Climate Realities and Utility Policies:
Why States & Commissions Are So Important

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The Regulatory Assistance Project

China ♦ India ♦ European Union ♦ Latin America ♦ United States

Website: *http://www.raponline.org*

What We Don't Know

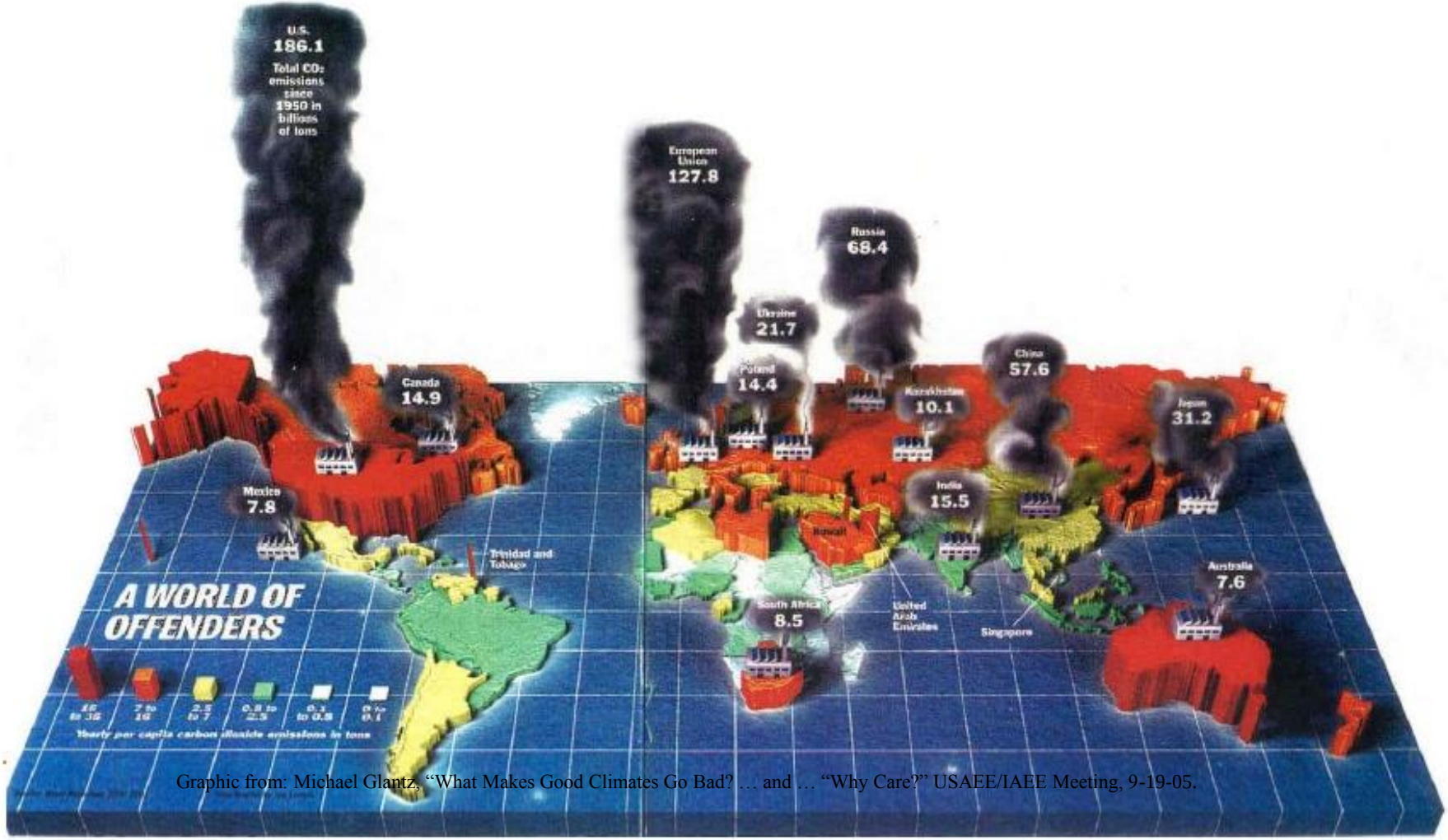
(July 2010 version)

- Will there be federal climate legislation?
  - Will it be comprehensive or utility-only?
  - Will utility emissions be capped?
  - Auction, allocation, or both?
  - Will there be federal mandates or supports for renewables, efficiency, CCS, etc?
- *All important issues – but with or without a federal bill, programs and policies delivered by STATES and PUCs are central to a prosperous, clean energy future.*

What We Do Know: 3 messages from the NARUC-National Council Climate Conference

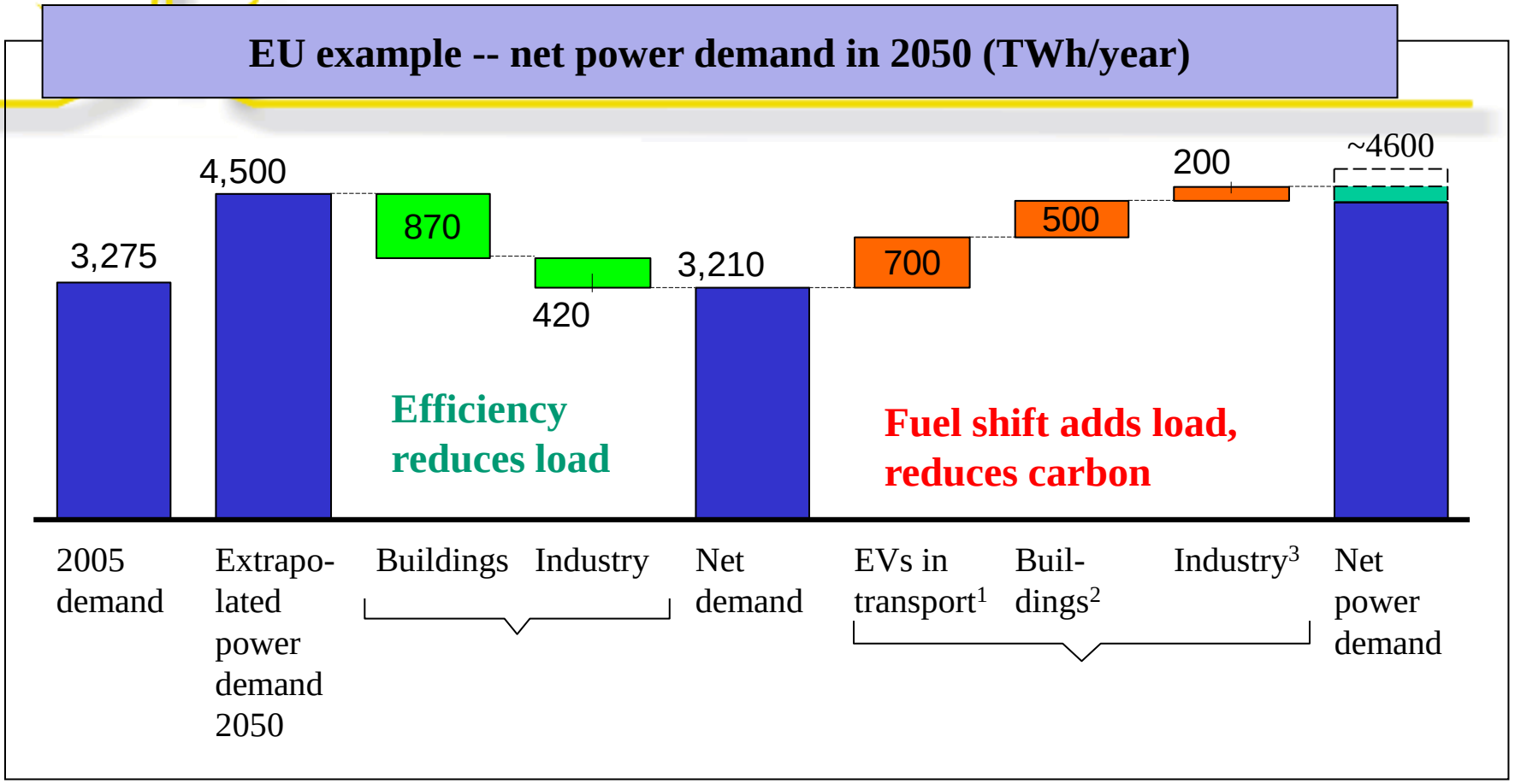
1. **Broad agreement on external drivers and imperatives:**
   - Limit of +2 degrees C = 450 ppm at most
   - Needed in US and EU: 80% reduction by 2050
   - "Decarbonizing the power sector" is essential
2. **Carbon markets/prices alone will not deliver the needed reductions in time.**
3. **States and PUC *policies* are central to the transition to a prosperous, low-carbon future**.

CO2 Emissions by Country: Total emissions since 1950 (b tons)



Graphic from: Michael Glantz, "What Makes Good Climates Go Bad? … and … "Why Care?" USAEE/IAEE Meeting, 9-19-05.

Power sector is the key to 2050 goals: we must decarbonize generation while electrifying buildings and transport



1 Assumption: electrification of 100% LDVs and MDVs (partially plug-in hybrids)
2 Assumption: 95% of remaining primary energy demand converted to electricity usage in Buildings for heating/cooling from heat pumps; assumed to be 2.5 times as efficient as primary fuel usage; lower case: electric heat pumps assumed to be 4 times as efficient as primary fuel usage
3 Assumption: 15% fuel switch of remaining primary energy demand converted to electricity in industry for heating from heat pumps; assumed to be 2,5 times as efficient as primary fuel usage; lower case: electric heat pumps assumed to be 4 times as efficient as primary fuel usage

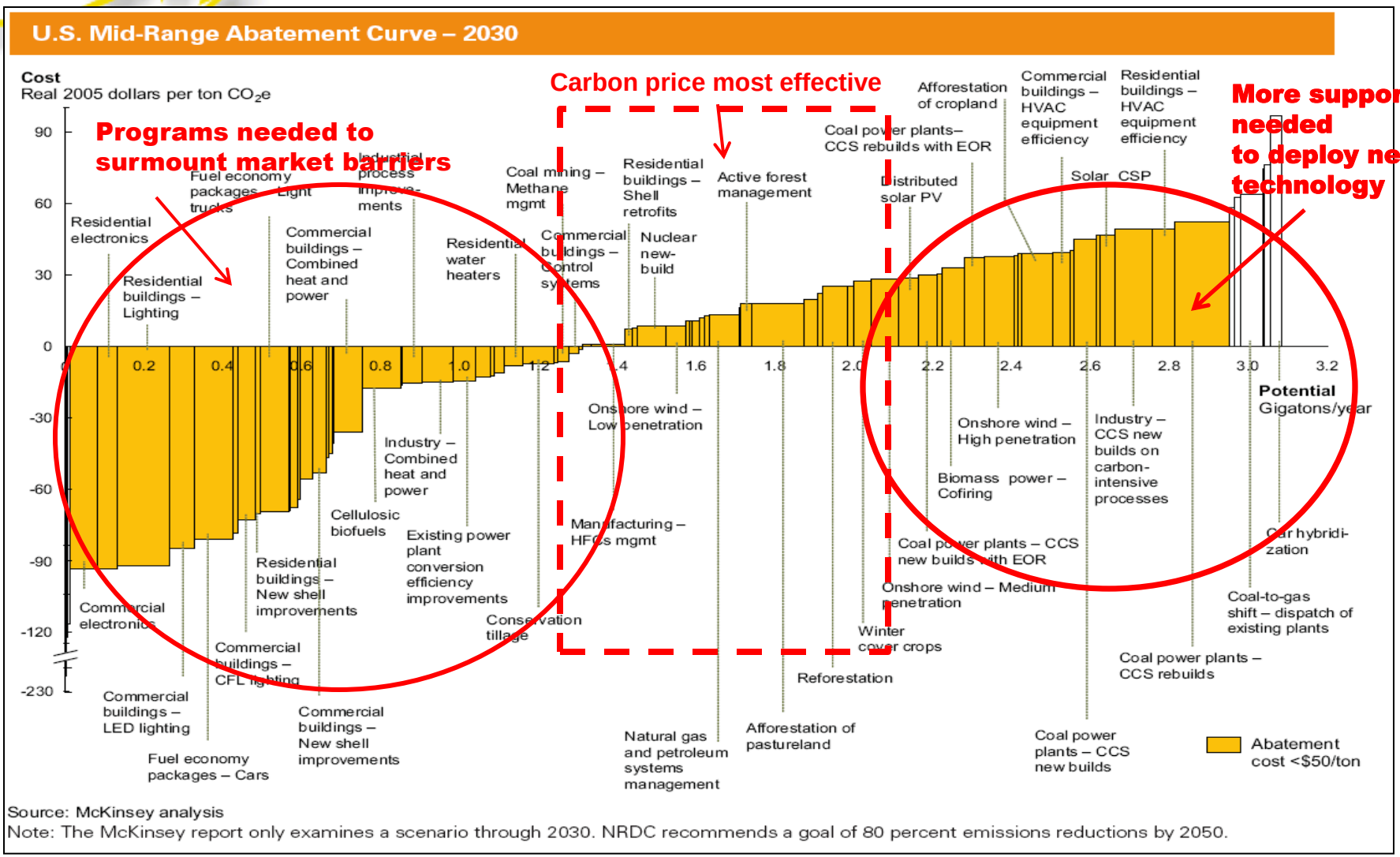
SOURCE: European Climate Foundation, McKinsey, and KEMA analysis March 2010 “Roadmap 2050” study

Where will GHG reductions actually come from? Four challenges:

1. **Consumer response:** Low demand-elasticity & market barriers to energy efficiency
2. **Dispatch:** High carbon prices needed to alter dispatch
3. **New generation:** High and sustained carbon prices needed to call forth investment in low-carbon resources
4. **Politics and equity:** Power markets magnify consumer cost impact, limit political feasibility of price-driven carbon policies

- **This means: A federal carbon price will not actually deliver needed results**
- ***With or without a federal program*, state & PUC policies and programs are the keys to serious GHG reductions**

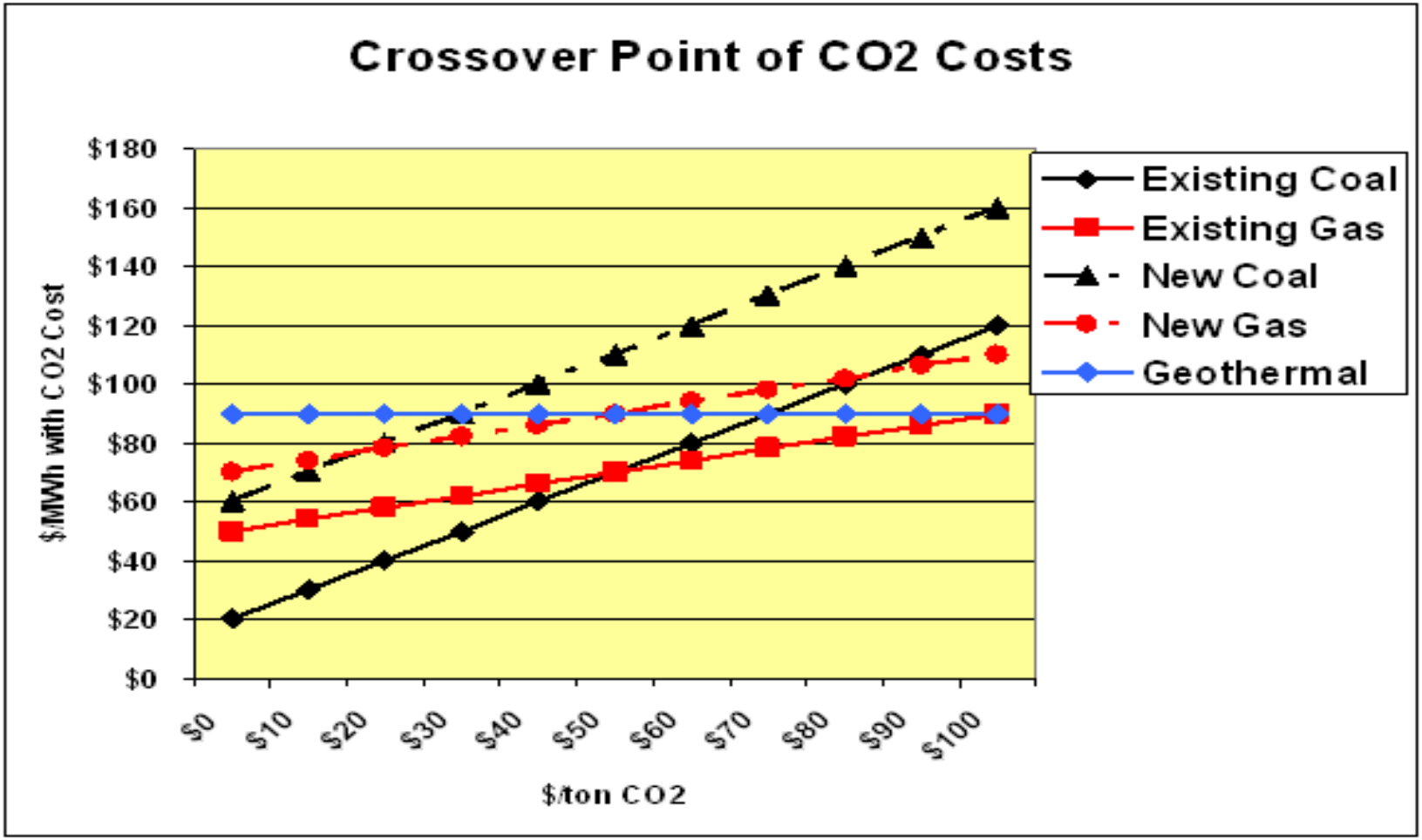
Carbon prices/taxes alone will deliver only a part of the abatement needed



Source: McKinsey analysis
Note: The McKinsey report only examines a scenario through 2030. NRDC recommends a goal of 80 percent emissions reductions by 2050.

Challenge #1: Hard to affect demand (enough) with carbon prices

Challenge 2. High Carbon Prices Needed to Displace Existing Fossil Plants



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?" Victor Niemeyer, (EPRI) -- Public Utilities Fortnightly May 2007

Challenge 3. We can't rely on carbon prices to deliver new low-carbon generation

--The view from Exelon

Cost of Carbon Mitigation in Electricity Supply

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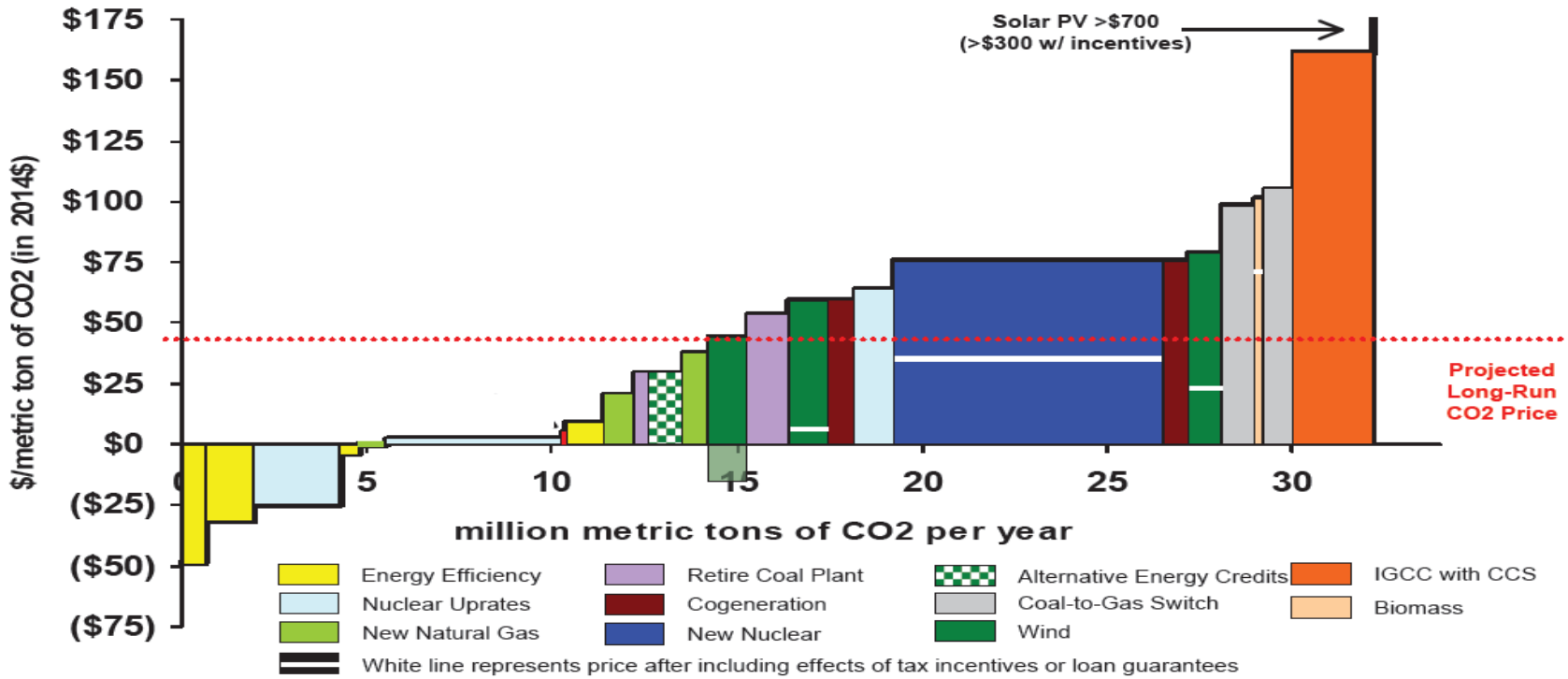


Note: Emissions abatement estimates for new generation capacity represents emissions reduced in the market as a result of the project less emissions introduced due to the project (if any). New nuclear plants assumes 1,460 MW of new generation.

Cap-and-trade legislation will encourage us to do the cheapest options first

Investor perspective…

Market and policy uncertainties undercut investor willingness to build clean generation

- Will the **carbon price** be high enough, for long enough?
  - The carbon market can be highly volatile
  - Will governments relax carbon rules in response to high prices or other problems?
- Will **fuel prices** stay high enough, for long enough?
- Will **power markets** permit capital cost recovery for high capital/low fuel cost assets?
- Will **transmission** access, rates, rules provide what renewables projects really need?

Challenge 4. Carbon taxes and auctions create “high cost tons”

- Carbon price must be quite high to alter dispatch meaningfully (for gas to displace coal, etc.);
- In power markets, fossil units almost always set the clearing price (and long-term prices follow);
- SO: Carbon penalty on sellers raises prices paid to all generation, including nuclear, with little CO2 effect;
- “Windfall gains” to existing generators paid for by consumers;
- **EPRI study:**
- **PJM study: a $20/ton carbon price could cost consumers $840 per ton actually reduced -- environmentally inefficient, and a political disaster.**
- **EU study: 20 Euro/tonne carbon price costs consumers 248 Euros per tonne actually reduced via dispatch switching.**

Solutions? Elements of a 2050 Roadmap – State PUCs roles in every step:

1. Deliver “Efficiency First” policies and programs
2. Halt lock-in of new unabated coal
3. Accelerate CCS for coal and gas
4. Add large-scale renewables
5. Grid expansion and access rules for renewables
6. Support nuclear where competitive
7. Electrify light-duty transportation (and buildings where needed)
8. Build a Smart/Green Grid for DR, EVs, PVs,etc.
9. Regulation and finance – Support profitable business models for utilities and investors

No scenario works without an "Efficiency First" commitment

- ***"If I were emperor of the world, I would put the pedal to the floor on energy efficiency and conservation for the next decade."***

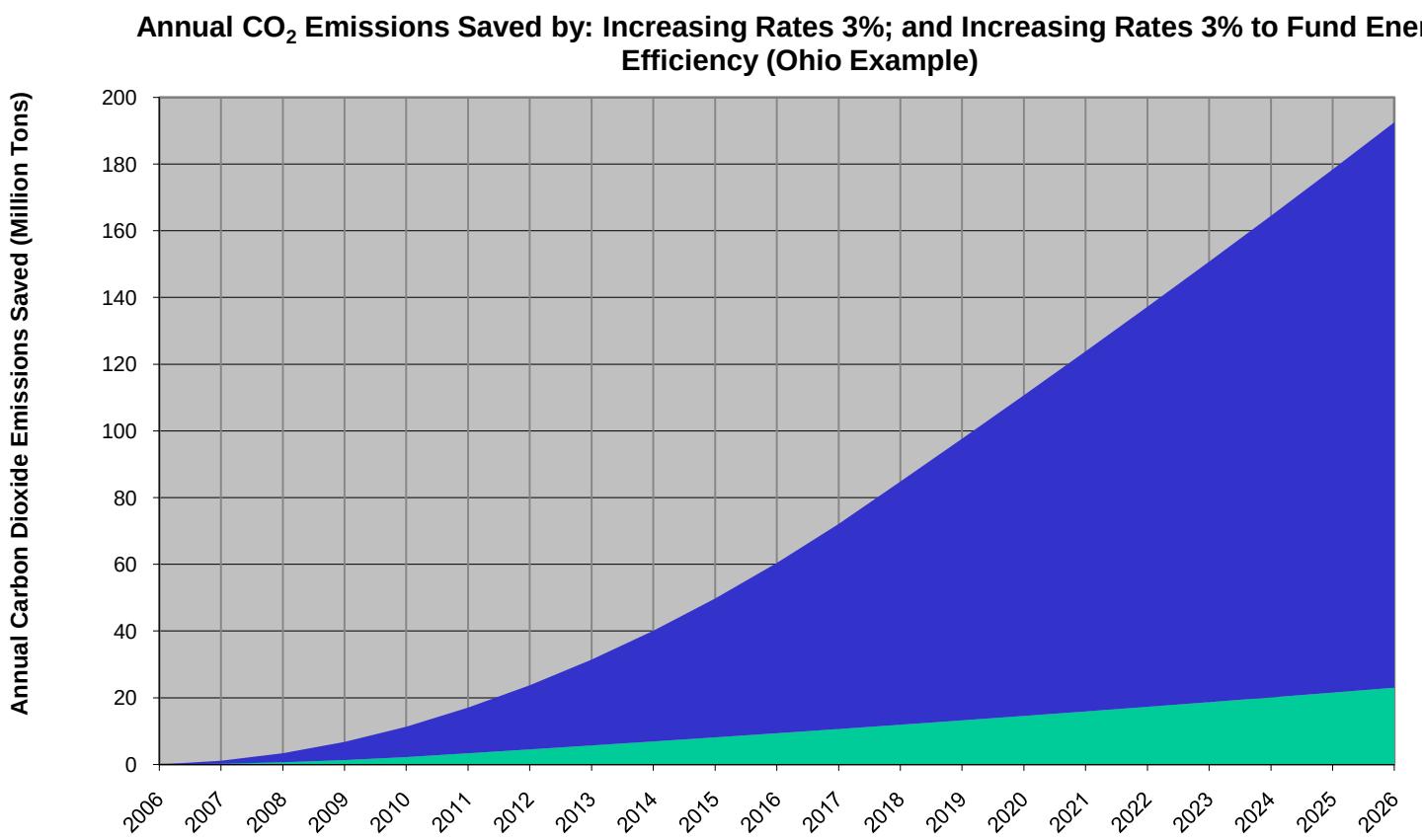
  — Dr. Stephen Chu, United States Secretary of Energy

- ***"No matter what approach we take, if we don't focus on efficiency, the costs are staggering…Energy efficiency is the foundation of every strategy we can develop"***

  -- Gina McCarthy (EPA Air Administrator) speaking to NARUC

- ***Breakthrough idea: 10 RGGI states are using a "cap and invest" strategy to target >70% of RGGI carbon revenues to energy efficiency ($500 million so far)***

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

States Manage Efficiency Obligations -- Top 10 US States use a variety of approaches

State	Efficiency Portfolio Manager Structure of Top 10 (ACEEE)
California	Regulated Utility (DNO with supply function)
Massachusetts	Regulated Utility (DNO with supply function)
Connecticut	Regulated Utility (DNO with supply function)
Vermont	Contracted Private Entity (non profit)
Wisconsin	Contracted Private Entity (non profit)
New York	Government Agency
Oregon	New, Sole-Purpose Public Corporation
Minnesota	Regulated Utility (DNO with supply function)
New Jersey	Contracted Private Entity (for profit)
Washington	Regulated Utility (DNO with supply function)

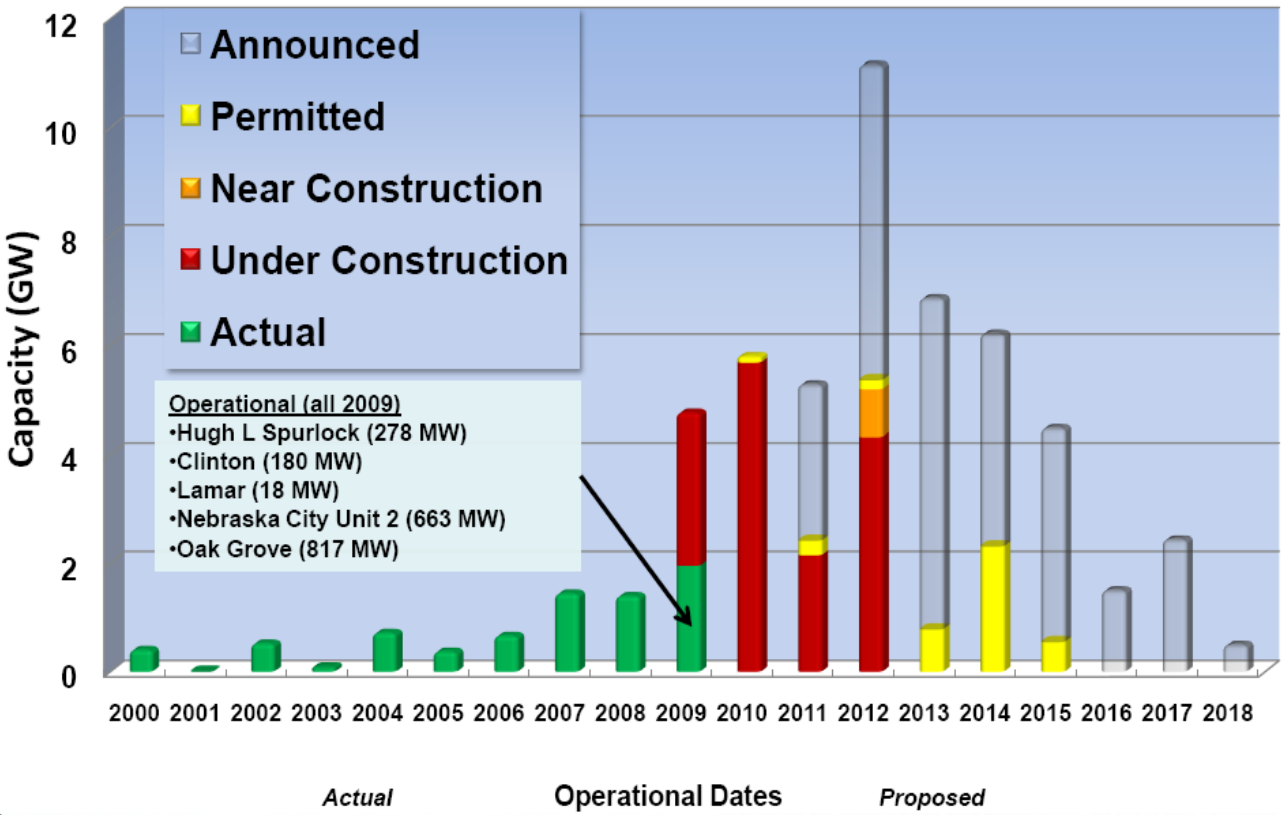
Best structure depends on local conditions

States supervise emissions and utility carbon risk --

Who will build the last unabated coal plant?

Current Capacity Additions by Years

Figure 2



Under construction (10/09)	25 plants 15 GW
Close to Build	12 plants 5 GW
Planned	46 plants 27 GW

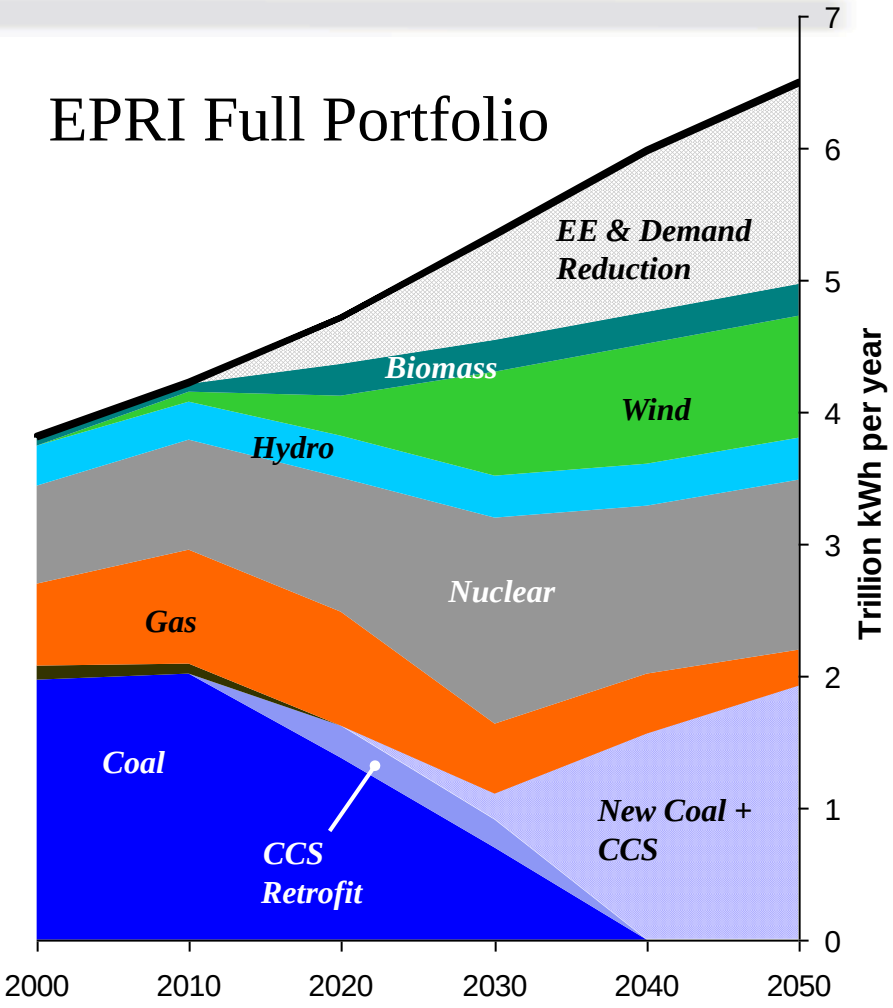
Source: Ventyx – Velocity Suite (10/8/2009)

States Manage U.S. Electric Generation Mix

RAP Observations:

- EE and DR resource supply can and must be much greater than EPRI projects here
- Renewables will need to provide more than EPRI projects
- Remaining mix between nuclear and CCS is unknown

- **Any way we go, almost all of today's generation fleet must be replaced**
- **State and PUC policies are key factors in each element of this mix**



Smart Grids and Smart Policies – key PUC roles

- Like the Internet, another communications technology, success of smart grids comes down to content.
- Smart grids of little use without smart policies
  - Rate designs and consumer information;
  - Links to efficiency programs and technologies
  - Links to renewables policies, net metering, interconnection rules, siting, etc.
  - And more….

The Financial Challenge --
Utility finance is governed by State PUCs

- **U.S. will need to spend $1.5 - $2 trillion by 2030** to upgrade its electricity system. To raise and spend capital on this massive scale, the utility industry must represent a sufficiently attractive investment vehicle -- *The Brattle Group*

- **U.S. EE investment of $520 Billion would yield energy savings of over $1.2 trillion by 2020 and reduce projected energy use by 23%**

  -- *McKinsey, Unlocking Energy Efficiency in the U.S. Economy," July 2009*

- Total global cleantech investment needs to reach $500 B/yr to hold global warming to less than 2° C --*New Energy Finance, Nov. 2009*

Another regulators' challenge: Avoiding "reforms" that make things worse

- **A "moral hazard"** arises when a decision-maker is insulated from the consequences of his choice because someone else will bear the risk and pay the resulting costs.
  - E.g.,recent debate whether to risk creating a moral hazard through government bail out of high-risk mortgage lenders

- Utility regulation offers many arcane methods to hide or shift risks:

- **E.g.,Fuel Adjustment Clause:** "The Commission shall permit an electric public utility to charge an increment or decrement as a rider to its rates for changes in the cost of fuel and fuel related costs <including>
  - The cost of fuel burned…
  - The cost of emission allowances as used, **including allowances for …carbon equivalent greenhouse gas emissions**…"

    --Proposed legislation, from Committee Substitute, S3 (North Carolina) June 2007 (emphasis added)

Conclusion: State PUCs have an essential role

- Utilities are ~40% of the problem but may be called on to be 75% (or 100%) of the solution
- **State policies** (EE, codes, portfolio mgt, RPS, etc.) are crucial to national and global success;
- This is true either **with or without** a federal climate bill
- **How we spend carbon revenue** is more important than the carbon price;
- **Congress should support those state policies**, as "foundation policies" for successful cap-and-trade, and by allocating carbon revenues to utilities and states for long-term consumer benefit.
- **"It has to be you** …We don't have a clean air future without a clean energy future"

  -- Gina McCarthy, US EPA (at the NARUC Climate Conference December 2009)

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)*
- *"State Options for Low-Carbon Coal Policy" (RAP and the Pew Center on Global Climate Change 2009)*
- *"Energy Efficiency Policy Toolkit" (C Harrington et al, RAP August 2006)*
- *"Efficient Reliability: the Critical Role of Demand-Side Resources in Power Systems and Markets" (R Cowart, for the National Association of Regulatory Utility Commissioners, June2001)*

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