

What's Reasonable?

MANE-VU Briefing

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Topics

- Reasonable Progress Requirement
- MANE-VU Approach
- Four-factor Analysis
- Bottom Line
- Next Steps

Requirement

- Make reasonable progress toward goal:
 - Prevention of future and remedying existing visibility impairment in Class I areas
 - Progress will be measured in deciviews
 - That is, actual improvement in visibility
 - The expected change in deciviews is calculated by modeling the impact of control measures considered to be reasonable
 - Thus, the decision about which measures are reasonable leads to a conclusion about how much visibility improvement is reasonable

Requirement (CAA Section 169A)

- Consider 4 factors to determine reasonable measures:
 - Costs of compliance
 - Time necessary for compliance
 - Remaining useful life of any existing source subject to such requirements
 - Energy and non-air quality environmental impacts of compliance

EPA Draft Guidance defines process for defining goals

- Identify key pollutants and source categories affecting visibility at Class I areas
- Identify possible control measures
 - Determine reductions from control measures which will be in place by 2018
 - Identify additional strategies
- Consider 4 statutory factors, choose measures
- Assess progress in comparison to uniform rate
- Determine reasonable progress goals

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MANE-VU Approach

- ✓ Conceptual Model: Sulfates
- ✓ Contribution Assessment: Contributing states
- ✓ Source modeling: Top contributing sources
- “Four factor analysis”: Costs of potential controls
- Regional modeling: Visibility benefits by 2018 & comparison to uniform rate
- Ongoing consultation & agreement

Major Source Categories Reviewed

- a. Electric Generating Units (SO₂)
- b. Heating Oil (SO₂)
- c. Industrial, Commercial, and Institutional Boilers (SO₂)
- d. Residential Wood Combustion (PM)
- e. Cement and Lime Kilns (SO₂)

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Four Factors

- Cost Effectiveness
- Time Necessary for Compliance
- Remaining Useful Life of the Source
- Energy and Non-air Impacts

Major Source Categories Reviewed in 4-factor Analysis

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- e. Cement and Lime Kilns (SO₂)

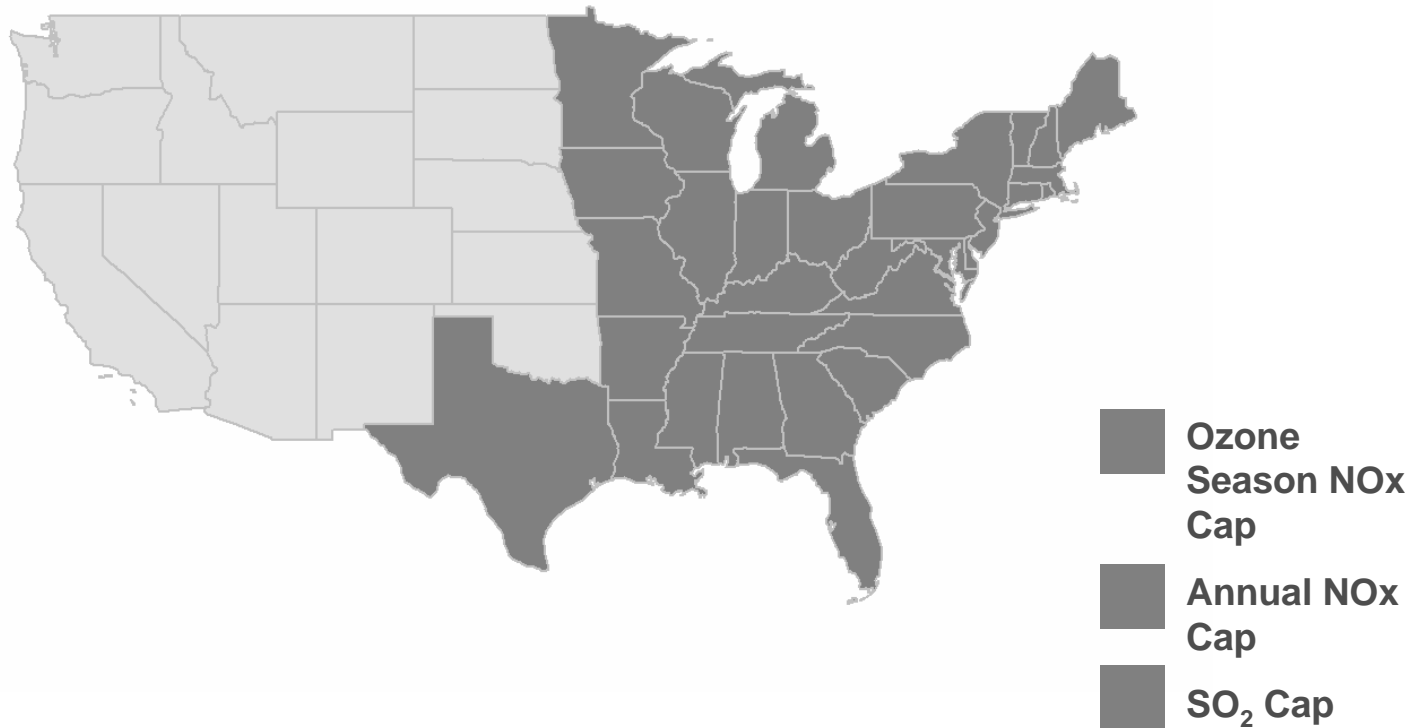
a. EGU Options

- CAIR
- CAIR+
- Key Plants

a. EGUs: Milestones

- CAIR milestone dates are
 - By 2010, EPA predicts CAIR will reduce SO₂ emissions by 4.3 million tons
 - By 2015, EPA predicts CAIR will reduce SO₂ emissions by 5.4 million tons
- MANE-VU predicts CAIR+ could reduce SO₂ emissions by 8.4 million tons by 2018

CAIR Plus Policy Region



SO₂ Cap was tightened by Increasing Allowance Requirements (Retirement Ratios)

CAIR Plus Scenario

SO₂ Retirement Ratios

- **2009** - 1.0
- **2010** - 2.50 (60% reduction)
- **2012** - 2.94 (66% reduction)
- **2015** - 3.57 (72% reduction)
- **2018** - 4.16 (76% reduction)

CAIR Base Case Scenario

SO₂ Retirement Ratios

- **2009** - 1.0
- **2010** - 2.0 (50% reduction)
- **2012** - 2.0 (50% reduction)
- **2015** - 2.86 (50% reduction)
- **2018** - 2.86 (65% reduction)

The SO₂ allowance retirement ratio is the number of Title IV SO₂ allowances that need to be surrendered for each tons of SO₂ emissions in the CAIR/CAIR Plus region.

Projected Costs

- **In comparing the CAIR Base Case with the CAIR Plus scenario, the annual incremental costs* increase by less than 5%:**
 - **\$2.6 billion (+2%) in 2018**

***Costs include the capital costs of new investment decisions, fuel costs and the power plant operation and maintenance costs**

a. EGUs: Projected Costs

- CAIR:
 - Cost of SO₂ allowances ~ \$1,100/ton in 2018
- CAIR+:
 - Cost of SO₂ allowances ~ \$1,400/ton in 2018
 - Timing affects costs
- 90% control on key plants:
 - Cost expected to be comparable to CAIR

a. EGUs: Other Factors

- Useful Life:
 - IPM modeling predicts
 - Some plants will shut down in the next decade with CAIR.
 - Higher retirement ratio (lower cap) will cause more plants to shut down (4,700 MW) and more new (cleaner) plants to be built.
 - Plants are built to last 50 years.
 - Actual lifetimes vary

a. EGUs: Other Factors

- Energy and Other Environmental Impacts:
 - IPM predicts:
 - CAIR+ would increase use of natural gas, decrease use of coal.
 - For CAIR+ new plants would be IGCC and combined cycle
 - Scrubbers use energy and generate solid waste.
 - Reducing emissions decreases acid deposition.

Major Source Categories Reviewed in 4-factor Analysis

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- e. Cement and Lime Kilns (SO₂)

b. Low Sulfur Oil Strategy

- Distillate
 - 500 ppm by 2012, 2014
 - 15 ppm by 2016, 2018
- #4 Residual
 - 0.25% to 0.5% by 2012, 2018
- #6 Residual
 - 0.3 to 0.5% by 2012, 2018

b. Heating Oil 4 Factors

- Cost: Fuel costs may increase, but lower maintenance costs will partially offset
- Compliance Time: Phase-in allows time for compliance
- Useful Life: Lower Sulfur should extend life of boilers
- Energy & Other Environmental Impacts: Higher combustion efficiency

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c. ICI Boilers—Factors

- Costs: Large range depending on boiler size, current fuel, control option.
- There is a potential for emissions reductions

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d. Wood Combustion

- PM and VOC emissions contribute to Regional Haze
- More local impacts
- Need to address this category for nuisance and health reasons in addition to regional haze

d. Wood Combustion - Control Options

- Public outreach and education programs
- Woodstove changeout programs to promote replacement of old equipment with cleaner burning equipment
- State requirements for new sources, stricter than federal NSPS
- State requirements for outdoor wood boilers/hydronic heaters

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- e. **Cement and Lime Kilns (SO₂)**

Cement and Lime Kilns - Conclusion

- There is so much variability that case-by-case analyses must be done.
- There is a potential for emissions reductions

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Cost- Effectiveness Summary

- EGUs: IPM Predicts SO₂ allowances ~ \$1,100/ton for CAIR and ~ \$1,400/ton for CAIR+ in 2018
- Heating Oil: Range \$500-750/ton SO₂ removed. Prices vary over the course of a year
- Coal-fired Industrial Boilers (100-250 MMBTU/hr): Range = \$150-\$10,000/ton SO₂ removed depending on technology used and boiler utilization
- Residential Wood Combustion: Range = \$700-\$10,000/ton PM removed
- Cement and Lime Kilns: Range = \$2,000-\$73,000/ton SO₂ removed

General Conclusions

- Additional controls on EGUs seem reasonable
- Tighter limits on sulfur in fuel/heating oil seem reasonable
- Residential wood combustion controls are needed for a variety of reasons and should be pursued
- Controls on ICI Boilers, Kilns, and other key sources should be considered by individual states

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Reasonable Progress Goals and Control Measures – Next Steps...

- Agree on strategies to include in modeling
- Consult within and outside MANE-VU about which control strategies are reasonable
- Determine goals based on final modeling
- SIPs are due 12/17/07
- Adopt enforceable emissions limits & compliance schedules
- Progress evaluation due in 5 years

- Report is Available at www.manevu.org