

# Electric Sector Restructuring and Utility GHG Emissions: Trends and Opportunities in the US

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# Overview: 3 topics

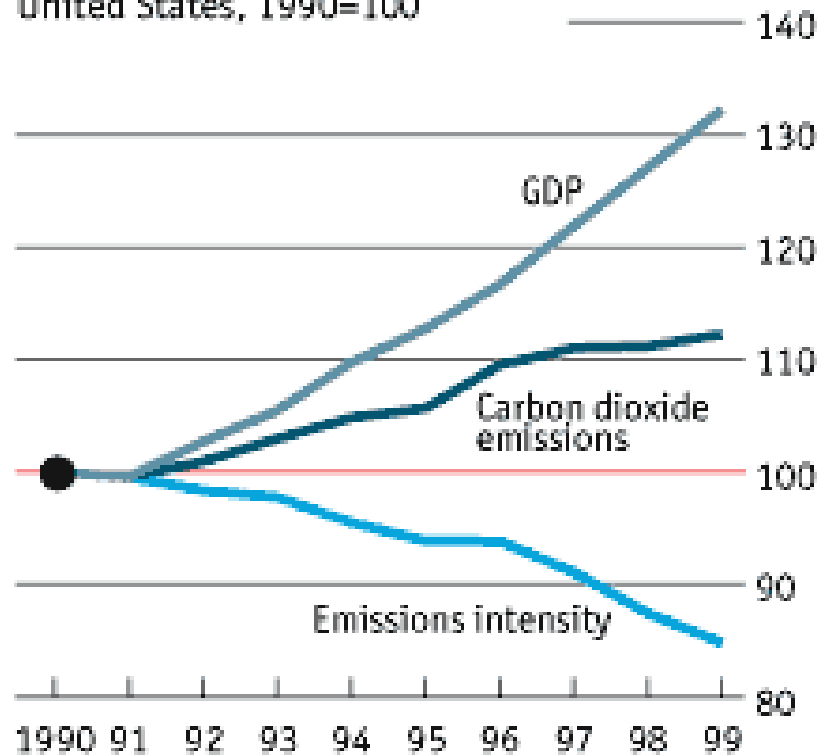
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- Does electric restructuring/liberalization *improve* or *worsen* the GHG profile of the electric industry?
- Actions by US states: (1): Initiatives in the US electric sector during the restructuring decade to promote efficiency and renewables
- Actions by US states (2): Explicit GHG initiatives now underway in the US, at the state and local levels

# US CO2 Emissions

## The heat is intense

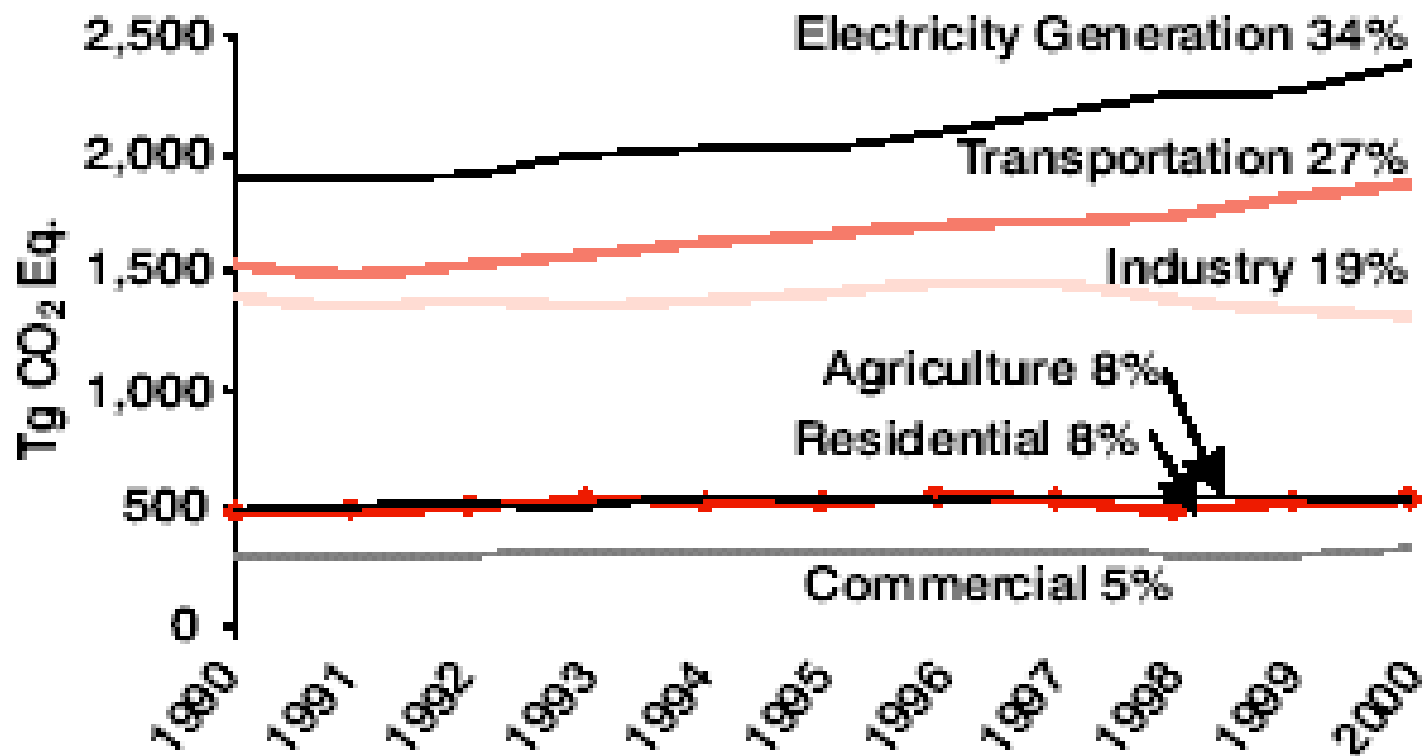
United States, 1990=100



\*Carbon dioxide emissions per dollar of GDP

Sources: Council of Economic Advisers; Energy Information Agency; Environmental Defence

# Why electricity matters





# US electricity growth trends

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- Sales up 31% in the past decade
- Summer peak up 56,000 MW in 4 years
- NERC predicts: +160,000 MW of demand growth, 1999-2010
- DOE forecast: we will need to add the equivalent of the current capacity of Japan AND Germany to the US electric grid by 2020.



# Why US states matter

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- Even individually, they are significant GHG producers.
  - ❖ Texas (population 21million) exceeds the combined CO2 emissions of 119 developing countries (over 1 Billion people), and its emissions exceed those of Canada.
  - ❖ California's emissions about the same as Australia, exceed those of Brazil
  - ❖ 42 US states, individually, exceed combined emissions of 50 or more developing nations.
- In the US federal system, states have significant authority to legislate and regulate. Most regulation of the electric sector in the US is at the state level.
- States really are the “laboratories of democracy.”
- State initiatives for carbon management contrast with US federal inaction.



# Does restructuring help?

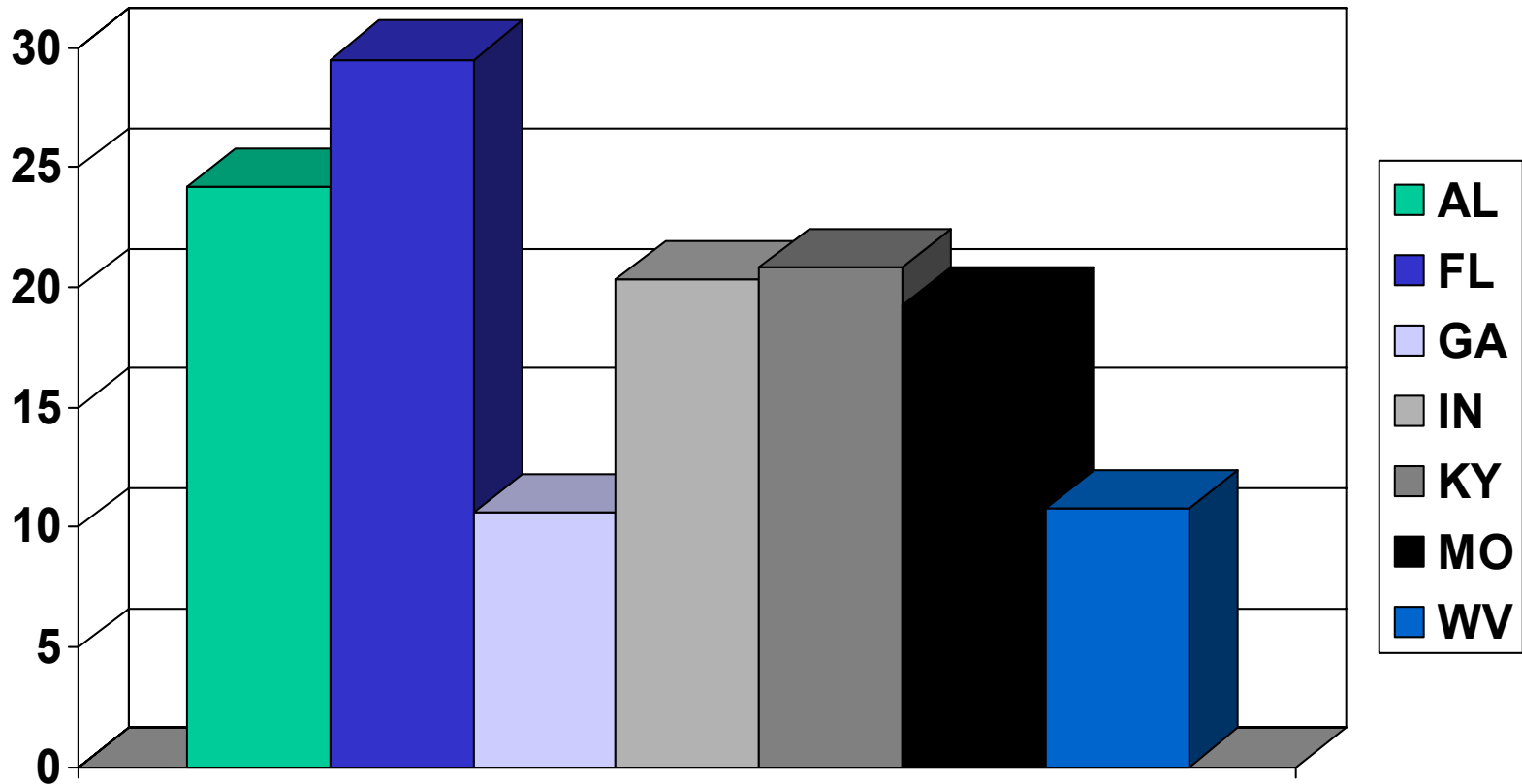
## Trends so far



- **Positive GHG trends :**
  - ❖ **New generation (mostly gas) is cleaner than US mix;**
  - ❖ **Competition pushes up output from nuclear units;**
- **BUT:**
  - ❖ **Competitive advantage to most older coal plants. Coal plant capacity factors rising.**
  - ❖ **Utility efficiency programs cut in half post-1994, reversing earlier growth trend;**
  - ❖ **Persistent load growth pushes the system;**
  - ❖ **Competitive pressure halts new PURPA renewables;**
  - ❖ **Retail markets and green markets developing slowly.**

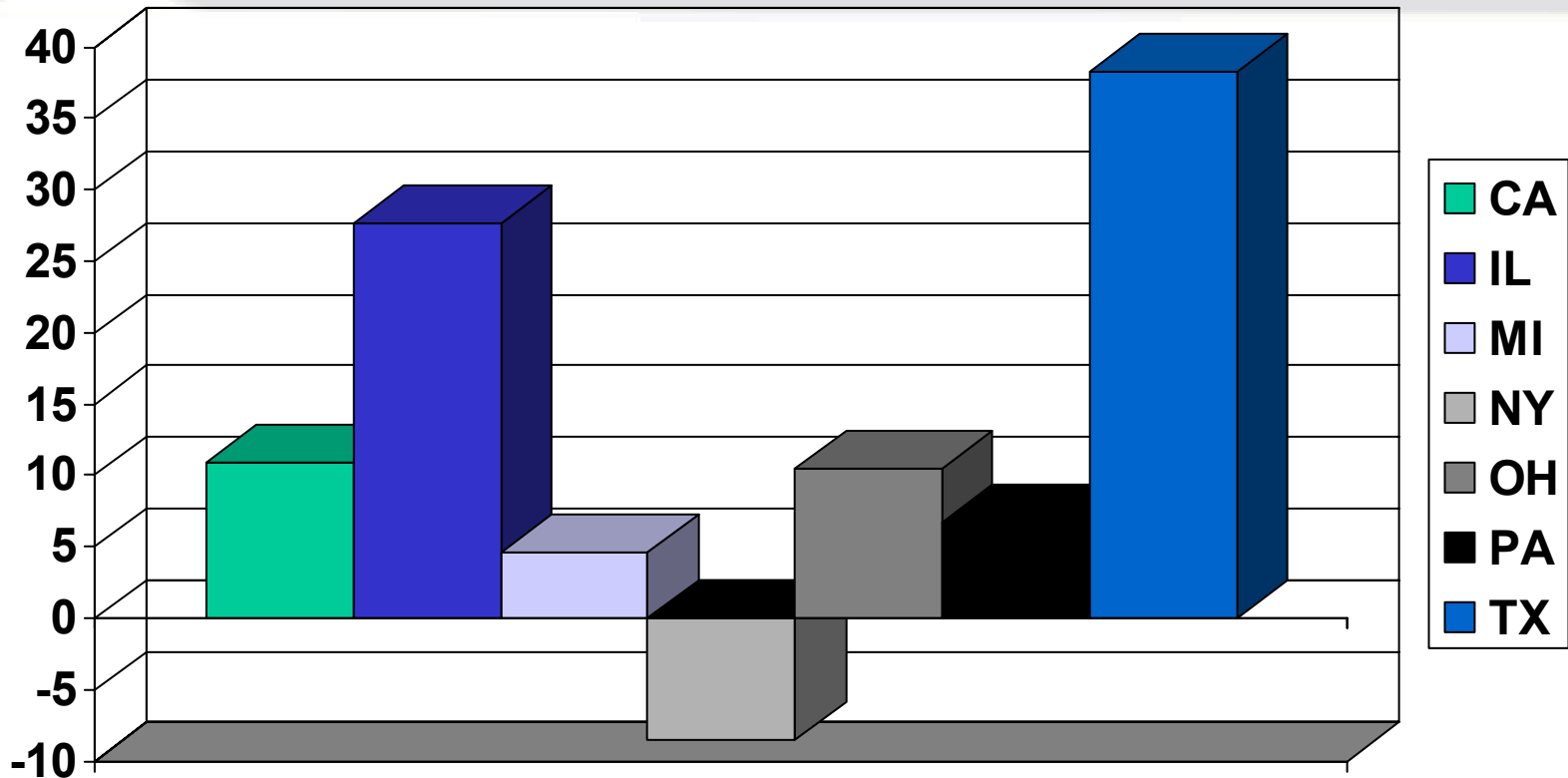


# CO2 emissions in franchise states: steadily rising



Change from 1990 to 1999-2001 (M metric tons/year)  
Electric sector only -- Sample of non-restructured states

# CO2 emissions in restructured states: mostly rising

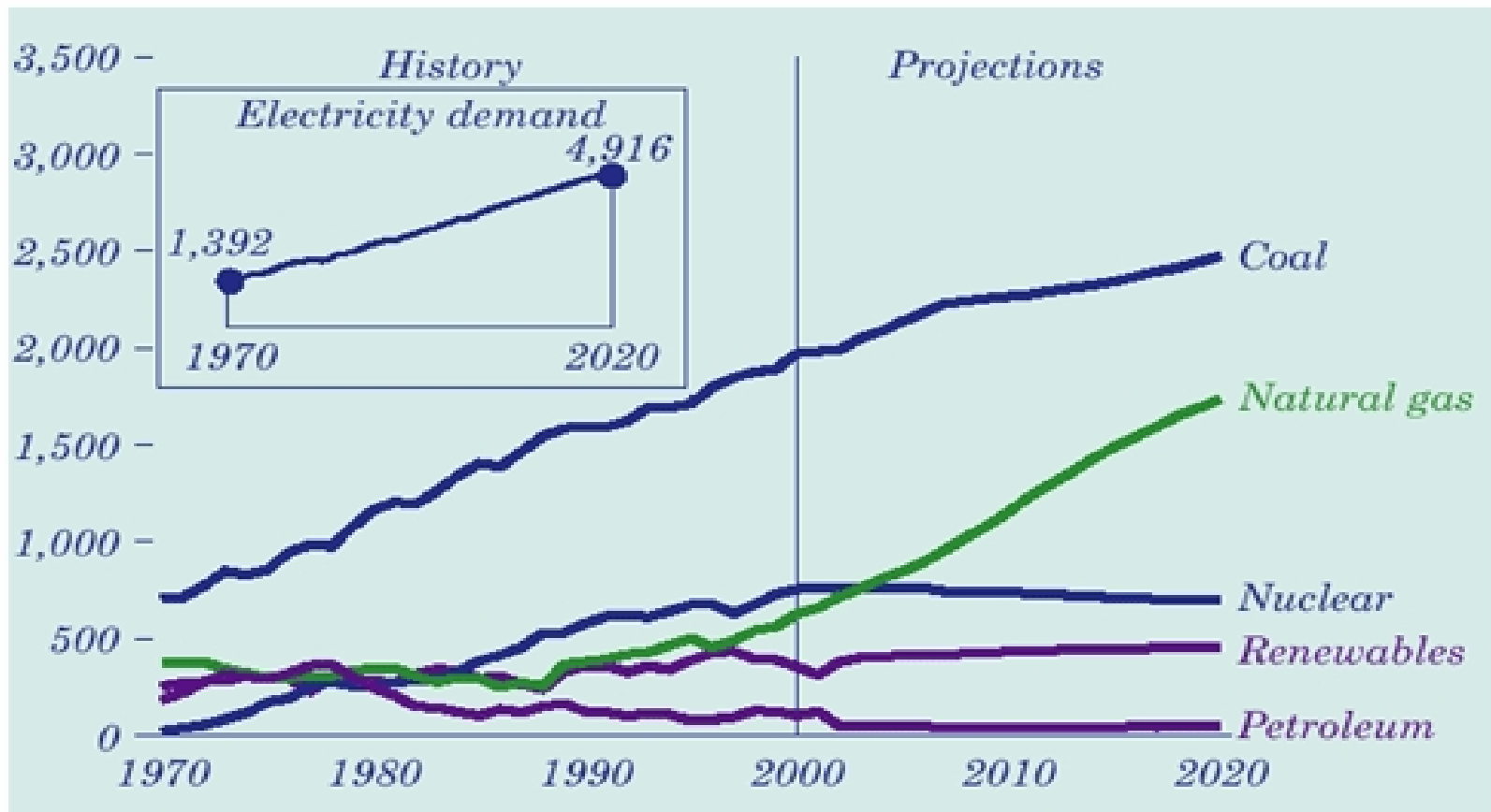


Change from 1990 to 1999-2001, Electric sector emissions  
(M metric tons Co2 eq./year) Sample of Restructured US States

Data source: [http://www.eia.doe.gov/cneaf/electricity/epa/emission\\_state.xls](http://www.eia.doe.gov/cneaf/electricity/epa/emission_state.xls)

# New gas does not displace old coal: Both are rising

*Figure 4. Electricity generation by fuel, 1970-2020 (billion kilowatthours)*



# Generation growth to 2020 – renewables still small

*Figure 52. Projected electricity generation by fuel, 2000 and 2020 (billion kilowatthours)*

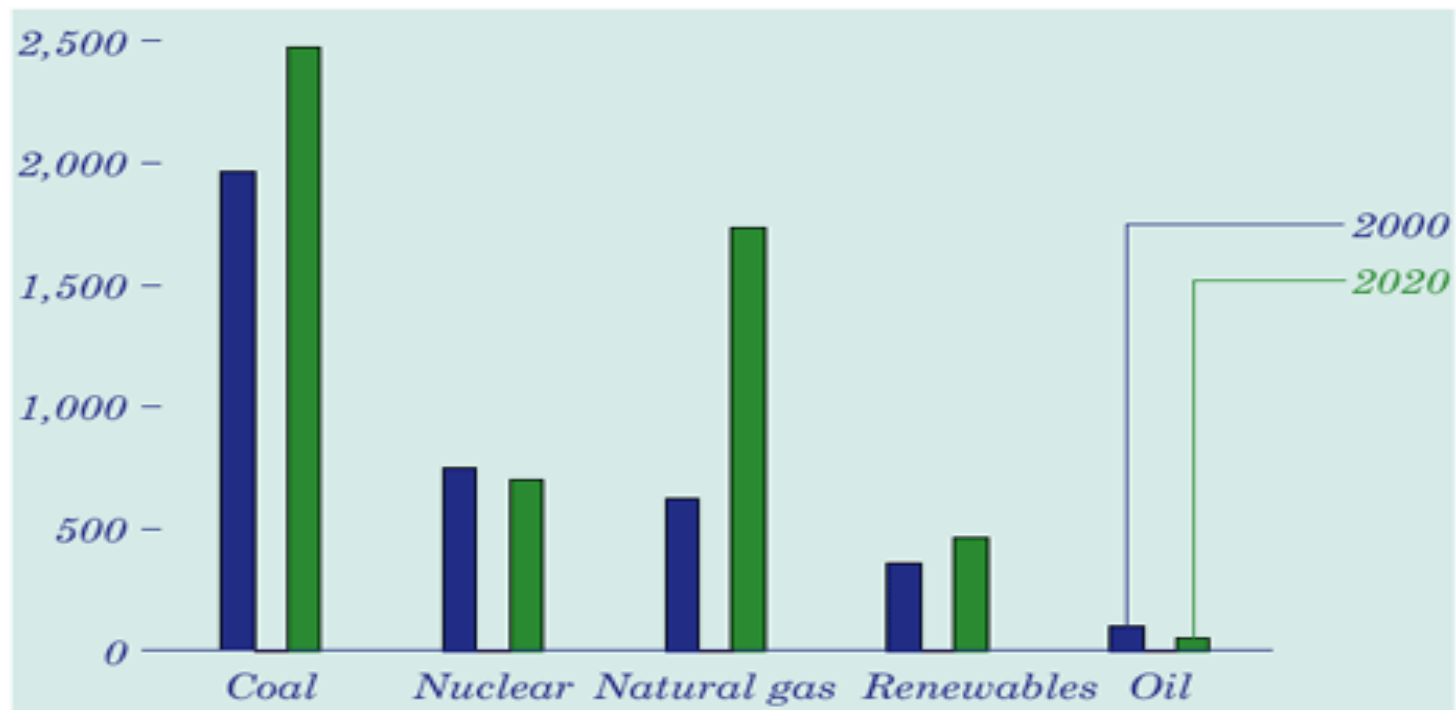
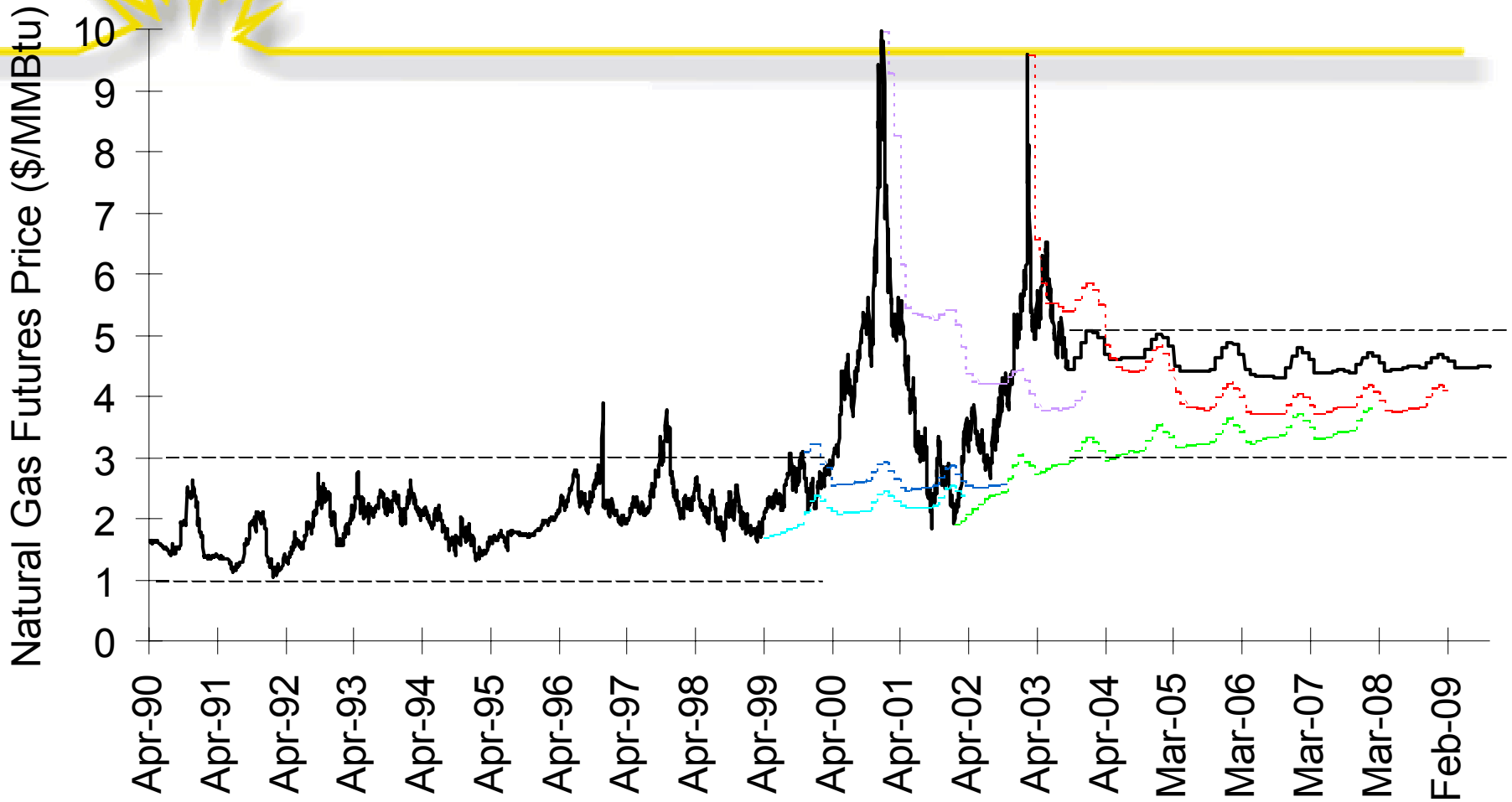


Table A8.

# Increased Gas prices-- will drive more Coal generation



Source: NYMEX

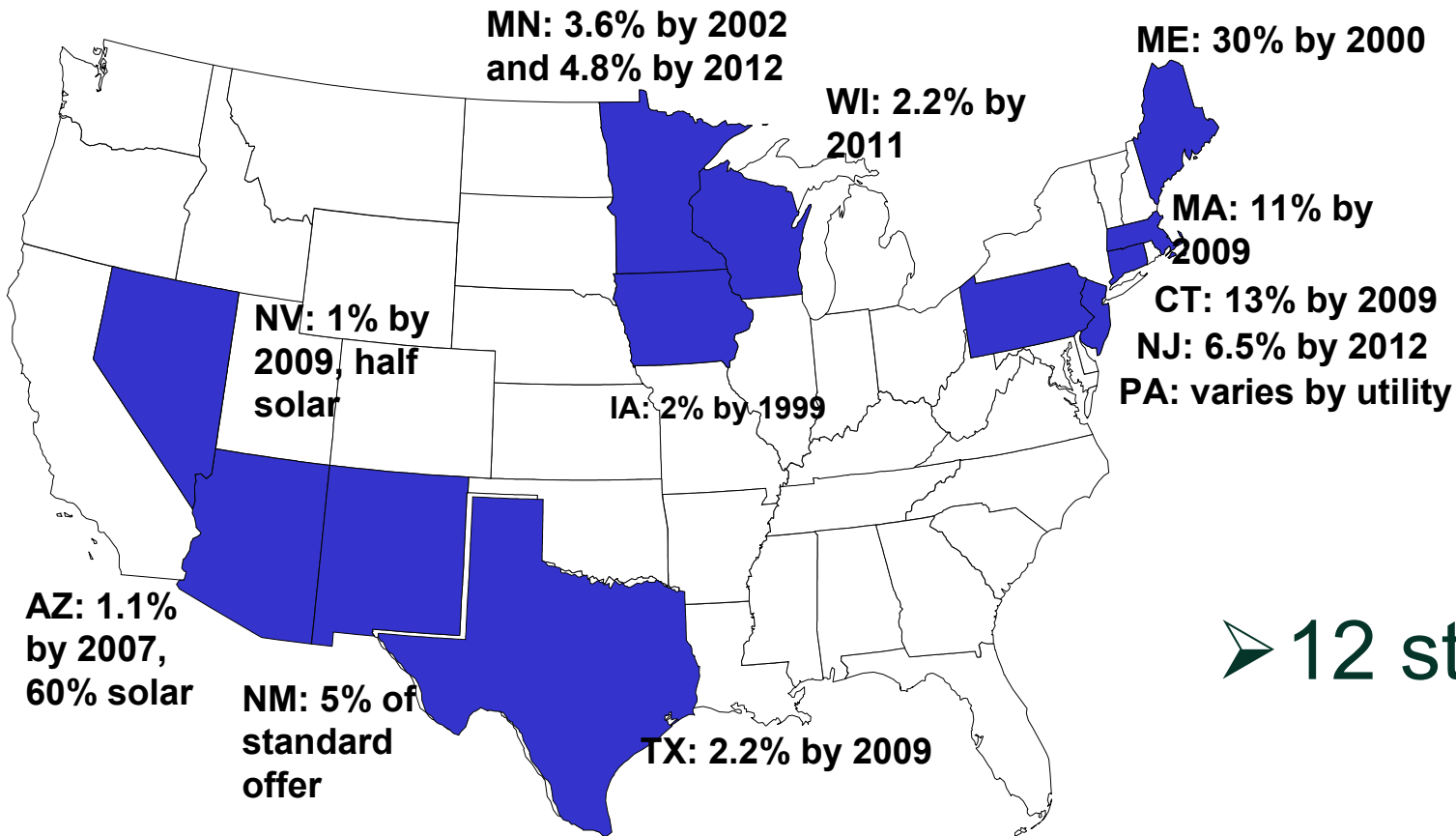
# Topic 2: Efficiency and renewables initiatives in state utility regulations



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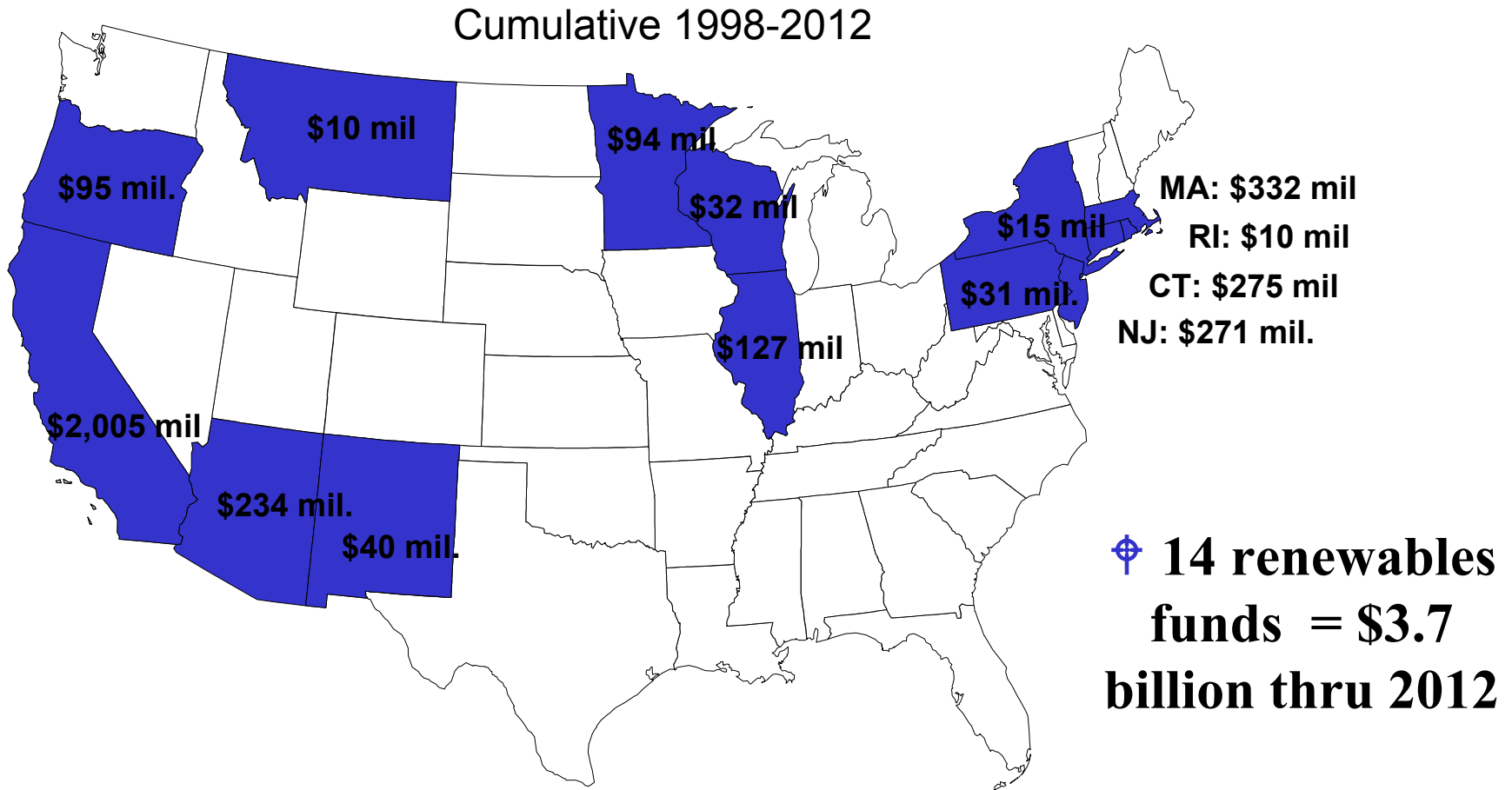
- Many public purposes -- not focused on GHG reductions
- Some as part of restructuring plans, some independently
- Leading initiatives:
  - ❖ Renewable portfolio standards
  - ❖ System benefit charges
  - ❖ Net metering for small renewables
  - ❖ Emissions disclosure and green marketing options

# Renewable energy standards



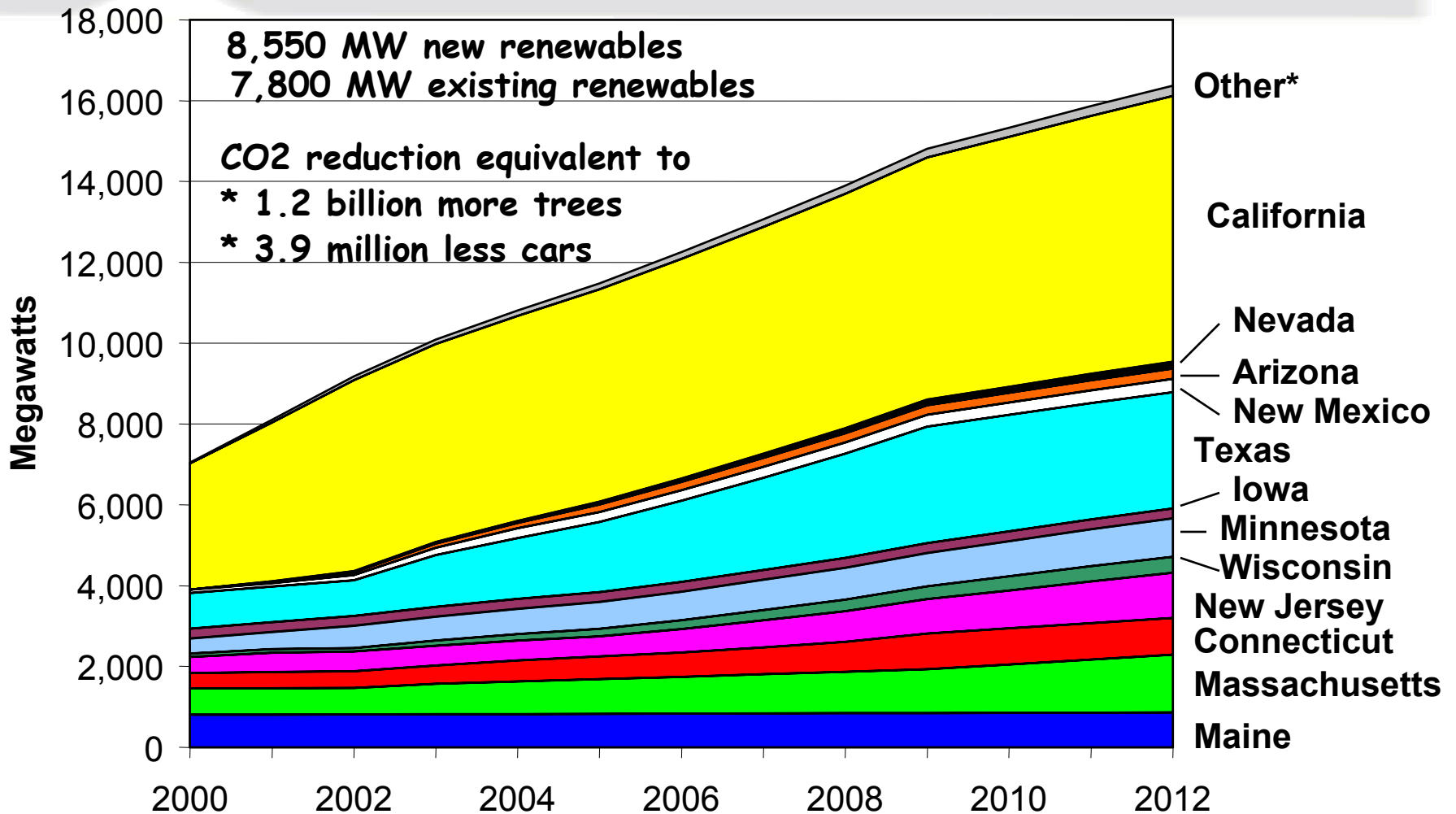
➤ 12 states

# Renewable energy funds



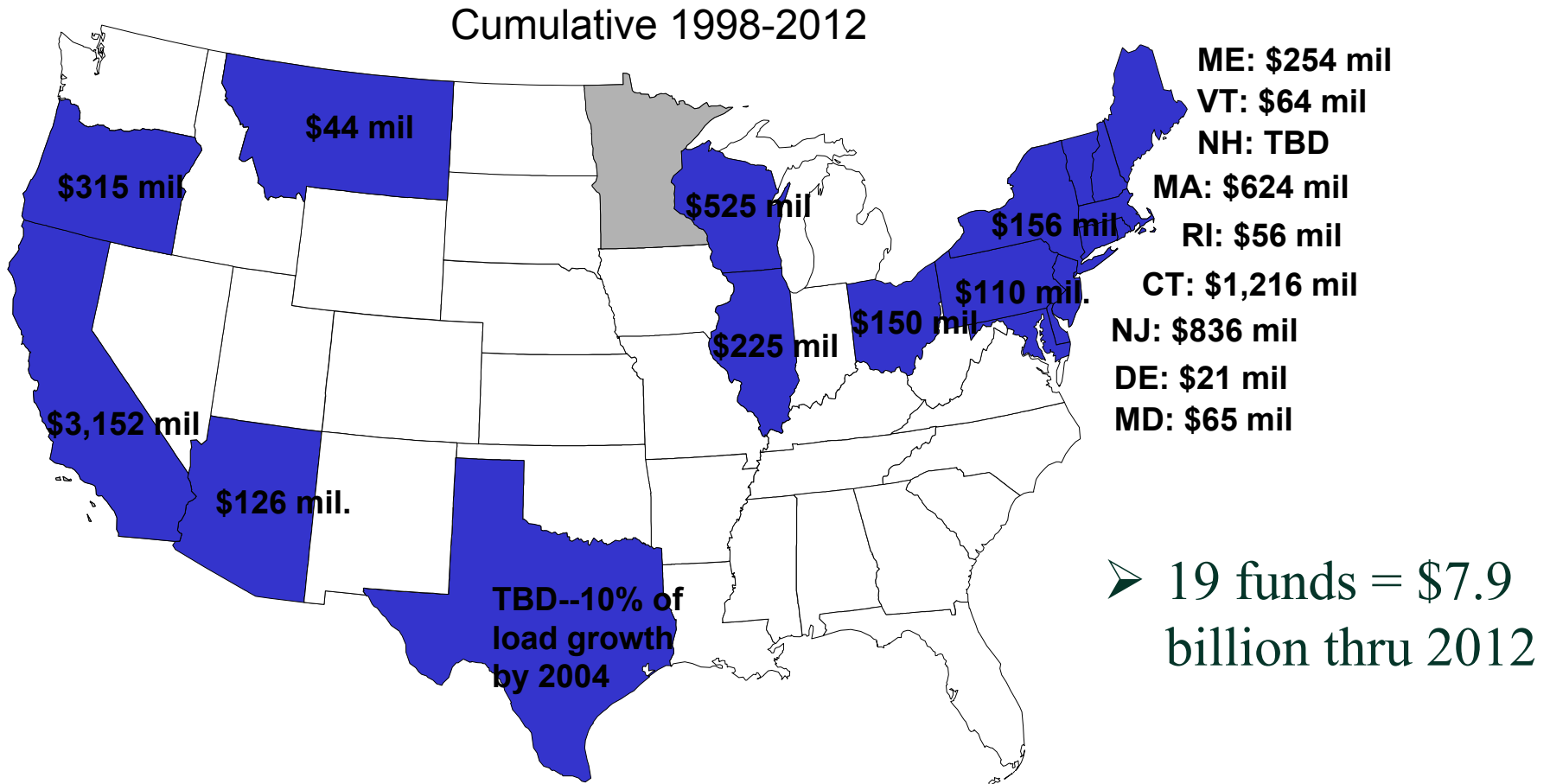


# Renewables expected from state standards and funds



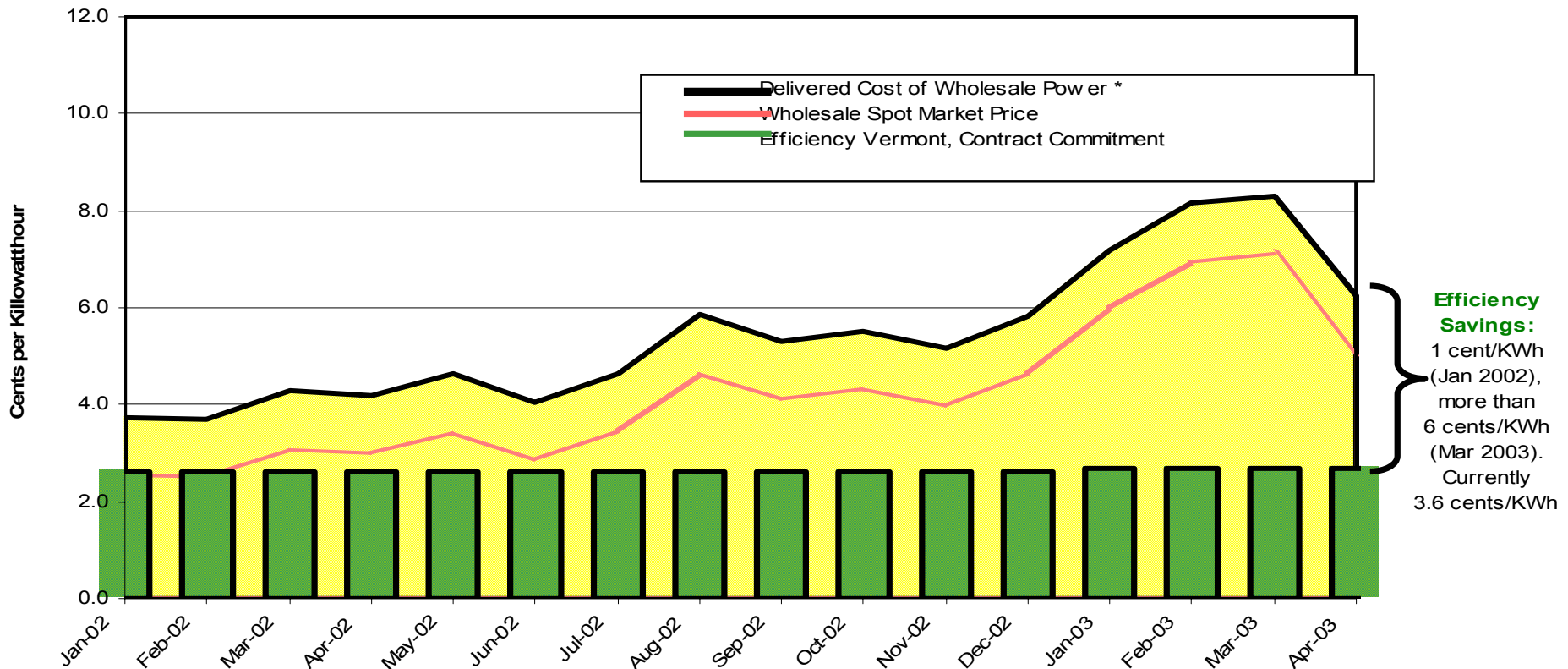
\*Includes Illinois, Montana, New York, Oregon, Pennsylvania and Rhode Island.

# Energy efficiency funds

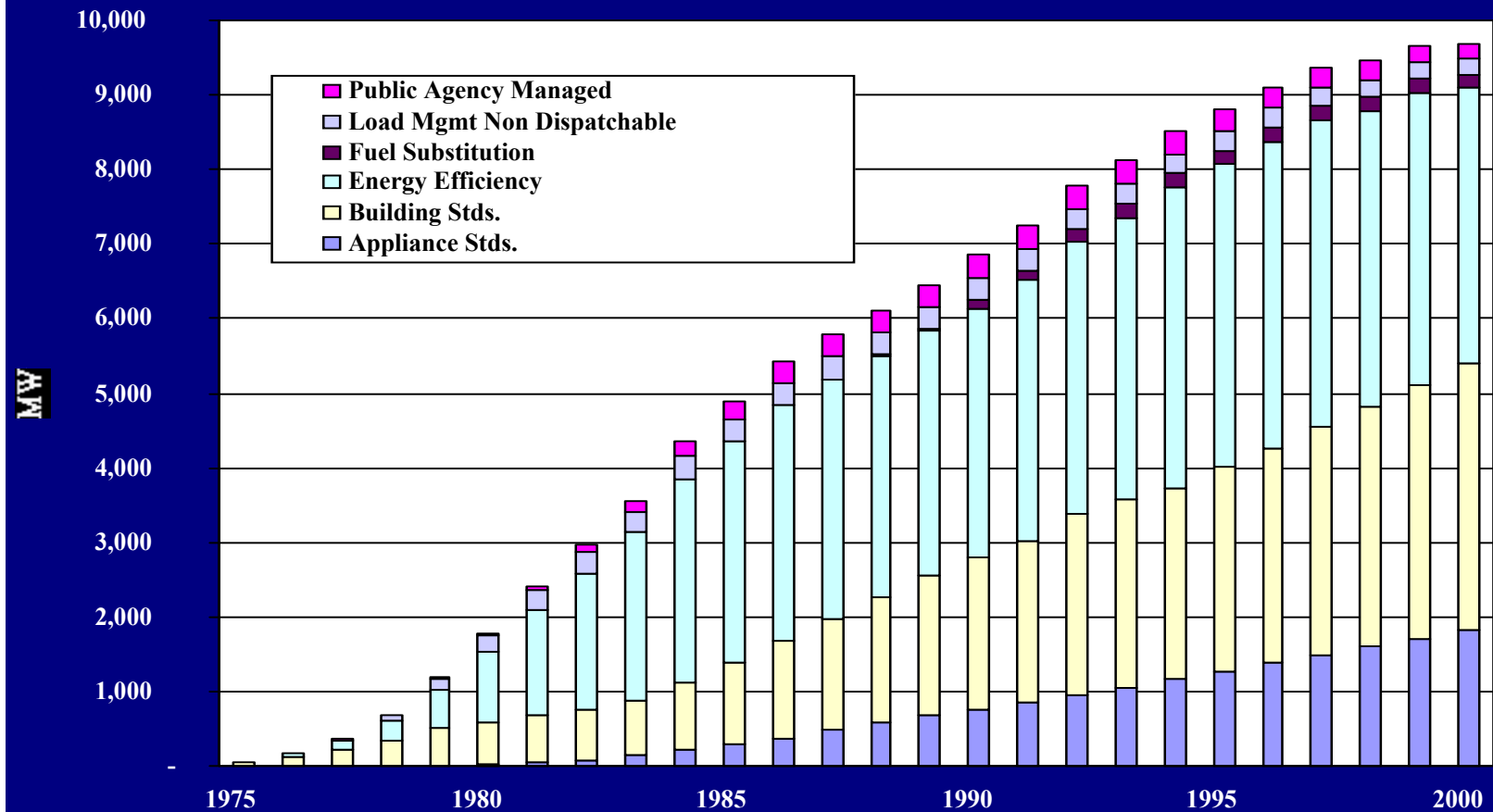


# The Vermont "Energy Efficiency Utility" Model

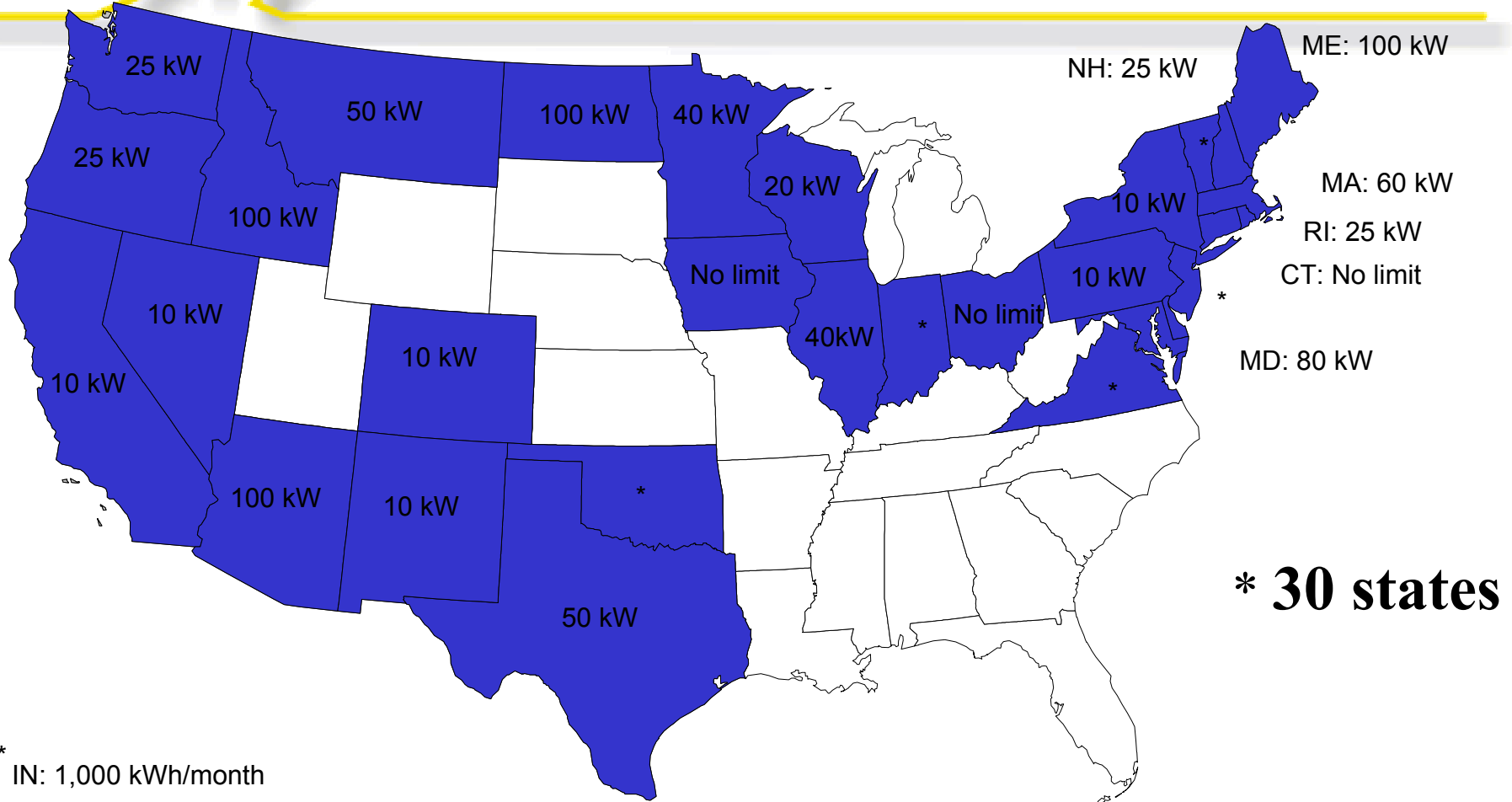
**Power Costs vs. Efficiency Vermont Costs for 2002 & 2003**  
NE-ISO Average Monthly Price



# Impact of California DSM Programs and Standards



# Net metering

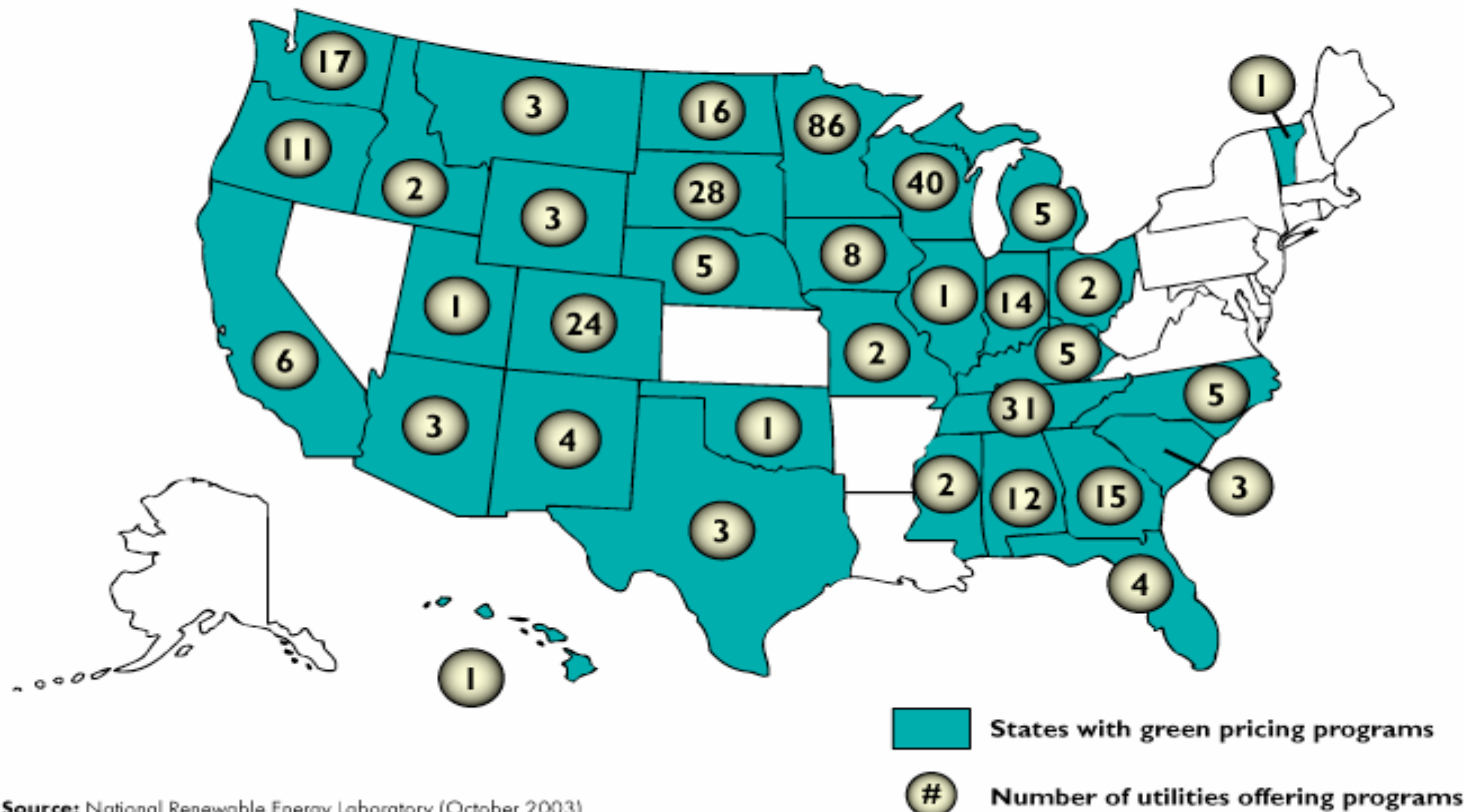


\* IN: 1,000 kWh/month  
VT: 15 kW, 100 kW for anaerobic digesters  
VA: 10 kW (residential); 25 kW (commercial)

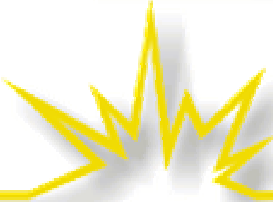
OK: 100 kW and 25,000 kWh  
NJ: No limit (100kW limit proposed)

# Green Pricing: widespread activity, but penetration is thin

## Utility Green Pricing Activities



Source: National Renewable Energy Laboratory (October 2003)



## Topic(3): New State Initiatives Focused on GHG

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- Renewables and Efficiency policies noted so far not focused explicitly on GHG
- US federal inaction creating a policy vacuum on GHG
- States, local governments, corporations are starting to act
- Examples of promising initiatives for the utility sector are:



# Recent Electric Power Sector GHG Reduction Initiatives

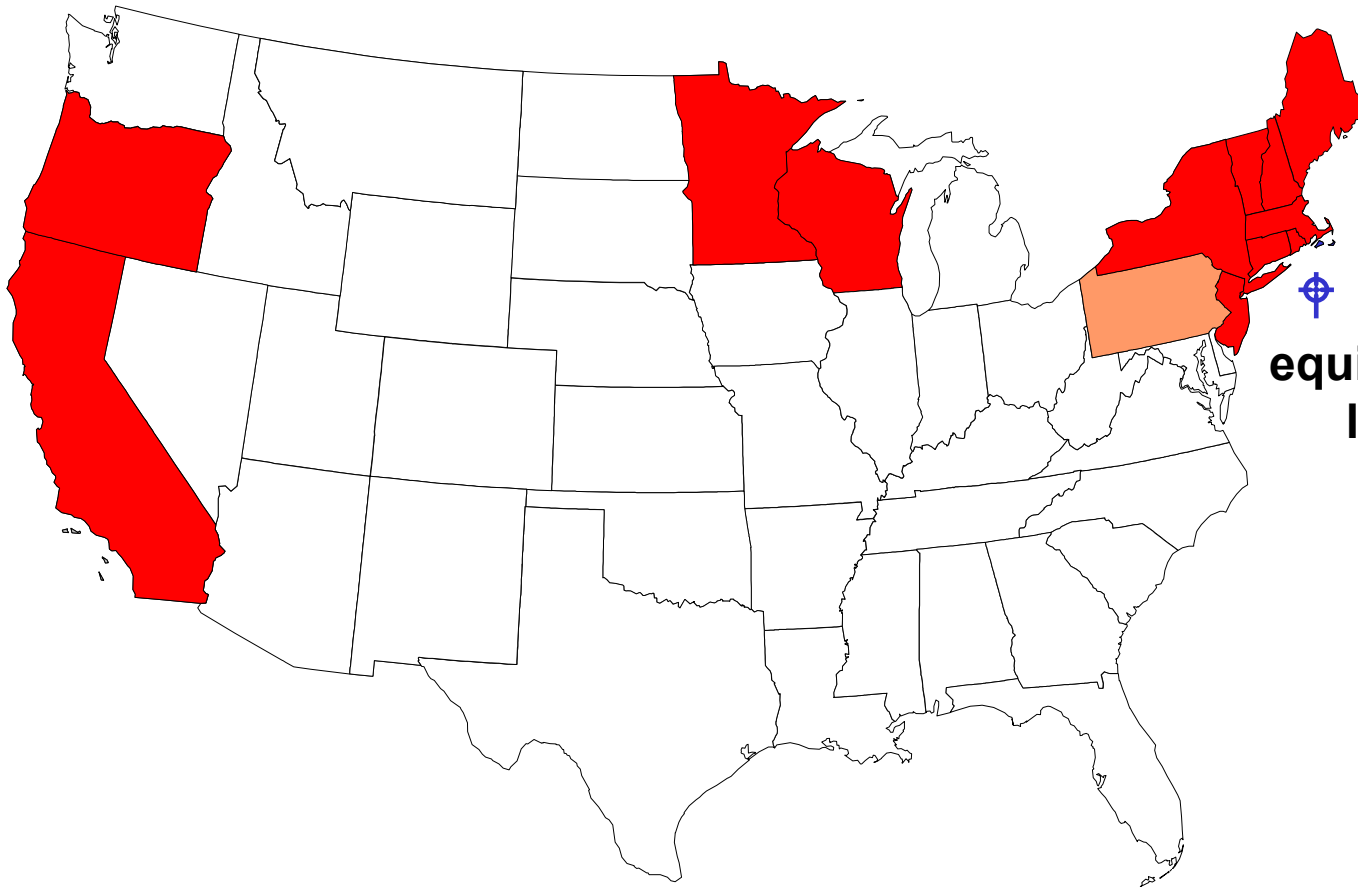
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- New England Governors/Eastern Canadian Premiers Climate Change Action Plan
- US Northeast – Regional Greenhouse Gas Initiative (RGGI)
- Oregon Power Plant CO<sub>2</sub> Offset Program
- New Jersey GHG Reduction Target
- California Climate Action Registry
- Massachusetts Power Plant Emission Standards



# Recent state initiatives to limit electric-sector GHGs

Explicit GHG initiatives, in addition to historic efficiency and renewables programs



⊕ 10 RGGI states  
equivalent to the 4<sup>th</sup>  
largest world  
economy



# New England Governors/Eastern Canadian Premiers Climate Change Action Plan (NEG/ECP)

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- Goal: Reduce regional GHG emissions
  - ❖ to 1990 levels by 2010
  - ❖ to 10% below 1990 by 2020
  - ❖ ultimately eliminate threat to climate
- Reduce electric sector emissions
  - ❖ Minus 20% per MWH from current levels by 2025 through more efficient or lower- carbon generation.
  - ❖ Increase end-use efficiency by 20%
- Establish a regional standardized GHG Emissions Inventory.
- Maine has adopted the goals into law, launching a process to identify needed action steps.



# Oregon: Power Plant CO2 Offset Program

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- Statute requires new plants, including emergency plants, to meet stringent levels of CO2 output per kwh
- Standard essentially requires offsets
- Many choose to pay the Climate Trust, which uses funds to reduce or sequester equivalent emissions.
- Five initial projects reduced CO2 at about US\$1.50 per ton.



# Massachusetts: Power Plant Emission Standards

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- Problem: Older plants not subject to Clean Air Act became more viable after restructuring.
- State DEP issued new multiple pollutant rule, specific to these facilities, with support of governor and other agencies, including:
  - ❖ cap on CO<sub>2</sub> emissions
  - ❖ reduction to combined average of 1800 lbs of CO<sub>2</sub>/MWh
- Mandatory CO<sub>2</sub> reductions for the 6 largest, most polluting plants in the state.



# 2003 Regional Initiative in Northeast US (RGGI)

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- Regional Greenhouse Gas Initiative (RGGI)
  - ❖ 10 Northeastern US States, led by NY, have agreed to develop a cap and trade program focusing on power plant CO<sub>2</sub> emissions.
  - ❖ RGGI States = world's 4th largest economy
  - ❖ Program design agreement by April 2005
  - ❖ Would work with, and supplement the NEG/ECP process noted above.



# Other GHG Reduction Initiatives Impacting Electric Power Sector

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- ***New Jersey*** : Covenant with state's largest utility to reduce emissions 15% below 1990 by 2005, with monetary penalties for non-attainment.
- ***Wisconsin***: large emitters required to report CO2 emissions since 1993. Has created Emissions Reduction Registry.
- ***Portland, Oregon***: goal to reduce GHG emissions 10% from 1990 levels by 2010.



# Lessons Being Learned

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- US national government is unable to resolve GW debate – state action is emerging
- Restructuring is stalled – the electricity context is going to be a hybrid system
- Default service is the new franchise –GHG policies must be built into it
- States can be creative and flexible in designing GHG mitigation programs
- Both “no regrets” and explicit GHG programs and goals can be pursued effectively by states
- Groups of states will be even more effective in developing broad programs and GHG trading systems
- International groups can help US states do a better job.