

# The MANE-VU Approach to Improving Visibility

MANE-VU Stakeholder Briefing

November 15, 2007

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# Goals of Presentation

- Explain MANE-VU's approach to establishing reasonable progress goals and defining a long term strategy for meeting those goals
- Review the anticipated visibility impacts and cost & benefit analyses of the long term strategy
- Describe specific elements of long-term strategy

# Principles

- June 2007 Board Meeting Resolution by MANE-VU Class I States on Principles for Implementing the Regional Haze Rule includes:
  - Establishing Reasonable Progress Goals reflecting the 4-factor analysis to determine measures to be implemented by contributing states
  - Achieving as much or more visibility improvement as the Uniform Rate of Progress
  - Providing flexibility to states in meeting the requested emission reductions
  - Calling upon EPA and FLMs to identify/act on inconsistencies
  - Other key provisions reflecting the MANE-VU approach
- MANE-VU States are not asking others to do more than we are willing to do ourselves

# MANE-VU Statements – Our “Ask” for Improved Visibility from States

## MANE-VU:

- BART
- Focused EGU Strategy within CAIR
- Low sulfur fuel oil strategy
- Continued evaluation of other measures, including Energy Efficiency, Clean Fuels and others

## Other Regions:

- BART
- Focused EGU Strategy within CAIR
- 28% reduction in non-EGU SO<sub>2</sub> emissions
- Continued evaluation of other measures, including from all coal-burning facilities, and others

# National “Ask” for EGUs

- Additional EGU reductions beyond CAIR requirements
- Discussing appropriate levels through the consultation process

# MANE-VU Approach

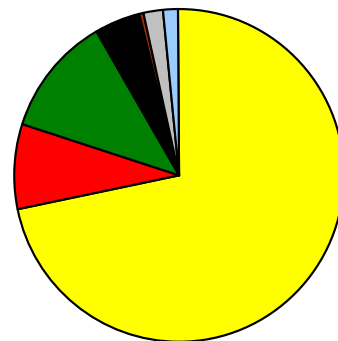
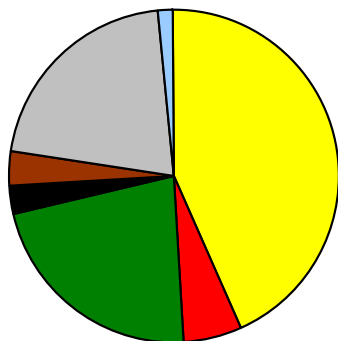
- ✓ Principles
- ✓ Conceptual Model: Sulfates
- ✓ Contribution Assessment: Contributing states
- ✓ “Four factor analysis”: Costs of potential controls
- ✓ Developed MANE-VU commitments and Regional/National “Asks”
- ✓ Regional modeling: Visibility benefits in 2018 with comparison to uniform rate

# Sulfate Role in Visibility Impairment

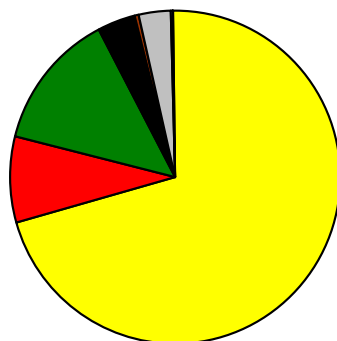
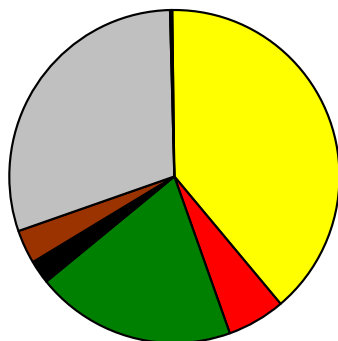
20% Worst Day **Mass**  
[2000-2004]

20% Worst Day **Haze**  
[2000-2004]

Acadia, ME



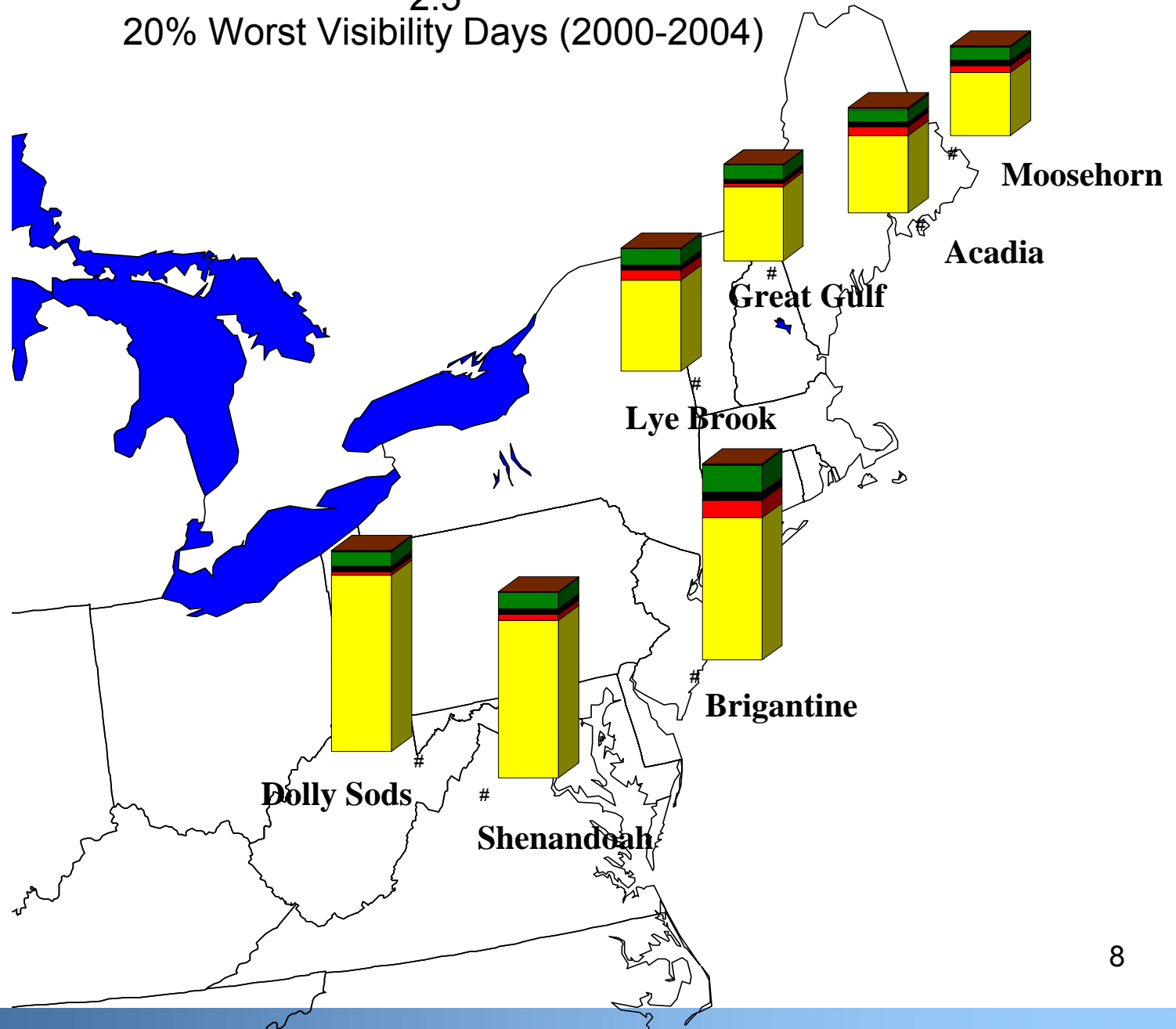
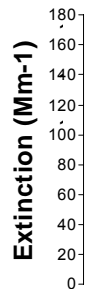
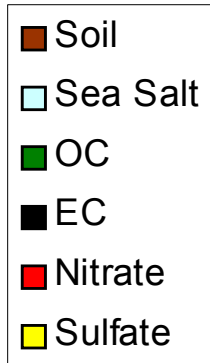
Brigantine, NJ



- Sulfate
- Nitrate
- Organic Carbon
- Elemental Carbon
- Soil
- Coarse Mass
- Sea salt<sub>7</sub>

# Contributions to PM<sub>2.5</sub> Extinction at 7 Sites

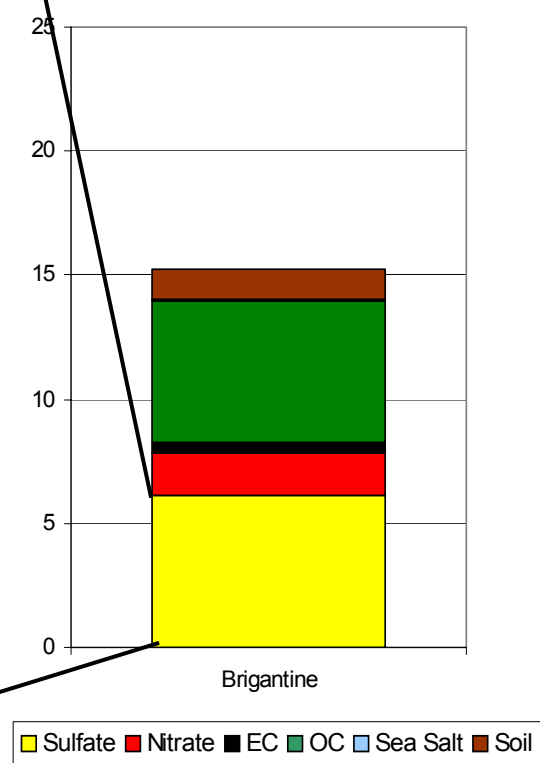
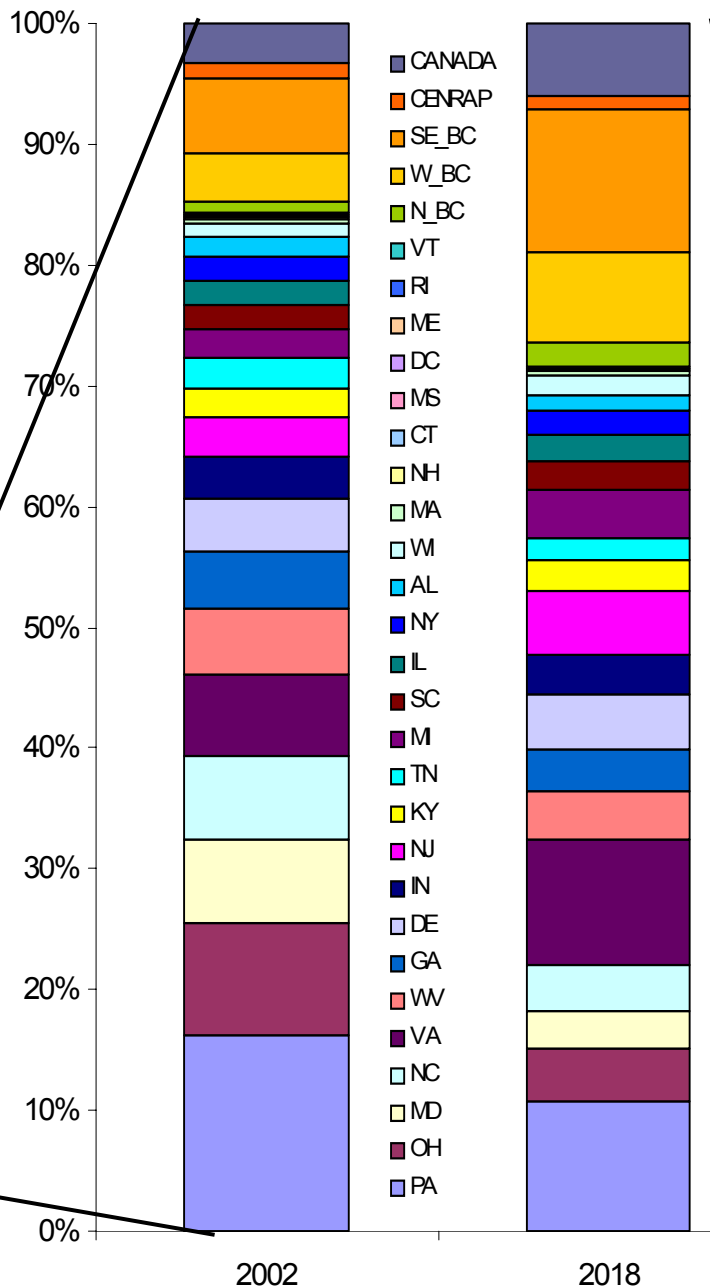
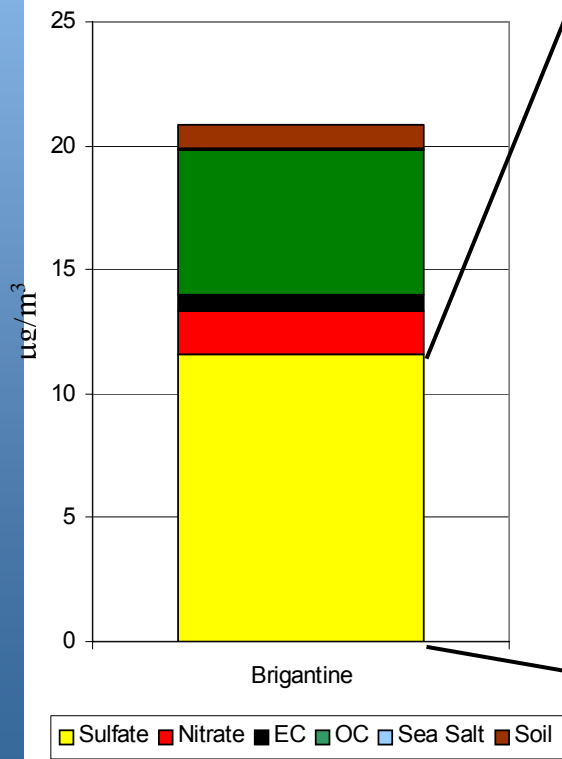
20% Worst Visibility Days (2000-2004)





# Brigantine

## 20% Worst Days



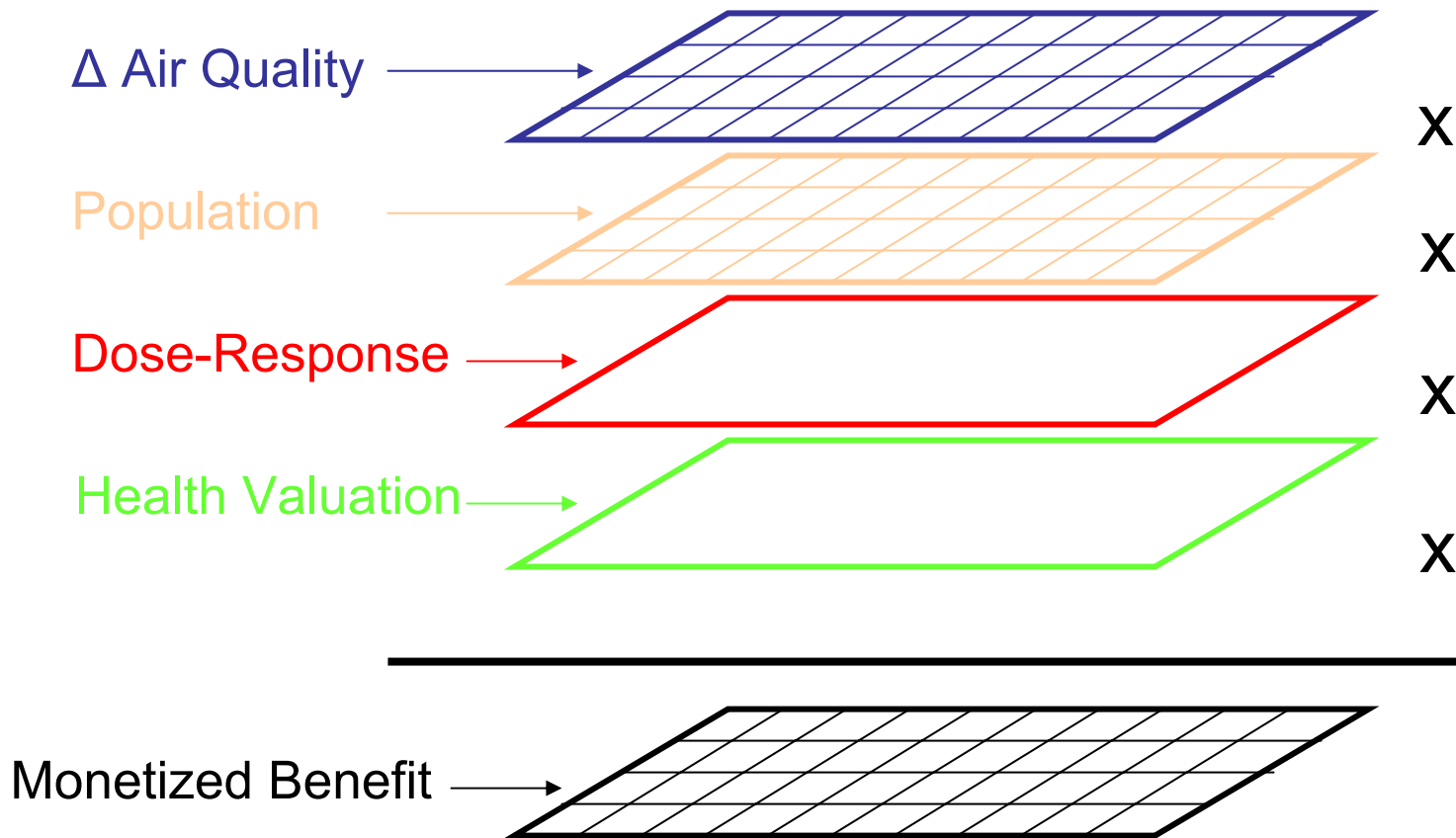
# 4-Factor Analysis: Requirements

- 4 factors to consider 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

# Benefits/Cost Analysis

- Weighs costs of imposing a regulatory program against monetized benefits of adoption
- Health and environmental benefits of air quality regulation has not traditionally been easy to monetize
- New tools developed by EPA help to identify these benefits of control programs

# What does BenMAP do?



# What did we do?

- Benefits analysis of four **potential** regional haze control measures in 2018
- Reference Scenario: On the Books/On the Way (**OTB/OTW**)
- Control Scenarios:
  - “**S-1**” and “**S-2**” fuel strategies
  - **BART** (anticipated reductions)
  - “**167 Stack**” EGU strategy
- Estimated benefits with BenMAP

# Opportunities for SO<sub>2</sub> Emission Reduction

- EGUs @ \$1,400/ton (IPM for >CAIR)
- Industrial Boilers @ \$150 - \$10,000/ton
  - Oil – 19,000 tons
  - Coal – 40,500 tons
- Fuel Oil @ \$500 - \$5000/ton
  - Distillate – 110,000 – 140,000 tons
  - Residual – 22,000 tons
- BART – 37,000 tons

# Description of Strategies

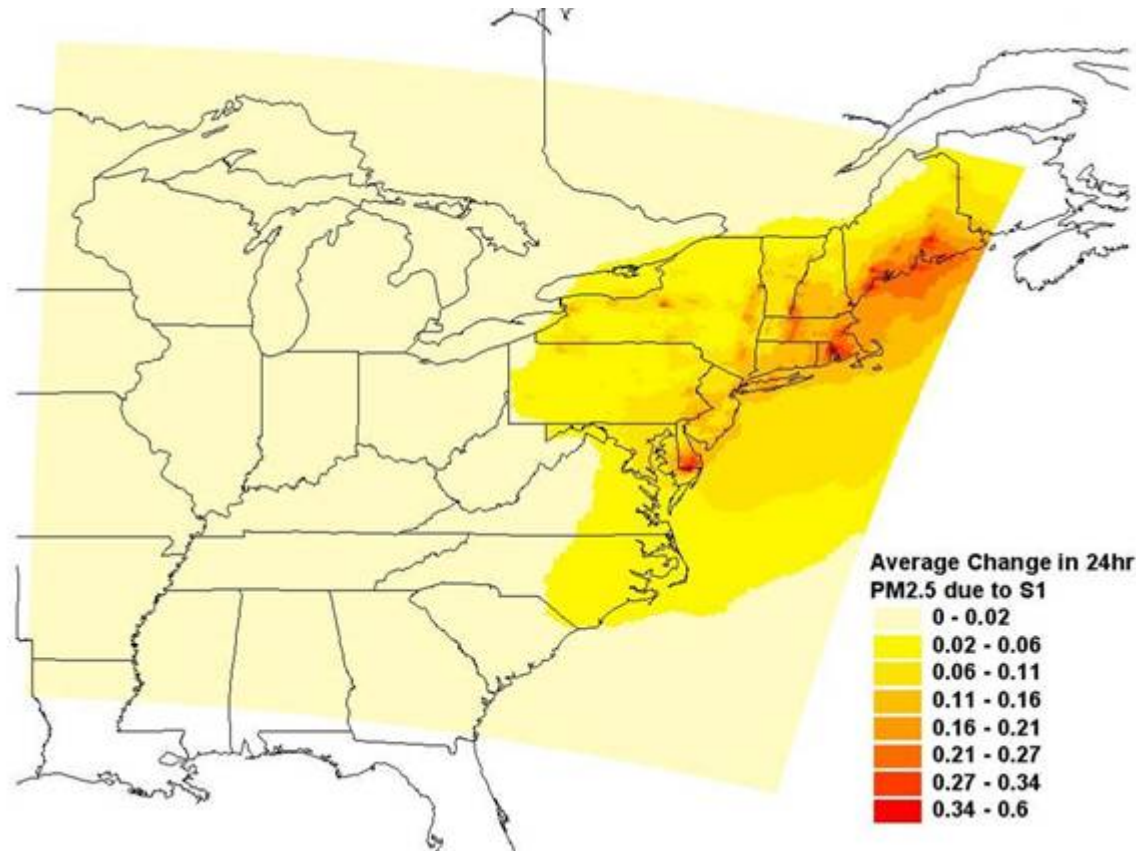
- S1-Low Sulfur Fuel (500ppm)
- S2-Low Sulfur Fuel (15ppm)
- BART- 2018 projections for 14 facilities expected to be controlled solely due to BART.
- 167 Stack Strategy – 90% control at “top impactors” relative to VISTAS IPM 2.1.9

# 1. Low Sulfur Oil Strategies

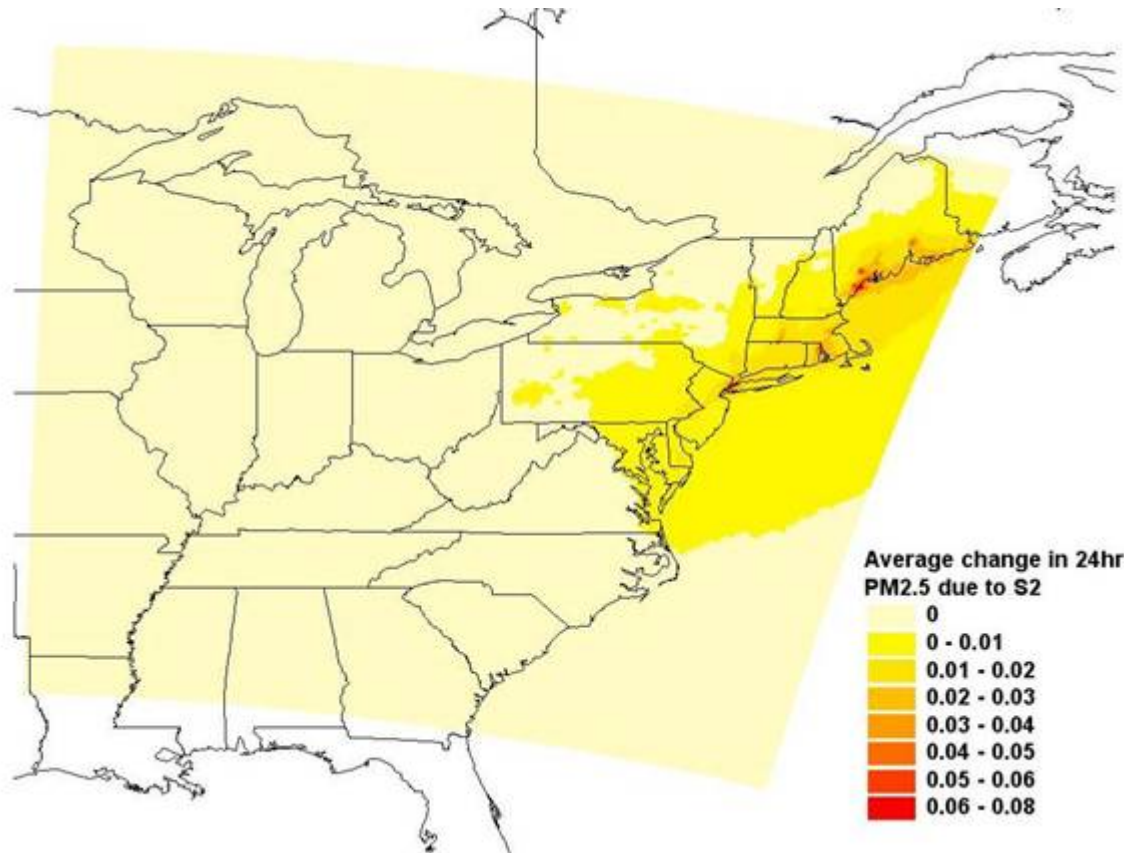
- Distillate (#2)
  - 500 ppm by 2012, 2014 (S-1)
  - 15 ppm by 2016, 2018 (S-2)
- #4 Residual (S-1 & S-2)
  - 0.25% to 0.5% by 2012, 2018
- #6 Residual (S-1 & S-2)
  - 0.3 to 0.5% by 2012, 2018
- Cost: Fuel costs may increase, but lower maintenance costs will partially offset
- Compliance Time: Phase-in allows time for compliance
- Useful Life: Lower Sulfur should extend life of boilers
- Energy & Other Environmental Impacts: Higher combustion efficiency



# Reduced PM<sub>2.5</sub> Levels in 2018 due to S1 Relative to OTB/OTW

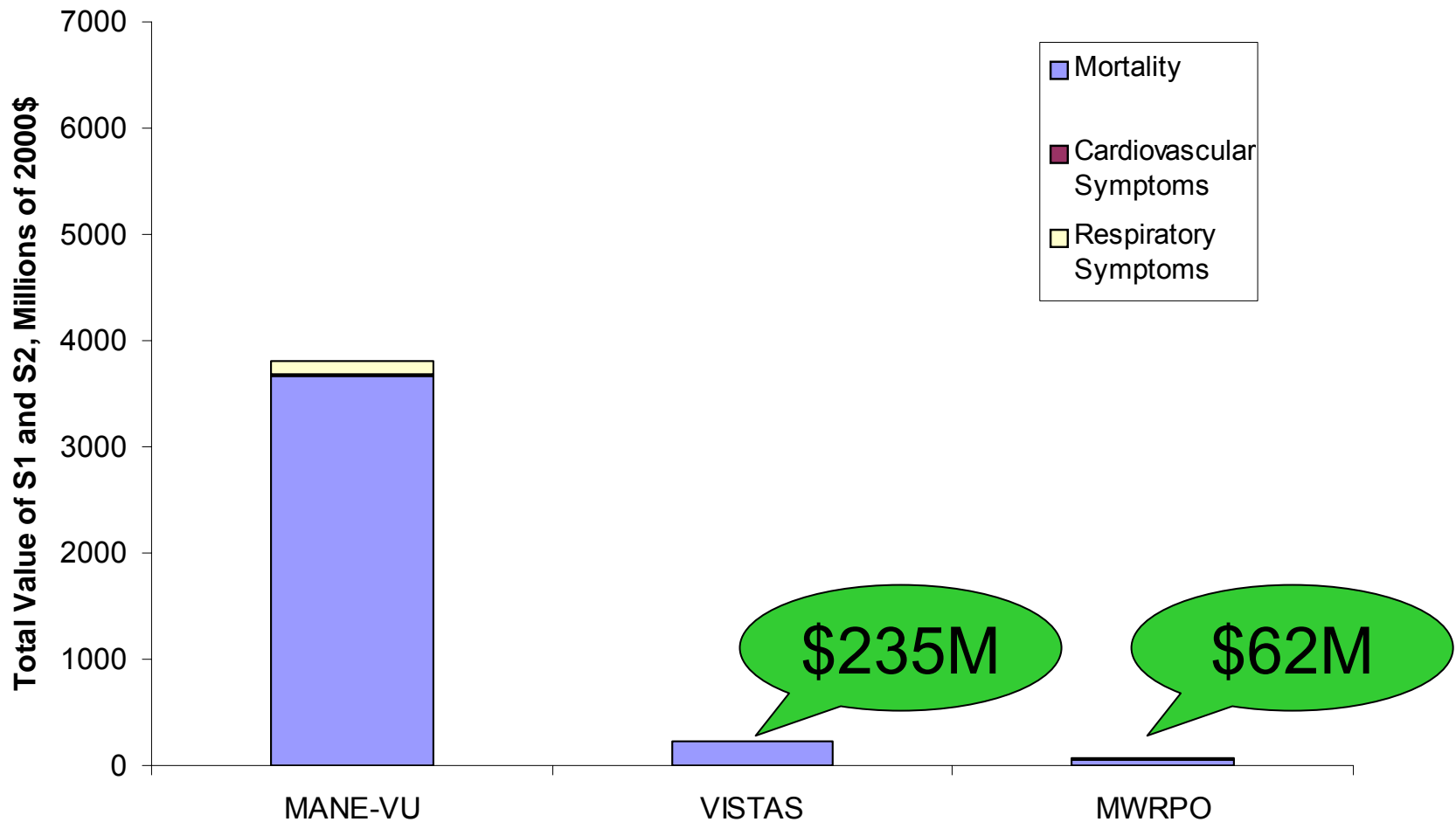


# Reduced PM2.5 Levels in 2018 due to S2 Relative to S1



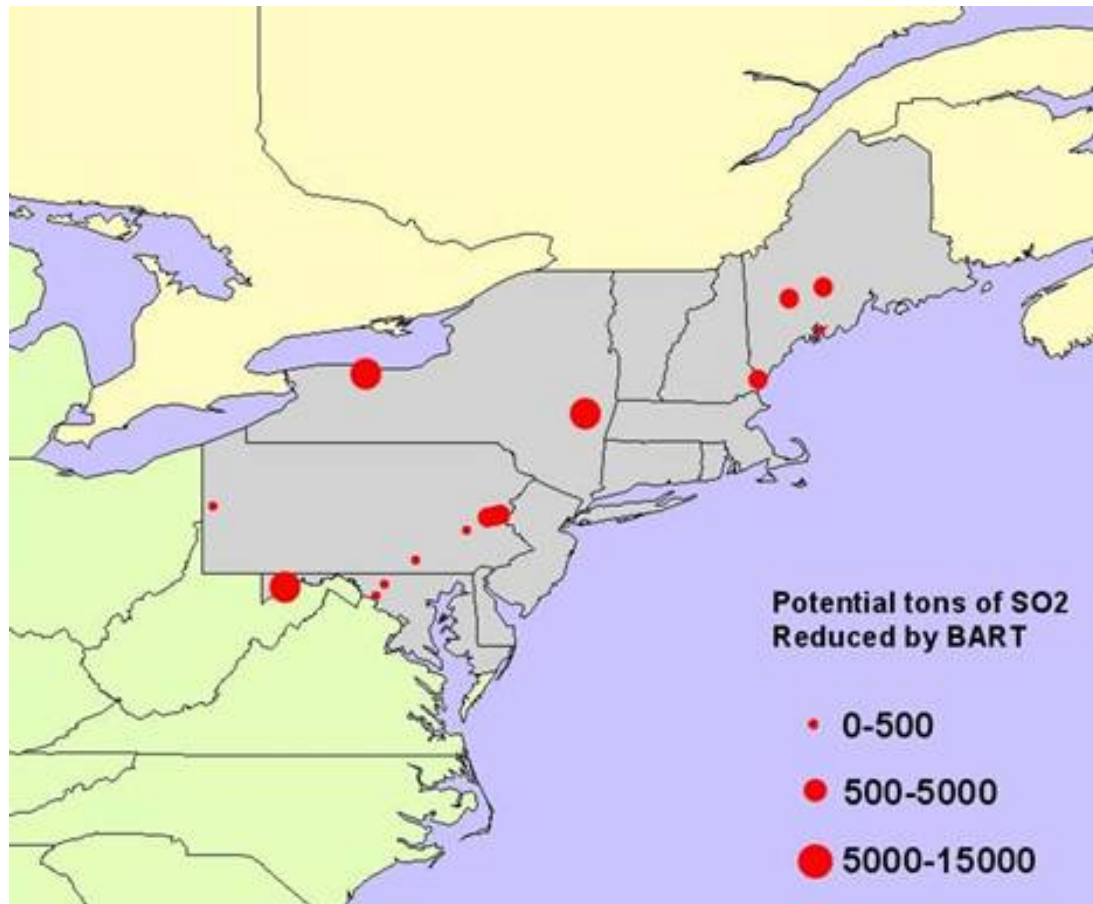
# Estimated Value of Avoided Incidences

due to change in PM2.5 from **Combined Fuel Strategy (S1 + S2)**  
in VISTAS and MWRPO



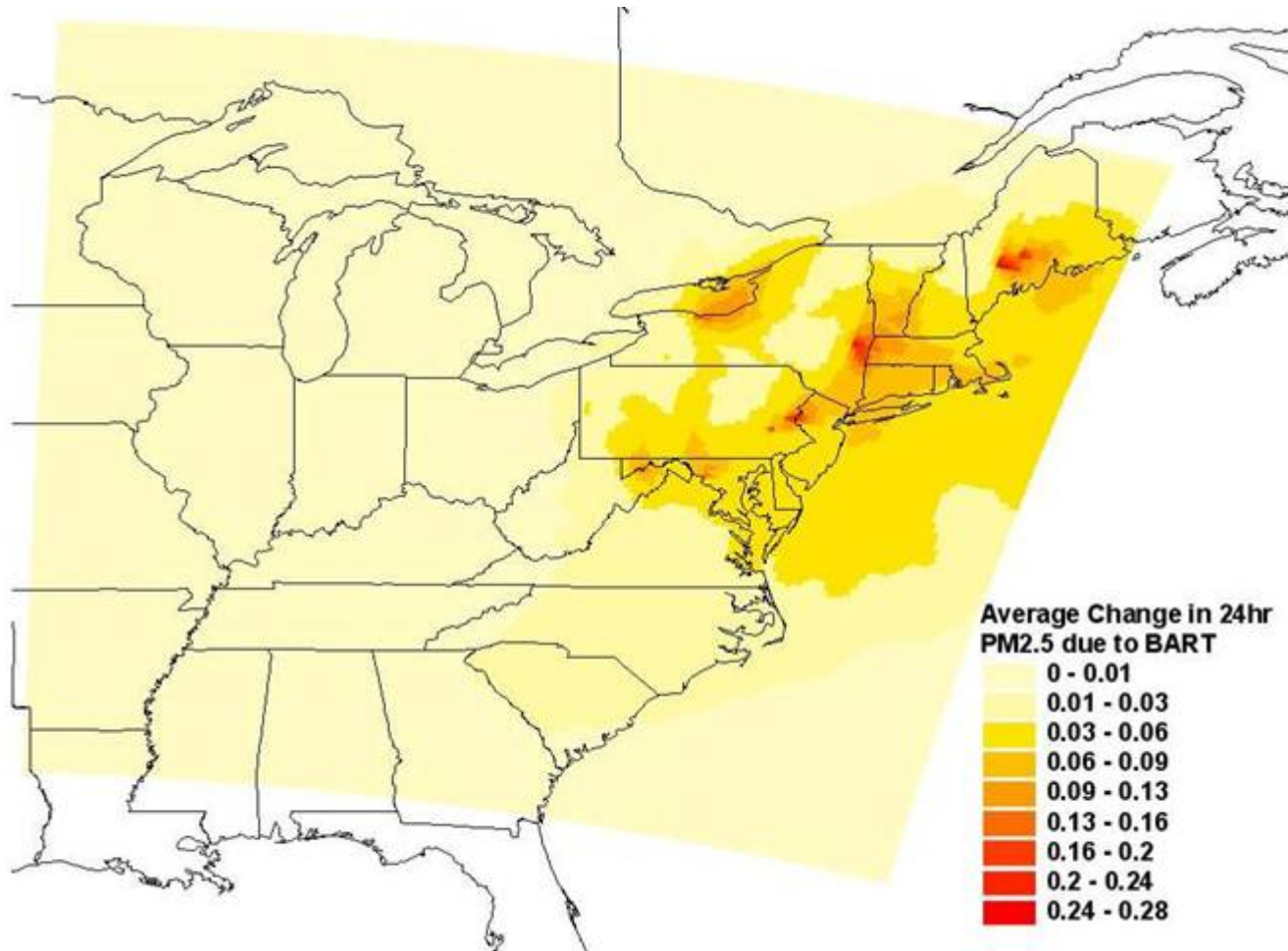
## 2. BART Strategy

- Includes reductions at 14 facilities where BART controls are anticipated due to the BART regulation alone



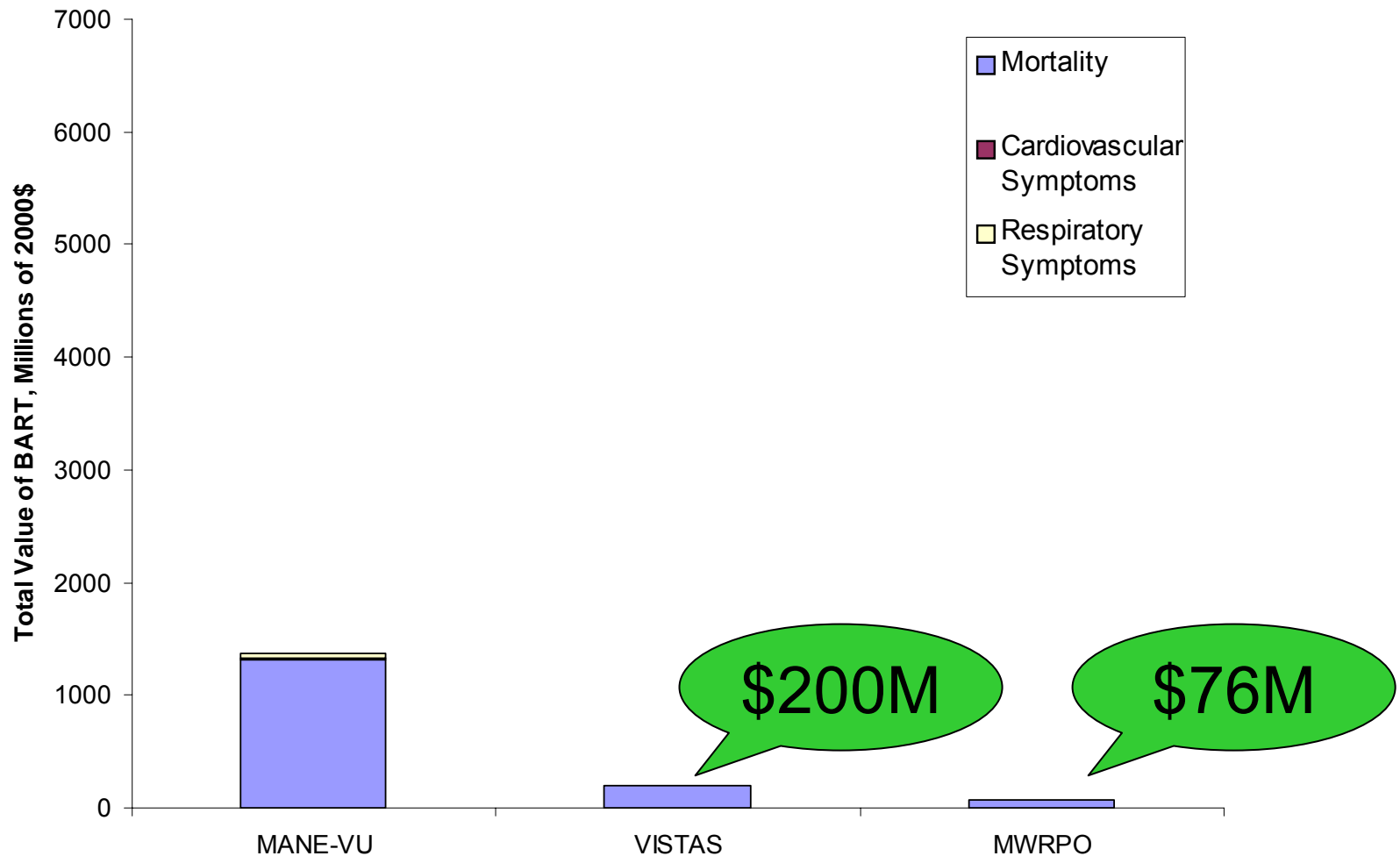
# Reduced PM<sub>2.5</sub> Levels in 2018 due to BART

Relative to OTB/OTW



# Estimated Value of Avoided Incidences

due to change in PM2.5 from **BART Strategy**  
in VISTAS and MWRPO

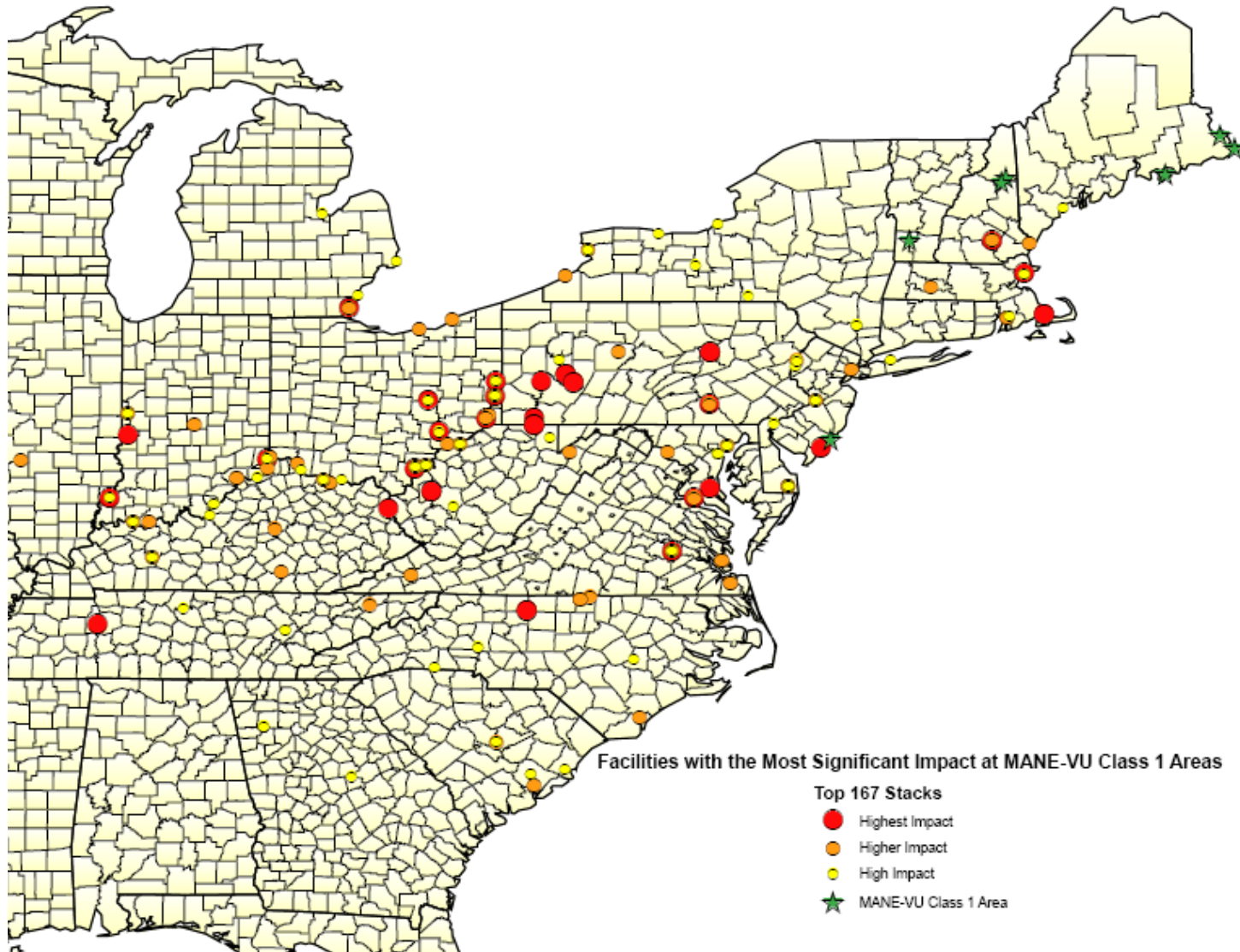


# 3. “167 Stack” EGU Strategy

- Control strategy focused on reducing SO<sub>2</sub> emissions from power plants.
- Emissions from power plants continue to dominate the SO<sub>2</sub> emissions inventory and are responsible for over half the mass and approximately 70-80 percent of the Haze
- MANE-VU is asking for 90% control at 167 “top impactors” relative to 2002

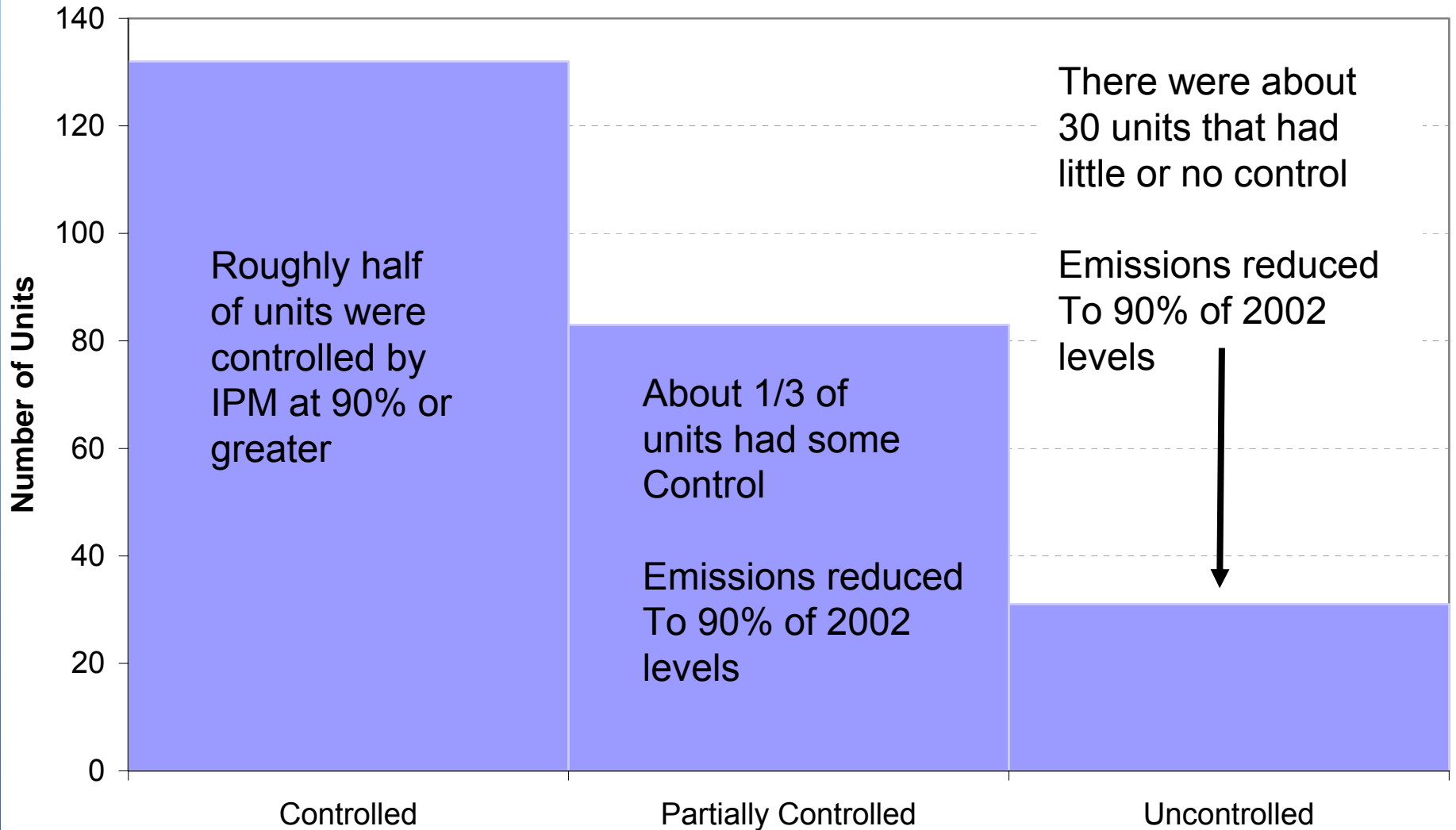


# EGU Strategy – “167 Stacks”

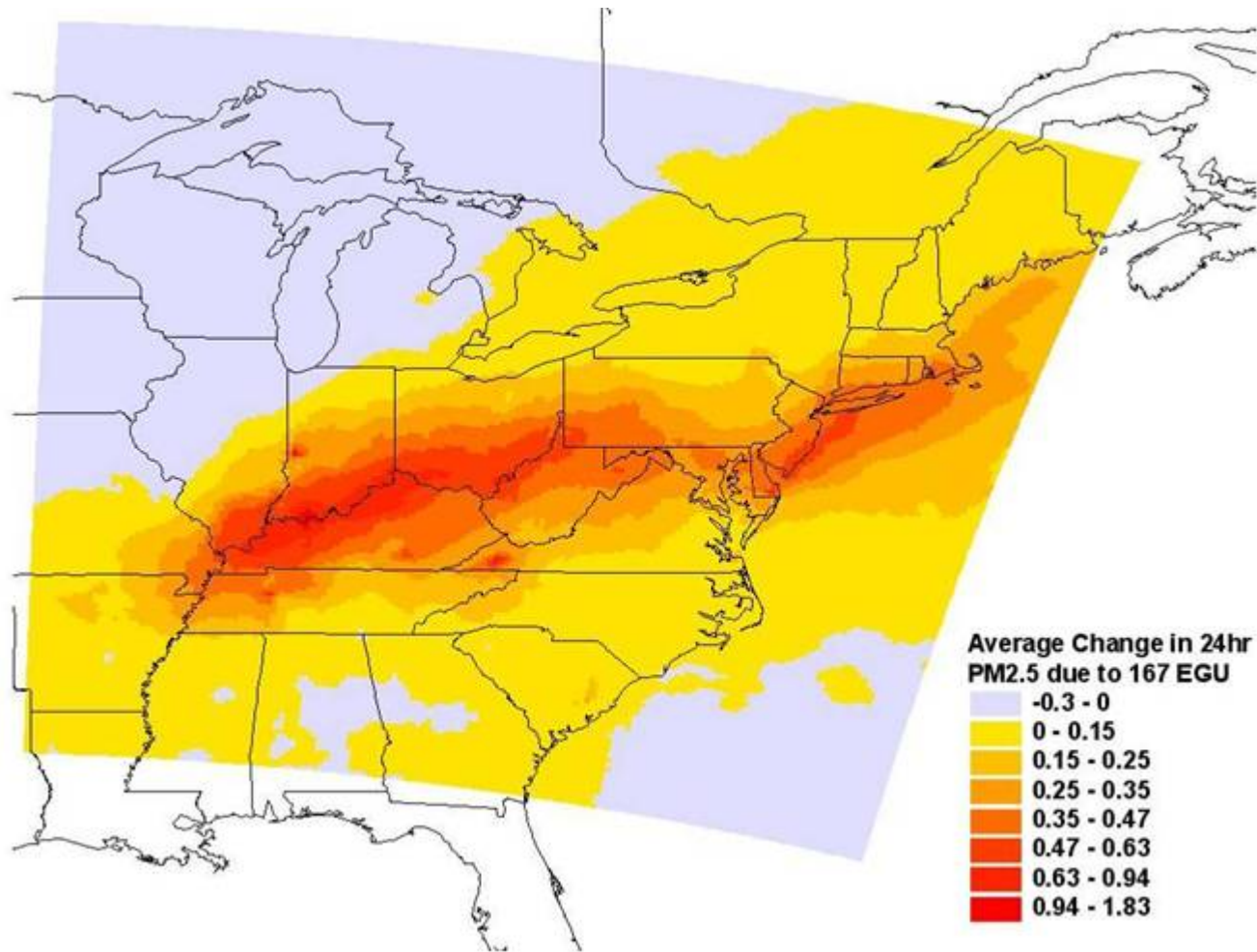




## Distribution of Controls Among 246 Units at "167 Stacks"

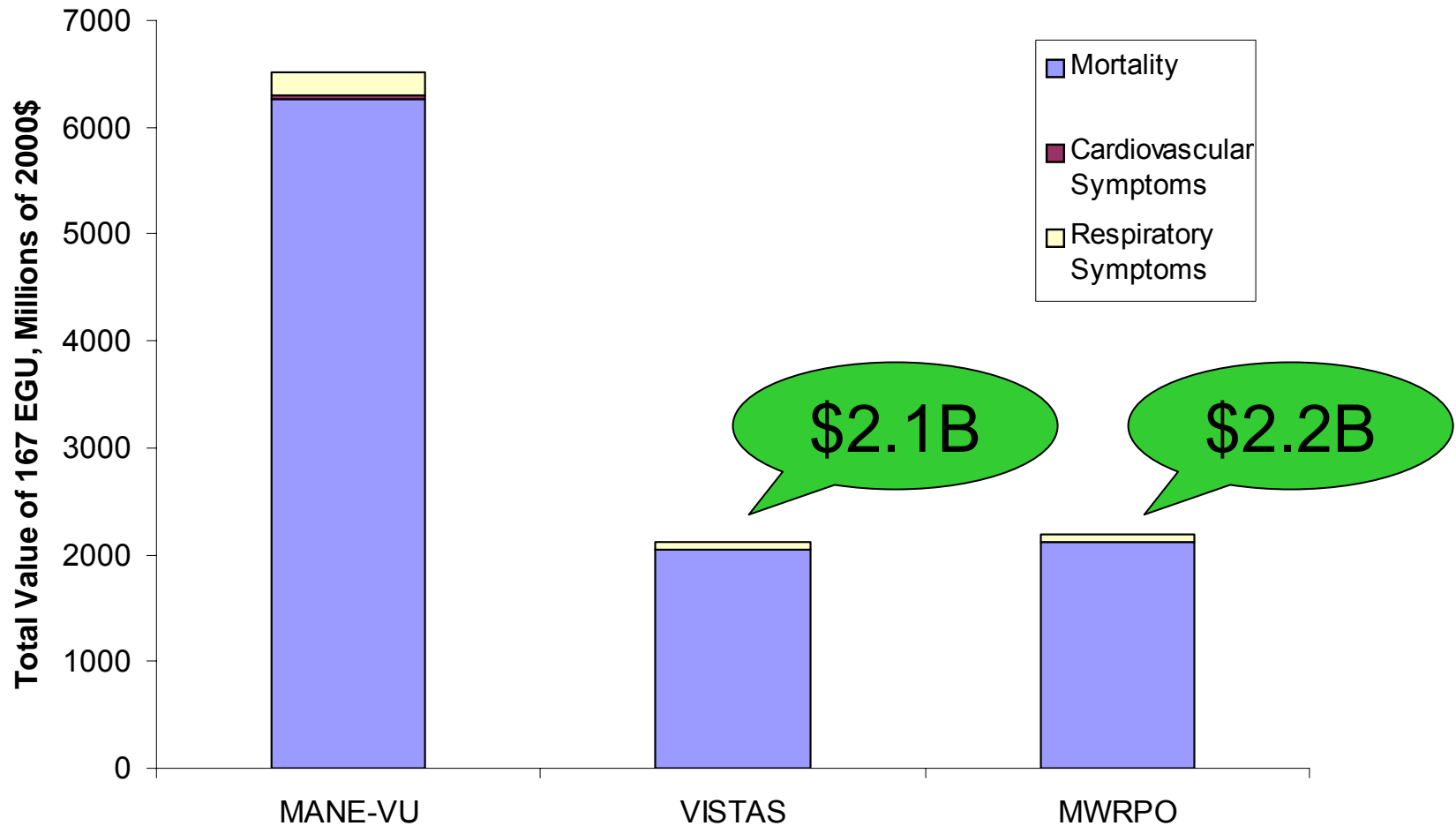


# Reduced PM<sub>2.5</sub> Levels in 2018 due to 167 EGU Relative to OTB/OTW

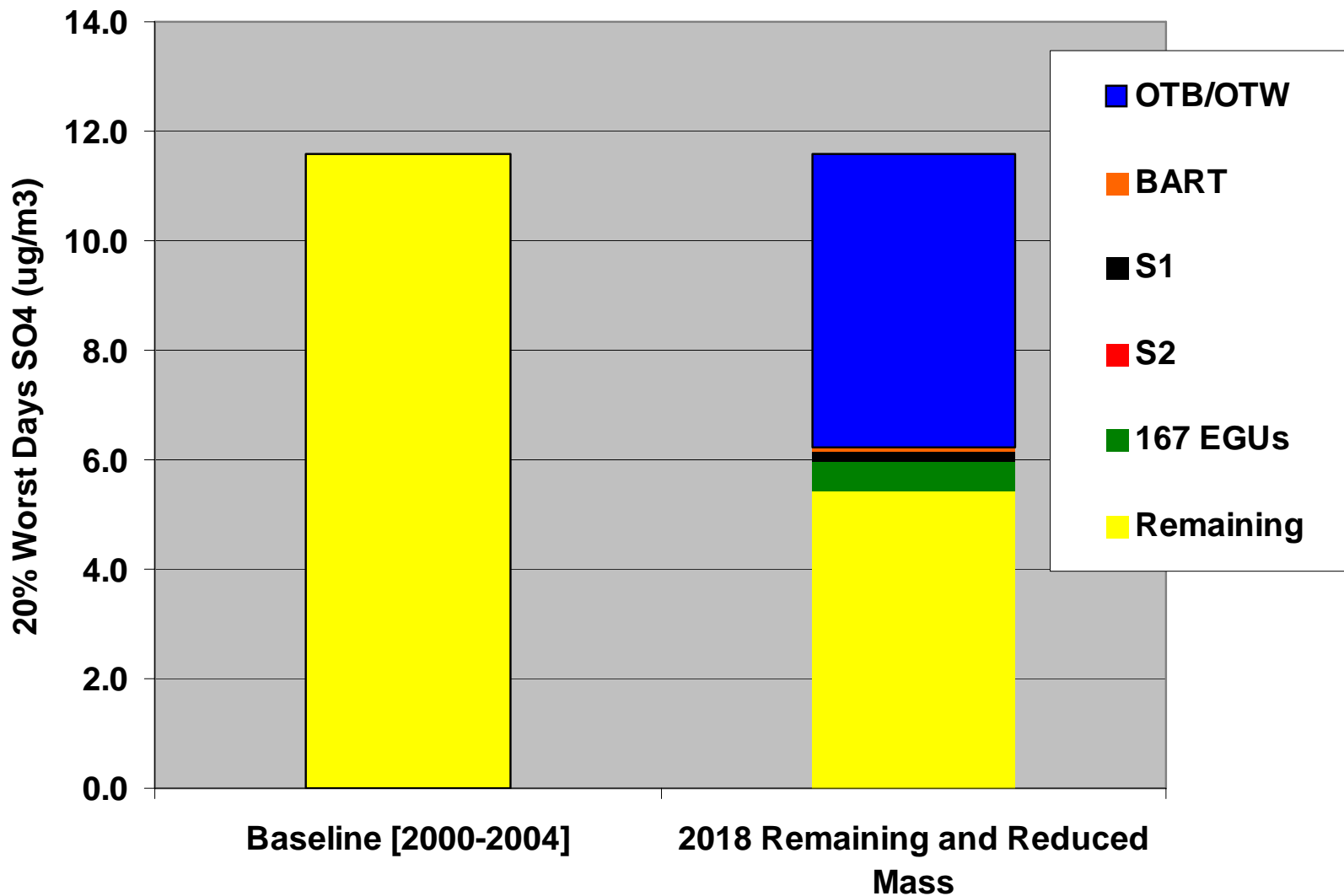


# Estimated Value of Avoided Incidences

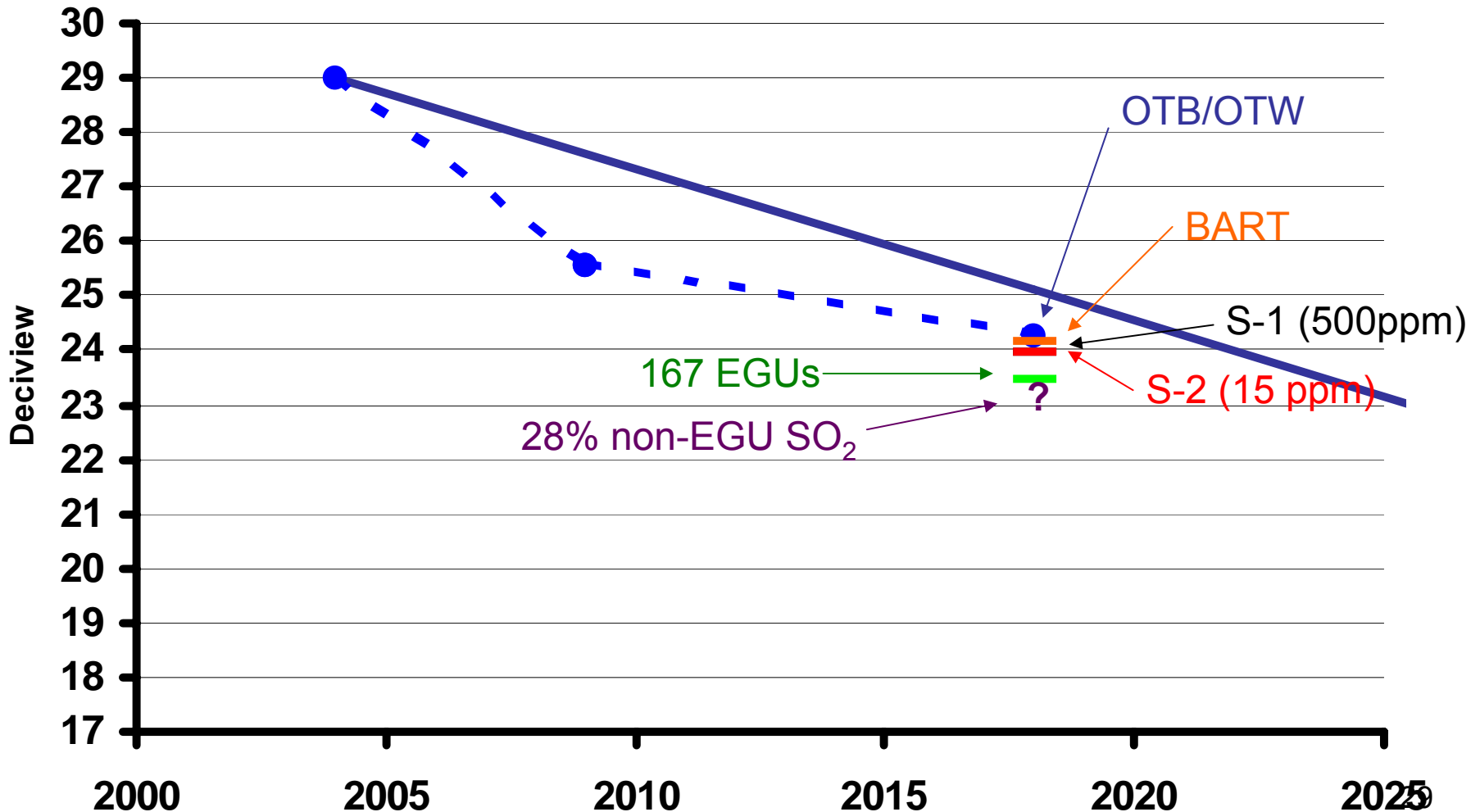
Value of Avoided incidences from reductions in PM2.5 due to **167 EGU** strategy in MANE-VU, VISTAS and MWRPO



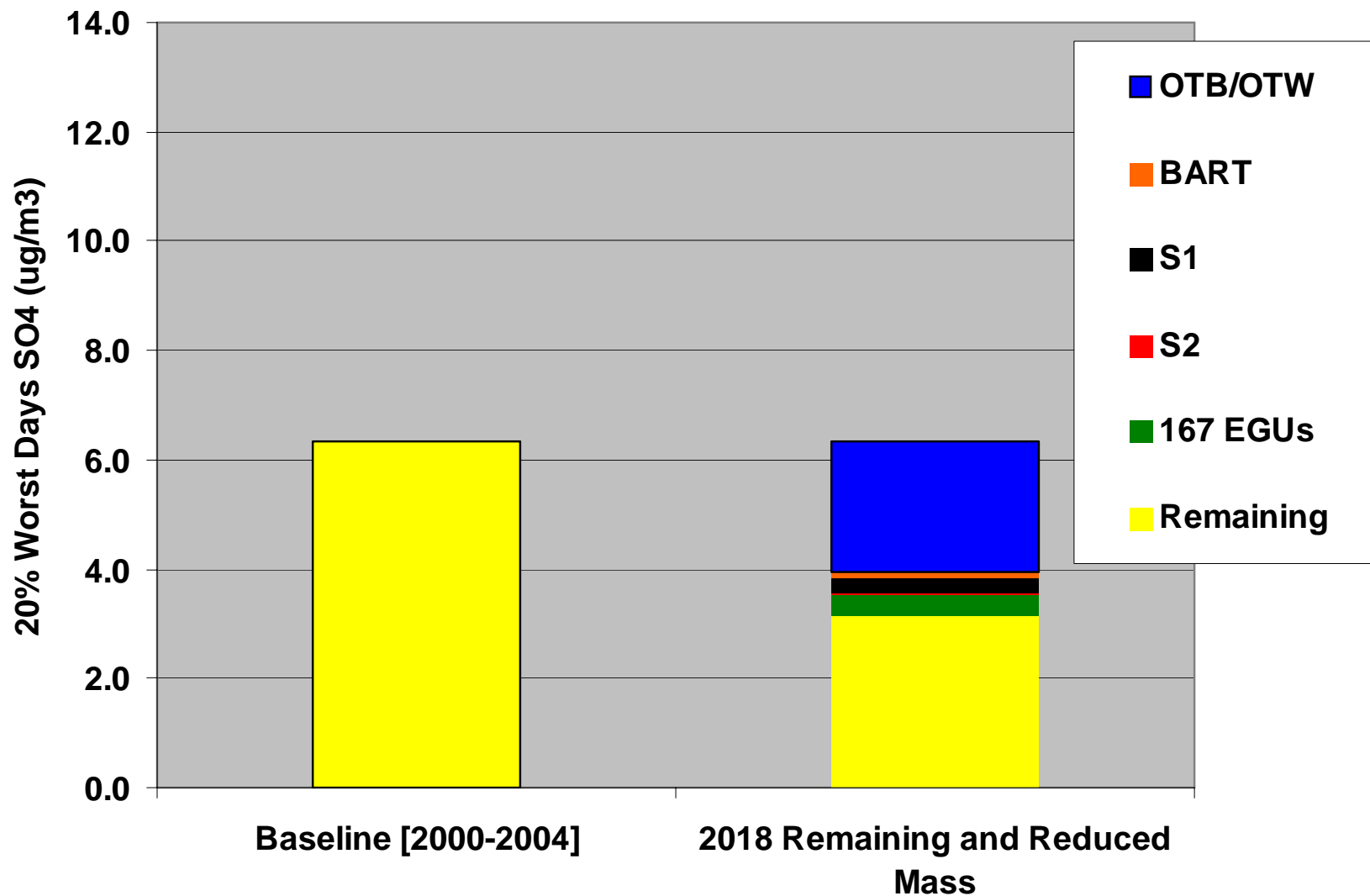
# Brigantine “Worst Day” Sulfate Mass Reductions by Strategy



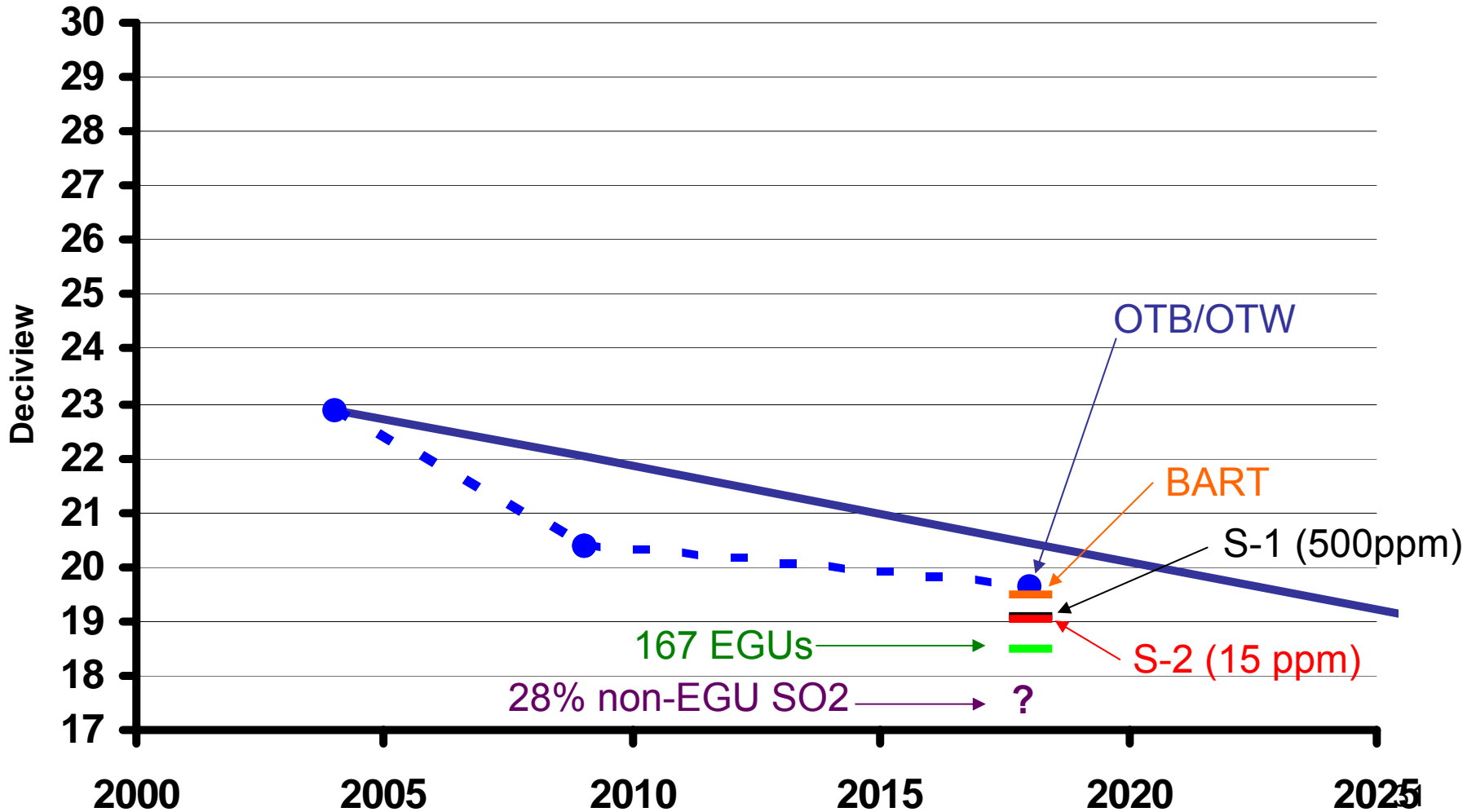
# Degree of Visibility Improvement Brigantine, NJ



# Acadia “Worst Day” Sulfate Mass Reductions by Strategy



# Degree of Visibility Improvement Acadia, ME



# Summary of Health Co-Benefits Regional Haze Programs in MANE-VU

- Fuel sulfur content: \$3.7 billion
- BART: \$1.8 billion
- “167 Stack” EGU measure: \$6.5 billion
- **\$12 billion** combined benefit



# Summary of Health Co-Benefits *in Neighboring RPOs*

- Fuel sulfur content: \$297 million
- BART: \$276 million
- “167 Stack” EGU measure: \$4.3 billion
- **\$4.9 billion** combined benefit

Program Grand Total = **\$16.9 billion**

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# National “Ask” for EGUs

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# In summary

- MANE-VU Class I areas are preparing to establish reasonable progress goals based on an analysis of the impacts of reasonable strategies
- The strategies include additional SO<sub>2</sub> controls both within and outside MANE-VU
- States will have up to 2018 to adopt and implement additional strategies

Questions?