

Energy Efficiency Resource Standards in the United States - Status and Prospects

Joint Research Center of the European Commission
Brussels

March 30, 2009

Richard Cowart



The Regulatory Assistance Project

*50 State Street, Suite 3
Montpelier, Vermont USA 05602
Tel: 802.223.8199
Fax: 802.223.8172*

*177 Water St.
Gardiner, Maine USA 04345
Tel: 207.582.1135
Fax: 207.582.1176*

*Website:
<http://www.raonline.org>*



The Regulatory Assistance Project

RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP is funded by several foundations, US DOE & EPA and international agencies. We have worked in over 40 states and 16 nations, and now work closely with the European Climate Foundation.

Richard Cowart was Chair of the Vermont PSB, Chair of NARUC's Energy & Environment Committee, and of the National Council on Electricity Policy. Recent assignments include technical assistance to the Regional Greenhouse Gas Initiative, the New York ISO, the California PUC, the National Association of Clean Air Agencies, NARUC, the Vermont legislature, and to China's national energy and environmental agencies.



Overview

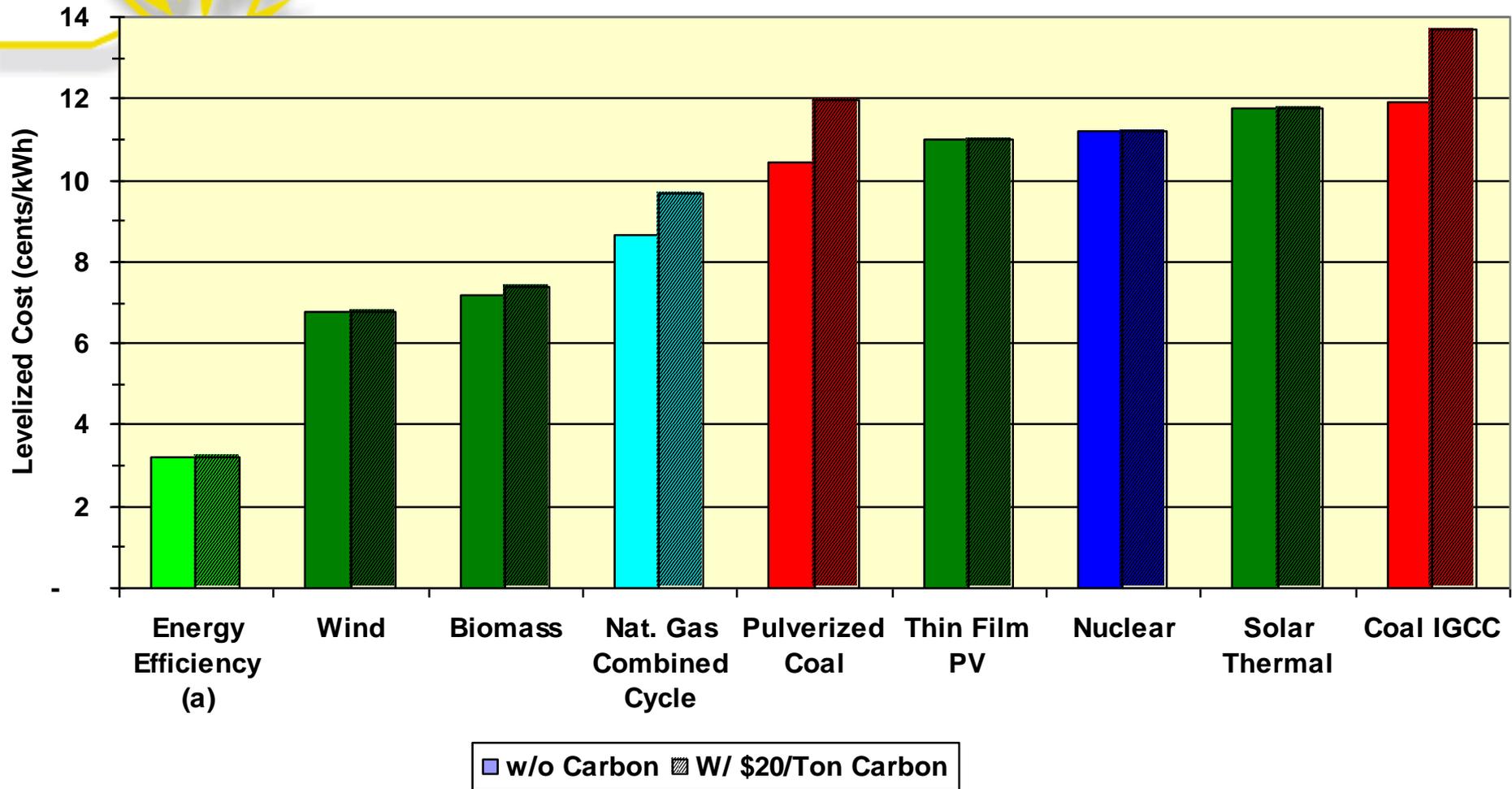
- **State policies** (EE, codes, portfolio mgt, RPS, etc.) are crucial to environmental and economic goals;
- **US states** are increasingly turning to EE as a resource, 19 states now have EE targets in place
- Most state EE mandates focus on distribution utilities and do not involve trading white tags
- **US Congress considering national EERS**
 - ❖ **As an essential complement to cap-and-trade for carbon**
 - ❖ And as an element in GHG designs – EE should be a leading target for use of **auction revenue**.



Energy Efficiency Resource Standards

- Analogous to a Renewable Portfolio Standard
- Electric and/or gas savings targets for utilities
 - ❖ Includes end-use efficiency and sometimes combined heat & power (CHP) and codes/standards
 - ❖ Targets generally start low and increase over time
- Savings must be documented in accordance with evaluation rules established by regulators
- Can authorize bilateral contracts to exchange savings credits and provide a role for 3rd parties

Cost of New Electricity Resources



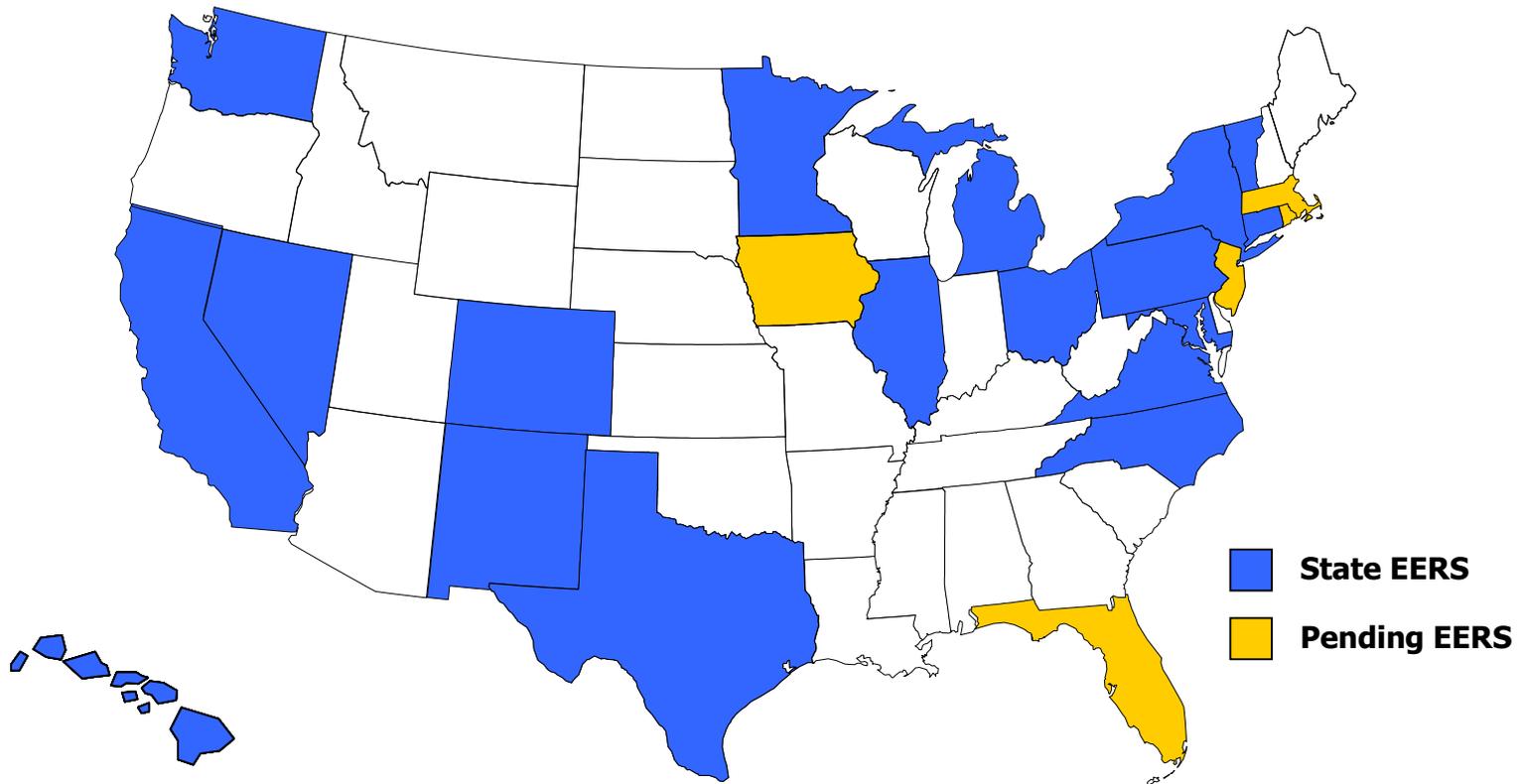
Source: Lazard 2008 for NARUC (midpoint of range)



Why an EERS?

- Achieve substantial energy and emissions savings
- Performance based – emphasizes savings, not spending
- Can be easier to legislate savings targets than spending amounts
- Can start programs quickly, without years of least-cost analysis (but targets should be based on cost-effective opportunities)

19 States with Energy Efficiency Resource Standards (EERS)



These plus BAU EE will save ~6% of total US power by 2020

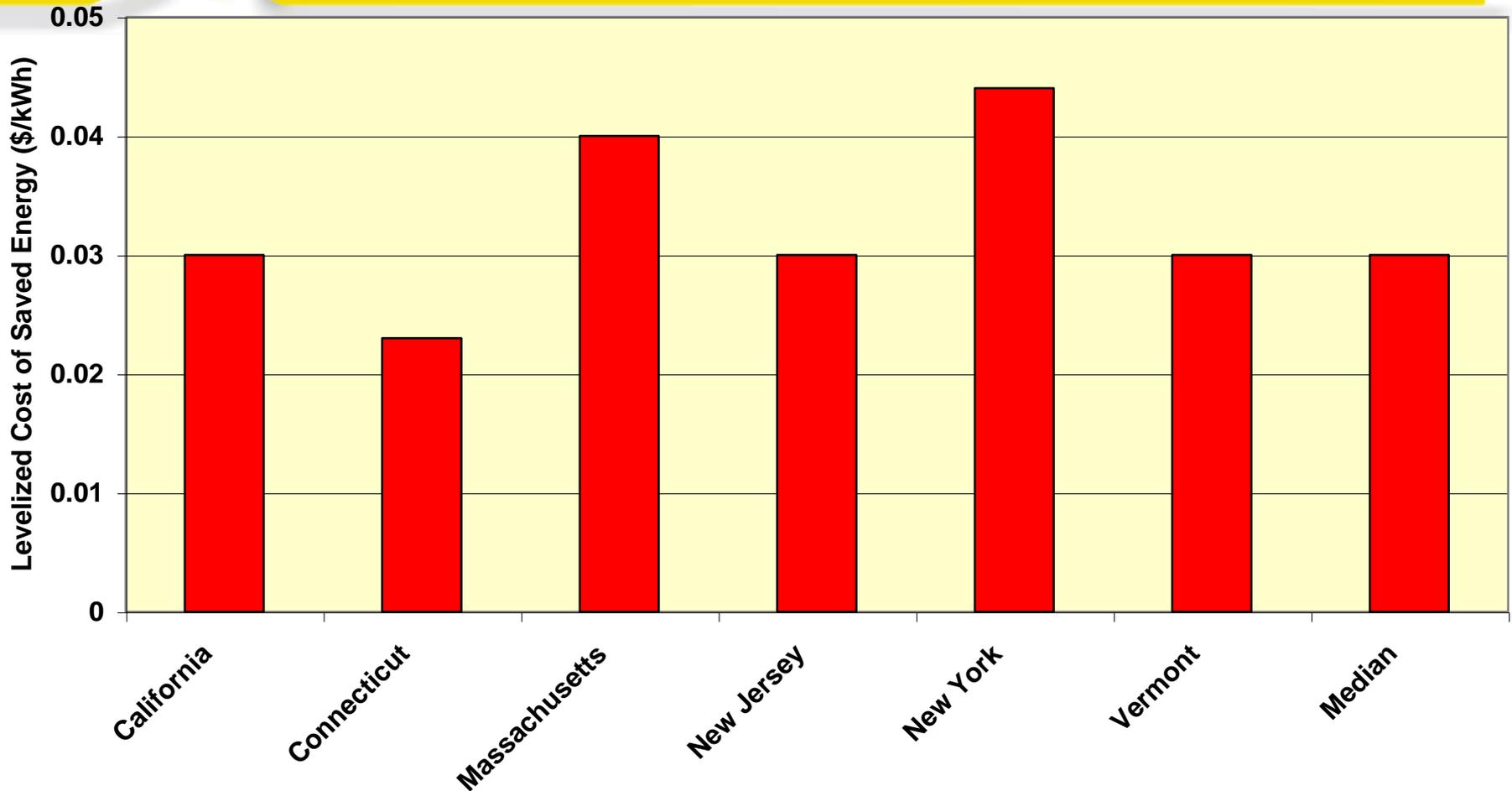
ENERGY EFFICIENCY ON A “POWER PLANT” SCALE



- Leading state examples
 - ❖ Minnesota has saved over 2,300 MW since 1990
 - ❖ The Pacific Northwest has saved over 1,600 MW over a similar timeframe
 - ❖ California has saved over 1,500 MW in the last 5 years
- Ten states have EE programs on a scale large enough to displace power plants (i.e., save an additional 0.4% to 1.0% or more of load each year)
 - CA, CT, IA, MA, MN, NY, OR, RI, VT, WI

Efficiency resources are cost effective across many states: 3 cents/kwh

Evaluated results of All-Sector State-Level Energy Efficiency Programs



Source: ACEEE, "Five Years In," 2005



Delivery Mechanisms Vary –

at least 5 options now used

1. **Obligation on distribution utility**

- ❖ Most states, including CA

2. **Obligation borne by a state agency**

- ❖ E.g., New York, Oregon

3. **Energy Efficiency Utility**

- ❖ *Efficiency Vermont* is the leading case

4. **Performance contracts with 3rd parties**

- ❖ Texas

5. **Bidding into regional capacity market**

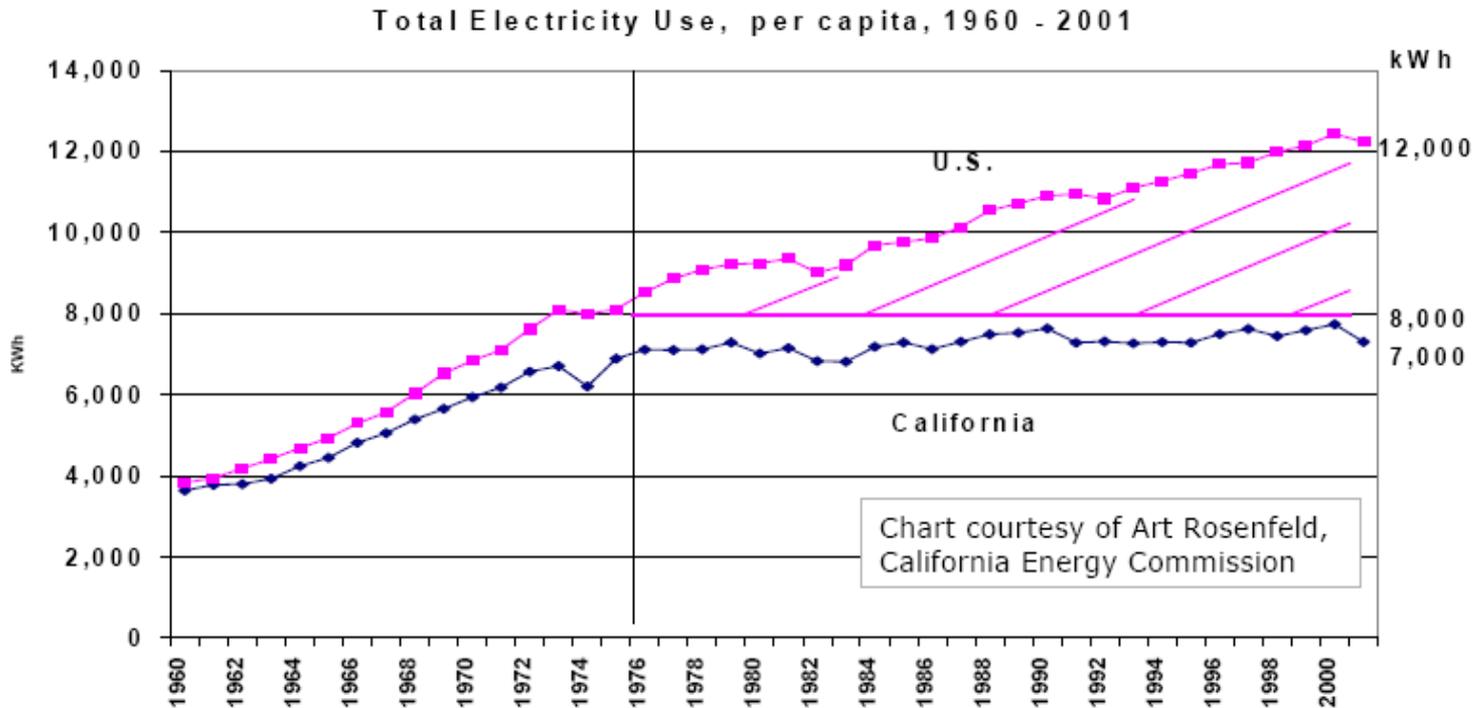
- ❖ New England ISO Forward Capacity Market



Savings Obligation on Distribution Utility -- CA

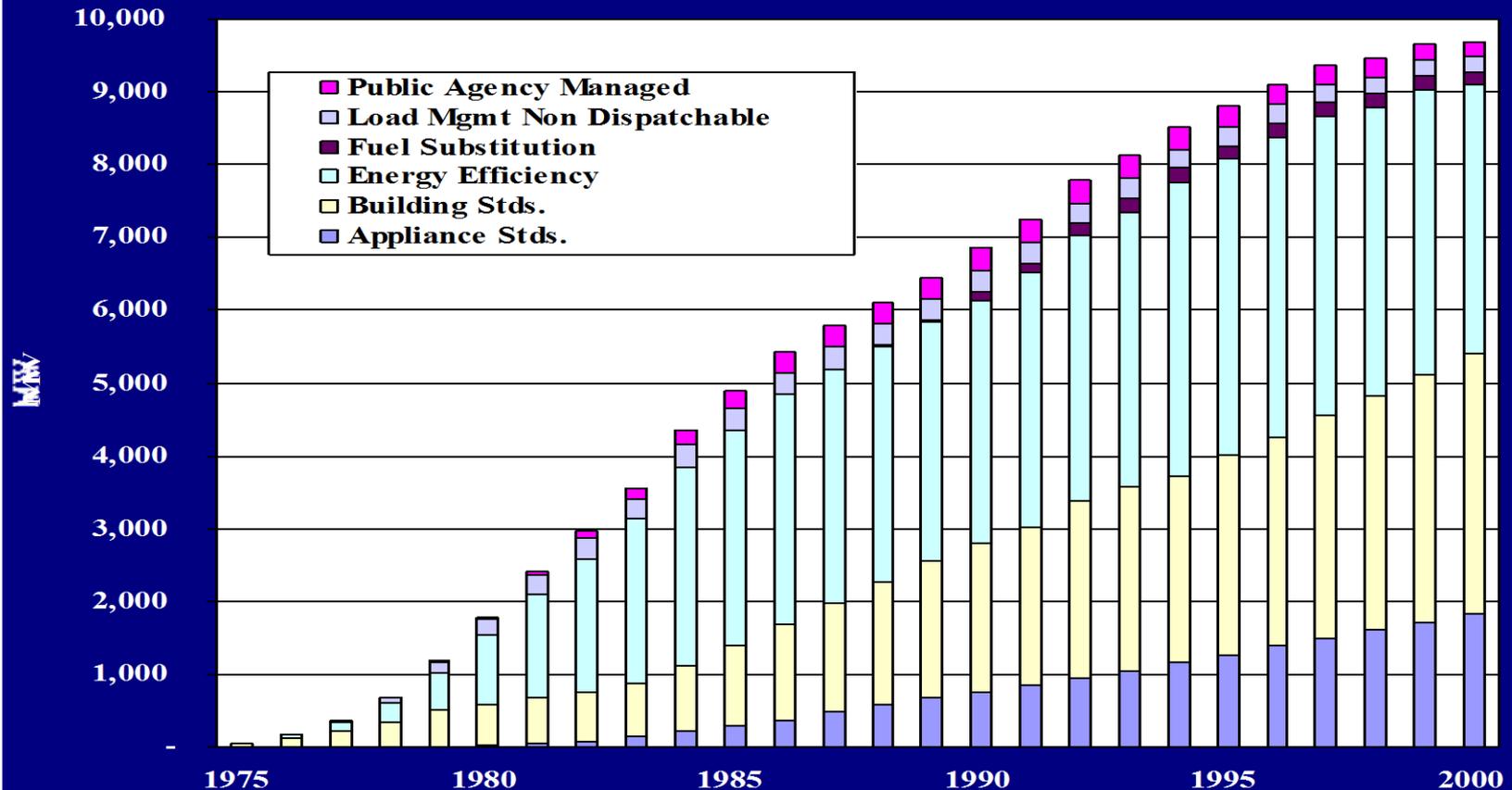
- Policy driven by the CA “loading order”: in all utility policy choices, EE comes first, then renewables, then fossil
- Major investor-owned utilities must develop EE plans with targets, subject to regulatory review
- Regulators also adopt “decoupling” and performance incentives for EE success
- SCE spending >\$400 million/year
- Cumulative savings: 22% to 25% of load

California Per Capita Electric Use Compared to the US Average



- California's electricity bill is 1.8% of the state's gross state product (GSP) as compared to an average of 2.5% for the other 49 states combined
- The average Californian residential bill is 15% lower than the average bill for the rest of the United States

California: a portfolio of efficiency measures pays off over time



California efficiency investments lower demand by 25% over 25

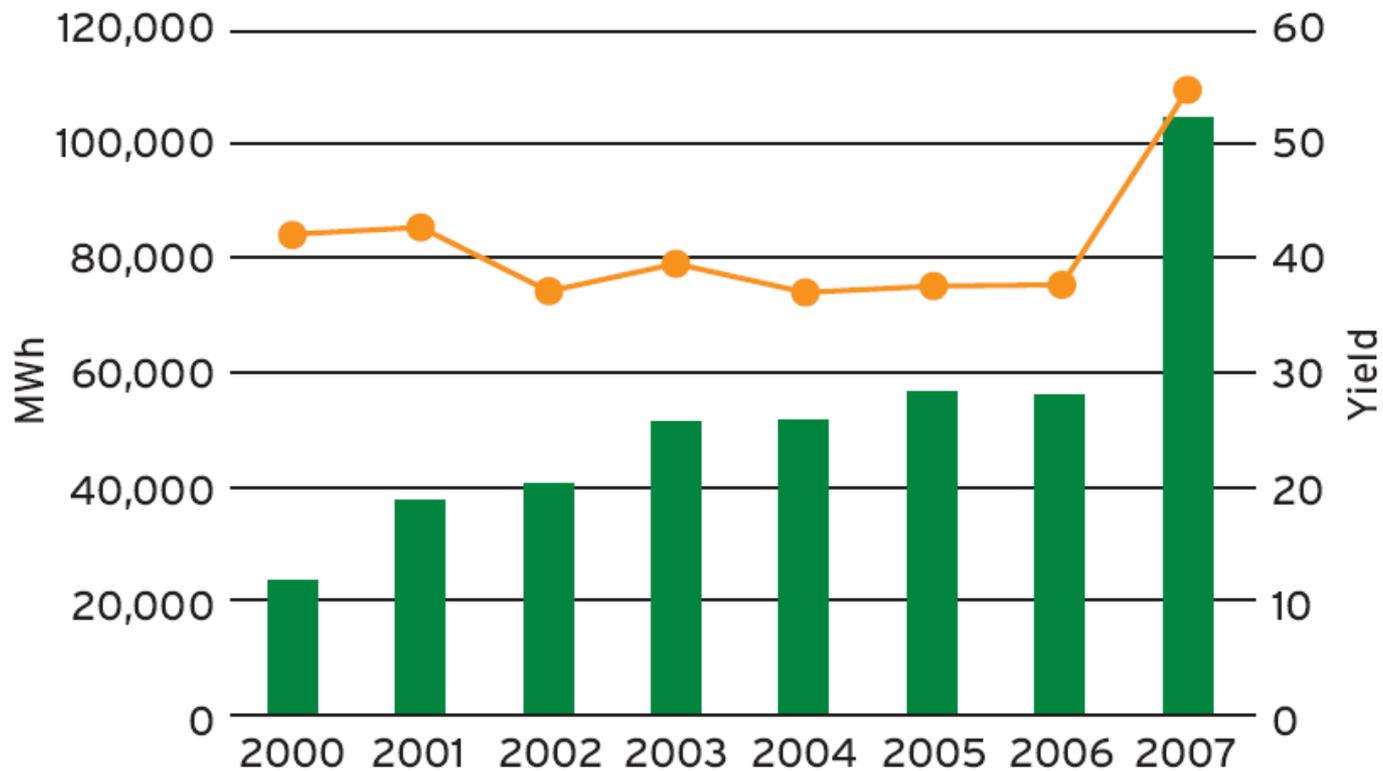


The Efficiency Utility – “Efficiency Vermont”

- A unique franchise – comprehensive **EE services only** -- awarded through a public tender and competitive bidding
- Funded by a **uniform “wires charge”** on electricity sales
- Supervised by the **energy regulator**
- Based on a **performance contract**
- **Single brand** builds awareness, trust
- Efficiency Vermont is now meeting 7% of Vermont’s energy requirements and is on path to meet well over 12% by 2012
- “Low-hanging fruit” is reappearing – costs per MWH actually declining & now meeting **>100% of load growth**

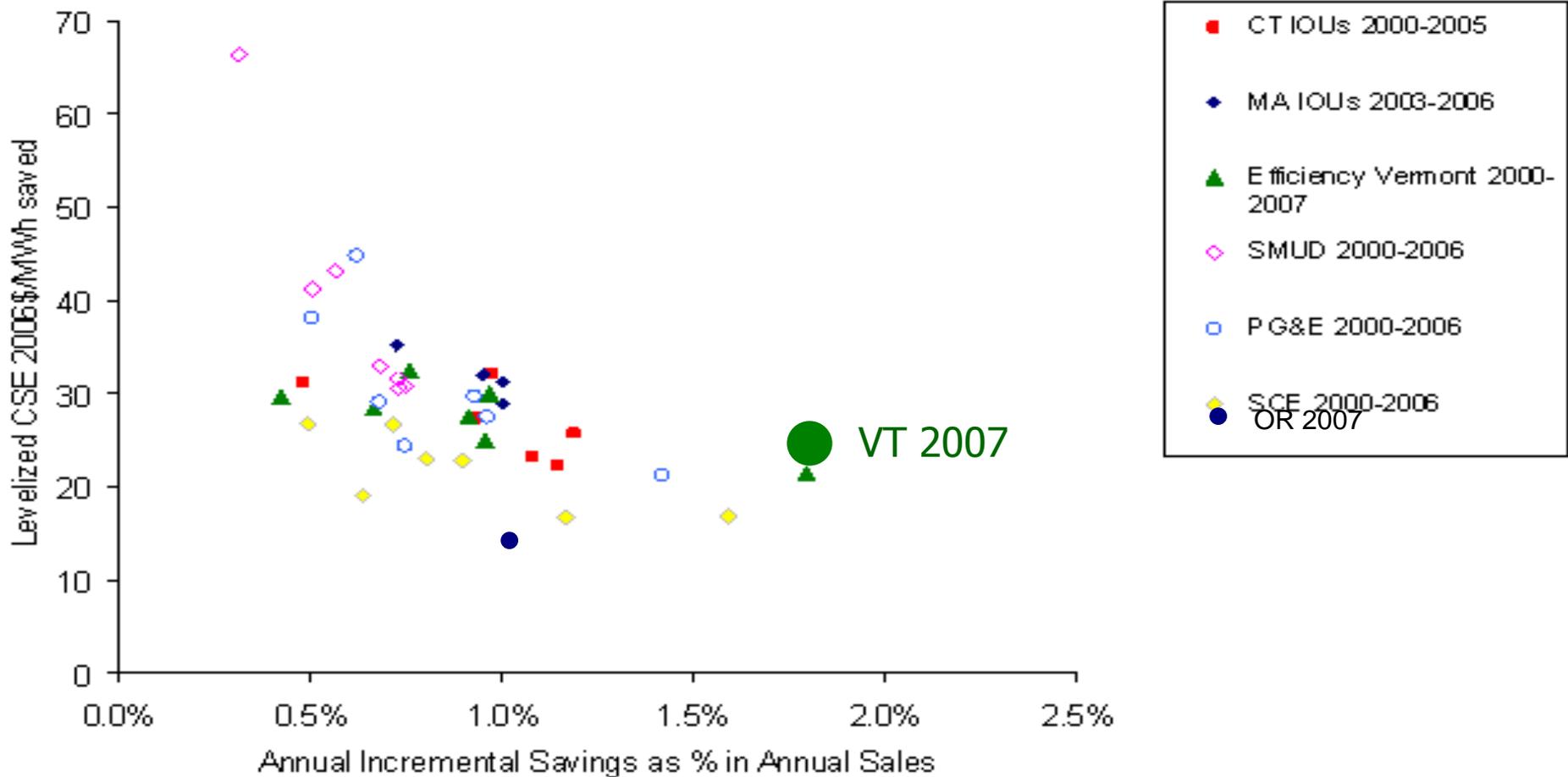
Vermont – EE economies of scale

Efficiency Vermont MWh Savings and Yield: 2000-2007



■ Incremental annual MWh savings ● Yield - MWh savings per \$10,000 invested

Cost and Savings Performance – Ambitious programs can cost less per MWh saved





Texas – performance contracts by 3rd parties

- First state to establish an explicit EERS
- Modest standard -- Initially 10% of load growth but increased by legislature to 20% of load growth
- Utilities have not had difficulty meeting and exceeding targets
- In 2009, bill likely to come up to increase to 30% or even 50% of load growth or the equivalent as % of sales



“Standard Performance Contracting” for EE (Texas)

- Legislature sets the goal (X% of load growth)
- Regulator sets the level of incentive payments to “project sponsors” for installing eligible energy efficiency measures in residences, businesses or industrial facilities.
- Incentives based on engineering estimates of the savings (“avoided costs”) for many measures.

- Utility has no role in delivery – simply pays for the resource delivered – akin to a feed-in tariff for EE

- In 2007, \$72.6 million was spent on EE through standard performance contracting
- EPPs build in 2007 = 122 MW saving 371 GWh annually
- Net benefits (resource savings minus costs) = \$155.4 million over the life of the EPPs



EE credits in New England ISO's Forward Capacity Market

- Needed: reliable capacity on a forwards basis (to avoid future capacity crisis)
- Generator proposal: Pay for Gen capacity in advance, for 10-year forward period
- Better solution: Let supply and demand-reduction bid to meet growth needs
- First auction 2007: demand resources including EE won 2/3rds of the bids for new capacity & lowered the clearing price

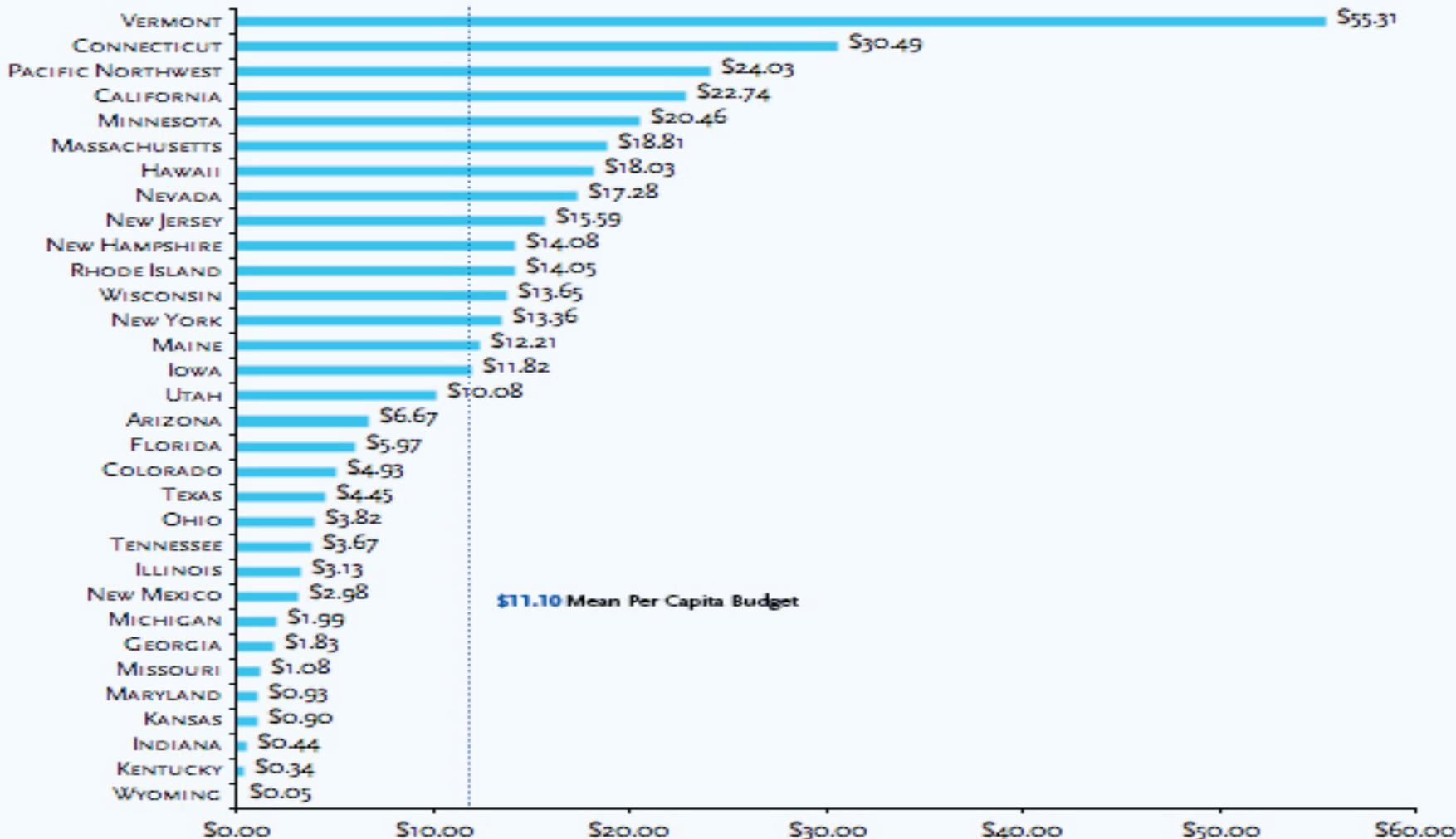
Markey HR 889 – 2009

A National EERS proposed

- 15% electric, 10% gas savings by 2020
- Includes CHP, recycled energy, codes and standards
- Limited EE credit trading allowed: Allow bilateral contracts within state; within power pool with PUC permission
- Penalty: 5 cents/kWh, 50 cents/therm buyout option
 - ❖ Funds can be used in state to operate EE programs
- DOE to establish M&V protocols
- States can set higher targets if they want

2008 Per Capita Budgets, Electric Programs

EXCLUDING LOAD MANAGEMENT





Cumulative savings approach

	<u>Electric</u>		<u>Natural Gas</u>	
	Annual	Cumulative	Annual	Cumulative
2011	0.33%	0.3%	0.25%	0.3%
2012	0.67%	1.0%	0.50%	0.8%
2013	1.00%	2.0%	0.75%	1.5%
2014	1.25%	3.3%	1.00%	2.5%
2015	1.25%	4.5%	1.00%	3.5%
2016	1.50%	6.0%	1.25%	4.8%
2017	1.50%	7.5%	1.25%	6.0%
2018	2.50%	10.0%	1.25%	7.3%
2019	2.50%	12.5%	1.25%	8.5%
2020	2.50%	15.0%	1.50%	10.0%

Note: Savings count from date of passage

Impacts of a National EERS



(15% electric, 10% gas by 2020; savings over and above existing state EERS's; includes codes & standards)

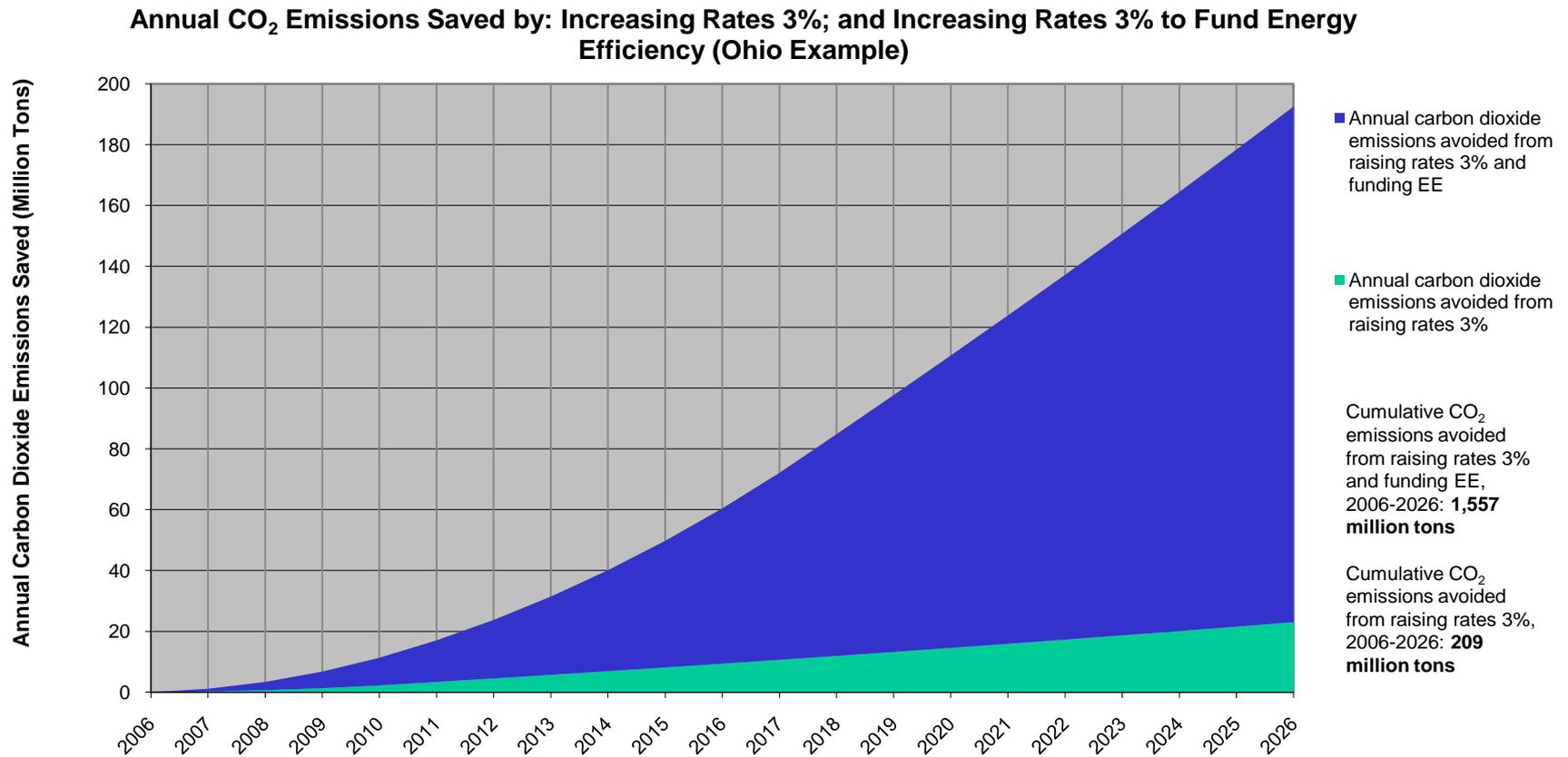
- Peak demand savings of 90,000 MW (300 power plants, 300 MW each)
- CO₂ emissions down 260 MMT in 2020 (equivalent to taking 43 million vehicles off the road for a year)
- 260,000 net jobs created
- Net savings of \$144 billion (B/C ~3:1)



Energy Efficiency is the Foundation for Successful GHG Cap-and-Trade

- **Evolution from “ancillary policy” to “complementary policy” to “cornerstone” role.**
- **California GHG Plan: 80% of reductions come from policies, only 20% from cap-and-trade.**
- **RGGI: Most CO2 savings come from RPS and EERS standards, maybe 25% from the cap.**
- **Design EERS to reduce emissions + Design cap-and-trade to deliver EE**

Efficiency programs can save 7x more carbon per consumer \$ than carbon taxes or prices



Assumptions: Electricity use increases by 1.7% per year; Retail electric sales increase by 3%; Price elasticity is -0.25 (-0.75 for a 3% increase), distributed over 5 years; Carbon dioxide emissions are 0.915 tons per MWh in Ohio; Cost of EE is 3 cents per kWh; Average EE measure life is 12 years



What happens if we double efficiency spending in RGGI?

Modeling* for RGGI found:

- Carbon credit prices drop 25%
- Need for new fossil capacity drops 33%
- Customer bills actually drop 5%(Industrial) to 12%(Residential)
- And – even greater EE investments (quite attainable) would yield greater savings

**IPM model runs by ICF Consulting using EE portfolios developed by ACEEE*



Design GHG cap-and-trade for efficiency: The “Cap and Invest” strategy

- Allocate up to 100% of initial credits to consumer trustees (eg, distribution utilities, Weatherization and other EE programs) Generators need to purchase allowances, recycling much windfall revenue BACK to consumers
- PUCs/gov't supervise use of the \$\$ to benefit consumers
- **Best result: focus these \$ on investments that lower carbon (EE, RE, and CCS)**
 - ❖ RGGI MOU - state minimum commitment is 25%
 - ❖ RGGI states: Auction ~90%; EE allocation ~80%
- Results: lower cost per ton avoided, lighter macro-economic impact >> quicker progress in reducing GHG emissions



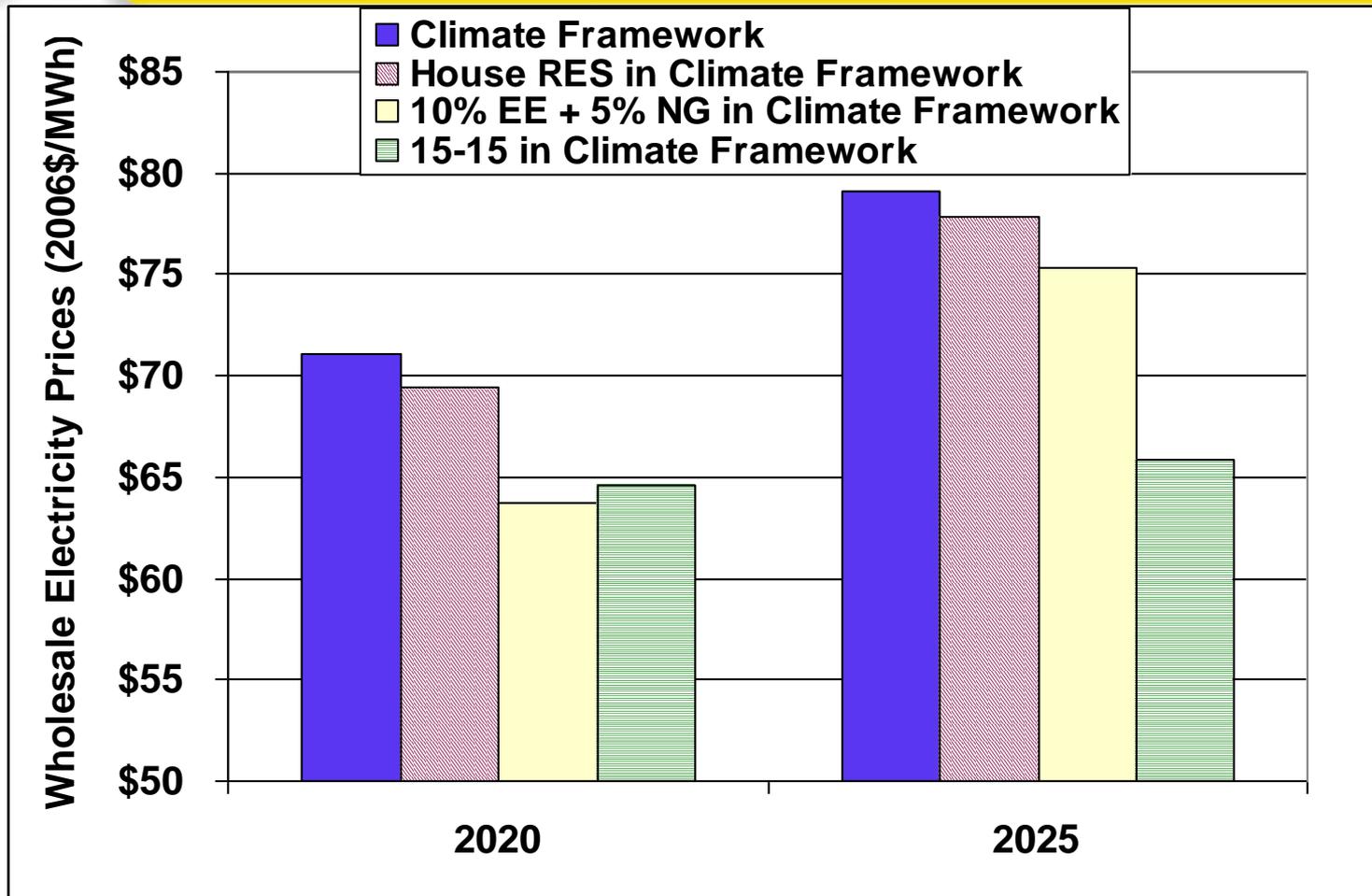
National Carbon Allocation for Efficiency *

- Proposal: Allocate a sizable pool of carbon allowances to states or wires companies to promote end-use efficiency
- **Allocation should be performance-based:**
 - ❖ Reward actual EE success, not expenditures or particular policy approaches
- **How to measure EE success?**
 - ❖ Key feature: % improvement compared to a baseline
 - ❖ Each state (or LSE) has its *own baseline*
 - ❖ *Indiana compared to Indiana, not Indiana compared to California*
 - ❖ *Sets up a “virtuous circle” of competition among entities – those who improve faster earn a bigger fraction of the pool.*

**As proposed by R Cowart (RAP) and S Nadel (ACEEE) March 2008 – comments and improvements are welcome*

National Wholesale Electricity Prices Much Lower With an EERS

(Climate Framework Scenario)



Note: Cost of efficiency programs may raise prices at retail level modestly.



EERS discussion

- Should states retain an “all cost-effective” mandate or use fixed targets (or both) ?
- Where does the obligation lie? Disco? Retailer? State?
- If we require distribution utilities to deliver EE, should we also use decoupling and performance rewards?
- Should reductions from codes, education, market transformation, etc. count as EERS-qualified savings?
- Best balance of deemed savings and detailed M & V?
- Should “prospecting” by ESCOs be rewarded through a feed-in tariff or standard contract offer?
- Should EE trade against RE in a combined low-carbon standard?
- Should programs be expanded to use white tags and trading ?
- How to integrate EE mandates and CO2 cap and trade?

For more information...



- *“Carbon Caps and Efficiency Resources: How Climate Legislation Can Mobilize Efficiency and Lower the Cost of Greenhouse Gas Emission Reduction” (Vermont Law Review 2008)*
- *“Who Slices the Pie in the Sky? What Role Should States Play in Allocating GHG Allowances and Distributing Carbon Auction Revenues?” (Issue brief for the National Association of Clean Air Agencies, January 2008)*
- *“Power System Carbon Caps: Portfolio-based Carbon Management” (NREL Carbon Analysis Forum November 2007)*
- *“Why Carbon Allocation Matters – Issues for Energy Regulators” (RGGI memo March 2005)*

Richard Cowart, Regulatory Assistance Project

Posted at www.raponline.org

Email questions to rcowart@raponline.com