


Overview of the
Clean Air Rules
*for New and Existing Coal-Based
Generation*

Presentation for the
Advanced Coal Technology Working Group
by
U.S. Environmental Protection Agency
Office of Air and Radiation
March 6, 2007



Overview of Applicable Air Provisions Related to the Electric Power Sector

I will cover:

- National Ambient Air Quality Standards (NAAQS)
- Clean Air Interstate Rule (CAIR)
- Clean Air Visibility rule (CAVR)
- Clean Air Mercury Rule (CAMR)
- New Source Review (NSR)

Steve Jenkins will cover:

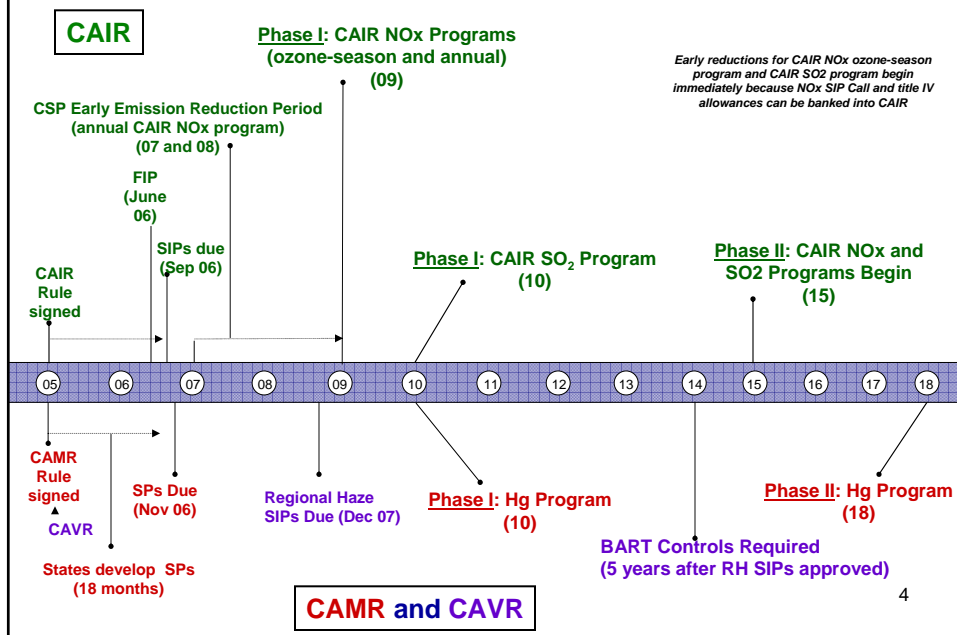
- New Source Performance Standards (NSPS)
- Emission Control Systems
 - Integrated Gasification Combined Cycle (IGCC)
 - Pulverized Coal (PC)

Overview of Major National Programs

- **National Ambient Air Quality Standards (NAAQS)**
 - Title I
 - Non-Attainment vs. Attainment six (6) Criteria Pollutants:
 - Nitrogen Oxides
 - Lead
 - Sulfur Dioxide
 - Ozone
 - Particulate Matter
 - Carbon Monoxide
- **Clean Air Interstate Rule (CAIR)**
 - Eastern 28 States and the District of Columbia
 - 70% reduction in SO₂ and NO_x emissions by 2015
- **Clean Air Mercury Rule (CAMR)**
 - Nationwide; linked to cobenefit reductions from CAIR
 - 70% reduction in Hg emissions by 2018
- **Clean Air Visibility Rule (CAVR)**
 - 26 industrial sectors, including power production
 - Focused on SO₂ and NO_x reductions
- **New Source Review (NSR)**
 - Prevention of Significant Deterioration (PSD)
 - Best Achievable Control Technology (BACT)
 - Non-Attainment NSR
 - Lowest Achievable Emissions Rate (LAER)

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CAIR, CAMR, CAVR Implementation Timeline



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Nationwide Emissions from Electric Generating Units: Historical and Projected under CAIR/CAMR/CAVR

— Historical
 - - - Projected, with CAIR, CAMR, and CAVR

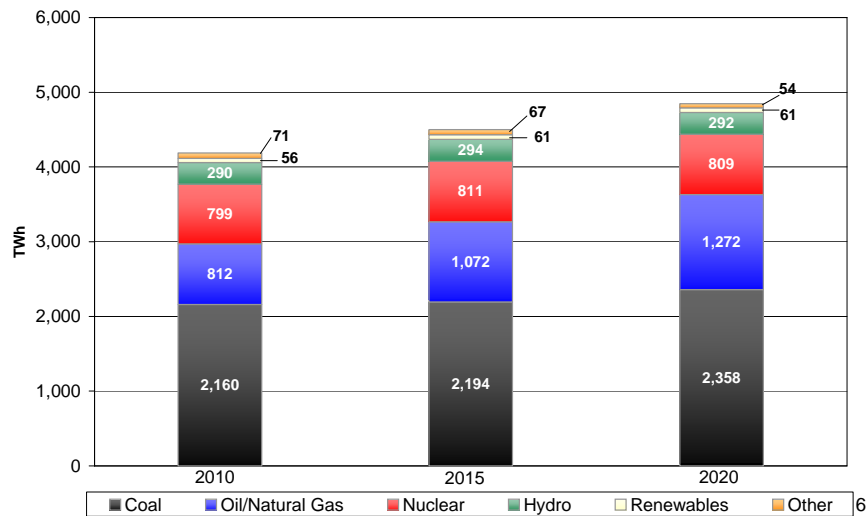
Hg
 SO₂
 NO_x

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Note: The CAIR regional SO₂ caps are 3.6 million tons in 2010 and 2.5 million tons in 2015, and the annual regional NO_x caps are 1.5 million tons in 2009 and 1.3 million tons in 2015. The CAMR caps for Hg are 38 tons in 2010 and 15 tons in 2018.

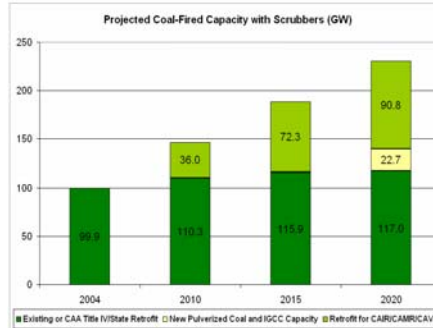
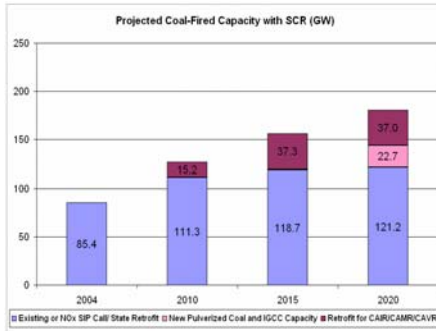
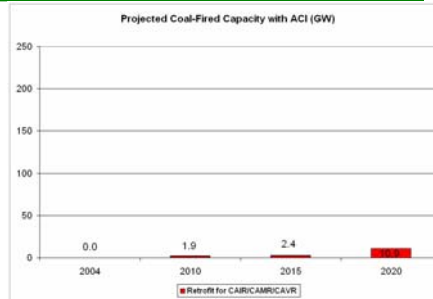
Projected Total Generation Mix

Projected Generation Mix in 2010, 2015, and 2020 with CAIR/CAMR/CAVR



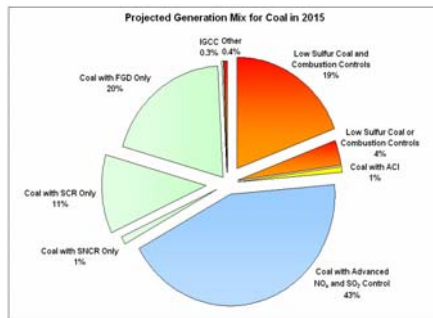
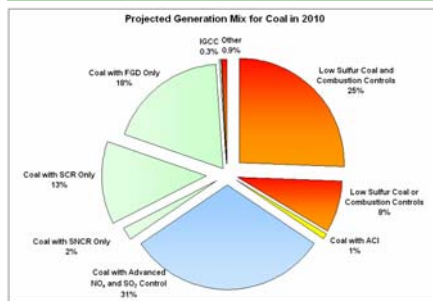
Projected Coal Capacity with Advanced Pollution Controls

- There are currently around 305 GW of coal-fired capacity in the U.S. That number is projected to increase to about 321 GW of coal-fired capacity by 2020 with CAIR/CAMR/CAVR.
- By 2020, about 79% of CAIR-affected coal-fired capacity is projected to have one or more of the following installed: selective catalytic and non-catalytic reduction (SCR/SNCR) for NO_x , flue gas desulfurization (scrubbers) for SO_2 , and/or activated carbon injection (ACI) for mercury. The existing and/or NO_x SIP Call SCR/SNCR will go from seasonal to year-round operation beginning in 2009 (see note).
- The graphics show cumulative capacity with existing controls; controls projected to be retrofitted under the NO_x SIP Call, NSR settlements, State-enacted programs, and CAA Title IV; and controls projected to be retrofitted with CAIR/CAMR/CAVR.

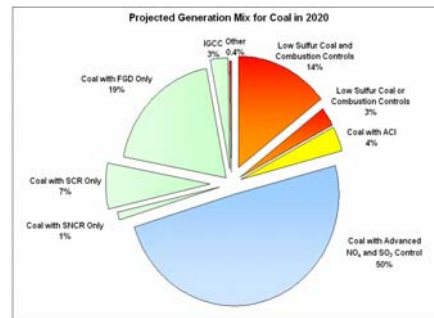


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Percent Coal-Fired Generation and Controls in 2010, 2015, and 2020

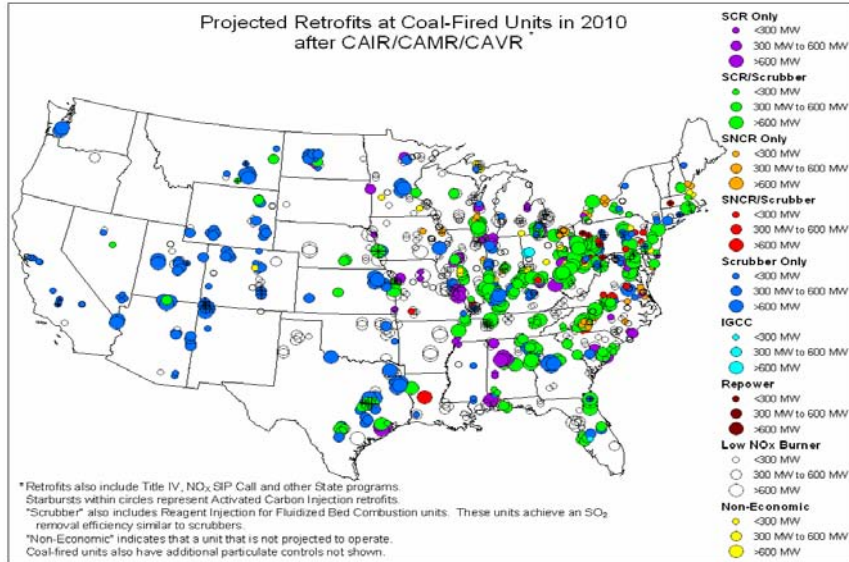


- The graphics show the percent of electricity generated from coal, by pollution control type.
- Over 99% of coal generation in all modeled years (2010, 2015, and 2020) comes from units with some NO_x or SO_2 control measures in place.
- There is a clear shift over time toward advanced SO_2 , NO_x , and mercury controls, such as SCR/SNCR for NO_x , scrubbers for SO_2 , and/or Activated Carbon Injection (ACI) for mercury control.



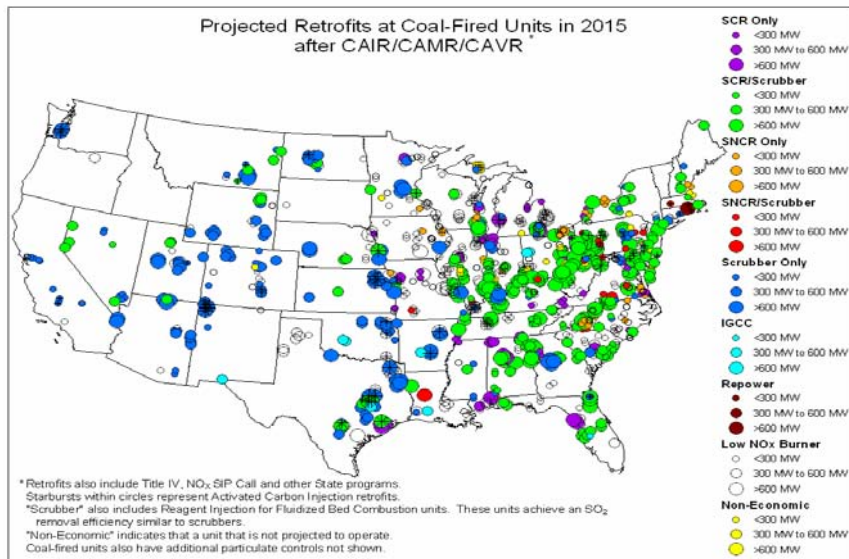
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Projected Technology Retrofits - 2010



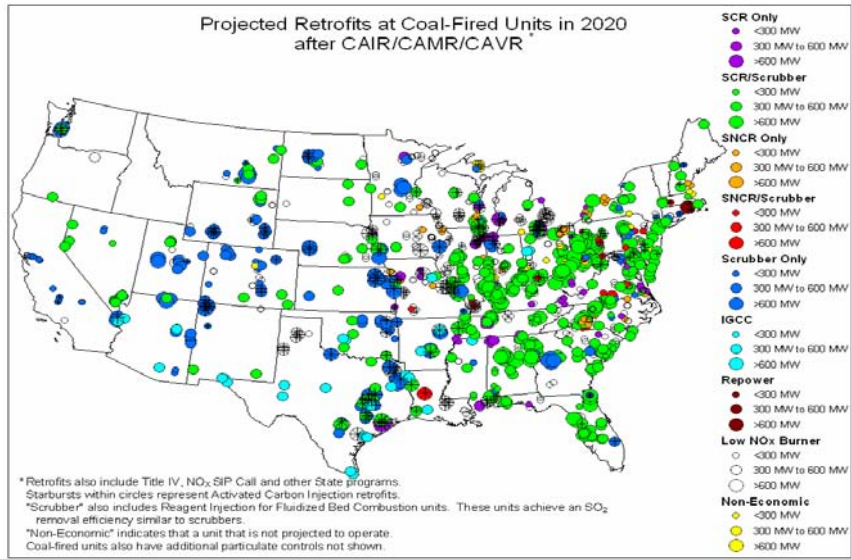
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Projected Technology Retrofits - 2015



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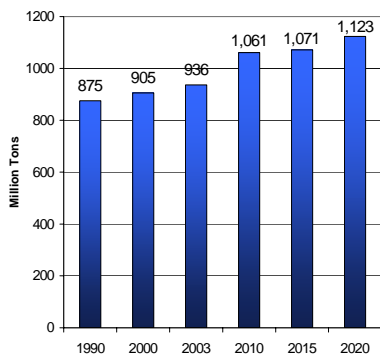
Projected Technology Retrofits - 2020



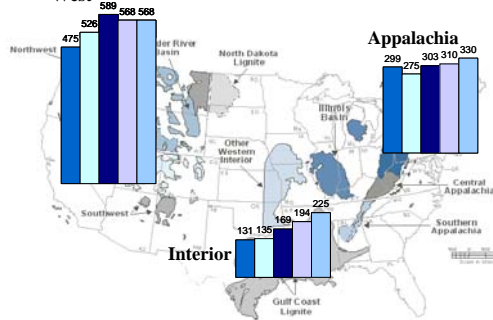
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Projected Impacts with CAIR/CAMR/CAVR: Generation Mix and Coal Production

Coal Production for Power Generation in 1990, 2000, and 2003 and Projected with CAIR/CAMR/CAVR in 2010, 2015, and 2020



West Coal Production for the Power Sector



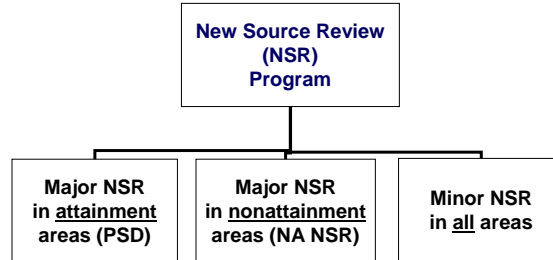
Source: EPA 2005

Notes: Coal production projections are EPA estimates from IPM. Historical data is from EIA.

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New Source Review (NSR) Basics

Major NSR Applies to New Major Sources and to Modifications That Result in Significant Emissions Increases



-An NSR permit must be obtained before construction can begin.

-Generally State/local agencies issue NSR permits.

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NSR Permit Requirements

- **PSD requirements:**
 - Require installation of **Best Available Control Technology (BACT)**
 - Perform Air Quality Analysis (protection of NAAQS and PSD increment)
 - Perform Additional Impacts Analysis (e.g., soils, vegetation, visibility)
 - Special analysis of impacts on national parks and wilderness areas
 - Opportunity for Public Involvement
- **NA NSR requirements:**
 - Require installation of **Lowest Achievable Emission Rate (LAER)**
 - Emission Offsets
 - Statewide Compliance Certification
 - Opportunity for Public Involvement
 - Alternatives Analysis

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What are BACT and LAER?

- **BACT (CAA Sec. 169(3))**
 - An emission limitation based on the maximum degree of reduction ... which the permitting authority... taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant...
- **LAER (CAA Sec. 171(3))**
 - For any source, that rate of emissions which reflects:
 - (A) the most stringent emission limitation which is contained in the implementation plan of any State for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable, or
 - (B) the most stringent emission limitation which is achieved in practice by such class or category of source, whichever is more stringent. In no event shall the application of this term permit a proposed new or modified source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance.
- **EPA policy and precedent that BACT and LAER requirements are not meant to redefine the source (e.g, require a coal fired power plant to become a gas fired power plant).**

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How are BACT and LAER Determined?

- Generally source proposes, and permitting authority reviews and accepts/rejects/modifies source proposal.
- BACT is determined by evaluating feasible control technologies
 - An option can be deemed unfeasible due to technical, energy, environmental or economic considerations.
 - EPA has suggested, and many states follow, a 'Top-Down' approach to this determination as follows:
 - Identifying all available air pollution control technology options, including pollution prevention alternatives, and excluding infeasible options.
 - Ranking the remaining control technologies according to their control effectiveness.
 - Considering all the statutory factors (economic, environmental, energy) for the ranked technologies and then choosing the most appropriate technology for the facility.
- LAER determinations require choosing the most stringent emissions limitation without considering economic factors.

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Questions?