



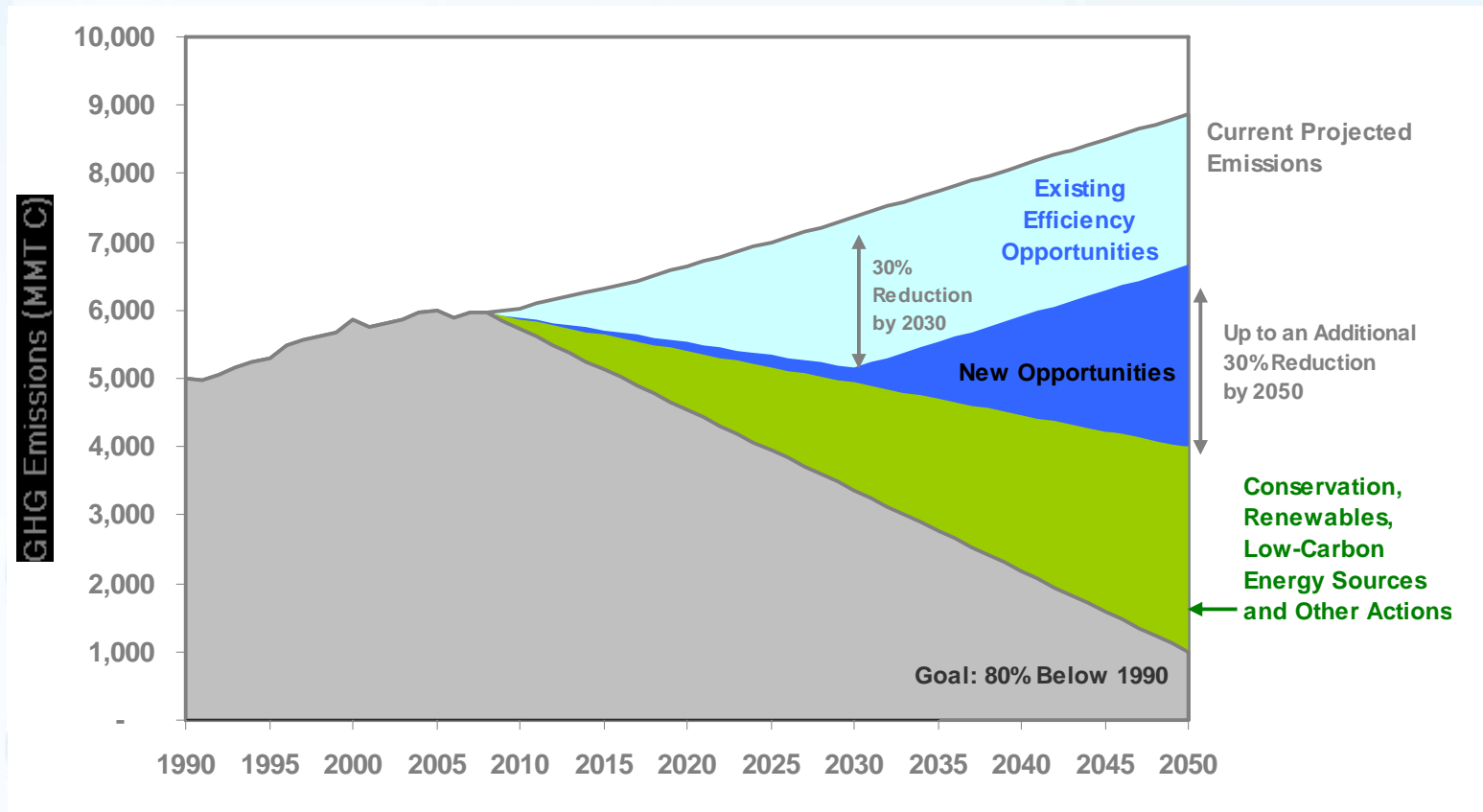
# 2010 State Energy Efficiency Scorecard



# State Policies Covered

1. Utility and public benefits programs and policies;
2. Transportation policies;
3. Building energy codes;
4. Combined heat and power;
5. State government initiatives; and
6. Appliance efficiency standards.

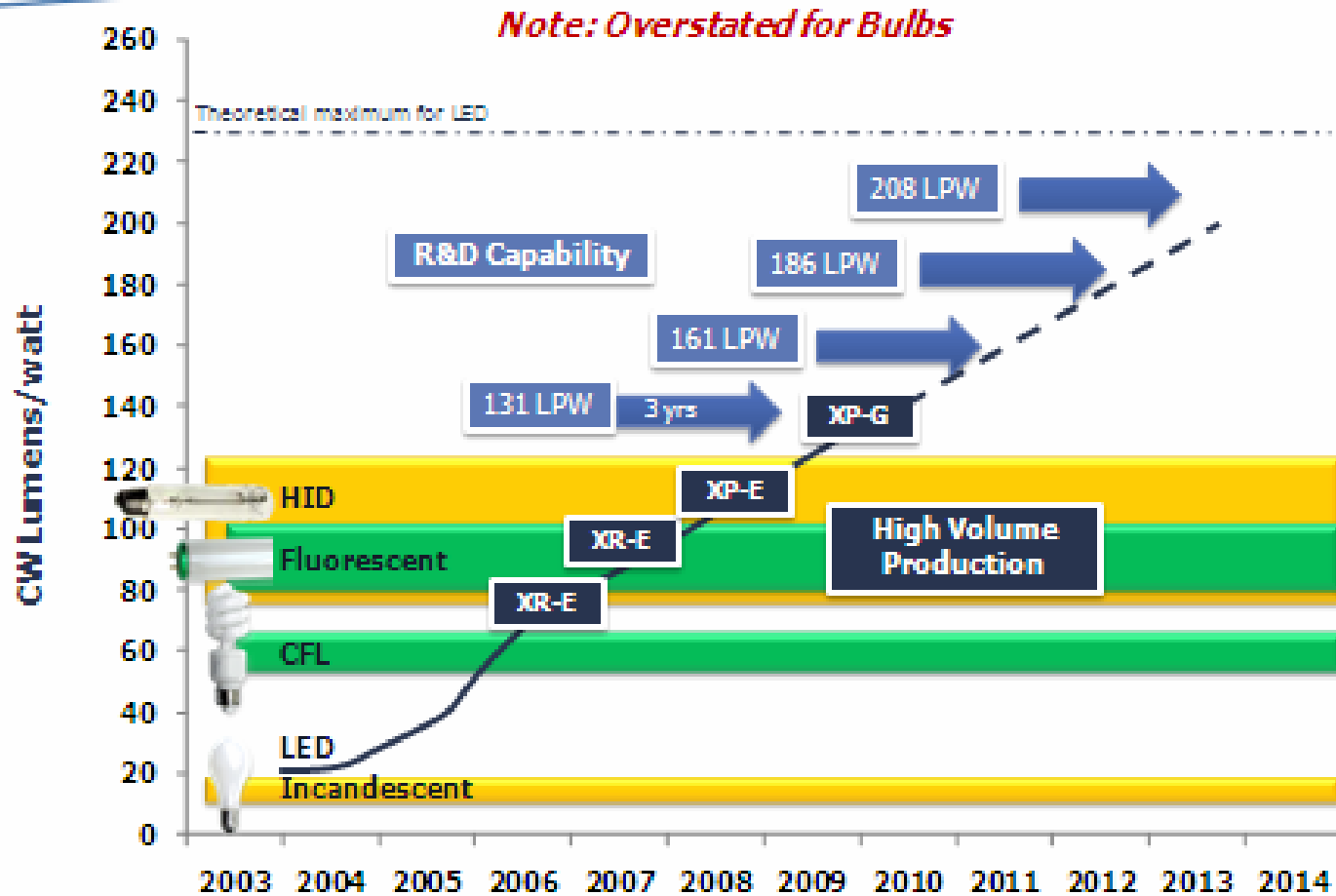
# Role of Efficiency in Addressing Climate Change in the U.S.



Note: This graph is stylized and is not exact.

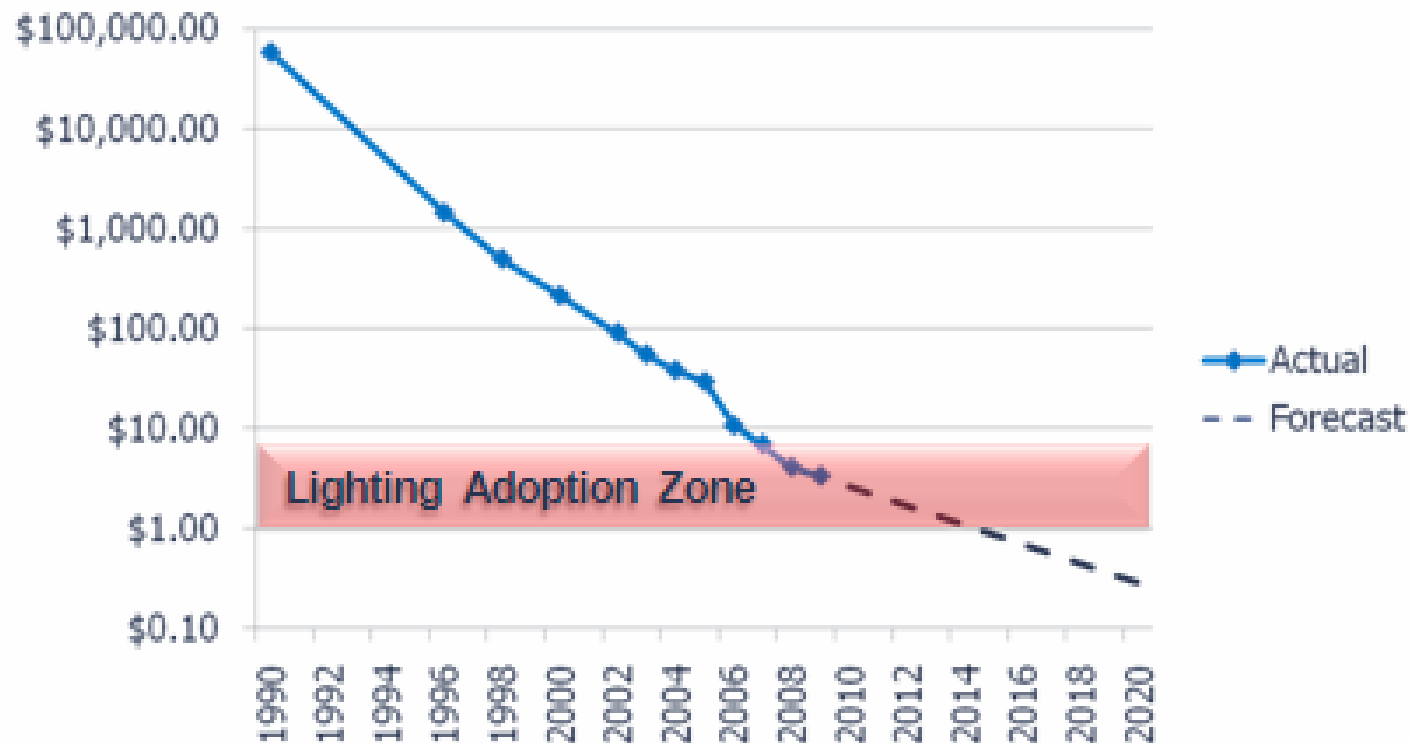
# Solid State Lighting

## LEDs Have Superior Performance





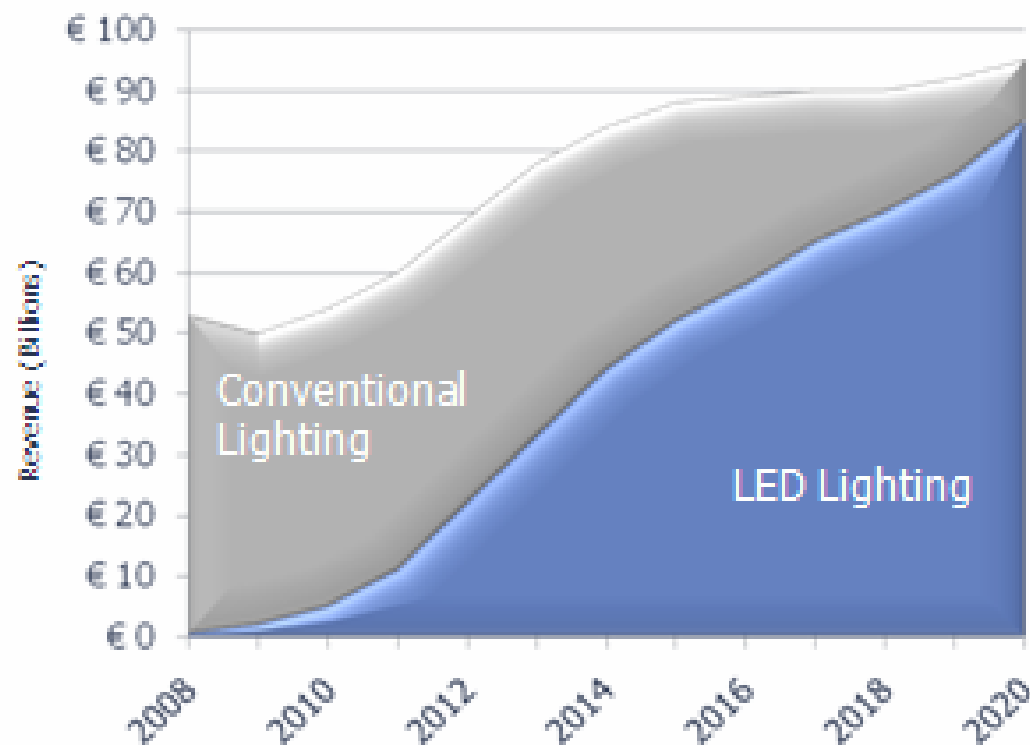
# LED Cost per Thousand Lumens (k-lumen)



Different lighting applications turn on at different LED cost/lumen points

# Even Bulb Companies See the Wave Coming

General Illumination Market\*\*



\* Strategies Unlimited 2009 / \*\*Phillips Lighting 2009

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pg. 24



# Heat Pump & Condensing Water Heaters



Rheem



GE



AO Smith

# Intelligent Efficiency (IT-driven)

## Automation



Industrial Robots

Logistics for  
Transportation

Smart Manufacturing  
and Infrastructure

## Substitution



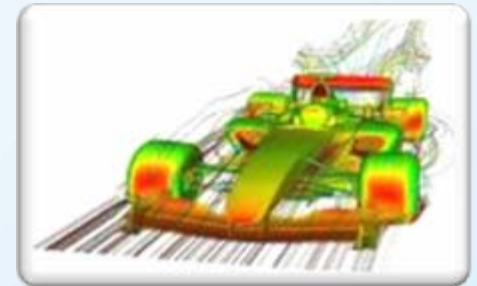
Video Conferencing

On-line  
Entertainment

E-commerce

Telecommuting

## De-materialization



On-line Banking

Digital Music

Digital Publishing

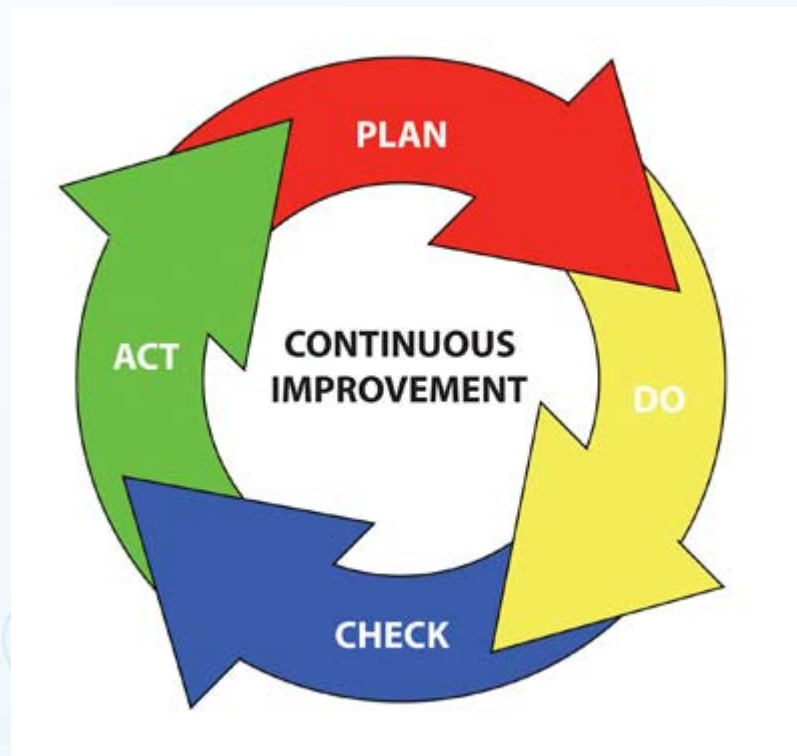
# Systems Engineering Like Zero Energy Buildings

- Use energy efficiency to reduce energy use ~70%
- Often include passive solar and daylighting
- People and equipment a major source of heat
- Commonly use PV and solar hot water to supply energy
- Generally *net* zero, not off grid



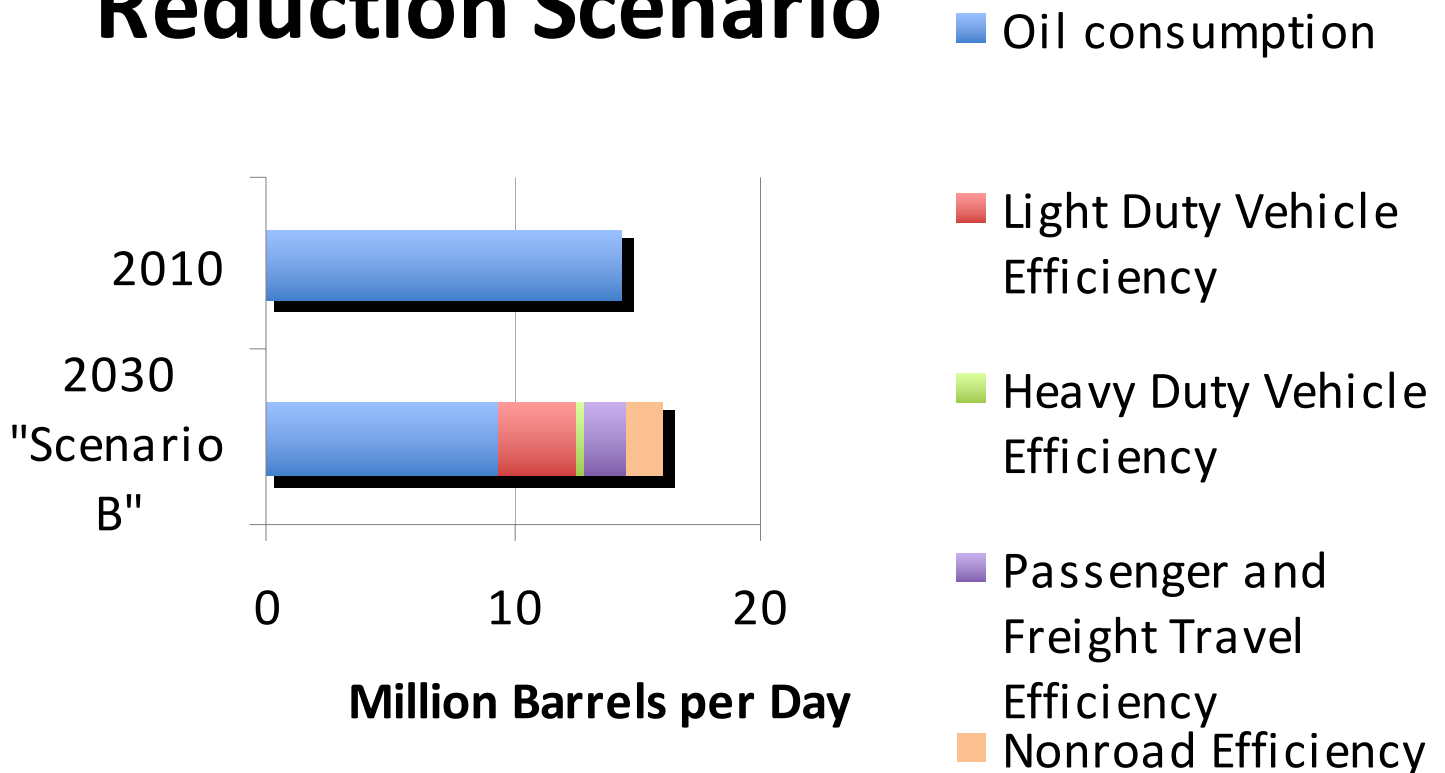


# Industrial Energy Management Standard—ISO 50001



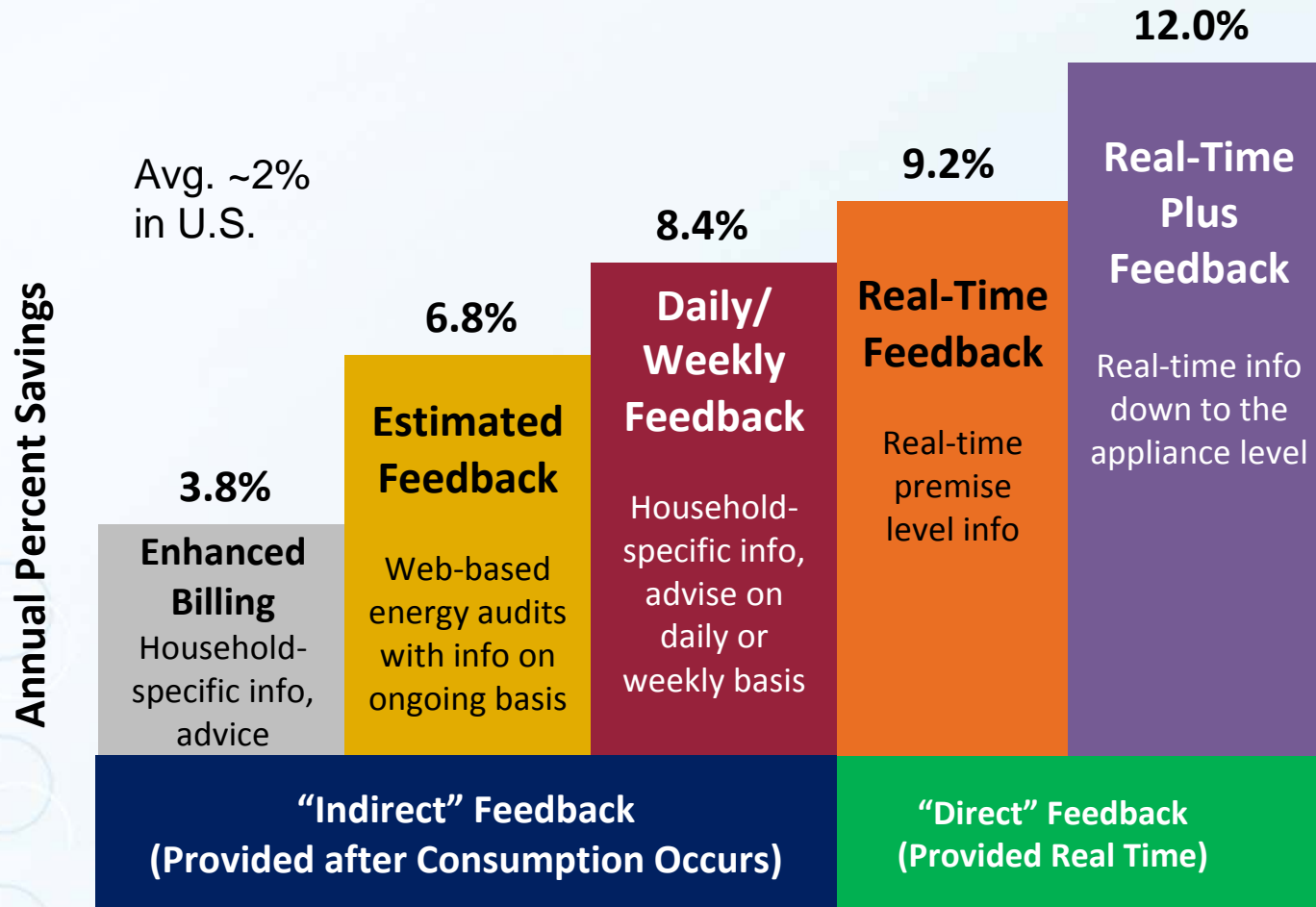
- DOE launched a program to assist adoption—*Superior Energy Performance (SEP)*

# U.S. Transportation Petroleum Consumption - EPA Oil Reduction Scenario



# Providing Consumers with Feedback on Energy Use

Small samples, need further testing



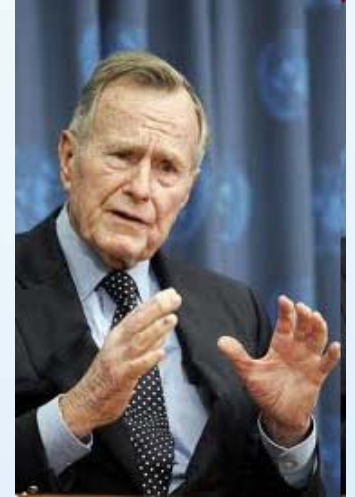
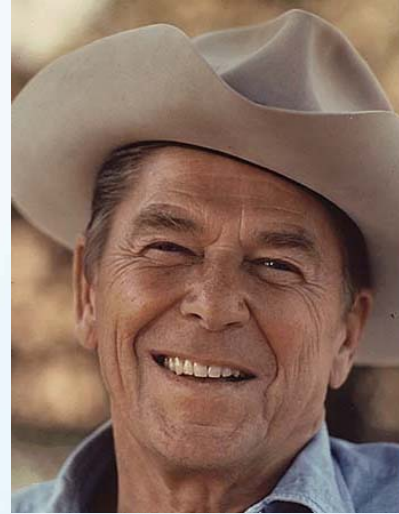
# Supportive Policies



- Price on carbon
  - Perhaps a carbon tax tied to balancing budget
- Efficiency and clean energy standards
- Continued improvements in fuel economy, appliance & building standards
- Support for state and local efforts
- Policy innovation at the state and local level

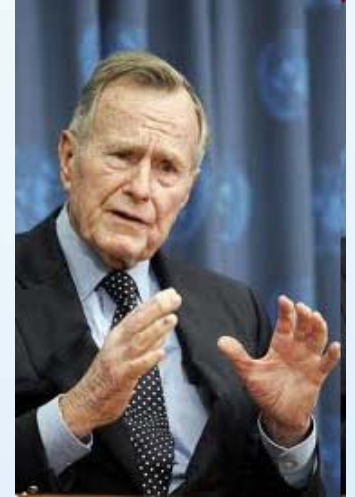
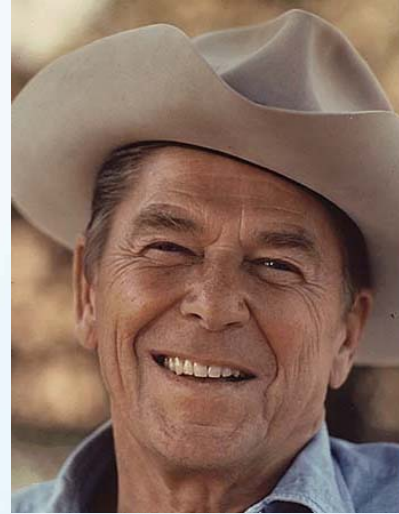


# Energy Efficiency Has Been a Bipartisan Issue

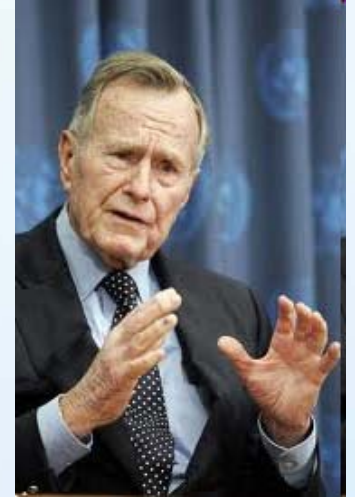
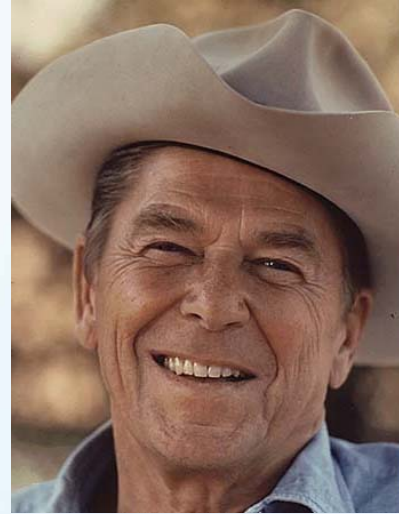




# Presidents Who Have Signed Major Energy Efficiency Legislation



# Presidents Who Have Signed Major Energy Efficiency Legislation



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