

# Greenhouse Gas Strategies 2008



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**For McIlvaine Company**

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# Need a Market

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- Uniform U.S. and International Program
  - Technology Neutral Approaches
  - Define Carbon Capture Ready
  - Flexibility in compliance: caps, averaging, safety valves
  - Allowance pricing that encourages controls on existing power sector
  - Funding for early technology adopters
  - Early start up incentives and changes to regulatory barriers
  - Solutions to storage portion of equation
  - Where is the new power?
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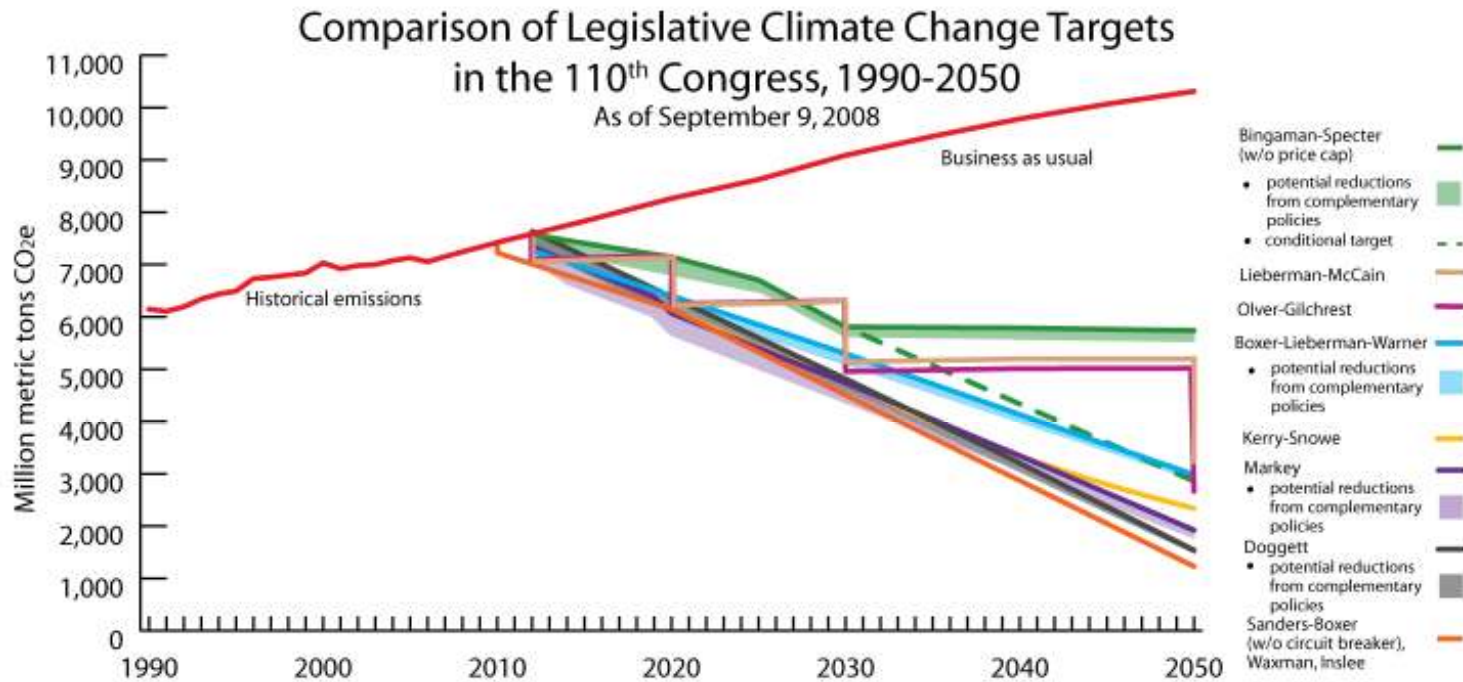
# Current Situation

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- Market Drivers
    - Numerous legislative bills
    - Administration/EPA: responding to courts;
      - Bush: start in 2025, promote new/zero emitting technologies development
      - EPA: refine measurement/inventories
      - GHG ANPRM: NO recommendations, judgments, commitments or regulations
      - Regulatory requirements and Authorities?
    - State and Regional Initiatives
  - Storage and Carbon Management Technologies
  - Demonstrations & Funding: Federal and Private
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# Waiting on Legislation



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For a full discussion of underlying methodology, assumptions and references, please see <http://www.wri.org/usclimatetargets>. WRI does not endorse any of these bills. This analysis is intended to fairly and accurately compare explicit carbon caps in Congressional climate proposals and uses underlying data that may differ from other analyses. Price caps, circuit breakers and other cost-containment mechanisms contained in some bills may allow emissions to deviate from the pathways depicted in this analysis.

# Authorities and Potential Regulation

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## Potential Regulatory Approaches Under CAA

- CAA Sections 108 -110: National Ambient Air Quality Standards (NAAQS)
- CAA Section 111: Standards of Performance for New Sources (NSPS)
- CAA Section 112: National Emission Standards for Hazardous Air Pollutants (NESHAP)
- CAA Section 129: Special Regulatory Authority for Solid Waste Combustion

## CAA Permit Programs

- Prevention of Significant Deterioration (PSD); triggered if standard set under Section 202
  - Title V Operating Permits
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# RGGI Up and Running

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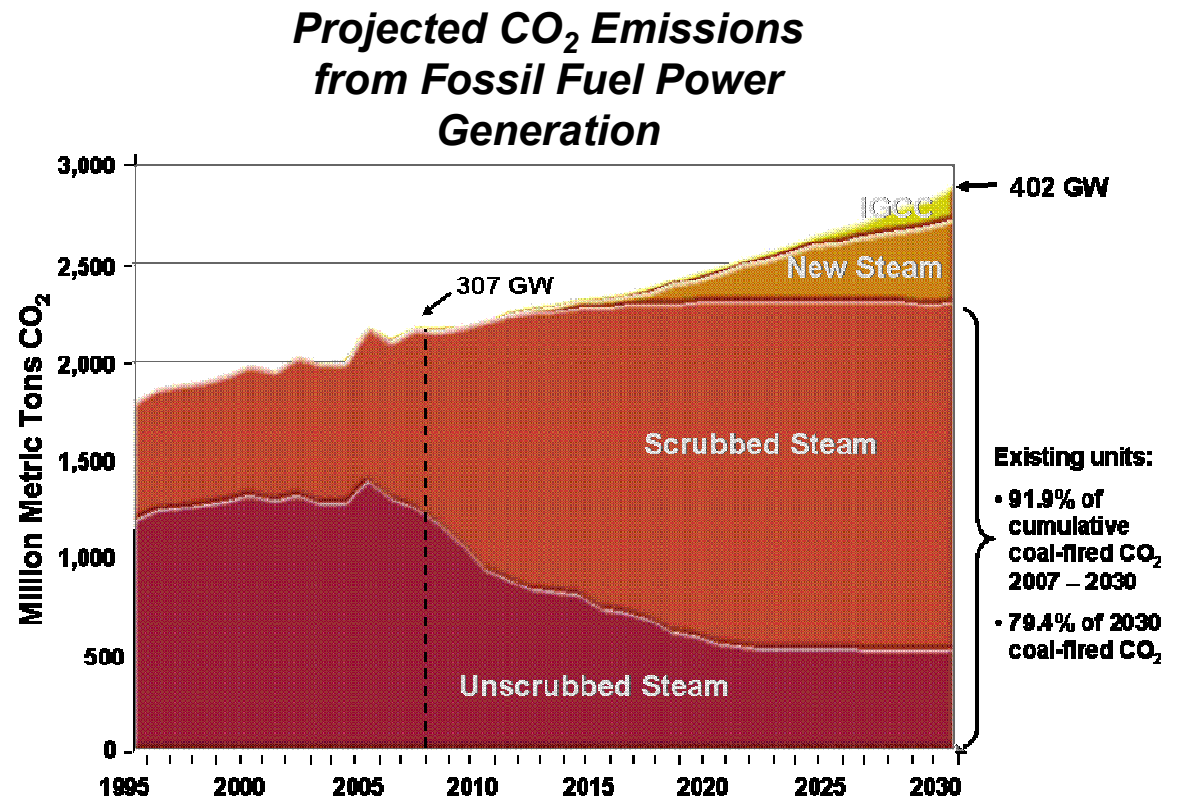


- Regional Greenhouse Gas Initiative
  - Mandatory Regional CO<sub>2</sub> Cap-n-Trade
  - Ten States Participating:  
CT,DE,MA,ME,MD,NH,NJ,NY,RI,VT
  - Goal to reduce CO<sub>2</sub> emissions by 10% by 2018
  - Sold 12.5 M allowances at 1<sup>st</sup> Auction (9-25-08)
  - Nearly 60 bidders and bids for 51.7 allowances
  - Allowance cleared at \$3.07 per ton
  - Generated \$38.5 M
  - \$\$\$ to energy efficiency and renewables
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# CO<sub>2</sub> Management for Existing Plants



- Coal-fired power plants will continue to dominate CO<sub>2</sub> emissions from fossil fuel power generation
- In FY08, Innovations for Existing Plants Program transitioned to CO<sub>2</sub> capture technology R&D
- focused on post-combustion and oxy-combustion capture technologies for existing plants



Source: EIA, Annual Energy Outlook 2008 Revised Early Release, March 2008

# Early Technology Adoption

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- CAAAC (ACT Workgroup) recommendations
    - 5-10 early commercial facilities integrating CCS (most coal-based power)
    - funding CCS technologies,
    - increased support for permitting,
    - initial liability treatment for fund-sponsored projects.
  
  - Lieberman-Warner Climate Security Act of 2008  
Manager's Substitute Amendment
    - Climate Change Technology Board: agency of Federal Government to oversee, administer and distribute funds
    - Funds made available under Titles VIII-XI to Accelerate Commercialization and Diffusion of Low-and Zero-Carbon Technologies and Practices
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# Carbon Management Technology Considerations



- Technologies
  - Ammonia-based systems
  - Amine scrubbers
  - Dry sorbents
  - Oxy-combustion
  - Role of efficiency improvements?
- U.S. R&D, Demonstrations and Programs
  - ALSTOM chilled ammonia (WI, WV, OK)
  - Powerspan aqueous ammonia
  - Babcock & Wilcox and Air Liquide oxy-coal combustion
  - NETL award of approx. \$30M (5-15 projects at \$150k to \$5M each)

# CO<sub>2</sub> Storage-Sequestration

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- Significant issues need to be resolved
    - Long-term liability and legal ownership need to be resolved at federal and/or state level
    - Deep saline aquifers v. EOR
    - Geology dependent
    - Variability of capacity and injection rates
    - Still need to prove at large scale (e.g. dozen wells per 500 MWe power plant)
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# For More:

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- Institute of Clean Air Companies
    - The national trade association for air pollution control and measurement technologies for stationary sources
    - [www.icac.com](http://www.icac.com)
    - 1730 M St., Suite 206  
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