

Carbon Caps and the Power Sector

National Goals, Essential State Roles

Resources for the Future

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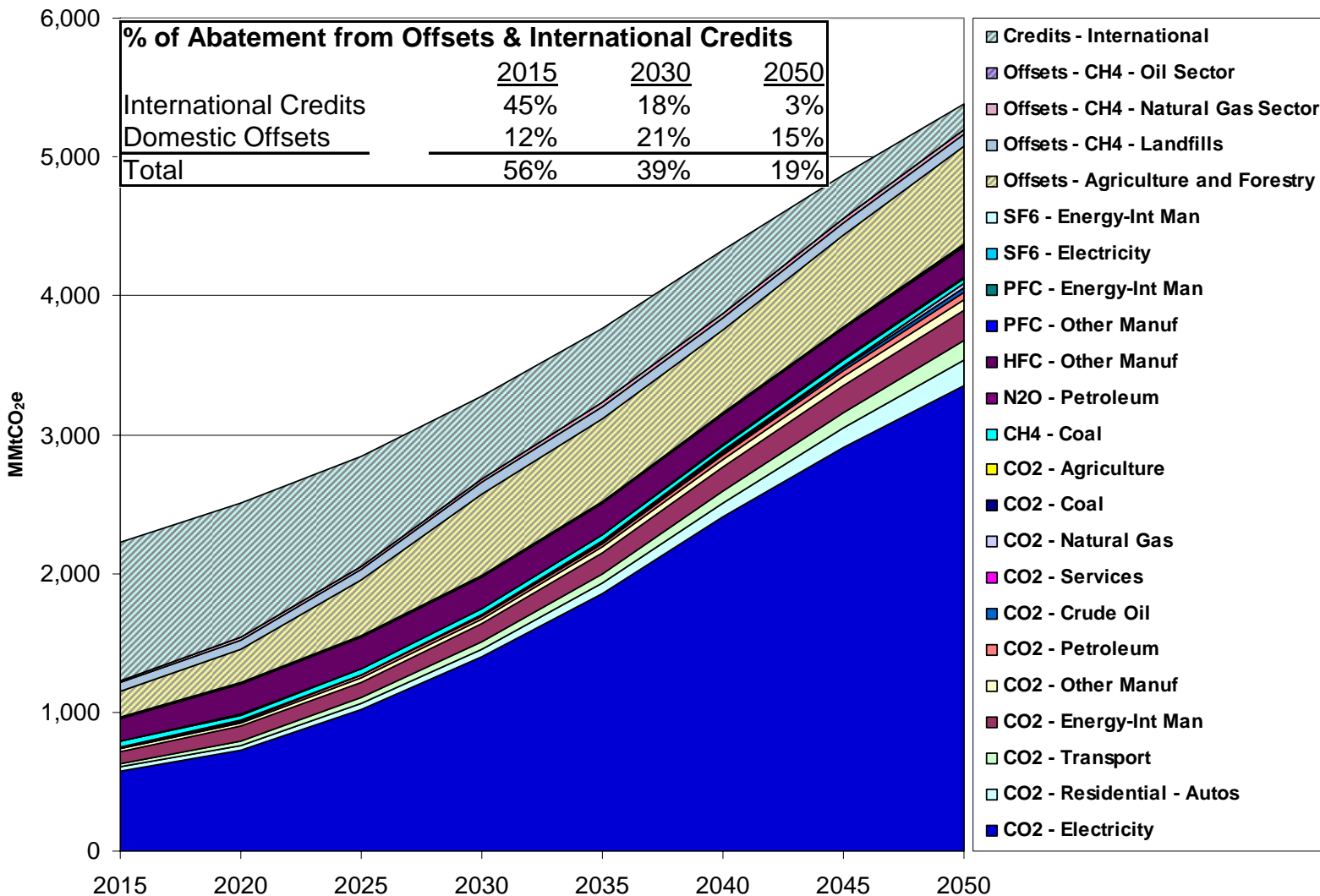
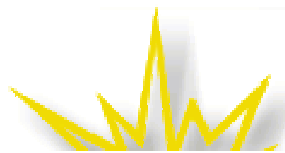


Overview

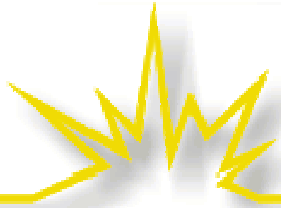
- “Top down” cap and trade relying on price alone is more expensive, less likely to succeed than a **portfolio-based policy menu** (plus a cap);
- “**Cap-and-invest**” can accelerate cap/trade success, & contain program costs – so build EE into national programs;
- **State policies** (EE, codes, portfolio mgt, RPS, etc.) are crucial to success;
- **Congress (and DOE & EPA) should support those state policies**, as a ramp to full-fledged cap and trade, and key elements in national GHG legislation.

Power sector bears a lot of the burden

Sources of GHG Abatement US EPA11-07
(ADAGE model) S. 280 Senate Scenario



- S. 280 allows offsets and international credits to make up 30% of the total allowance submissions requirement.
- The quantity of offsets allowed decreases as allowance submissions decrease.
- Since the quantity of offsets allowed is decreasing over time and the quantity of abatement is increasing over time, offsets make up a large fraction of abatement in the early years of the policy, and their contribution to total abatement decreases over time.



Policy Tug-of-War

- Most environmental economists believe change requires high carbon prices;
 - ❖ And climate legislation is the way to do this
- Consumer advocates (inc. low-income advocates and industrial customers) already want *lower* power and heat bills;
 - ❖ And climate legislation only makes the situation worse
- Congress unlikely to force hefty price increases
 - ❖ So climate legislation may be stalled (L-Warner) or modest in effect, or stalled later



Where will power sector reductions come from?

3 main possibilities:

- Reduce consumption
- Re-dispatch the existing fleet
- Lower the emission profile of new generation (including repowering)

For each opportunity, ask:

1. **How many tons will it avoid?**
2. **How much will it cost consumers per ton ?**
3. **What tools – including what kind of carbon caps -- get the best results on #1 & #2 ?**

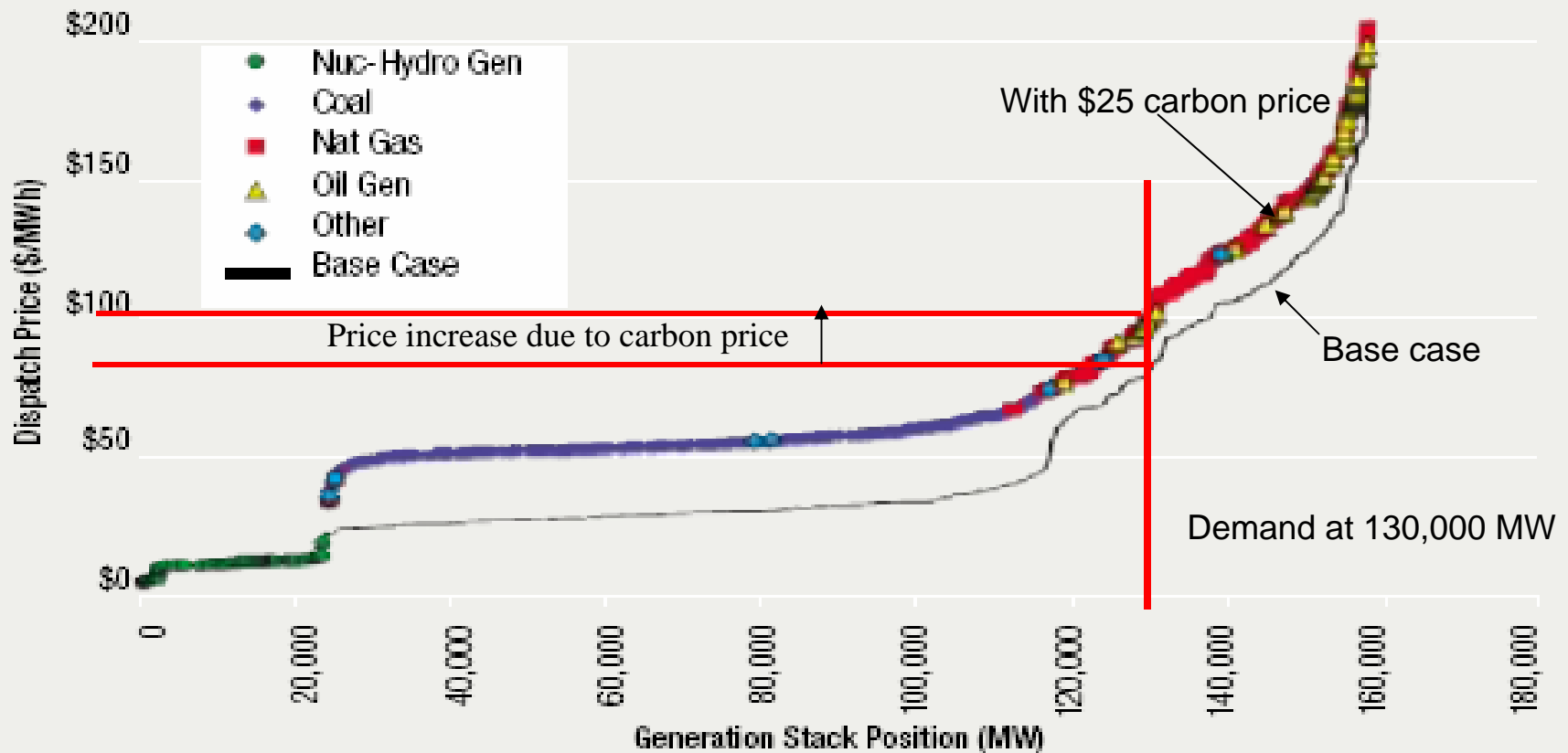
Problem #1: It's hard to affect *demand* (enough) with carbon prices



Problem #2: Carbon taxes and auctions to sources can increase wholesale power prices with little effect on dispatch or emissions

Fig. 3

SUPPLY CURVE WITH EMISSIONS PENALTY OF \$25/TON CO₂



Source: "The Change in Profit Climate: How will carbon-emissions policies affect the generation fleet?"
Victor Niemeyer, (EPRI) -- Public Utilities Fortnightly May 2007 <some captions, demand and price lines added>

Gen-side carbon costs can increase wholesale power prices with little effect on dispatch & emissions

-- Modeling results from ECAR-MAIN and ERCOT

- In ECAR-MAIN (Upper Midwest, coal-heavy) a carbon charge of \$25/ton would raise wholesale power prices \$21/MWH.
 - ❖ “Even a CO2 value of \$50/ton would produce only a 4% reduction in regional emissions given the current generation mix.”
- In ERCOT (Texas, gas-heavy) “when gas is selling for around \$8MMbtu, even a CO2 value of \$40/ton produces little emissions reduction” from the existing mix.
- Thus, the most important tools to reduce emissions are new long-term investments.

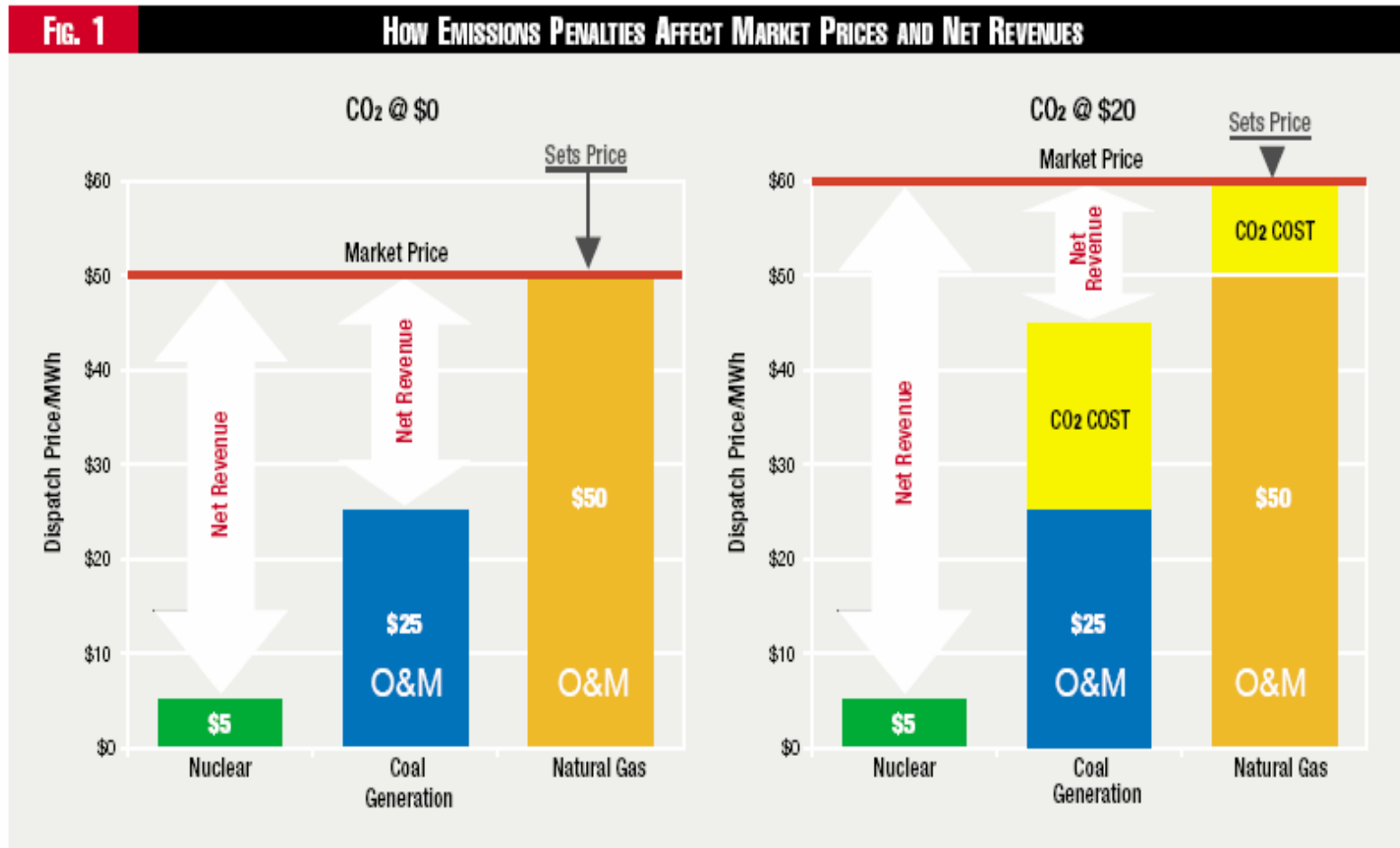
*Source: “The Change in Profit Climate: How will carbon-emissions policies affect the generation fleet?”
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Why carbon taxes and auctions create “high cost tons”



- Carbon price must be very high to save many tons (for gas to displace coal, etc.)
- Fossil units almost always set the clearing price
- Short-term clearing price provides the benchmark for longer-term and bilateral contracts
- SO: Carbon penalty on sellers raises prices generally
- Inframarginal rent a/k/a “windfall gains” to generators paid for by consumers

How Emission Charges Can Raise Prices Without Changing Dispatch or Emissions



Source: "The Change in Profit Climate" -- Public Utilities Fortnightly May 2007 --Victor Niemeyer, EPRI

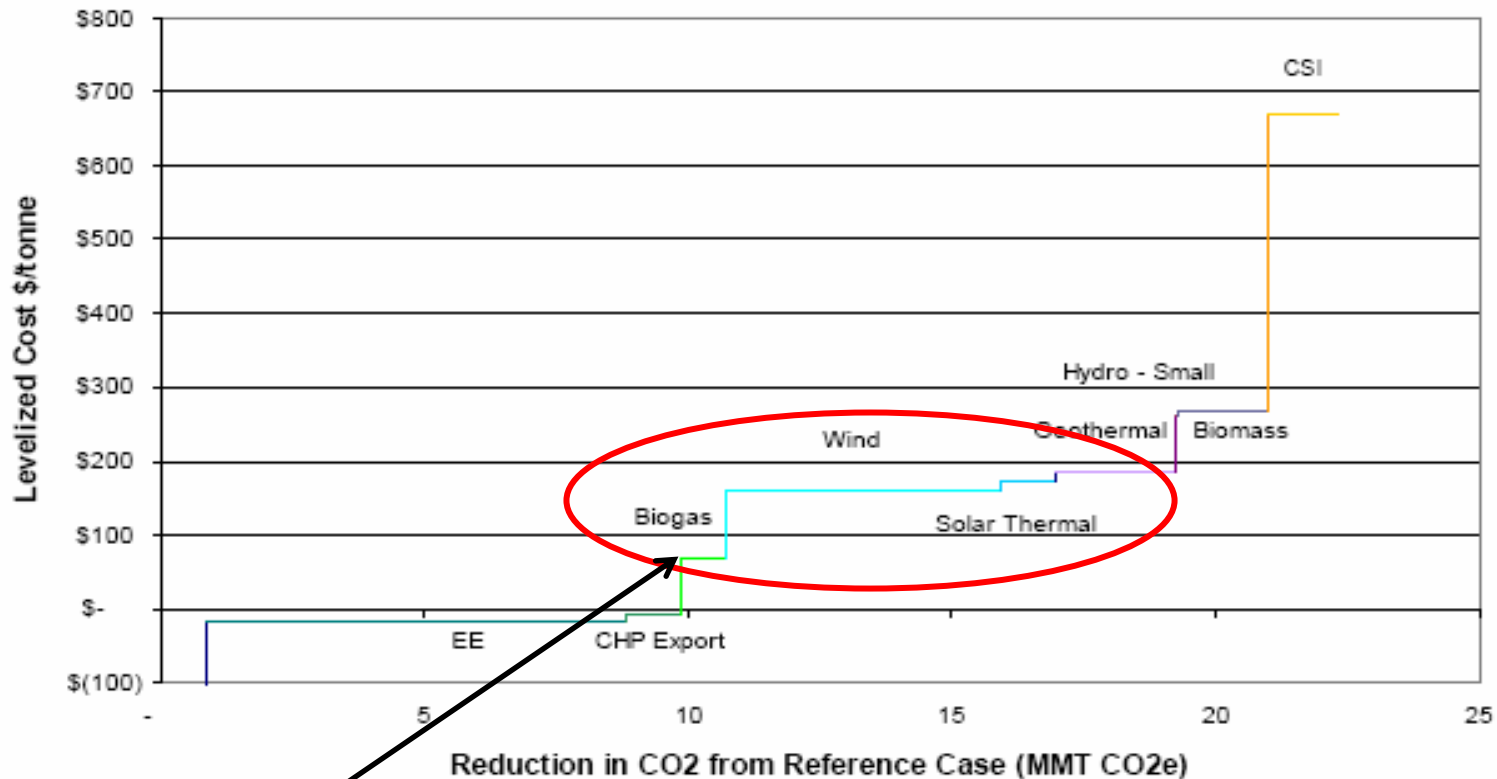


Problem #3: The consumer cost of clean generation

- How high must the carbon penalty be to drive replacement of coal/gas with wind/solar, on market prices alone?
- Counter-example: With the RPS, consumers pay just for the incremental cost of new RE -- without also paying increased costs for the existing fleet of coal, gas, and nuclear.
- Good news: *Most of RGGI states' and CA GHG savings will actually come from EE and RPS policies, not cap-and trade price effects.*

Implied carbon price for new low-carbon capital investment

CO2 Supply Curve of Selected Low-Carbon Resources



CO2 price must be in the \$150/tonne range to induce investment in renewable energy beyond the RPS

Source: E3 analysis for California PUC, assumes RPS in effect

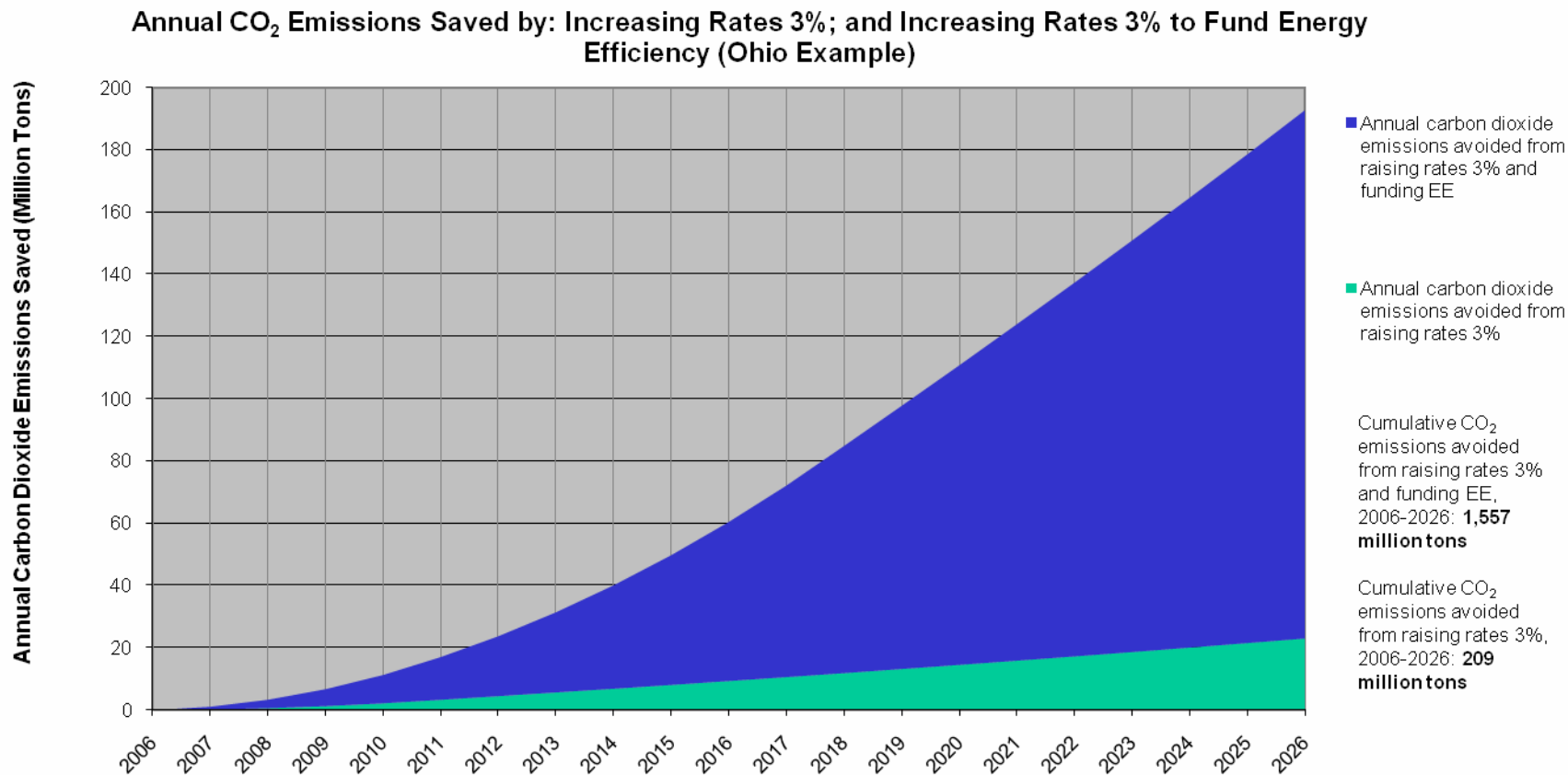


What's Needed?

A More Consumer-Friendly Climate Strategy

1. **Accelerate energy efficiency** for GHG reduction and cost containment
2. **Support state policies** as the essential foundation stones for cap-and-trade (EE, codes, portfolio mgt, RPS, etc.) ;
3. **Use carbon allocation & auction rules** to accelerate cap/trade success, lower program costs
4. **Enhance state roles** through allocations
5. National **Carbon Allocation for Efficiency** would reward states/utilities for EE progress (not just spending)

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 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*



Response #2: Manage carbon from the portfolio UP, not just the smokestack DOWN

- Realistic power solutions require **“what utility regulators and states do”** not just **“what carbon markets do”**
- **State PUC and legislative options:**
 - ❖ Energy efficiency is the essential “bridge fuel”
 - ❖ Rediscover, update IRP and Portfolio Management for LSEs
 - ❖ New capacity: Accelerate the transition with explicit policies for low-carbon resources (e.g., RPS, advanced coal w/ storage)
 - ❖ Promote a new business model for load-serving utilities. (Decoupling, PBR, owned DG, etc.)
 - ❖ And much more: rate design for EE and DR, “loading” orders, carbon performance standards, EERS, etc.

Response #3: 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, WAP 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)**
 - ❖ 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

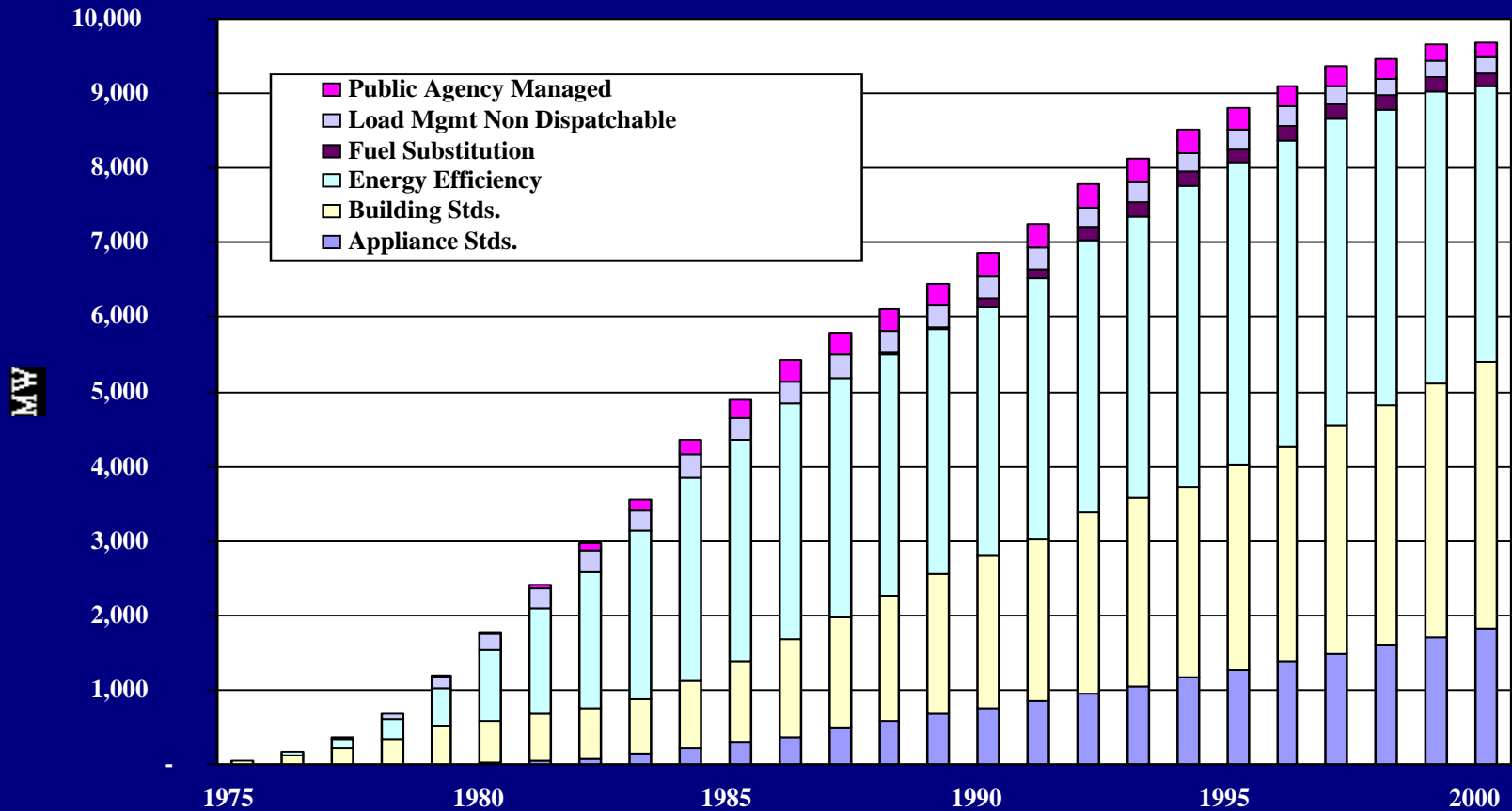


National Carbon Allocation for Efficiency *

- Proposal: Allocate a sizable pool of carbon allowances to states or LSEs 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*

It's not just spending: a portfolio of efficiency measures pays off over time




California efficiency investments lower demand by 25% over 25 years



So what does this mean for federal legislation?

1. Focus on “**portfolio-up**” **policies** (e.g., RPS & EEPS) not just “carbon price driven” policies for power sector GHG reduction.
2. To moderate generator windfalls and lower the cost-per-ton-avoided: **auction allowances** or allocate them to **distribution utilities** (i.e., to power buyers, not sellers).
3. Dedicate auction revenues to investments in **end-use efficiency**.
4. **Allocate allowances to states/LDCs** on a performance basis to support EE progress.

For more information...

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- *“Carbon Caps and Efficiency Resources: How Climate Legislation Can Mobilize Efficiency and Lower the Cost of Greenhouse Gas Emission Reduction” (Vermont Law Review 2009)*
 - *“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)*

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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 US DOE & EPA, several foundations, and international agencies. We have worked in over 40 states and 16 nations.

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 Oregon Carbon Allocation Task Force, the National Association of Clean Air Agencies, NARUC, the Vermont legislature, and to China's national energy and environmental agencies.