The Clear Skies Act of 2003

Virginia and Clear Skies

Highlights of Clear Skies in Virginia

- **Virginia sources would reduce emissions of SO_2 by 55%, NO_x by 42%, and mercury by 42% by 2020 due to Clear Skies.**

- **The health benefits in Virginia would total $5.1 billion annually ($950 million under the alternative estimate) and include approximately 700 fewer premature deaths (400 under the alternative estimate) and 1,300 fewer hospitalizations/emergency room visits each year.**

- **In addition, Virginia would receive environmental benefits, including improved visibility, faster attainment of air quality standards, and reduced acid deposition.**

- **Clear Skies does not significantly impact electricity prices. With or without Clear Skies, electricity prices in the electricity supply region that includes Virginia are expected to remain below 2000 prices.**

Clear Skies: An Innovative Approach to Improving Human Health and the Environment

Why Clear Skies?

- **Air quality has improved, but serious concerns persist**
  - Virginia's citizens suffer ill effects from air pollution, including asthma attacks and premature death

- **Electricity generation sector remains a major emissions source**
  - Very cost-effective to control the power sector, relative to other sources
  - Sources are concerned about upcoming complex and burdensome regulations

Advantages of the Clear Skies Approach

- **Guarantees significant nationwide emissions reductions – beginning years before full implementation**
  - Virginia sources would substantially reduce emissions of SO_2, NO_x and mercury
  - Delivers dramatic progress towards achievement of critical health and environmental goals

- **Uses proven, market-based flexible approach with incentives for innovation**
  - Recognizes environmental needs as well as industry constraints, allowing industry to better manage its operations and finances while lowering risks to the public
  - Sources are projected to install pollution controls to enable continued reliance on coal

- **Increases certainty across the board for industry, regulators, and consumers**

Under Current Clean Air Act Power Plants Would Face a Complex Set of Requirements

NSR Permits for new sources & modifications that increase emissions

Ozone

1-hr Serious Area Attainment Date

OTC NO_x Trading

NO_x SIPs Due

Designate areas for 8-hr Ozone NAAQS

NO_x SIP Call Red-uc-tions

1-hr Severe Area Attainment Date

Marg-inal 8-hr Ozone NAAQS Attain-ment Date

8-hr Ozone Attain-ment Demon-stration SIPs due

Assess Effectiveness of Regional Ozone Strategies

Possible Regional NO_x Reductions ? (SIP call II)[1]

Moderate 8-hr Ozone NAAQS Attainment Date

Serious 8-hr Ozone NAAQS attainment Date

99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18

Mercury Determination

Proposed Utility MACT

Final Utility MACT

Compliance with Utility MACT

Compliance for BART Sources

Compliance for BART sources under the Trading Program

Phase II Acid Rain Compliance

Designate Areas for Fine PM NAAQS

New Fine PM NAAQS Implementation Plans

Latest attainment date for Fine PM NAAQS [3]

Second Regional Haze SIPs due

Interstate Transport Rule to Address SO_2/ NO_x Emissions for Fine PM NAAQS and Regional Haze

Regional Haze SIPs due

Acid Rain, $PM_{2.5}$, Haze, Toxics

Note: Dotted lines indicate a range of possible dates.

[1] Further action on ozone would be considered based on the 2007 assessment.

[2] The SIP-submittal and attainment dates are keyed off the date of designation; for example, if PM or ozone are designated in 2004, the first attainment date is 2009

EPA is required to update the new source performance standards (NSPS) for boilers and turbines every 8 years

In developing the timeline of current CAA requirements, it was necessary for EPA to make assumptions about rulemakings that have not been completed or, in some case, not even started. EPA's rulemakings will be conducted through the usual notice-and-comment process, and the conclusions may vary from these assumptions.

Clear Skies Sets a Firm Timeline for Emission Reductions

The existing Title IV SO_2 cap-and-trade program provides an incentive and a mechanism to begin reductions upon enactment of Clear Skies years before regulatory action under the current Act.

2004: The NOx SIP call (summertime NOx cap in 19 Eastern States + D.C.)

2004

2008: Clear Skies NOx Phase I (2.1 million ton annual cap assigned to two Zones with trading programs)

2008

2010: Clear Skies Hg Phase I (26 ton annual cap with a national trading program)

2010

2010: SO_2 Phase I (4.5 million ton annual cap with a national trading program)

2018: Clear Skies NOx Phase II (1.7 million ton annual cap assigned to two Zones with trading programs)

2018

2018: Clear Skies Hg Phase II (15 ton annual cap with a national trading program)

2018: Clear Skies SO_2 Phase II (3.0 million ton annual cap with a national trading program)

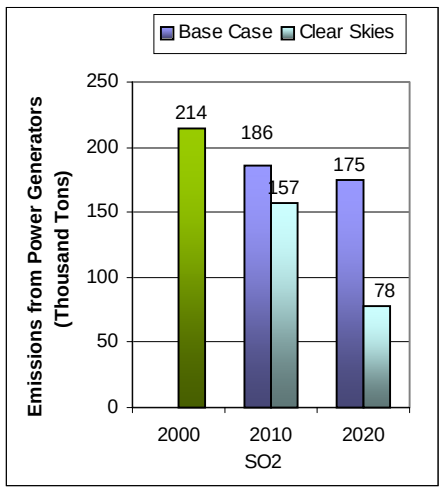
Emissions in Virginia under Clear Skies

Emissions in Virginia (2020) would be significantly reduced from 2000 levels:

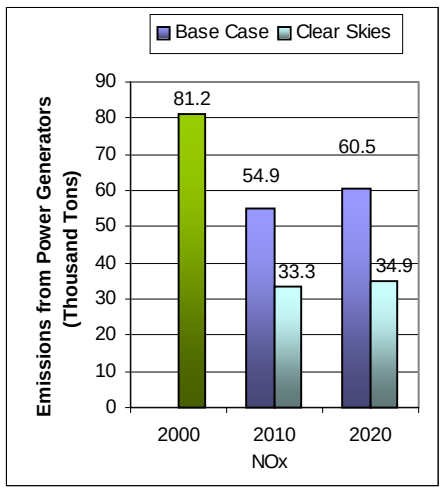
- 63% reduction in SO_2 emissions
- 57% reduction in NO_x emissions
- 44% reduction in mercury emissions

Emissions: Current (2000) and Existing Clean Air Act Regulations (base case*) vs. Clear Skies in Virginia in 2010 and 2020

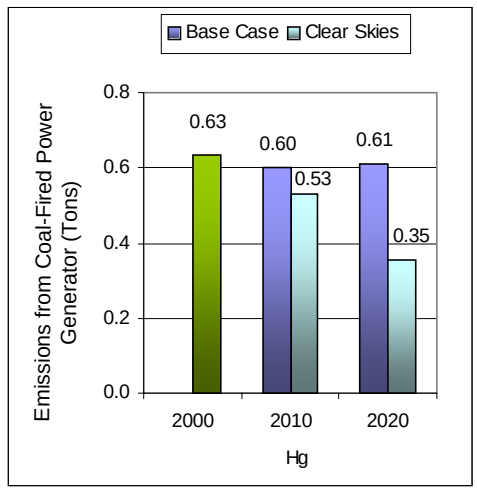
Sulfur dioxide



Nitrogen oxides



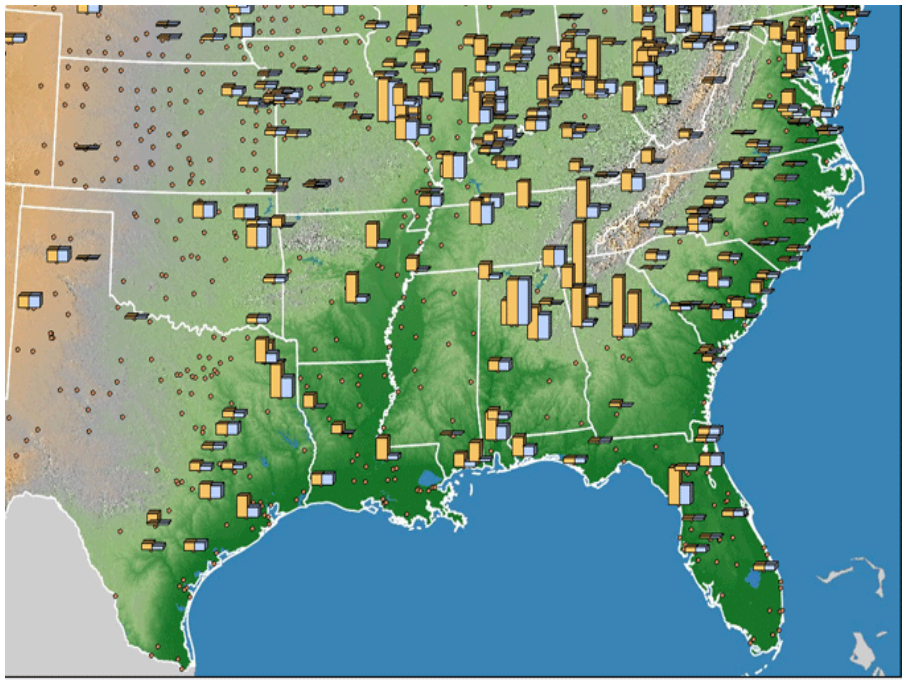
Mercury



Note: The base case using IPM includes Title IV, the NO_x SIP Call, NSR settlements, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT in 2007 or any other potential future regulations to implement the current air quality standards or other parts of the Clean Air Act. Base case emissions in 2020 will likely be lower due to state and federal regulatory actions that have not yet been promulgated.

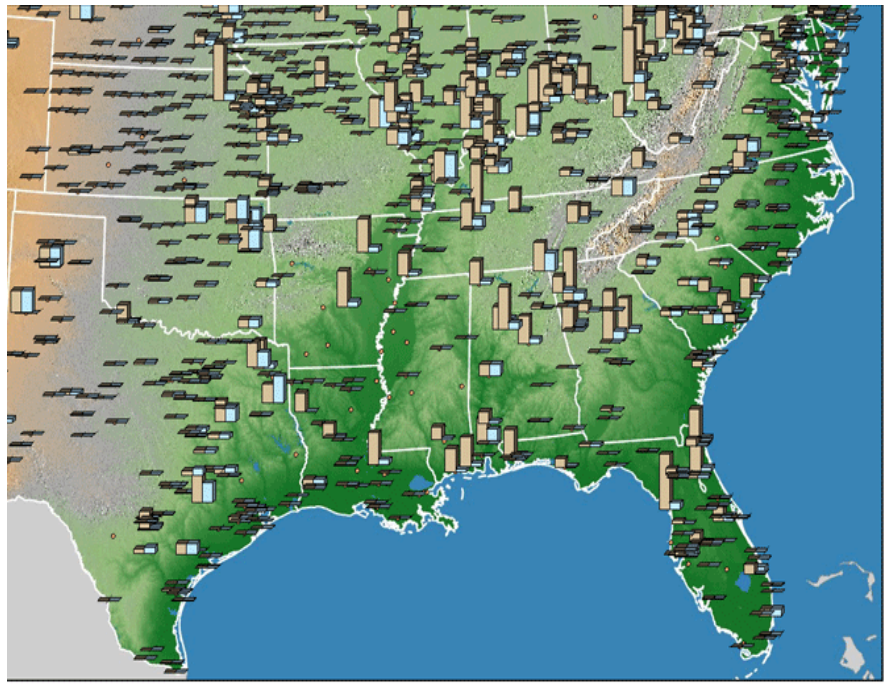
Emission Reductions under Clear Skies

Emissions in Virginia and surrounding states would decrease considerably. These emission reductions would make it much easier for Virginia to maintain compliance with the national air quality standards.



Projected SO_2 Emissions from Power Plants with the Base Case and Clear Skies (2020)
South

- 75,000 tons
- Base Case Power Plant SO_2
- Clear Skies Power Plant SO_2
- Fossil Power Plants with Negligible SO_2 Emissions



Projected NO_x Emissions from Power Plants with the Base Case and Clear Skies (2020)
South

- 22,000 tons
- Base Case Power Plant NO_x
- Clear Skies Power Plant NO_x
- Fossil Power Plants with Negligible NO_x Emissions

Note: The base case in IPM includes Title IV, the NOx SIP Call, NSR settlements, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT in 2007 or any other potential future regulations to implement the current air quality standards or other parts of the Clean Air Act. Base case emissions in 2020 will likely be lower due to state and federal regulatory actions that have not yet been promulgated. Emissions projected for new units in 2020 are not reflected.

Clear Skies Health Benefits in Virginia

Improve Public Health

- **Reduced ozone and fine particle exposure** by 2020 would result in public health benefits of:
  - approximately 700 fewer premature deaths each year[1]
  - approximately 400 fewer cases of chronic bronchitis each year
  - approximately 1,000 fewer non-fatal heart attacks each year
  - approximately 1,300 fewer hospital and emergency room visits each year
  - approximately 78,000 fewer days workers are out sick due to respiratory symptoms each year
  - approximately 4,500 fewer school absences each year

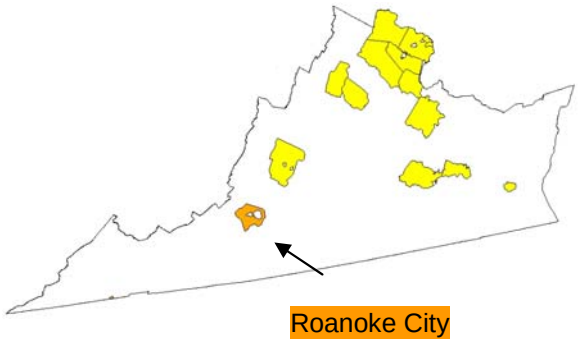
By 2020, Virginia would receive approximately $5.1 billion in annual health benefits from reductions in fine particle and ozone concentrations alone due to Clear Skies.[1]

- **Reduced mercury emissions** would reduce exposure to mercury through consumption of contaminated fish, resulting in additional, unquantified benefits for those who eat fish from Virginia's lakes, streams, and coastal waters.

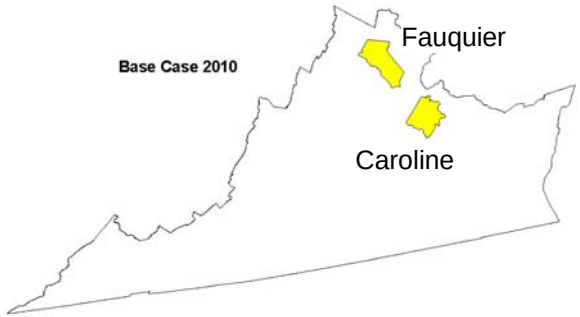
1. An alternative methodology for calculating health-related benefits projects approximately 400 premature deaths prevented and $950 million in health benefits each year in Virginia by 2020.

Counties Projected to Remain Out of Attainment with the $PM_{2.5}$ and Ozone Standards in Virginia

Current Conditions

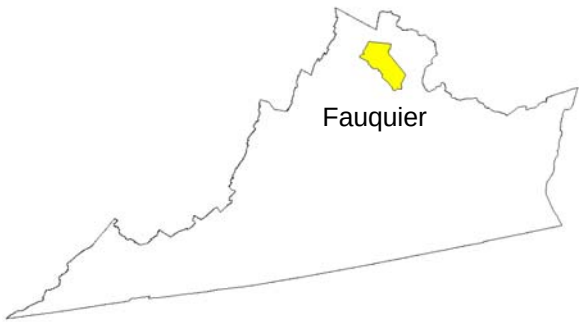


2010 Base Case



2020 Base Case

2010 Clear Skies



2020 Clear Skies

Legend

- out of attainment with the 8-hour ozone standard only
- out of attainment with the annual fine particle standards only
- out of attainment with both standards

Note: Based on 1999-2001 data of counties with monitors that have three years of complete data. The base case includes Title IV, the NOx SIP Call, the Tier II, Heavy-Duty Diesel, and Nonroad Diesel rules, final NSR settlements as of early spring 2003, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT or any other potential future regulations to implement the current air quality standards or other parts of the Clean Air Act.

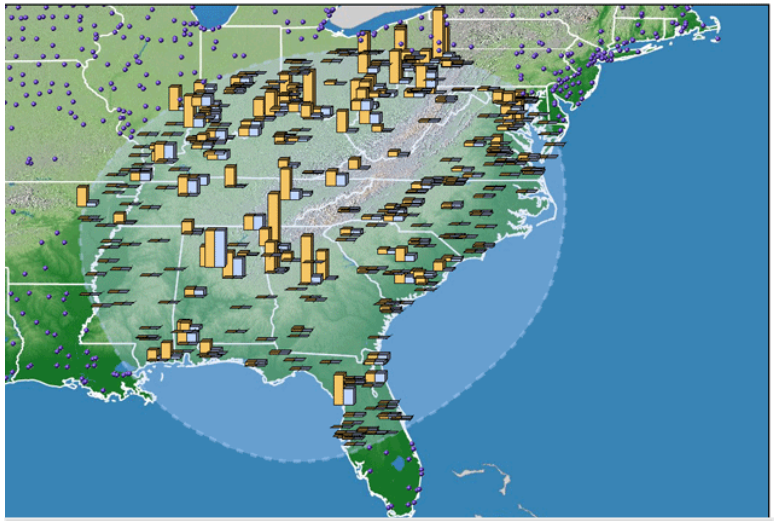
Clear Skies Would Help Virginia Meet Air Quality Standards

- Currently there are 2 counties exceeding the annual fine particle standards and 14 counties exceeding the 8-hour ozone standard.
  - All of these counties are expected to be brought into attainment with the fine particle standards under existing programs by 2010.
  - All of these counties are expected to be brought into attainment with the ozone standard under existing programs by 2020.

- **Clear Skies would significantly improve air quality in Virginia** further and more quickly than what is expected from existing programs.
  - By 2010, Clear Skies would bring Caroline County (population approximately 200,000) into attainment with the 8-hour ozone standard.
  - In addition, Clear Skies would reduce ozone and fine particle concentrations in counties attaining the standards throughout the state.

Note: Based on 1999-2001 data of counties with monitors that have three years of complete data.

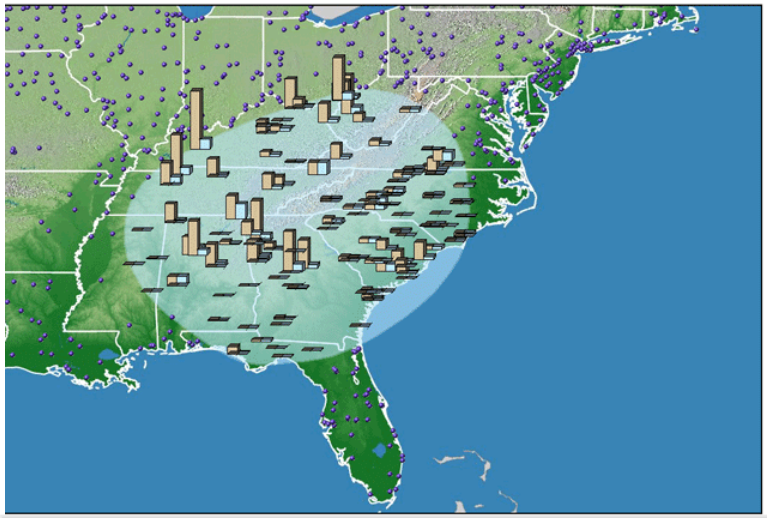
Airsheds for the Southern Blue Ridge Mountains



Projected SO_2 Emissions from Existing Power Generation Sources in the Southern Blue Ridge Airshed in 2020

Base Case | Clear Skies | sulfur airshed

Scale: 75,000 tons | other fossil fuel power plants



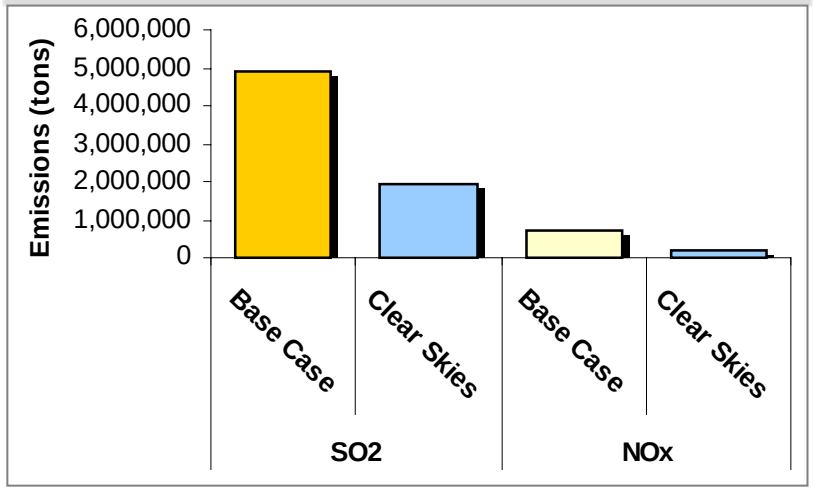
Projected NOx Emissions from Existing Power Generation Sources in the Southern Blue Ridge Airshed in 2020

Base Case | Clear Skies | nitrogen airshed

Scale: 22,000 tons | other fossil fuel power plants

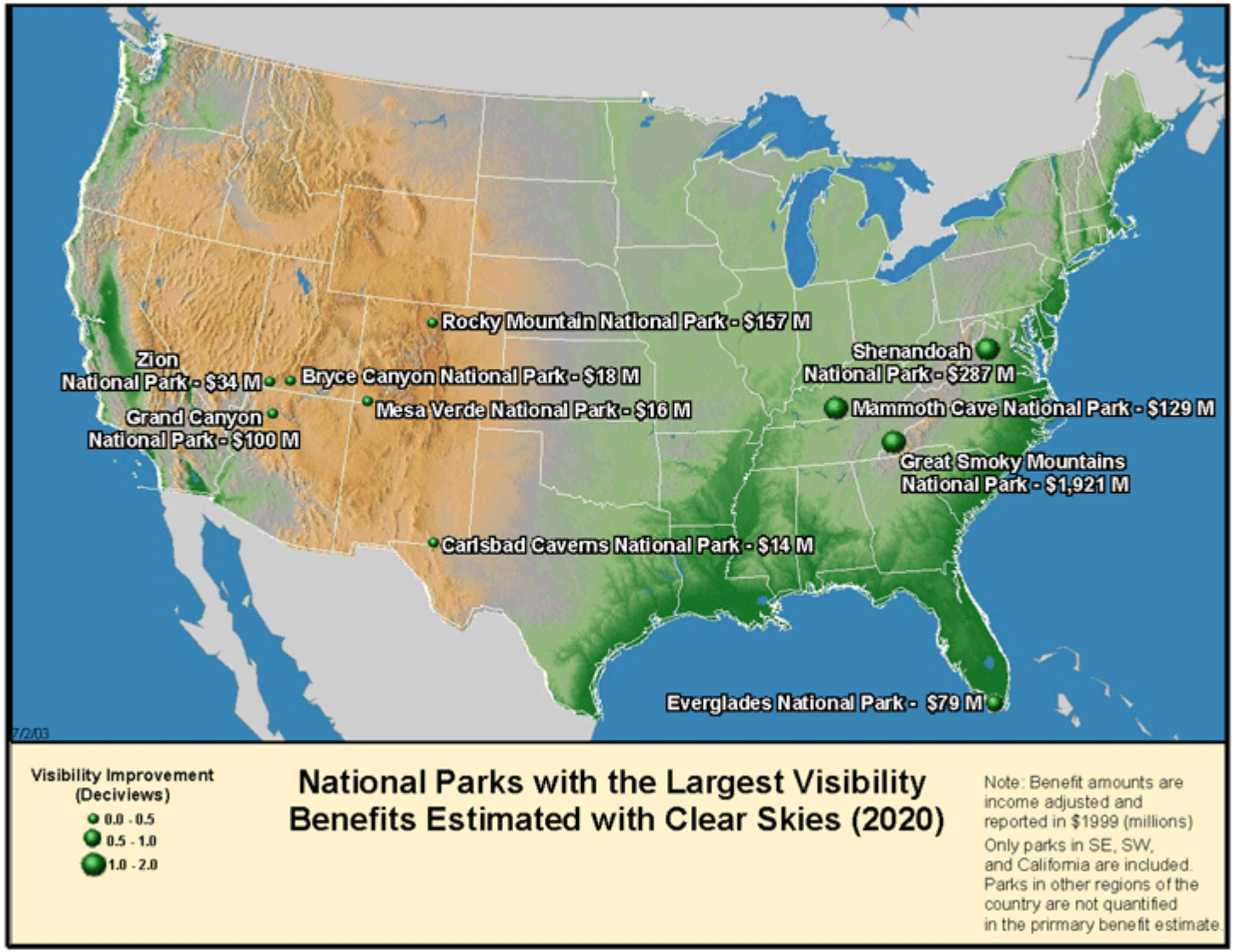
- This page shows regional airshed maps that were developed for the Southern Blue Ridge Mountains (which includes Shenandoah National Park).
- Multiple emission sources in numerous states contribute to air quality degradation and acid deposition in the Southern Blue Ridge region.
- In 2020, emissions from power plants in the Southern Blue Ridge region are projected to be substantially lower with Clear Skies than under the Base Case:
  - SO_2 emissions are projected to decrease 61%;
  - NOx emissions are projected to decrease 68%.

SO_2 and NOx Emissions in the Airsheds (2020)



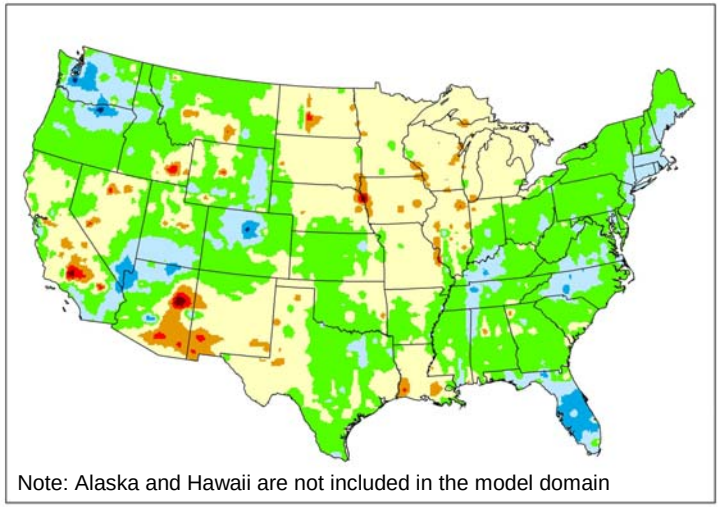
Note: An "airshed" depicts a modeled approximation of a large proportion of sources contributing to air quality in a particular receptor region.

Visibility Benefits in National Parks



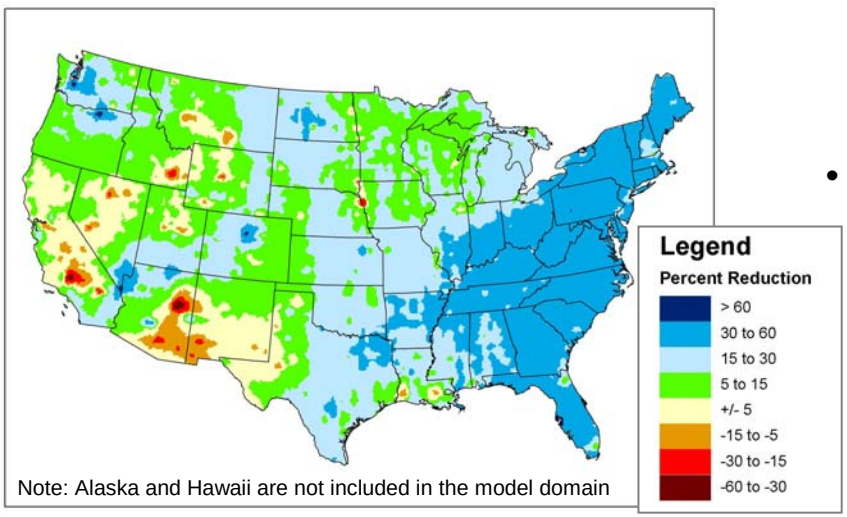
Clear Skies Environmental Benefits in Virginia

Projected Changes in Sulfur Deposition with the Base Case in 2020 Compared to 2001



Note: Alaska and Hawaii are not included in the model domain

Projected Changes in Sulfur Deposition with Clear Skies and the Base Case in 2020 Compared to 2001



Note: Alaska and Hawaii are not included in the model domain

Clear Skies Would Provide Substantial Environmental Benefits in Virginia

In comparison to existing programs,

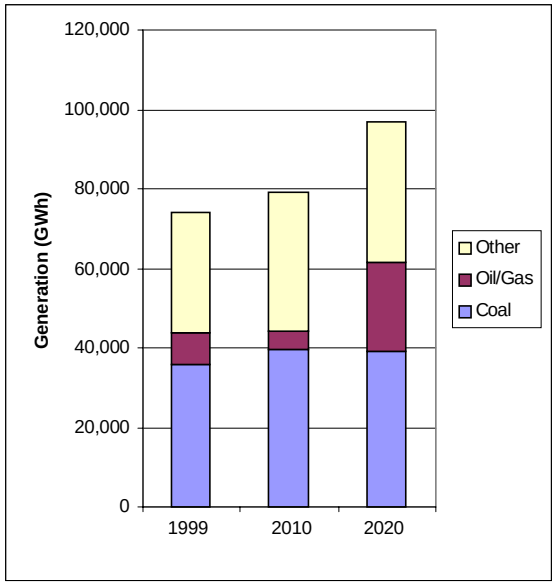
- **Visibility would improve** perceptibly throughout the state. In Shenandoah National Park, the visual range would increase by approximately four miles, resulting in $290 million in benefits under Clear Skies by 2020.
- **Sulfur deposition, a primary cause of acid rain, would decrease** by up to 60% across nearly the entire state, including Shenandoah National Park, providing greater protection for acid-sensitive streams.
- **Nitrogen deposition, another significant contributor to acid rain, as well as a cause of damage in nitrogen-sensitive forests and coastal waters, would decrease** by up to 20%.
- **Mercury deposition would decrease** by 5-15% across much of the state, and by 15-30% in small areas.*

Note: Sulfur deposition in the West is generally low. The large percentage increases correspond to relatively small changes in actual deposition from expected increases in emissions primarily from sources not affected by Clear Skies (e.g., metals processing, petroleum refining, chemical and fertilizer manufacturing). A few power plants are expected to increase emissions slightly under existing programs.

* These results are based on modeling the Clear Skies mercury cap without triggering the safety valve.

Electricity Generation in Virginia under Clear Skies

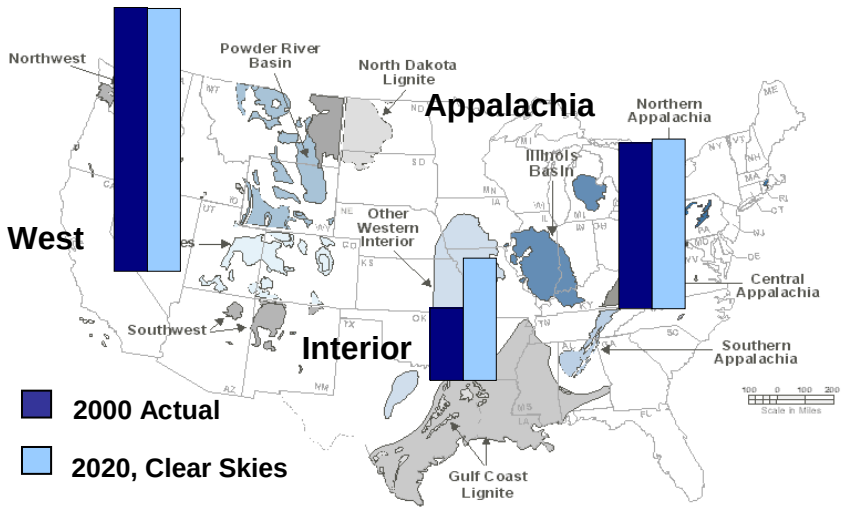
Current and Projected Generation by Fuel Type in Virginia under Clear Skies (GWh)



- **Virginia's sources are projected to reduce their emissions through the installation of emission controls, rather than through a switch from coal to natural gas.**
  - In 2010, 85% of Virginia's coal-fired generation is projected to come from units with advanced SO_2 and/or NO_x control equipment that also substantially reduce mercury emissions; in 2020, the percentage is projected to increase to 88%.

- **Virginia's electricity growth is projected to be met by increases in gas-fired and coal-fired generation. Clear Skies does not significantly alter this projection.**
  - Electricity from coal-fired generation will increase by 10% from 1999 to 2020.

Current and Projected Coal Production for Electricity Generation



Scale: Appalachia 2000 = 299 million tons

Emission Controls in Virginia under Clear Skies

- **Under Clear Skies by 2020...**
  - 37% would install scrubbers

- **The major generation companies in Virginia include:**
  - Dominion Virginia Power
  - Virginia Electric & Power Company
  - Appalachian Power Company
  - Mirant
- **Total coal-fired capacity in Virginia is projected to be 5,382 MW in 2010.**

Units in Virginia Projected to Be Retrofitted Due to Clear Skies by 2020

Plant Name	Unit ID	Technology
CHESTERFIELD	4	Scrubber*
CHESTERFIELD	5	Scrubber*
CHESTERFIELD	6	Scrubber*
CLINCH RIVER	1	Scrubber
CLINCH RIVER	2	Scrubber
CLINCH RIVER	3	Scrubber
GLEN LYN	6	Scrubber

* Retrofit was installed under Clear Skies by 2010

Notes:

[1] Retrofits and total coal-fired capacity apply to coal units greater than 25 MW.

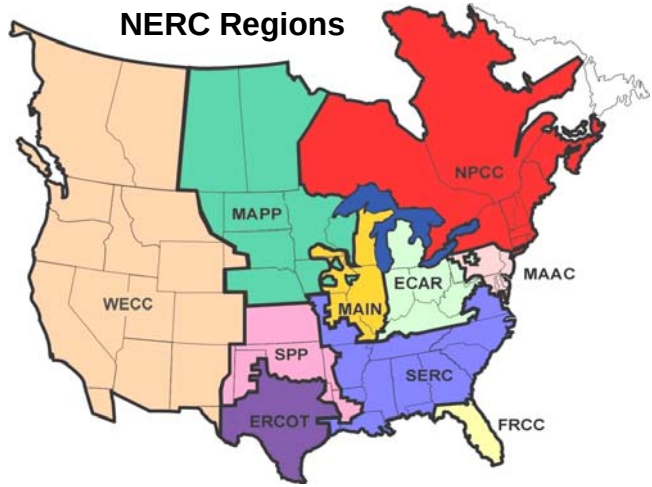
[2] Potomac River units 1 & 2 are projected to be removed from operation by 2005 with Clear Skies due to excess gas-fired capacity in the marketplace, unless otherwise needed for voltage purposes. The recent overbuild of gas-fired generation reduces the need for less efficient units operating at lower capacity factors. These units are inefficient compared to other coal-fired plants and newer gas-fired generation. Less conservative assumptions regarding natural gas prices or electricity demand would create a greater incentive to keep these units operational.

Electricity Prices in Virginia under Clear Skies

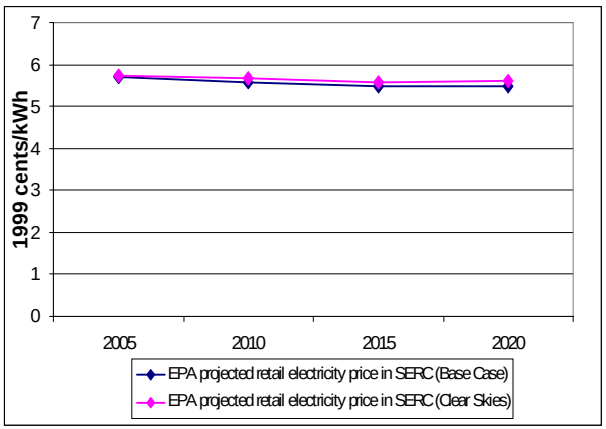
- **With or without Clear Skies, retail prices in the North American Electric Reliability Council (NERC) SERC region (the electricity supply region that contains Virginia) are projected to decrease between 2005 and 2020.**

- **With Clear Skies, retail prices are projected to be approximately 0.7 – 2.8% higher between 2005 and 2020 than in the absence of the legislation.**

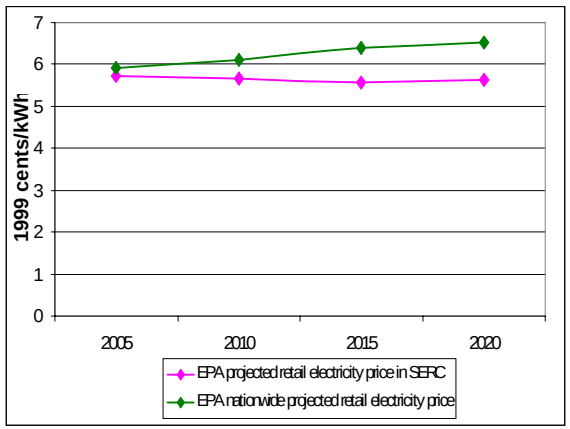
NERC Regions



Projected Retail Electricity Prices in Virginia under the Base Case and Clear Skies (2005-2020)



Projected National Retail Electricity Prices and Prices in Virginia under Clear Skies (2005-2020)



In 2000, the average retail electricity price in Virginia was approximately 6.0 cents/kWh, which was below the average *national* retail price of approximately 6.7 cents/kWh.

Note: The base case using IPM includes Title IV, the NO_x SIP Call, NSR settlements, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT in 2007 or any other potential future regulations to implement the current air quality standards or other parts of the Clean Air Act. Base case emissions in 2020 will likely be lower due to state and federal regulatory actions that have not yet been promulgated.

Costs and Benefits in Virginia under Clear Skies

Benefits Outweigh the Costs

- **In Virginia, Clear Skies is projected to cost approximately $100 million annually by 2020 while providing health benefits totaling approximately $5.1 billion annually**.
- **The increases in production costs under Clear Skies represent only a small percentage of total retail electricity sales revenue in Virginia.**
  - Retail electricity sales revenue in Virginia was almost $5.7 billion in 2000.
  - Adjusting these sales revenues by the same growth rate used for the modeling of costs would result in revenues of almost $8.8 billion annually in 2020.
- **Nationwide, the projected annual costs of Clear Skies (in $1999) are $4.3 billion in 2010 and $6.3 billion in 2020; the nationwide benefits of Clear Skies are expected to be over $113 billion annually by 2020.**
  - An alternate estimate projects annual health benefits totaling $23 billion.

Clear Skies….

- **Guarantees significant emissions reductions – beginning years before full implementation**
- **Uses a proven and flexible market-based approach with incentives for innovation**
- **Increases certainty across the board for industry, regulators, and consumers**

Note: Costs include capital costs, fuel, and other operation and maintenance costs (both fixed and variable) associated with the achievement of the emissions caps in the legislation (for example, the installation and operation of pollution controls). These state-level production costs are estimates; they do not account for the costs associated with the transfer of electricity across regions, nor the costs or savings that could be associated with allowance movement between sources.

Notes on EPA's Analysis

- The information presented in this analysis reflects EPA's modeling of the Clear Skies Act of 2003.
  - EPA has updated this information to reflect modifications:
    - Changes included in the Clear Skies Act of 2003.
    - Revisions to the Base Case to reflect newly promulgated rules at the state and federal level since the initial analysis was undertaken.
  - The Clear Skies modeling results presented include the safety valve feature
- This analysis compares new programs to a Base Case (Existing Control Programs), which is typical when calculating costs and benefits of Agency rulemakings.
  - The Base Case reflects implementation of current control programs only:
    - Does not include yet-to-be developed regulations such as those to implement the National Ambient Air Quality Standards.
  - The EPA Base Case for power sector modeling includes:
    - Title IV, the NO_x SIP Call, NSR settlements, and state-specific caps in Connecticut, Massachusetts, Missouri, New Hampshire, North Carolina, Texas, and Wisconsin finalized before March 2003.
  - For air quality modeling, the Base Case also includes federal and state control programs, as well as the Tier II, Heavy Duty Diesel, and Non-Road Diesel rules.

- **For more information regarding the Clear Skies Act, please visit the EPA website:**

(http://www.epa.gov/clearskies)

CLEAR SKIES
Better Health, Brighter Future