

US EPA ARCHIVE DOCUMENT



The Clear Skies Act of 2003

South Carolina and Clear Skies

Highlights of Clear Skies in South Carolina

- **South Carolina sources would reduce emissions of SO₂ by 49%, NO_x by 52%, and mercury by 45% by 2020 due to Clear Skies.**
- **The health benefits in South Carolina would total \$3.1 billion annually (\$550 million under the alternative estimate) and include approximately 400 fewer premature deaths (200 under the alternative estimate) and 700 fewer hospitalizations/emergency room visits each year.**
- **In addition, South Carolina would receive environmental benefits, including full attainment of the clean air standards by 2020, improved visibility, and reduced nitrogen loading to sensitive estuaries.**
- **Clear Skies does not significantly impact electricity prices. With or without Clear Skies, electricity prices in the electric supply region that includes South Carolina are expected to remain near 2000 prices.**

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

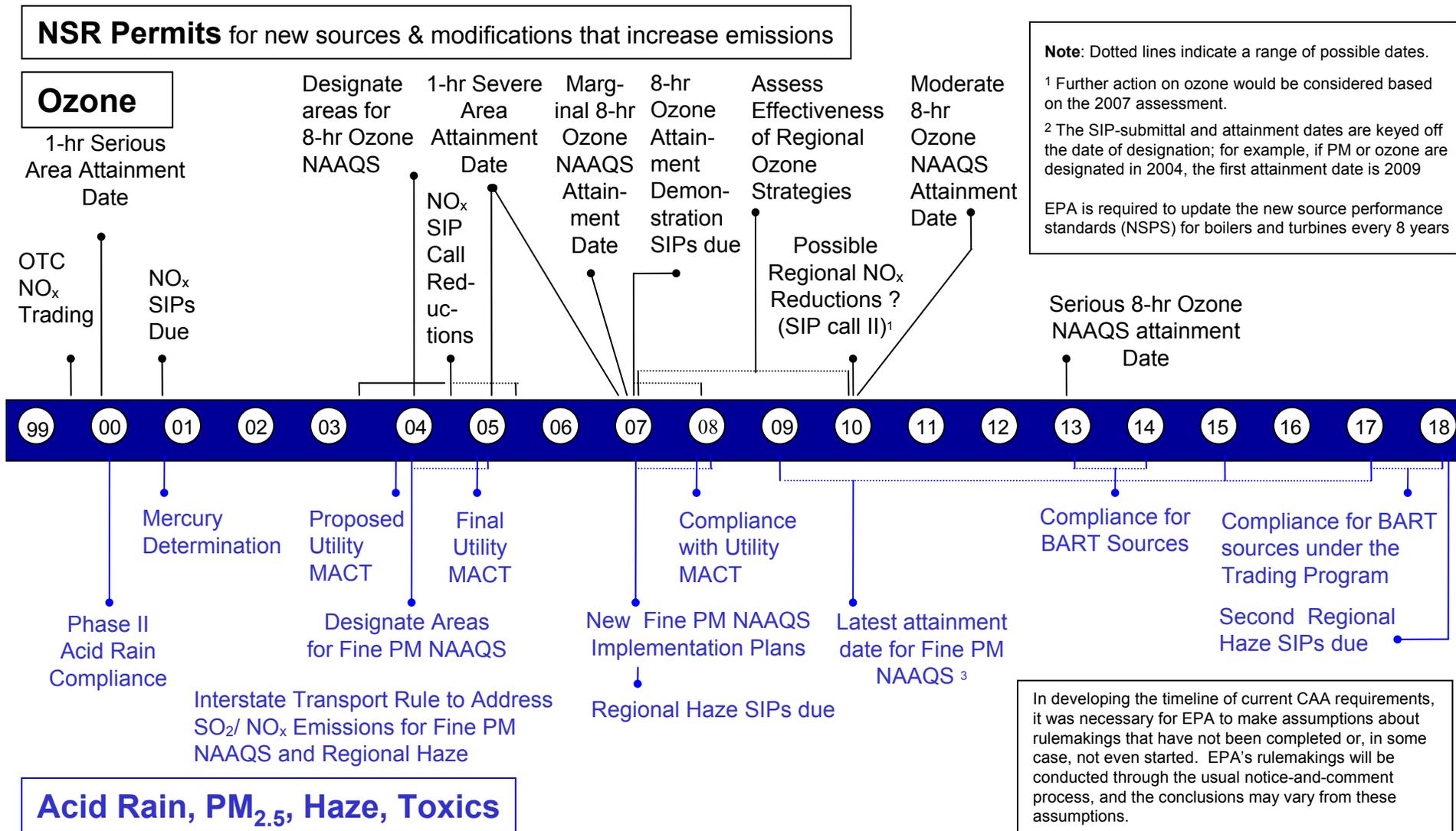
Why Clear Skies?

- **Air quality has improved, but serious concerns persist**
 - South Carolina 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**
 - South Carolina sources would substantially reduce emissions of SO₂, 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



Clear Skies Sets a Firm Timeline for Emission Reductions

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

2004

The existing Title IV SO₂ 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.

2008: Clear Skies NO_x 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: SO₂ Phase I (4.5 million ton annual cap with a national trading program)

2018: Clear Skies NO_x 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)

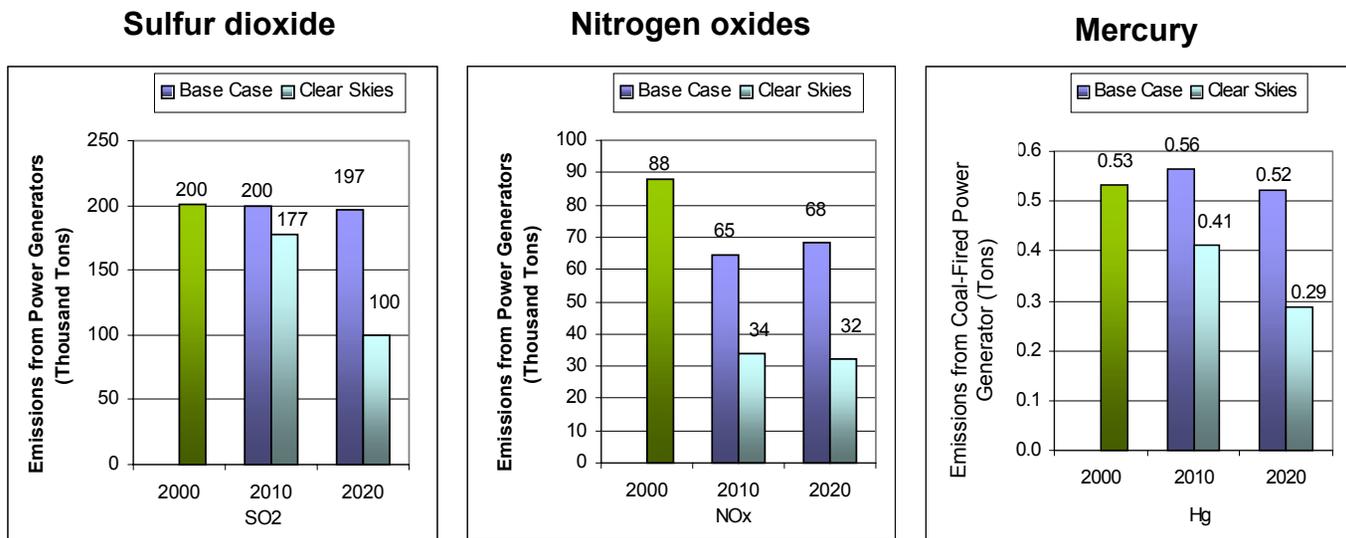
2018: Clear Skies SO₂ Phase II (3.0 million ton annual cap with a national trading program)

Emissions in South Carolina under Clear Skies

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

- 50% reduction in SO₂ emissions
- 63% reduction in NO_x emissions
- 46% reduction in mercury emissions

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



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 ambient 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.

Clear Skies Health Benefits in South Carolina

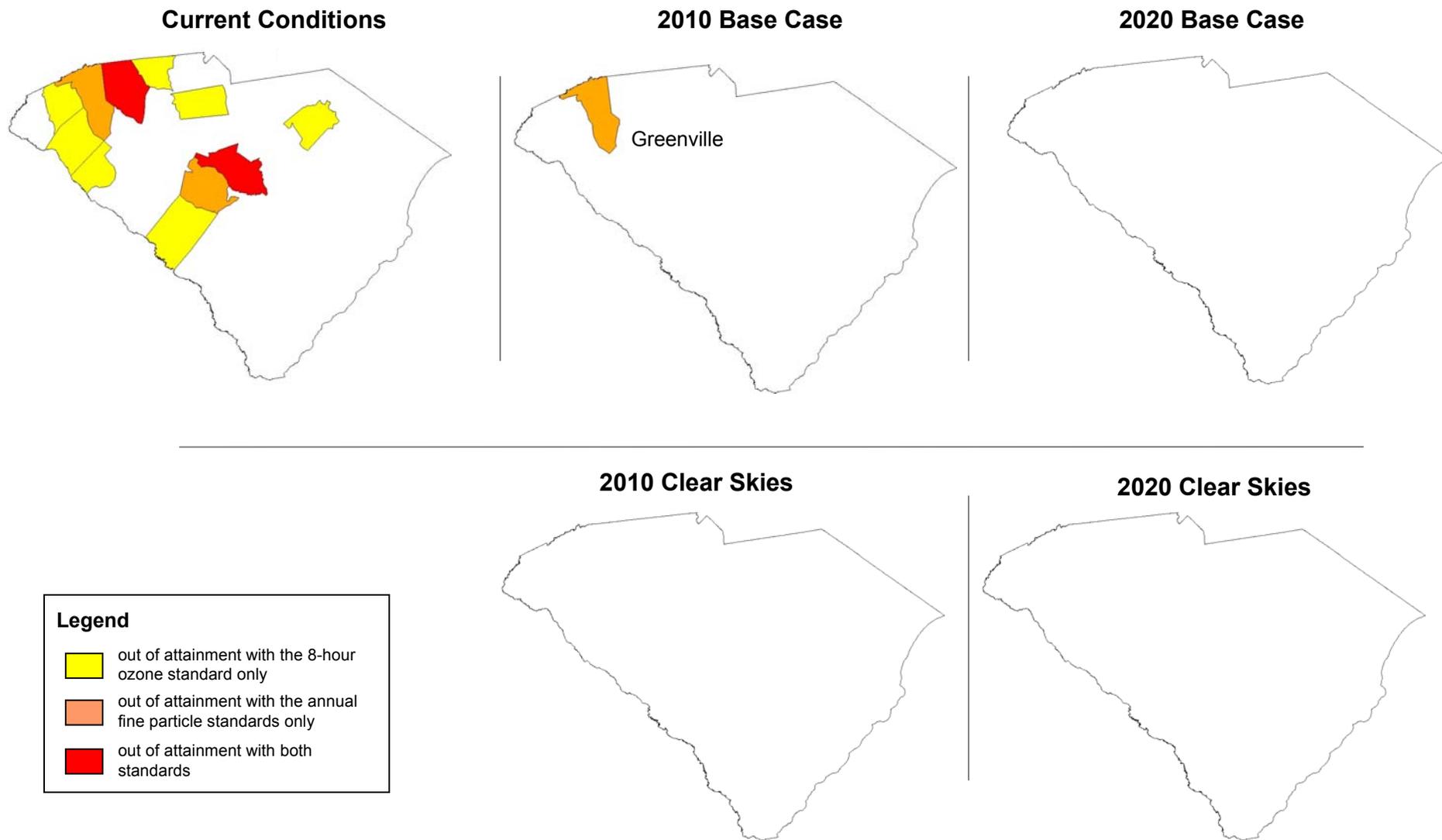
Improve Public Health

- **Reduced ozone and fine particle exposure** by 2020 would result in public health benefits of:
 - approximately 400 fewer premature deaths each year¹
 - approximately 200 fewer cases of chronic bronchitis each year
 - approximately 500 fewer non-fatal heart attacks each year
 - approximately 700 fewer hospital and emergency room visits each year
 - approximately 40,000 fewer days workers are out sick due to respiratory symptoms each year
 - approximately 3,300 fewer school absences each year
- **Reduced mercury emissions** would reduce exposure to mercury through consumption of contaminated fish, resulting in additional, unquantified benefits for those who eat fish from South Carolina's lakes, streams, and coastal waters.

By 2020, South Carolina would receive approximately \$3.1 billion in annual health benefits from reductions in fine particle and ozone concentrations alone due to Clear Skies.¹

1. An alternative methodology for calculating health-related benefits projects approximately 200 premature deaths prevented and \$550 million in health benefits each year in South Carolina by 2020.

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



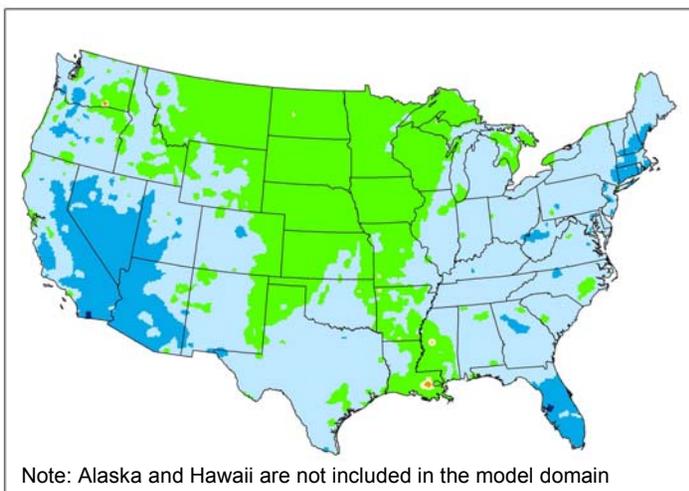
Note: Based on 1999-2001 modeling of counties with monitors that have three years of complete data. The base case includes Title IV, the NO_x SIP Call, the Tier II, Heavy-Duty Diesel, and Nonroad Diesel rules, final NSR settlements as of early spring 2003, and state-specific caps in CT, MA, MO, NC, NH,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

Clear Skies Would Help South Carolina Meet Air Quality Standards

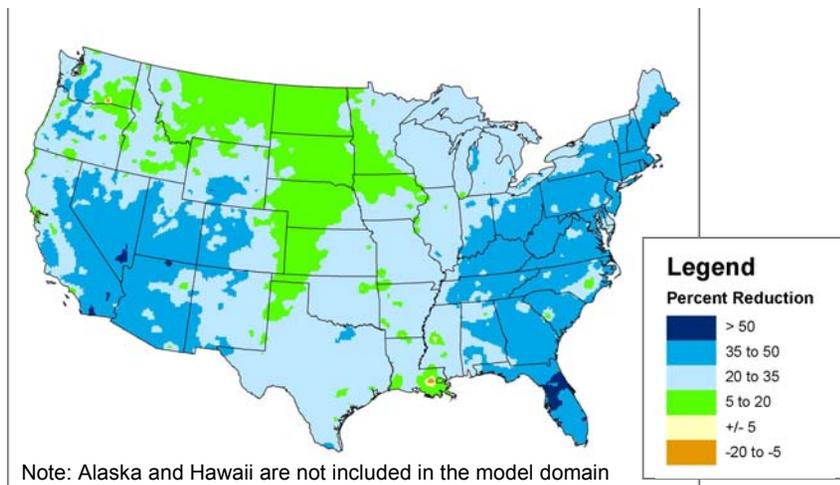
- Currently there are 4 counties exceeding the annual fine particle standards and 9 counties exceeding the 8-hour ozone standard.
 - Almost all of these counties are expected to be brought into attainment with the fine particle standards under existing programs by 2010.
 - By 2010, all 9 counties exceeding the ozone standard would be brought into attainment under existing programs.
 - By 2020, all of these counties are expected to be brought into attainment with the fine particle and ozone standards under existing programs.
- **Clear Skies would significantly improve air quality in South Carolina** further and more quickly than what is expected from existing programs.
 - By 2010, Clear Skies would bring the sole remaining non-attainment county (Greenville County--population approximately 400,000) into attainment with the annual fine particle standards.
 - In addition, Clear Skies would reduce ozone and fine particle concentrations in counties attaining the standards throughout the state.

Clear Skies Environmental Benefits in South Carolina

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



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



Clear Skies Would Provide Substantial Environmental Benefits in South Carolina

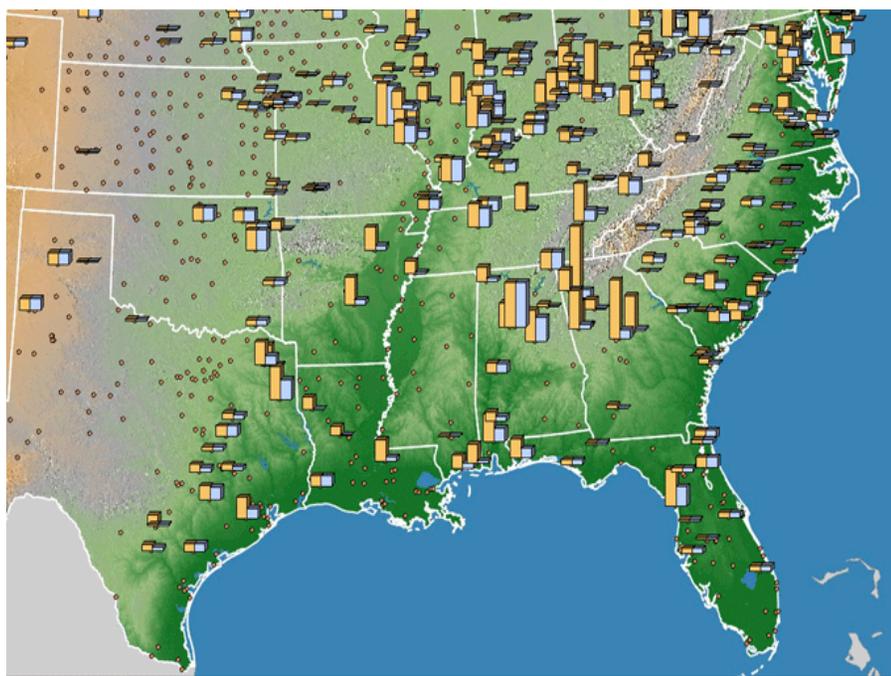
In comparison to existing programs,

- **Visibility would improve perceptibly** in South Carolina.
 - The value of improved visibility for South Carolina residents who visit National Parks and Wilderness areas throughout the country would be \$49 million each year by 2020.
- **Sulfur deposition, a primary cause of acid rain, would decrease by 30-60%** across most of the state.
- **Nitrogen deposition, another significant contributor to acid rain as well as a cause of damage in nitrogen-sensitive forests and coastal waters, would be reduced by 5-20%** across much of the state and by up to 35% to some nitrogen-sensitive estuaries.
- **Mercury deposition would decrease by 5-15%** across the state.*

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

Emission Reductions under Clear Skies

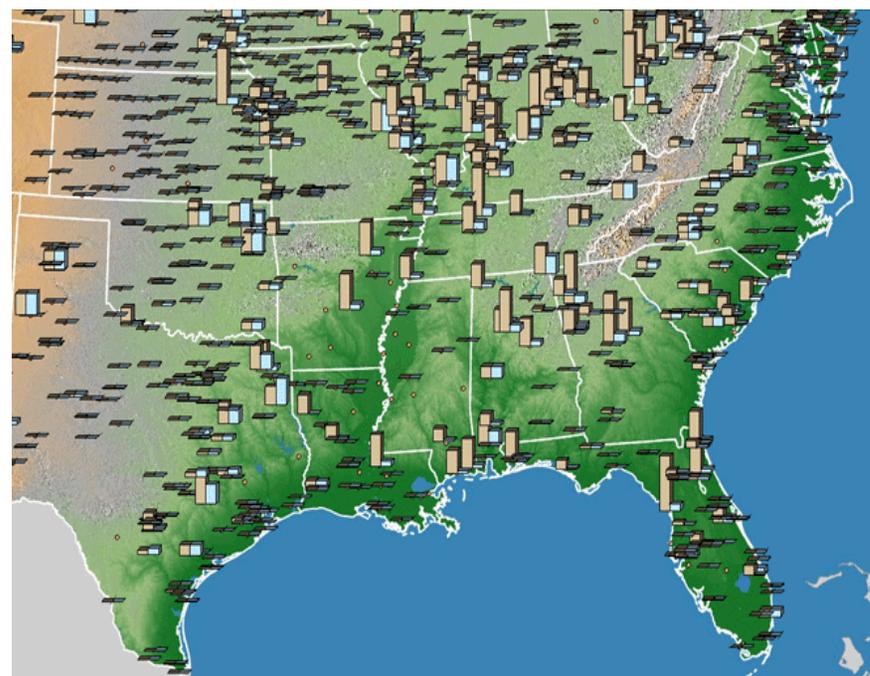
Emissions in South Carolina and surrounding states would decrease considerably. These emission reductions would make it much easier for South Carolina to maintain compliance with the national air quality standards.



Projected SO₂ Emissions from Power Plants with the Base Case and Clear Skies (2020)

South

-  75,000 tons
-  Base Case Power Plant SO₂
-  Clear Skies Power Plant SO₂
-  Fossil Power Plants with Negligible SO₂ Emissions

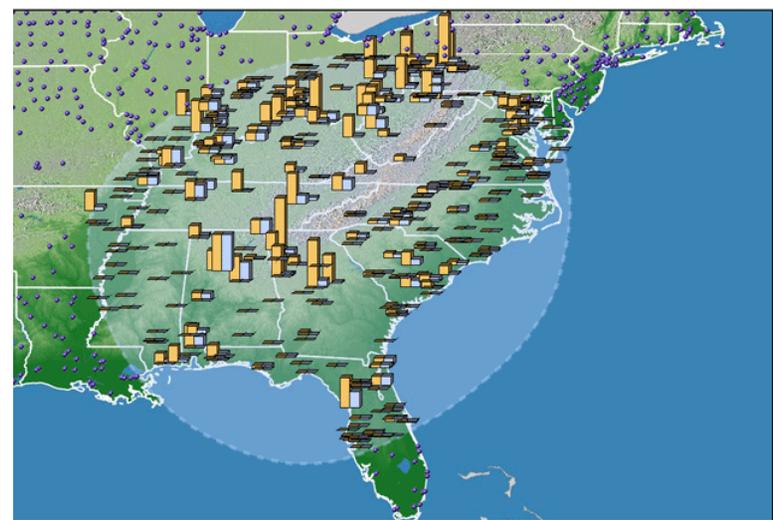


Projected NO_x Emissions from Power Plants with the Base Case and Clear Skies (2020)

South

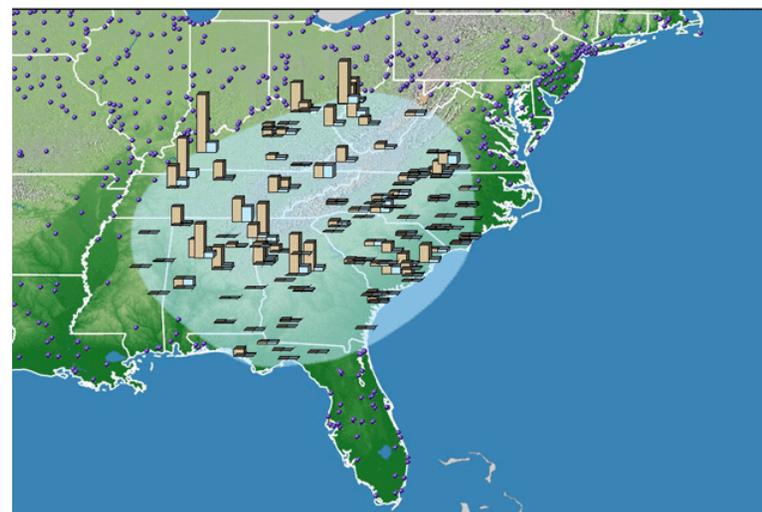
-  22,000 tons
-  Base Case Power Plant NO_x
-  Clear Skies Power Plant NO_x
-  Fossil Power Plants with Negligible NO_x Emissions

Note: The base case in IPM includes Title IV, the 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 ambient 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.



Projected SO₂ 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



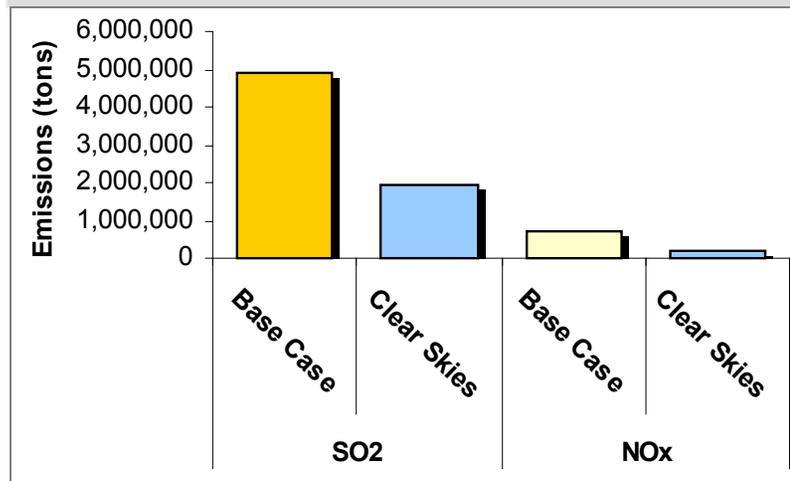
Projected NO_x Emissions from Existing Power Generation Sources in the Southern Blue Ridge Airshed in 2020

■ Base Case ■ Clear Skies - - nitrogen airshed
 Scale: 22,000 tons | ● other fossil fuel power plants

Airsheds for the Southern Blue Ridge Mountains

- This page shows regional airshed maps that were developed for the Southern Blue Ridge Mountains (which includes Great Smoky Mountain 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:
 - SO₂ emissions are projected to decrease 61%;
 - NO_x emissions are projected to decrease 68%.

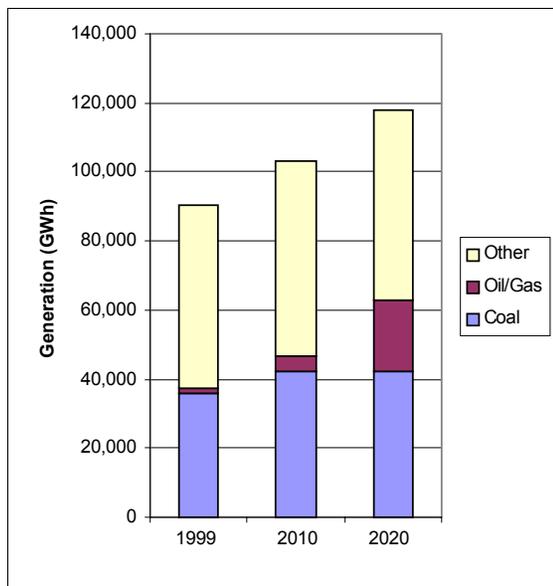
SO₂ and NO_x Emissions in the Airsheds (2020)



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

Electricity Generation in South Carolina under Clear Skies

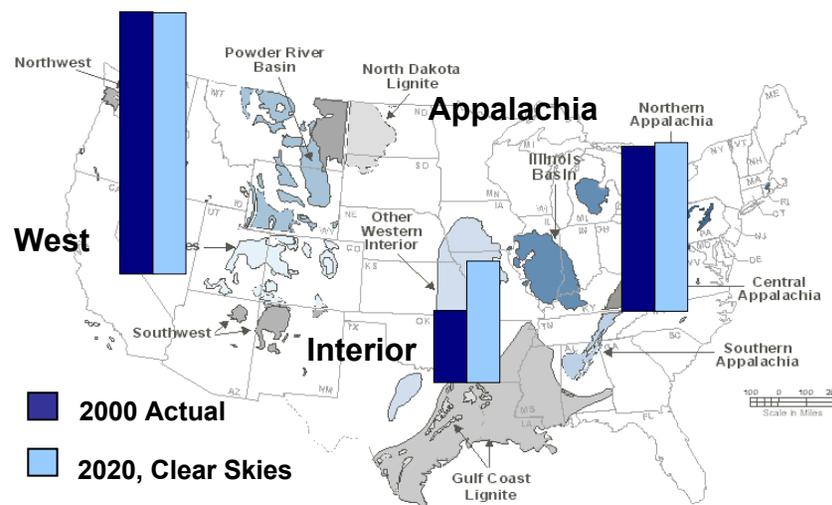
Current and Projected Generation by Fuel Type in South Carolina under Clear Skies (GWh)



- **South Carolina'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, 70% of South Carolina's coal-fired generation is projected to come from units with advanced SO₂ and/or NO_x control equipment that also substantially reduce mercury emissions; in 2020, the percentage is projected to increase to 74%.
 - No coal-fired units in South Carolina are projected to be removed from operation as a result of Clear Skies.

- **South Carolina'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 18% from 1999 to 2020.

Current and Projected Coal Production for Electricity Generation



Scale: Appalachia 2000 = 299 million tons

Emission Controls in South Carolina under Clear Skies

- **Under Clear Skies by 2020...**

- 5% of coal-fired capacity would install SCR
- 20% would install scrubbers

- **The major generation companies in South Carolina include:**

- South Carolina Electric & Gas Company
- Santee Cooper
- Duke Energy Corporation
- Progress Energy Carolinas, Inc.

- **Total coal-fired capacity in South Carolina is projected to be 5,867 MW in 2010.**

Units in South Carolina Projected to Be Retrofitted Due to Clear Skies by 2020

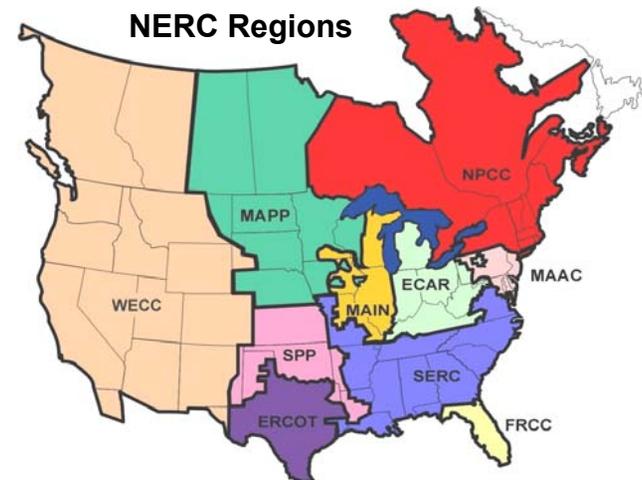
Plant Name	Unit ID	Technology
WATEREE	WAT2	Scrubber
WILLIAMS	WIL1	Scrubber
WINYAH	1	Scrubber
JEFFERIES	3	SCR
JEFFERIES	4	SCR

* Retrofit was installed under Clear Skies by 2010

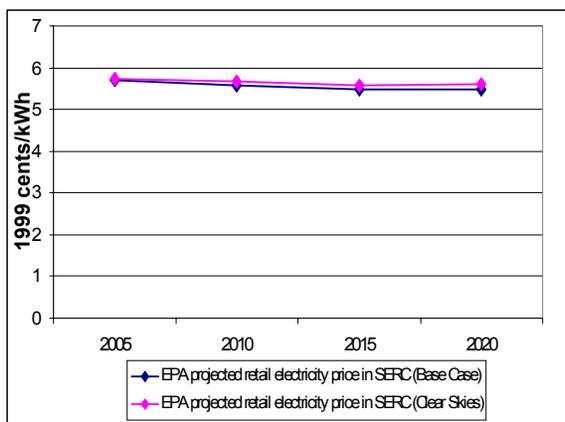
Note: Retrofits and total coal-fired capacity apply to coal units greater than 25 MW.

Electricity Prices in South Carolina under Clear Skies

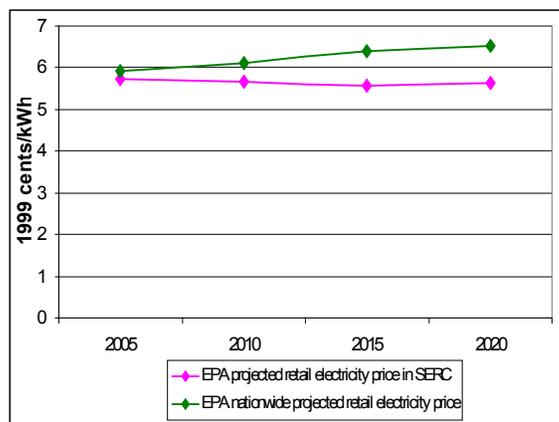
- With or without Clear Skies, retail prices in the North American Electric Reliability Council (NERC) SERC region (the electricity supply region that contains South Carolina) are projected to decrease between 2005 and 2020.
- With Clear Skies, retail prices are projected to be approximately 0.7 – 2.8% higher between 2005 and 2020 than in the absence of the legislation.



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



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



In 2000, the average retail electricity price in South Carolina was approximately 5.5 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 ambient 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 South Carolina under Clear Skies

Benefits Outweigh the Costs

- In South Carolina, Clear Skies is projected to cost approximately \$128 million annually by 2020 while providing health benefits totaling approximately \$3.1 billion annually.
- The increases in production costs under Clear Skies represent only a small percentage of total retail electricity sales revenue in South Carolina.
 - Retail electricity sales revenue in South Carolina was almost \$4.2 billion in 2000.
 - Adjusting these sales revenues by the same growth rate used for the modeling of costs would result in revenues of over \$6.5 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, South 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>)

