New Regional Strategies for Customer-Based Resources: Carbon Allocation and Resource Adequacy

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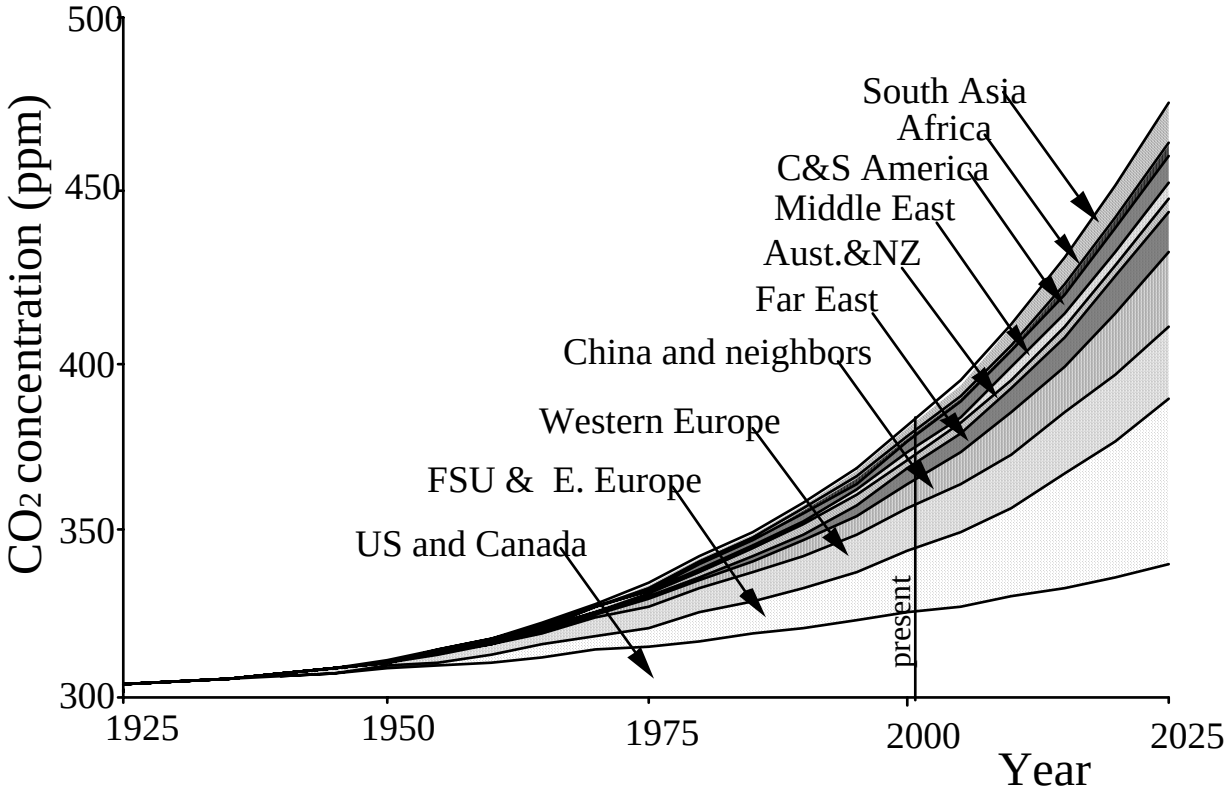
New Regional Strategies for Energy Efficiency

- Context: Resource Options for a Carbon-Constrained World (EPRI presentation)
  - Customer-based resources often overlooked
- Energy efficiency as a greenhouse gas reduction strategy (RGGI and California)
- Demand-side capacity as a resource in regional capacity markets (New England ISO)

2 billion villagers want a better life

Why us?

…most of the CO_2 in the atmosphere will be from N. America and Europe for years to come.



Explanatory note: Despite rapid increases in the emissions from developing countries such as China that are anticipated in the coming decades, the U.S., Europe and Russia will continue to be the source of most of what is in the atmosphere for many decades because carbon dioxide has a long residence time in the atmosphere. The projections shown assume that the Russian economy recovers and resumes its past practices in energy use.

State and regional power sector carbon caps

California & Oregon

RGGI - 7 to 10 states

Together, their carbon profiles exceed most nations.

The high cost of carbon

- Not just environmental impacts
- Economic challenge:
  - New England exports well over $22 Billion per year to import fossil carbon*…
  - That we DON'T want to release into the atmosphere
- The answer isn't cheaper carbon, it's greater efficiency

Source: EIA (2002 data) The total is undoubtedly much higher now

Today's main points: Three lessons in cap-and-trade architecture

- 1.The Acid Rain program design – smokestack-based, free allocations based on historic emissions – is not the best design for a carbon cap/trade system for the power sector.
- 2. An effective power sector carbon program requires focus on the load side of the power system, not just the generation side.
- 3. Energy efficiency is not a "collateral energy policy," it is **the key to success** of power-sector carbon programs.

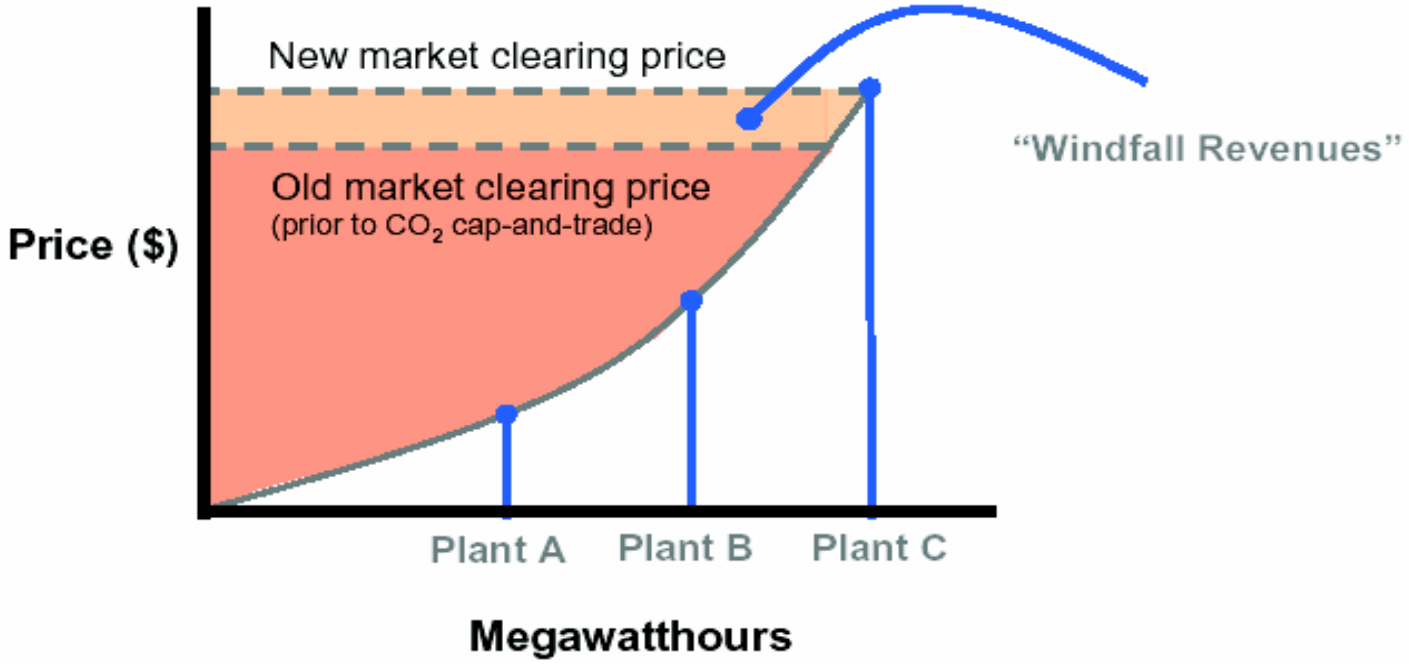
Architectural mistakes: Three wrong assumptions

- 1. Generators lose money under carbon cap and trade, so designers must give them allowances for free.
- 2. Just manage pollution, price increases and demand elasticity will deliver needed efficiency.
- 3. Initial allocation of carbon credits does not affect program cost to consumers.

Reality #1 Most generators make money with free historic allocation

Theoretical representation of "windfall revenues"

A fossil unit on the margin increases the market clearing price (i.e., the price paid to all generating units dispatched) to reflect the cost of CO_2 compliance



What free % would make generators whole?

- (IF WE DECIDE TO COMPENSATE GENERATORS)
- CBO: "Producers would have to receive only a modest portion of the allowances to offset their costs from a cap on carbon emissions, because they would be expected to pass a large share of those costs on to consumers."
- RGGI study (by RFF): Generators need less than 25% of allowances
- Goulder (Stanford): Generators could be made whole with just 13% free allowances
- UK Parliament: EUTS is creating windfall gains for generators in the UK.
- Similar studies now reported in Germany and the Netherlands

Reality #2: EE programs are more powerful than rate increases

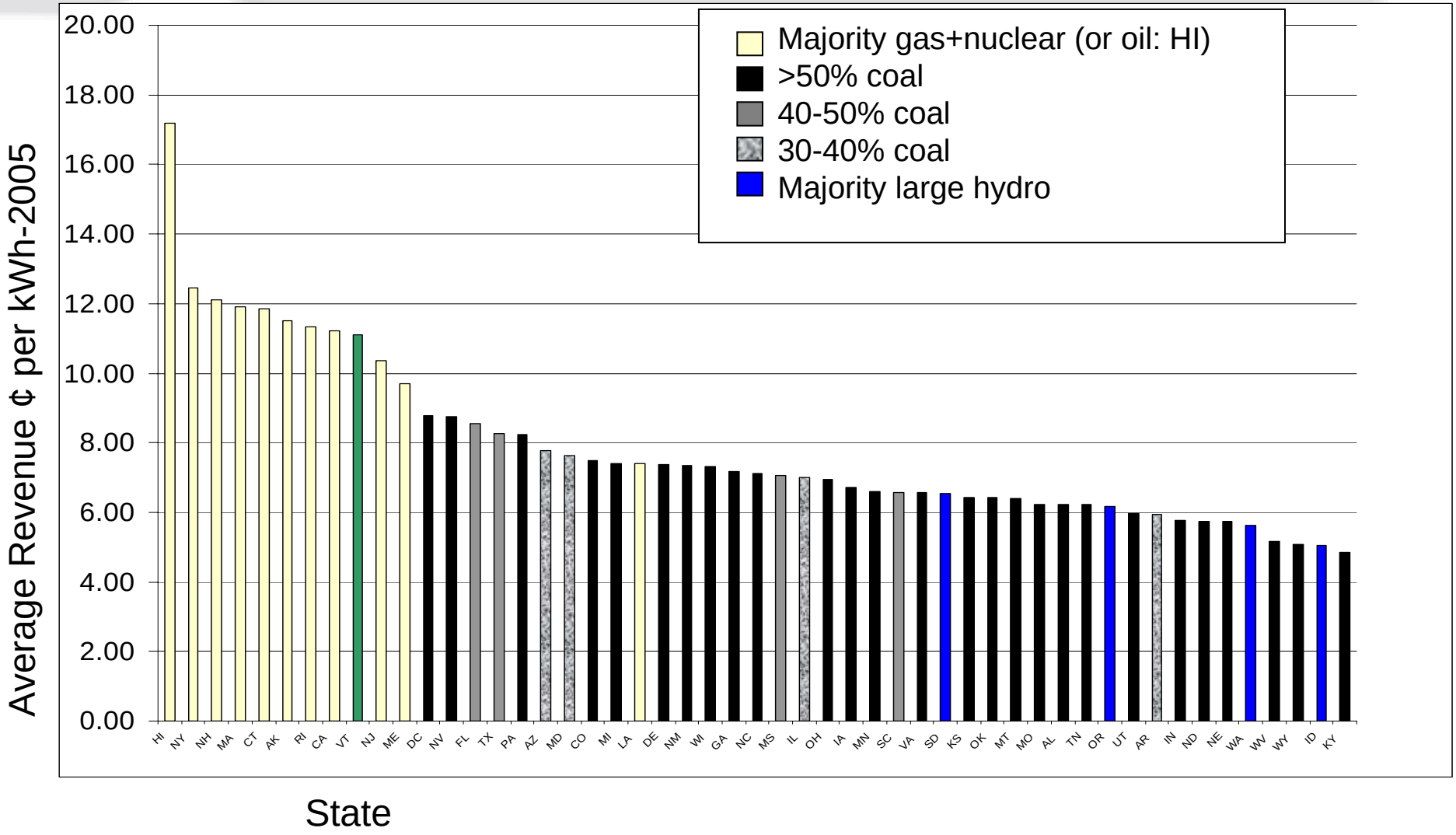
- Economic theory: just raise the price of power
- DSM reality: ***Programs*** are needed to surmount market barriers to efficiency
- $ spent through programs will deliver >5x the efficiency savings of $ spent in higher prices
- Key conclusion: Build efficiency support into program architecture.
- BUT: Generators don't deliver efficiency
- Hmmm…Who has relationships with customers?

What does it cost to avoid a ton of electric carbon?*

Resource option	Carbon intensity	Cost per MWh	Cost per ton avoided
Coal	.92/MWh	$40	NA
Gas	.45/MWh	$55+	$30+
New Nuclear	big debate	$70+ to ??	$30 to +??
Wind	low	$75	$35
PV	low	$180+	$140+
Efficiency	low	$30	(-$10)

**Non-nuclear generation cost data from EPRI ("Generation Technologies in a Carbon-constrained World," 2005, assuming gas at $6MMbtu); EE data from Efficiency Vermont; nuclear data from For the point made here the precise numbers are not critical*

High emissions vs. High costs: Is there another choice?



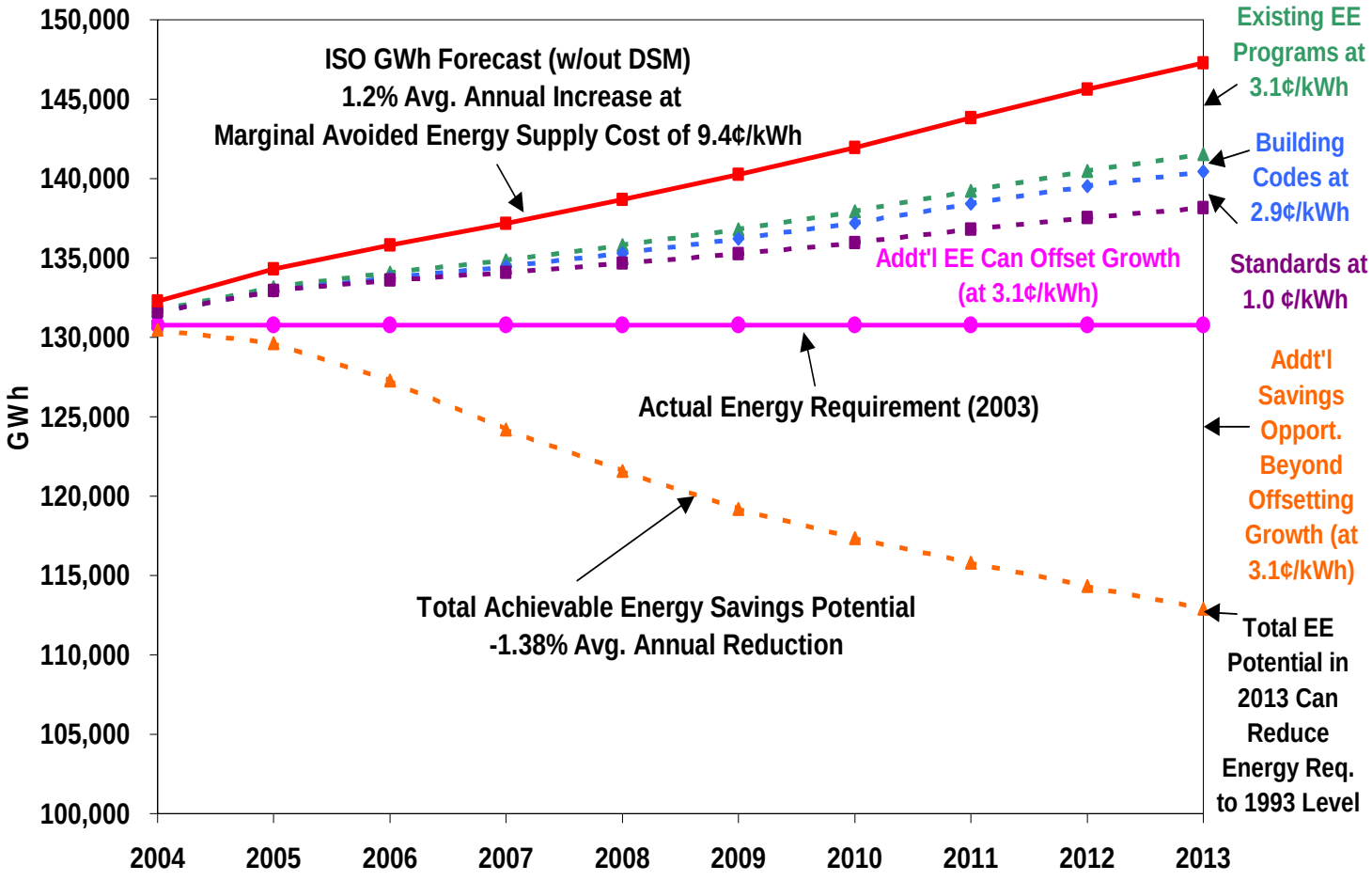
Reality #3: Carbon credit allocation can mobilize efficiency

- Key point: A carbon program that directly mobilizes end use efficiency **will cost less and achieve more** than one that focuses only on smokestacks.
- Two possible techniques to reveal the carbon value of efficiency and renewables:
  - **Consumer allocation (RGGI region)**
  - **Load-side cap and trade (California and Oregon)**

RGGI answer: The Consumer Allocation

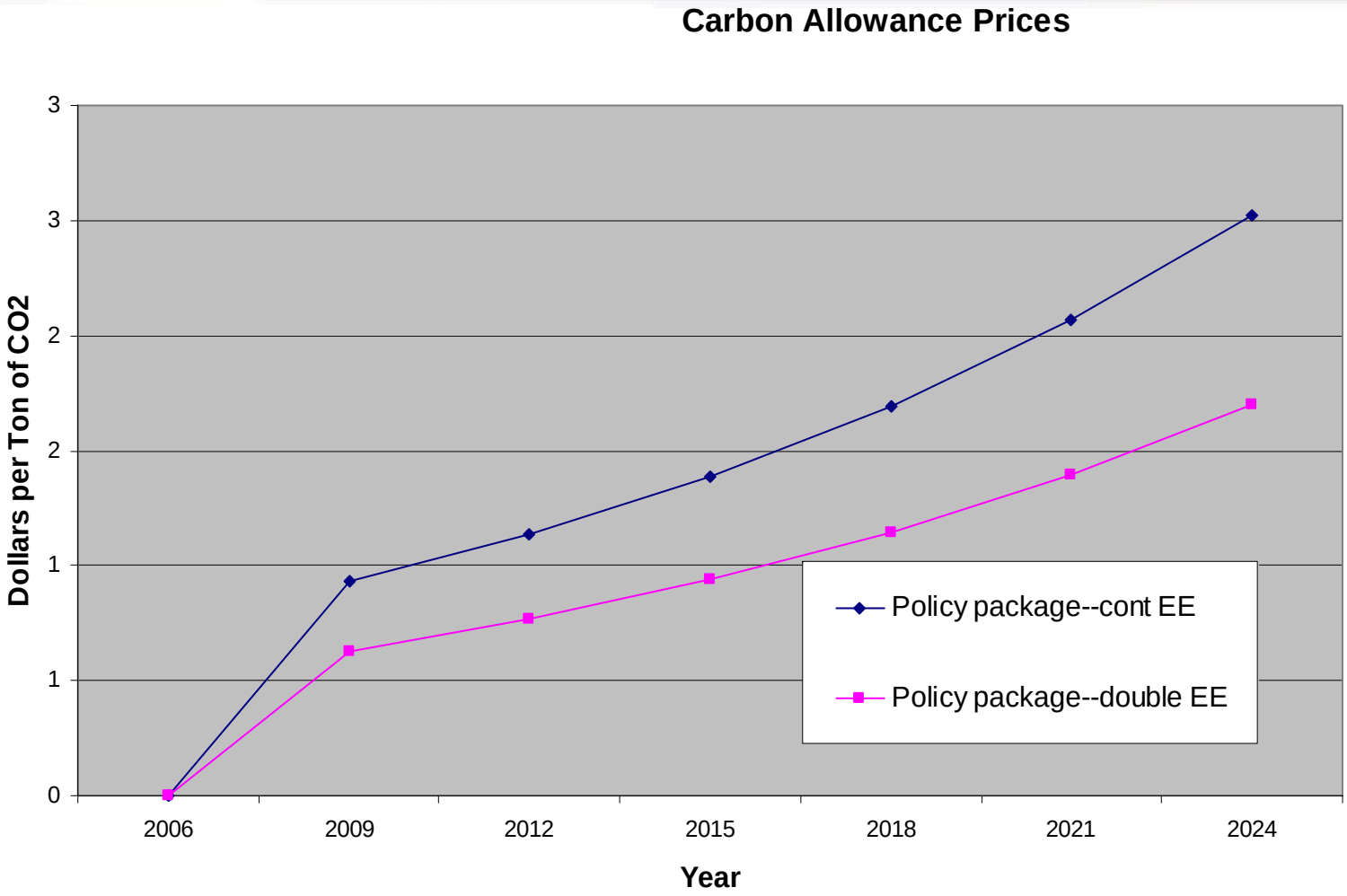
- Allocate up to100% of initial credits to consumer representatives (eg, distribution utilities, Efficiency Utility)
  - RGGI MOU - state minimum commitment is 25%
  - Most states will be higher – Vermont law is 100%; NJ, CT, NY all considering high %s
- Generators need to purchase allowances, recycling the windfall revenue BACK to consumers
- PUCs supervise use of the $$ for benefit of consumers
- **Best result: focus on investments that lower carbon (EE &RE)**
- Result: lower program cost, greater efficiency

Efficiency in New England can reverse demand growth



Source: NEEP, 2004

IPM Results: Carbon Prices

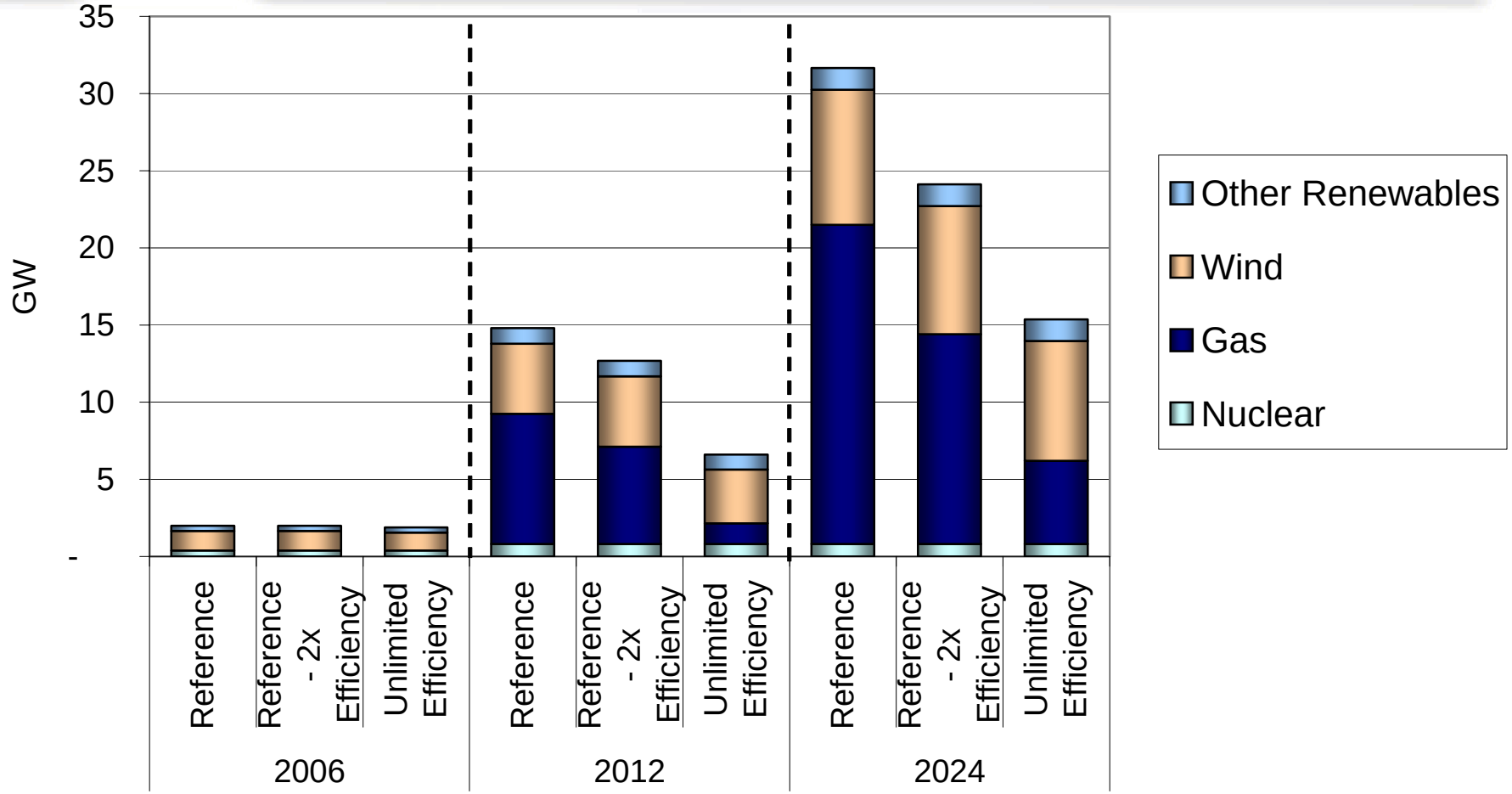


Energy Bill Impacts

Average Energy Bill Savings —RGGI Package with Doubled Efficiency					
Residential		Commercial		Industrial	
2015	2021	2015	2021	2015	2021
$71	$118	$390	$650	$2468	$4092
7.5%	12.4%	4.8%	8.1%	2.8%	4.7%

Source: REMI modeling for the RGGI State Working Group design process

RGGI Cumulative Capacity Additions



West Coast approach: Load-Side Cap & Trade

Basic rule: LSEs must have credits to cover the emissions associated with their sales to retail customers? Steps:

1. Measure historic emissions associated with electricity *serving the state* (or region) –
   - ❖ All sources, wherever located -- both in-state and imports
2. Set "hard" emissions caps to lower impact in stages
3. Distribute allowances ("carbon credits") to LSEs
4. LSEs spend credits as needed to match their portfolio of sources
   - ➢ can sell excess credits from RE & EE choices
5. Gains: (a) no leakage problem (b) no generator windfall (c) EE and RE earn carbon value automatically

Conclusions

- Cap-and-trade architecture is a matter for ISOs, PUCs and Energy Offices, not just Air agencies
- Consumer allocation avoids generator windfall and provides a revenue source for efficiency and renewables:
  - In RGGI, 50% consumer allocation could add $250 million (=+50%) to regional EE budgets
- Efficiency is the key to low-cost power sector carbon reduction

Topic 2

New England's Forward Capacity Market: Demand Resources as Qualified Capacity

Forward Capacity Market - Goals

- Secure adequate capacity to meet New England's forecasted Demand three years in advance
- Select a portfolio of Supply and Demand Resources through a competitive Forward Capacity Auction process
- Provide a long-term (up to 5 year) commitment to Supply and Demand Resources to encourage investment

Forward Capacity Market Overview

- ISO–NE settlement on capacity, March 2006 approved by FERC June, 2006
  - Annual Forward Capacity Auctions (FCAs) for capacity to be available three years hence.
  - Customer-sited resources—energy efficiency, distributed generation, demand response—can participate
    - Called “Other Demand Resources” (ODRs), as real-time demand response will be treated separately
  - Rules for the transition from the current ICAP system to the final FCM (beginning 2010) have been agreed on and filed at FERC for implementation in 2007
- Rules for the final FCM are currently being negotiated by the stakeholders in the “Demand Resources Group” (DRG):
    - DR providers, efficiency providers, regulators, utilities, generators, other interested parties

Transition Period
(12/1/2006 to 5/31/2010)

- Eligible Supply and Demand Resources can earn monthly Capacity Payments
- Resources must be registered with ISO New England
- Demand Resources must demonstrate demand reduction or output per a **Measurement & Verification Plan**
- Note: **Pre-existing DR** does not get paid

Period	**Capacity Rate**
12/1/2006 to 5/31/2008	$3.05/kW per Month
6/1/2008 to 5/31/2009	$3.75/kW per Month
6/1/2009 to 5/31/2010	$4.10/kw per Month

FCM Auction Basics

- ISO-NE determines total capacity need for the region, three years ahead
- Clearing price set by the marginal bid
  - Only new capacity bids price
  - Existing capacity is a price-taker: it merely states whether it is in the market or not
- Capacity receives payments for as long as it is available
  - New capacity has option to lock in its first year clearing price, for up to five years; a price-taker thereafter

DRG Accomplishments to Date

- Established a new resource category – "Other Demand Resources" – which includes Energy Efficiency, Load Management & Distributed Generation
- Recommended Transition Period rules for Demand Resources
- Determined how DR ought to be integrated into the FCM
  - DR can submit capacity supply offers in the Forward Capacity Auction ("FCA")

DR Group work to date (con't)

- Recommended Installed Capacity Requirement ("ICR") rules to ensure that DR is not double-counted, which could result in the under-procurement of capacity
  - For the LSE, DR is either a *resource* or a *reduction to load,* not both
- Proposed transition rules filed with the FERC on September 1, 2006

Stages in the (post-transition) FCA Process

- The primary Forward Capacity Auction process consists of these major phases
  - **Qualification Period:** determine which resources can submit offers into the FCA
  - **Auction** occurs
  - **Planning Period:** give suppliers with accepted offers sufficient time to construct new resources to fulfill capacity obligations
  - **Commitment Period:** the period over which suppliers with accepted offers are obligated to deliver capacity (1-5 years)

Market Rules for DR Participation in the FCM: Thorny Issues

- **Resource definitions**
  - **On-Peak** Demand Resources (typical high-demand periods)
    - Energy Efficiency
    - Some Load Management and Distributed Generation
  - **Critical Peak** Demand Resources (a few "seasonal peak hours" and unpredictable "shortage hours")
    - Real-Time Demand Response
    - Some Energy Efficiency, Load Management and Distributed Generation
- Determining **Capacity Value** of a Demand Resource
  - How much weight to give On-Peak versus Critical Peak performance?
  - Summer versus winter peaks; Shoulder months
  - Avoided losses and generation reserve margin adjustments

ODR Market Rules Issues (2)

- Types of DR capacity offers
  - Bids specify size and location
  - New, Existing, Self-Supply
  - Retirement dates and Measure Life
- **Measurement and Verification** (M&V)
  - FCM goal: DR must be real and verified to be relied upon, and to be paid
  - M&V Plan & Reference Reports expected
  - Monthly M&V Summary Reports will be required (to support settlement)

ODR Market Rules and Issues (3)

- **Qualification criteria** and process
  - DR Project Description, Source of Funding, Customer Acquisition Plan
  - Measurement and Verification (M&V) plan
  - Critical Path Schedule Milestones
  - Financial Assurance
- **Performance incentives**
  - Under-performing DR gets paid less, over-performing DR gets paid more up to the over-delivered kW times the FCA clearing price for the relevant Commitment Period.
  - Overall payments to DR capped to the amount cleared in the FCA.
- **Who pays?** LSEs must meet ICR requirements
  - Juicy issue of “load reconstitution” – should LSE’s have lower ICR requirements when FCM-eligible DR lowers their load?
  - Proposal – put this one off for 2 years

Some Lessons from ISO-NE's FCM saga

- The process of turning resource neutrality into an actual Rule has taken years:
  - "Efficient Reliability" 2001
  - NECPUC and ISO Advisory Council advocacy
  - NEDRI 2003
  - Settlement 2006
  - First FC auction payments 2010
- Details matter – and can kill effective DR participation (e.g., performance periods, penalties, valuation rules)
- Governance matters: ISO-NE has Customer and Alternative Resource sectors.

Lessons (con't)

- FERC is prepared to approve, perhaps not yet to mandate, resource adequacy payments to DR assets.
- What could this mean for customer-based resources?
  - Level playing field
  - ~2000MW @ $5.00/kw-month = $120 million/year
- Finally: Integrating DR in capacity markets is POSSIBLE and is consistent with ISO market goals and with public policy

For more information…

Carbon Allocation:

- *"Another Option for Power Sector Carbon Cap and Trade Systems – Allocating to Load"*
- *"Why Carbon Allocation Matters – Issues for Energy Regulators"*

Efficient Reliability and Capacity Markets:

- *"Efficient Reliability: The Critical Role of Demand-Side Resources in Power Systems and Markets" (2001)*
- *"Dimensions of Demand Response: Final Report of the New England Demand Response Initiative" (2003)*
- *"Revealing the Value of Demand Response" (EPRI 2003)*

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