

US EPA ARCHIVE DOCUMENT



The Clear Skies Act of 2003

Missouri and Clear Skies



Highlights of Clear Skies in Missouri

- Missouri sources would reduce emissions of SO₂ by 28%, NO_x by 61%, and mercury by 41% by 2020 due to Clear Skies.
- The health benefits in Missouri would total \$3.1 billion annually (\$560 million under an alternative estimate) and include 400 fewer premature deaths (200 under an alternative estimate) and 1,000 fewer hospitalizations/emergency room visits each year. These substantial benefits would occur largely due to significant emissions reductions in states upwind of Missouri.
- In addition, Missouri would receive environmental benefits, including improved visibility and reductions in sulfur, nitrogen, and mercury deposition.
- Clear Skies does not significantly impact electricity prices. With or without Clear Skies, electricity prices in the electricity supply region that includes Missouri 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**
 - Missouri'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**
 - Missouri 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

NSR Permits for new sources & modifications that increase emissions

Ozone

1-hr Serious Area Attainment Date

Designate areas for 8-hr Ozone NAAQS

1-hr Severe Area Attainment Date

Marginal 8-hr Ozone NAAQS Attainment Date

8-hr Ozone Attainment Demonstration SIPs due

Assess Effectiveness of Regional Ozone Strategies

Moderate 8-hr Ozone NAAQS Attainment Date

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

Serious 8-hr Ozone NAAQS attainment Date

Possible Regional NO_x Reductions ? (SIP call II)¹

NO_x SIP Call Reductions

NO_x SIPs Due

OTC NO_x Trading

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

Interstate Transport Rule to Address SO₂/ NO_x Emissions for Fine PM NAAQS and Regional Haze

Designate Areas for Fine PM NAAQS

New Fine PM NAAQS Implementation Plans

Latest attainment date for Fine PM NAAQS³

Regional Haze SIPs due

Second Regional Haze SIPs due

Acid Rain, PM_{2.5}, Haze, Toxics

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

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)

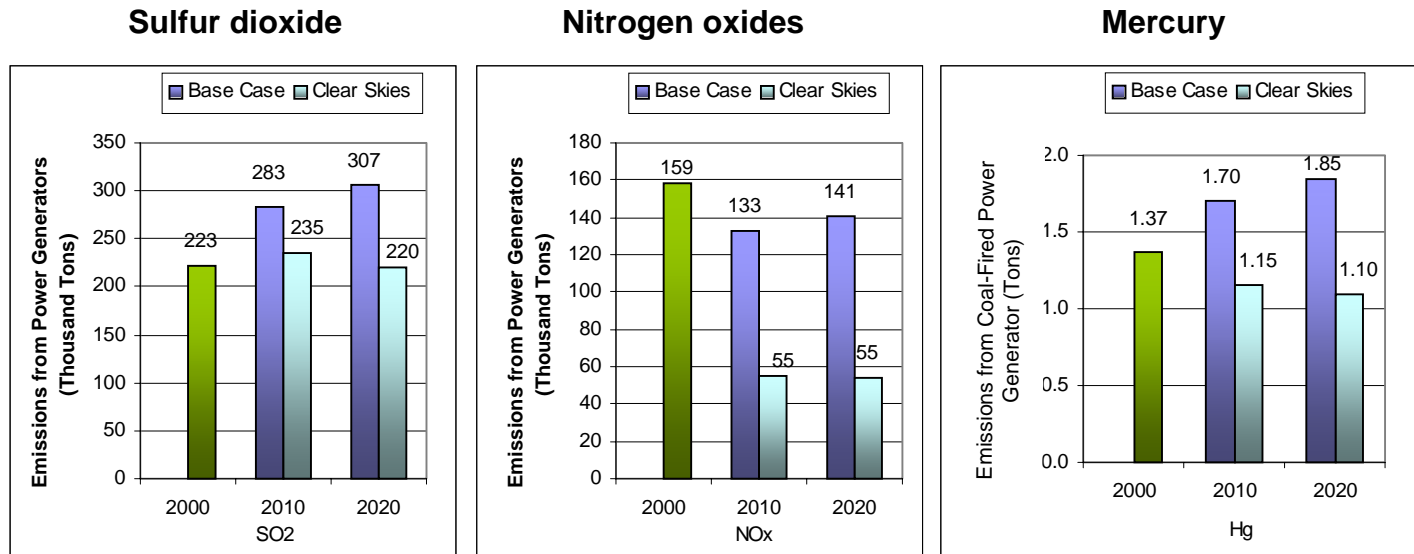
Emissions in Missouri under Clear Skies

Emissions in Missouri (2020) would be significantly reduced

- 28% reduction in SO₂ emissions from the base case
- 66% reduction in NO_x emissions from 2000 levels
- 41% reduction in mercury emissions from the base case

Missouri has a summertime state requirement for NO_x reductions.

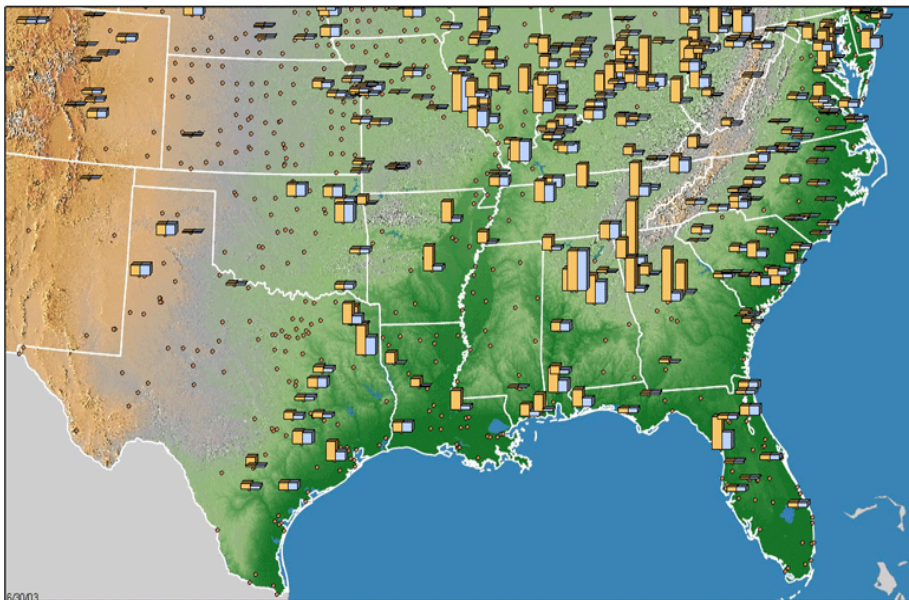
**Emissions: Current (2000) and Existing Clean Air Act Regulations (base case*)
vs. Clear Skies in Missouri in 2010 and 2020**



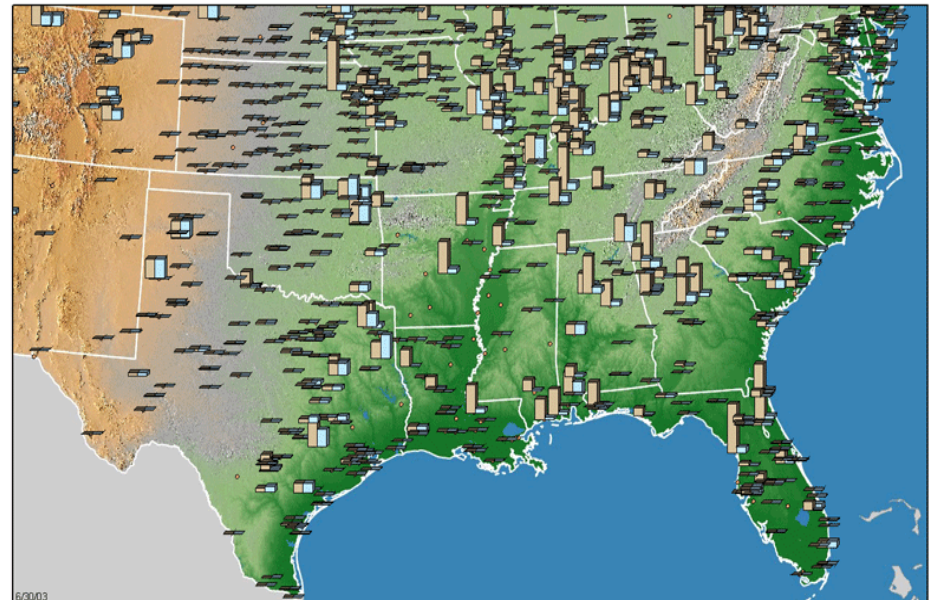
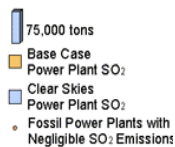
Note: The base case using IPM includes Title IV, the NO_x SIP Call, NSR settlements, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT in 2007 or any other potential future regulations to implement the current ambient air quality standards or other parts of the 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.

SO₂ and NO_x Emissions Reductions under Clear Skies

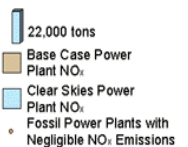
Emissions in Missouri and surrounding states would decrease. These emission reductions would make it easier for Missouri to comply with the national air quality standards.



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



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



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.

Clear Skies Health and Air Quality Benefits in Missouri

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 700 fewer non-fatal heart attacks each year
 - approximately 1,000 fewer hospital and emergency room visits each year
 - approximately 43,000 fewer days workers are out sick due to respiratory symptoms each year
 - approximately 9,900 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 Missouri's lakes and streams.

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

1. An alternative methodology for calculating health-related benefits projects approximately 200 premature deaths prevented and \$560 million in health benefits each year in Missouri by 2020.

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

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

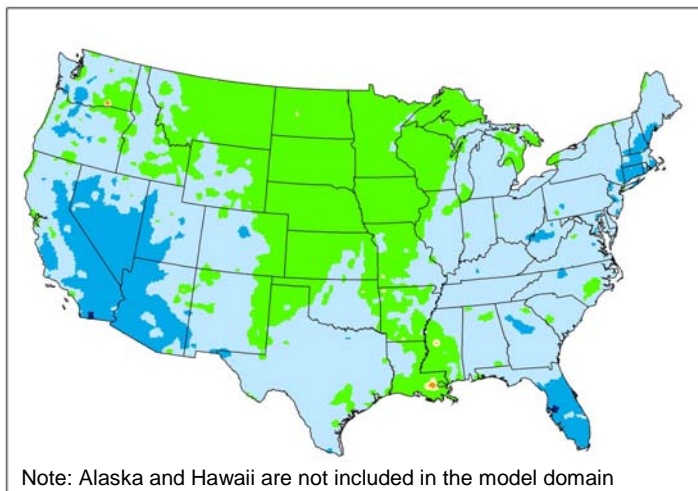
Note: Based on 1999-2001 data of counties with monitors that have three years of complete data. The base case includes Title IV, the NO_x SIP Call, the Tier II, Heavy-Duty Diesel, and Nonroad Diesel rules, final NSR settlements as of early spring 2003, and state-specific caps in CT, MA, MO, NC, NH, TX, 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 Missouri Meet Air Quality Standards

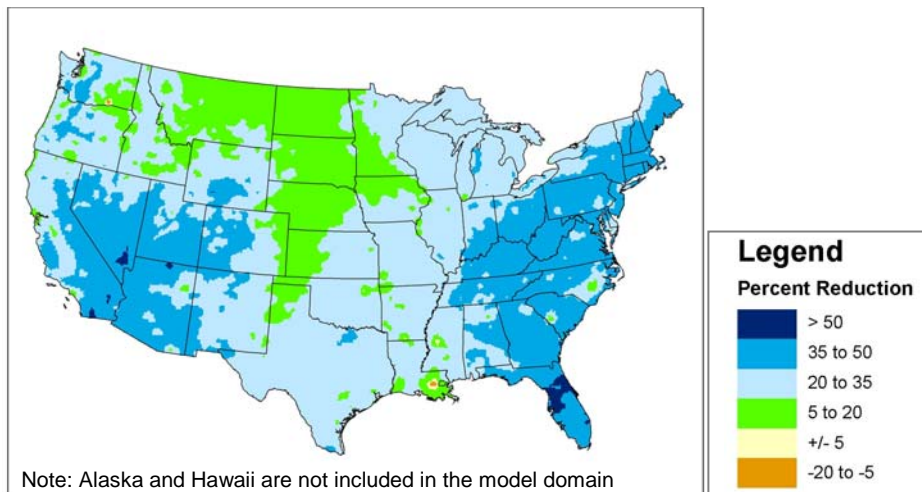
- Currently, only St. Louis city exceeds the annual fine particle standard and St. Louis, Ste. Genevieve, Jefferson, and St. Charles Counties exceed the 8-hour ozone standard.
 - Under existing programs, all counties exceeding the ozone standard are expected to be brought into attainment with the ozone standard by 2010 and St. Louis city would be brought into attainment with the fine particle standard by 2020.
- **Clear Skies would significantly improve air quality in Missouri** further and more quickly what is expected from existing programs.
 - By 2010, Clear Skies would bring St. Louis city, the sole remaining non-attainment area (population approximately 350,000) into attainment with the annual fine particle standard, earlier than under existing programs.
 - In addition, Clear Skies would reduce ozone and fine particle concentrations in counties attaining the standards throughout the state.

Clear Skies Environmental Benefits in Missouri

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 Environmental Benefits in Missouri

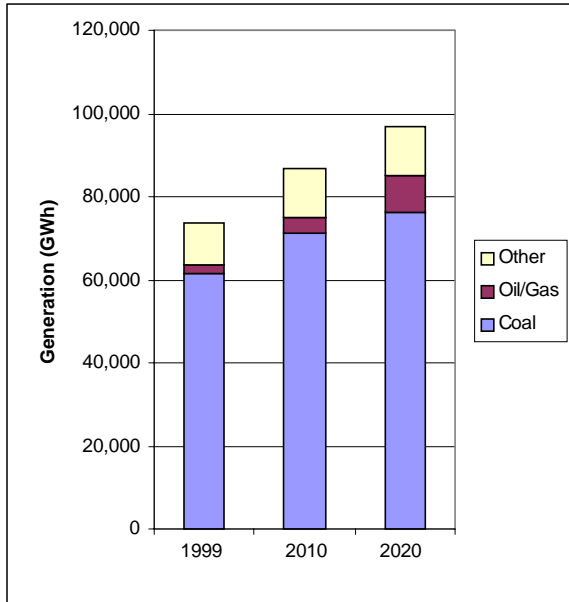
In comparison to existing programs,

- **Visibility would improve** perceptibly.
 - The value of this benefit for Missouri residents who visit America's National Parks and Wilderness Areas is \$44 million.
- **Sulfur deposition would decrease 15-30%** across the state.
- **Nitrogen deposition, a cause of damage to nitrogen-sensitive coastal waters, including the Gulf of Mexico hypoxia zone, would decrease 5-20%** in Missouri.
- **Mercury deposition would decrease up to 15%*** throughout most of the state.

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

Electricity Generation in Missouri under Clear Skies

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

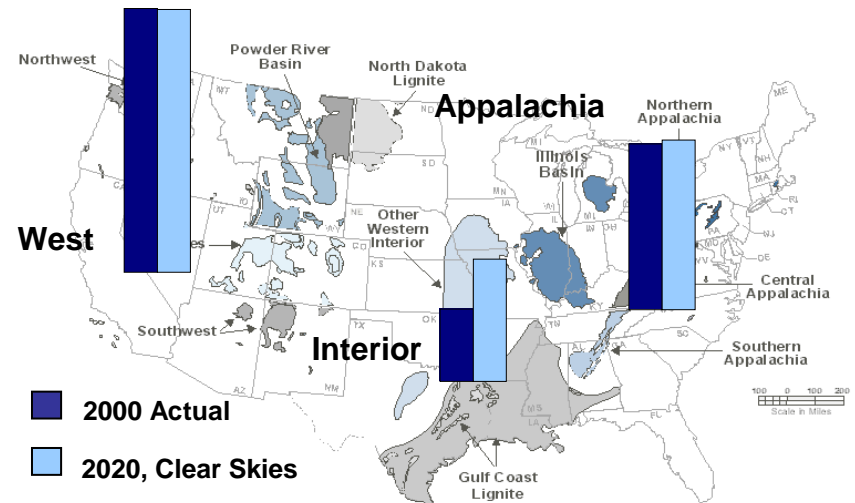


- **Missouri's electricity growth is projected to be met by increases in gas-fired and coal-fired generation. Clear Skies does not significantly alter this projection.**

- Electricity from coal-fired generation will increase by 24% from 1999 to 2020.

- **Missouri'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, 46% of Missouri's coal-fired generation is projected to come from units with advanced SO₂ and/or NO_x control equipment that also substantially reduces mercury emissions; in 2020, the percentage is projected to increase to 49%.

Current and Projected Coal Production for Electricity Generation



Scale: Appalachia 2000 = 299 million tons

Emission Controls in Missouri under Clear Skies

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

- 21% of coal-fired capacity would install SCR or SNCR
- 10% would install scrubbers

- **The major generation companies in Missouri include:**

- Union Electric Company
- NRG Energy
- Kansas City Power & Light Co.
- Associated Electric Cooperative

- **Total coal-fired capacity in Missouri is projected to be 10,473 MW in 2010.**

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

Plant Name	Unit ID	Technology
ASBURY	1	Scrubber/ SCR
SIOUX	1	Scrubber
SIOUX	2	Scrubber
IATAN	1	SCR*
MONTROSE	1	SCR
MONTROSE	2	SCR
THOMAS HILL	MB1	SCR*
THOMAS HILL	MB2	SCR*
THOMAS HILL	MB3	SCR*
JAMES RIVER	5	SNCR

* Retrofit was installed under Clear Skies by 2010

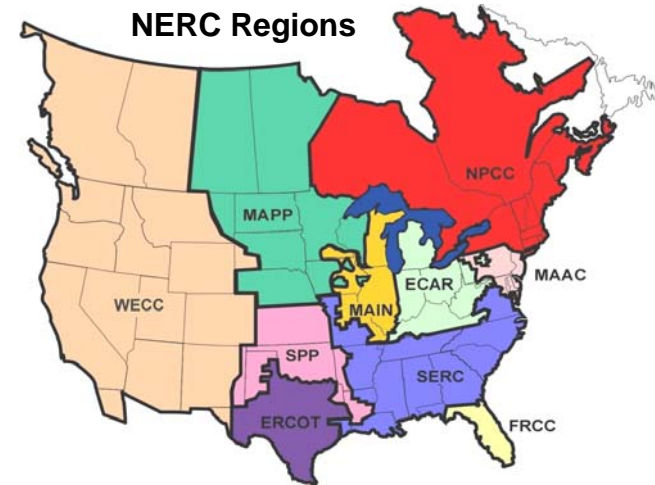
Notes:

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

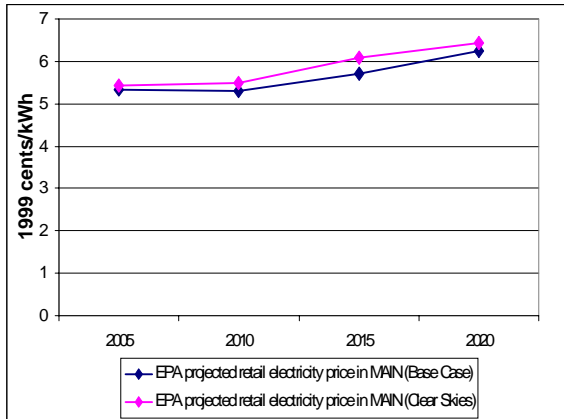
[2] The Meramec units are projected to be removed from operation by 2005 with Clear Skies due to excess gas-fired capacity in the marketplace, unless otherwise needed for voltage purposes. The recent overbuild of gas-fired generation reduces the need for less efficient units operating at lower capacity factors, such as the Meramec units. The Meramec units have been in operation for 50 years and 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. Recent upgrades at Meramec, which EPA modeling may not be capturing, may also impact whether the units are removed from operation or not.

Electricity Prices in Missouri under Clear Skies

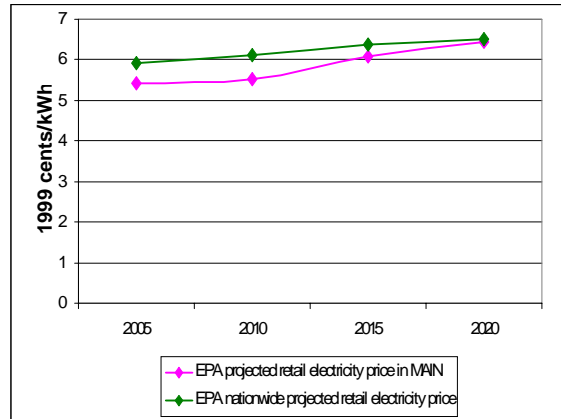
- With or without Clear Skies, retail prices in the North American Electric Reliability Council (NERC) MAIN region (the electricity supply region that contains Missouri) are projected to increase between 2005 and 2020.
- With Clear Skies, retail prices are projected to be approximately 1.9 – 6.5% higher between 2005 and 2020 than in the absence of the legislation.



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



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



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

Costs and Benefits in Missouri under Clear Skies

Benefits Outweigh the Costs

- **In Missouri, Clear Skies is projected to cost approximately \$32 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 Missouri.**
 - Retail electricity sales revenue in Missouri was almost \$4.4 billion in 2000.
 - Adjusting these sales revenues by the same growth rate used for the modeling of costs would result in revenues of almost \$6.8 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 proven, market-based flexible 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>)

