# The Clear Skies Act of 2003

## Ohio and Clear Skies

# Highlights of Clear Skies in Ohio

- **Ohio sources would reduce emissions of $SO_2$ by 77%, $NO_x$ by 67%, and mercury by 66% by 2020 due to Clear Skies.**

- **The health benefits in Ohio would total $7.9 billion ($1.5 billion under the alternative estimate) and include approximately 1,000 fewer premature deaths (600 under the alternative estimate) and 2,300 fewer hospitalizations/emergency room visits each year.**

- **In addition, Ohio would receive environmental benefits, including reduced acid 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 Ohio 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**
  - Ohio'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**
  - Ohio 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

Regional Haze SIPs due

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

**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 $NO_x$ SIP call (summertime $NO_x$ cap in 19 Eastern States + D.C.)** → **2004**

**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: $SO_2$ 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** ←

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

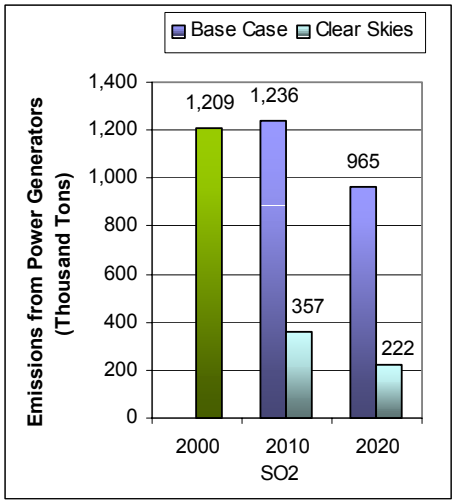
# Emissions in Ohio under Clear Skies

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

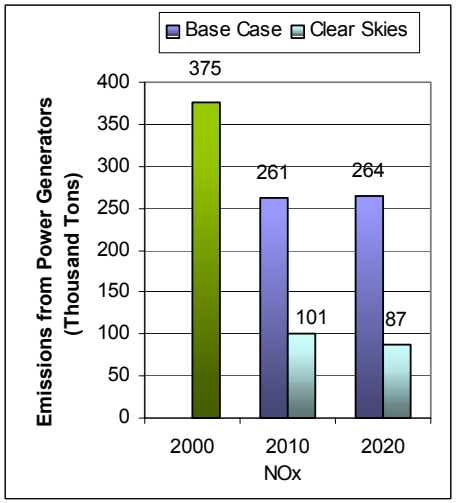
- 82% reduction in $SO_2$ emissions
- 77% reduction in $NO_x$ emissions
- 69% reduction in mercury emissions

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

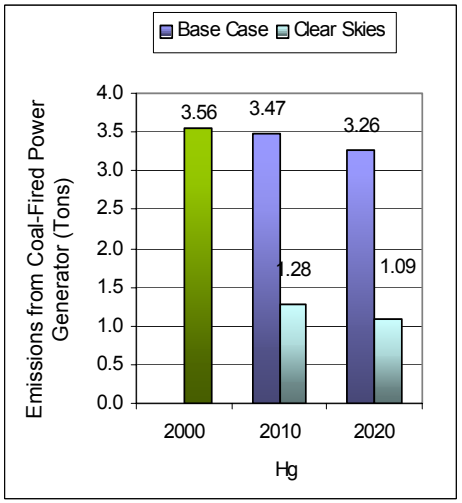
**Sulfur dioxide**




**Nitrogen oxides**



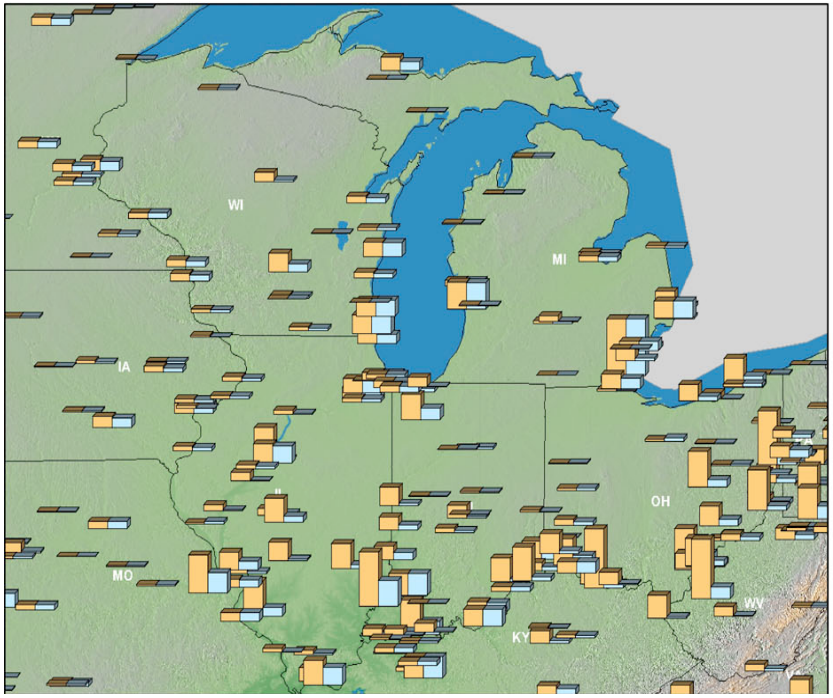

**Mercury**




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 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.

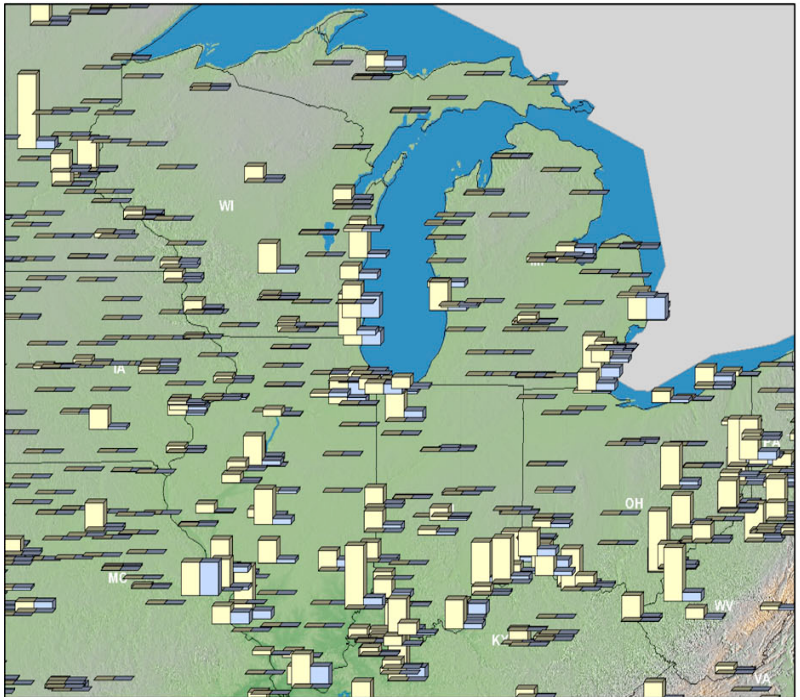
# $SO_2$ and $NO_x$ Emissions Reductions under Clear Skies

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




without Clear Skies
with Clear Skies

Scale:
85,000 tons




without Clear Skies
with Clear Skies

Scale:
26,000 tons

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 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 Benefits in Ohio

## Improve Public Health

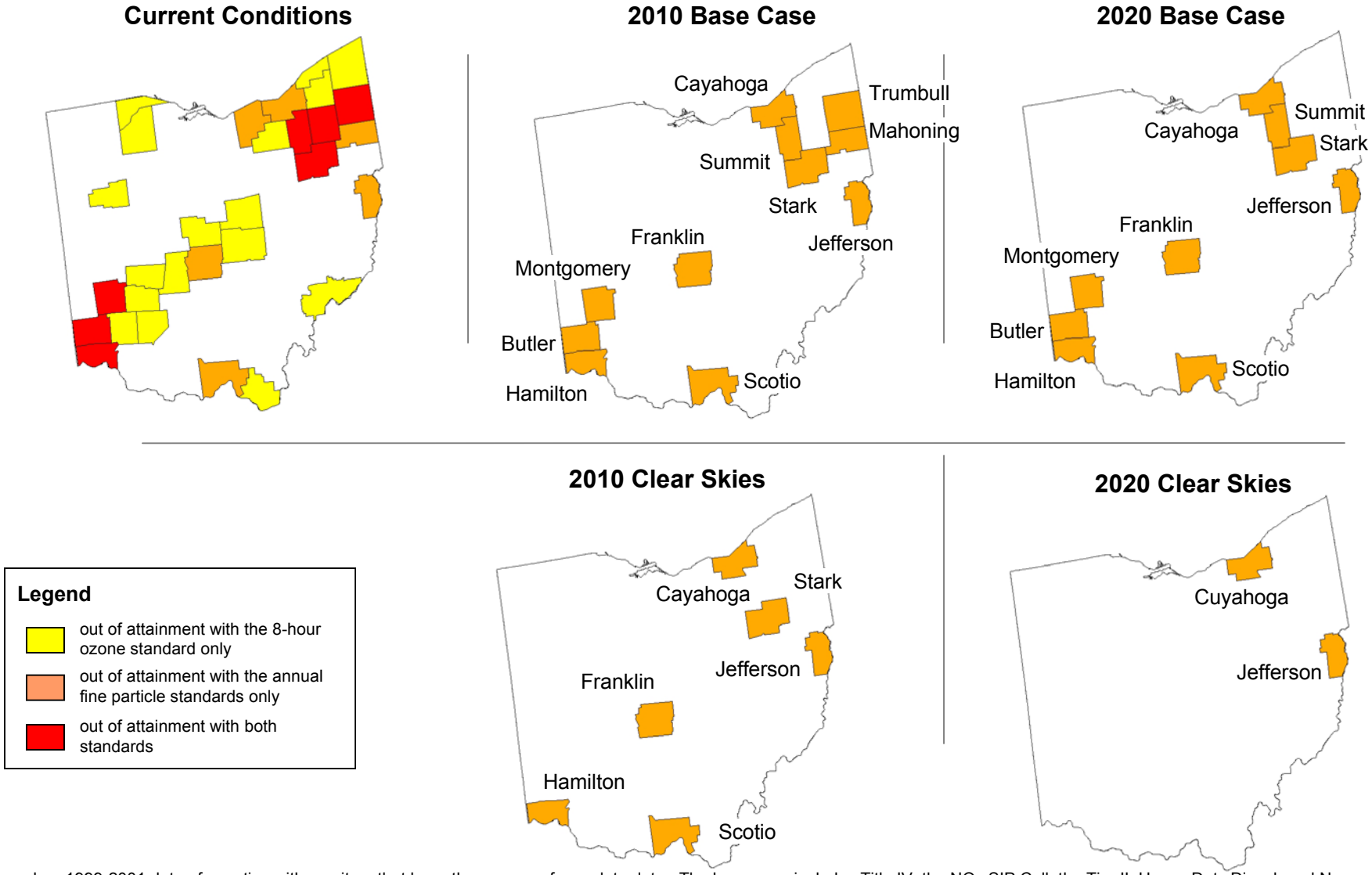
- **Reduced ozone and fine particle exposure** by 2020 would result in public health benefits of:
  - approximately 1,000 fewer premature deaths each year[1]
  - approximately 600 fewer cases of chronic bronchitis each year
  - approximately 1,700 fewer non-fatal heart attacks each year
  - approximately 2,300 fewer hospital and emergency room visits each year
  - approximately 110,000 fewer days workers are out sick due to respiratory symptoms each year
  - approximately 10,000 fewer school absences each year

**By 2020, Ohio would receive approximately $7.9 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 Ohio's lakes and streams.

1. An alternative methodology for calculating health-related benefits projects approximately 600 premature deaths prevented and $1.5 billion in health benefits each year in Ohio by 2020.

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




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 ambient air quality standards or other parts of the Clean Air Act.

# Clear Skies Would Help Ohio Meet Air Quality Standards

- Currently there are 13 counties exceeding the annual fine particle standards and 24 counties exceeding the 8-hour ozone standard.
  - Many of these counties are expected to be brought into attainment with the fine particle standards under existing programs.
  - All of these counties are expected to be brought into attainment with the ozone standard under existing programs.

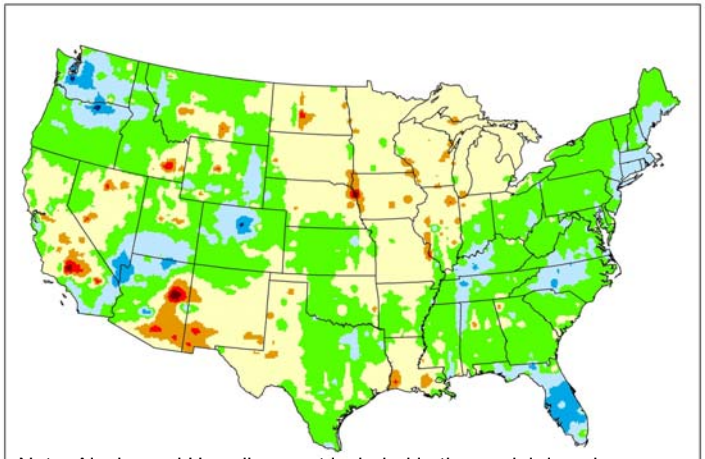
- **Clear Skies would significantly improve air quality in Ohio** beyond what is expected from existing programs.
  - By 2010, Clear Skies would bring 5 non-attainment counties (Butler, Montgomery, Trumbull, Mahoning, and Summit -- population approximately 2 million) into attainment with the annual fine particle standards.
  - By 2020, Clear Skies would bring 4 additional counties (Stark, Franklin, Hamilton, and Scotio--population approximately 2.4 million) into attainment with the annual fine particle standards.

- In addition, Clear Skies would reduce ozone and fine particle concentrations in counties throughout the state and move the remaining 2 non-attainment counties in Ohio (Cuyahoga and Jefferson) closer to attainment.

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

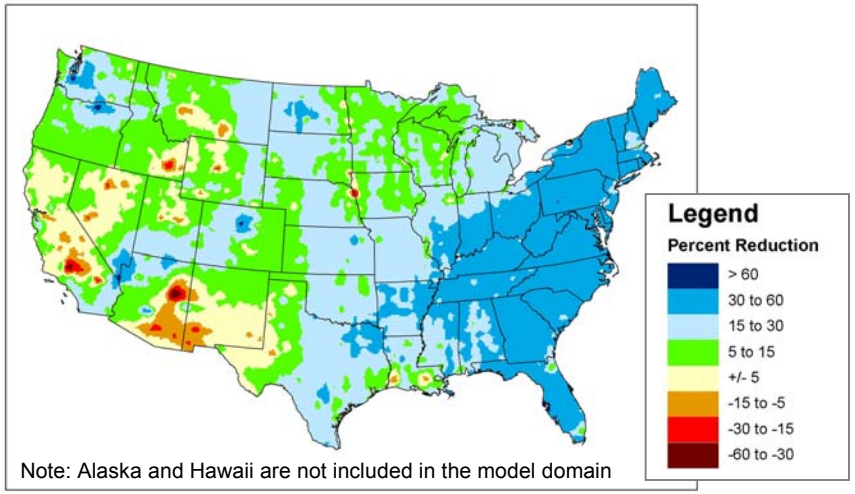
# Clear Skies Environmental Benefits in Ohio

**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 Ohio

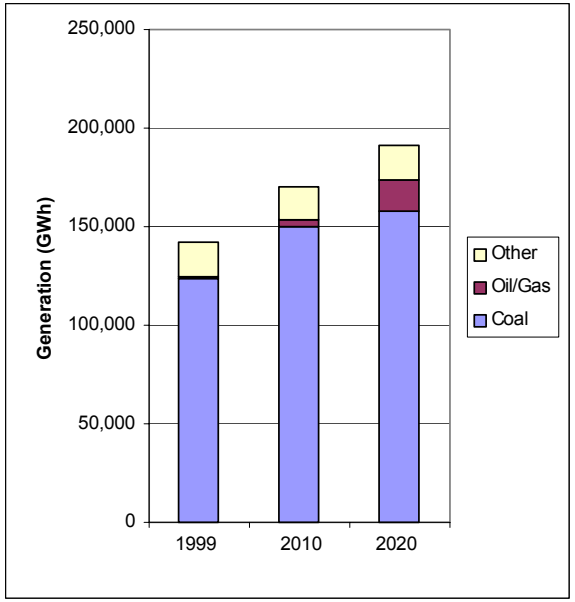
In comparison to existing programs,

- **Visibility would improve** perceptibly.
  - The value of this benefit for Ohio residents who visit America's National Parks and Wilderness Areas is $91 million.
- **Sulfur deposition, a primary cause of acid rain, would decrease** 30-60% in eastern and central Ohio and 15-30% throughout the rest of the state.
- **Nitrogen deposition, another significant contributor to acid rain as well as a cause of damage in nitrogen-sensitive forests, would decrease** 5-20%.
- **Mercury deposition would decrease** up to 15% throughout most of Ohio and up to 30% along the Ohio River.*

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

# Electricity Generation in Ohio under Clear Skies

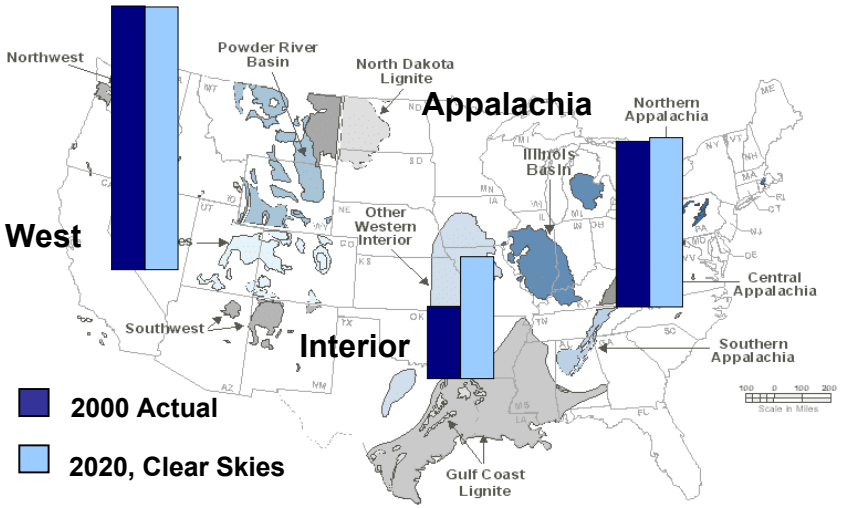
**Current and Projected Generation by Fuel Type in Ohio under Clear Skies (GWh)**




- **Ohio'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, 84% of Ohio'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 93%.

- **Ohio'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 28% from 1999 to 2020.

**Current and Projected Coal Production for Electricity Generation**




**Scale: Appalachia 2000 = 299 million tons**

# Emission Controls in Ohio under Clear Skies

- **Under Clear Skies by 2020...**
  - 17% of coal-fired capacity would install SCR or SNCR
  - 59% would install scrubbers

- **The major generation companies in Ohio include:**
  - First Energy Generation Corporation
  - Ohio Edison Company
  - Cincinnati Gas & Electric Company
  - Cleveland Electric Illuminating Company
  - Columbus Southern Power Company
  - Dayton Power & Light
  - DPL Energy

- **Total coal-fired capacity in Ohio is projected to be 21,382 MW in 2010.**

## Units in Ohio Projected to Be Retrofitted Due to Clear Skies by 2020

| Plant Name | Unit ID | Technology |
|---|---|---|
| AVON LAKE | 12 | Scrubber* |
| CARDINAL | 1 | Scrubber* |
| CARDINAL | 2 | Scrubber* |
| CARDINAL | 3 | Scrubber |
| CONESVILLE | 1 | SCR / Scrubber |
| CONESVILLE | 2 | SCR / Scrubber |
| CONESVILLE | 3 | SCR* / Scrubber' |
| CONESVILLE | 4 | SCR* / Scrubber' |
| EASTLAKE | 1 | SCR / Scrubber |
| EASTLAKE | 2 | SCR / Scrubber |
| EASTLAKE | 4 | SCR / Scrubber |
| EASTLAKE | 5 | Scrubber* |
| J M STUART | 1 | Scrubber* |
| J M STUART | 2 | Scrubber* |
| J M STUART | 3 | Scrubber* |
| J M STUART | 4 | Scrubber* |
| KYGER CREEK | 1 | Scrubber* |
| KYGER CREEK | 2 | Scrubber* |
| KYGER CREEK | 3 | Scrubber* |
| KYGER CREEK | 4 | Scrubber* |
| KYGER CREEK | 5 | Scrubber* |
| LAKE SHORE | 18 | Scrubber* |
| MIAMI FORT | 6 | Scrubber |
| MIAMI FORT | 7 | Scrubber* |
| MIAMI FORT | 8 | Scrubber |
| MUSKINGUM RIVER | 5 | Scrubber* |
| R E BURGER | 7 | SCR / Scrubber |
| R E BURGER | 8 | SCR / Scrubber |
| W H SAMMIS | 1 | Scrubber |
| W H SAMMIS | 2 | Scrubber |
| W H SAMMIS | 3 | Scrubber |
| W H SAMMIS | 4 | Scrubber |
| W H SAMMIS | 5 | Scrubber* |
| W H SAMMIS | 6 | Scrubber* |
| W H SAMMIS | 7 | Scrubber |
| WALTER C BECKJORD | 5 | SCR / Scrubber |
| WALTER C BECKJORD | 6 | SCR / Scrubber |
| ASHTABULA | 7 | SCR* |
| CONESVILLE | 5 | SCR* |
| CONESVILLE | 6 | SCR* |
| MIAMI FORT | 5-1 | SNCR |
| MIAMI FORT | 5-2 | SNCR |
| R E BURGER | 5 | SNCR |
| R E BURGER | 6 | SNCR |
| TORONTO | 9 | SNCR |

* Retrofit was installed under Clear Skies by 2010

Notes:

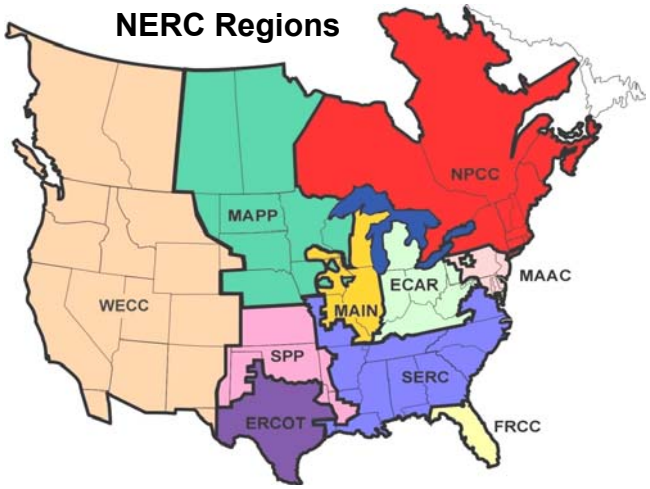
[1] Retrofits and total coal-fired capacity apply to coal units greater than 25 MW.

[2] Hamilton unit 8, Niles unit 2, OH Hutchings units H1/H2, Picway unit 9, and Richard Gorsuch units 1 & 3 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.

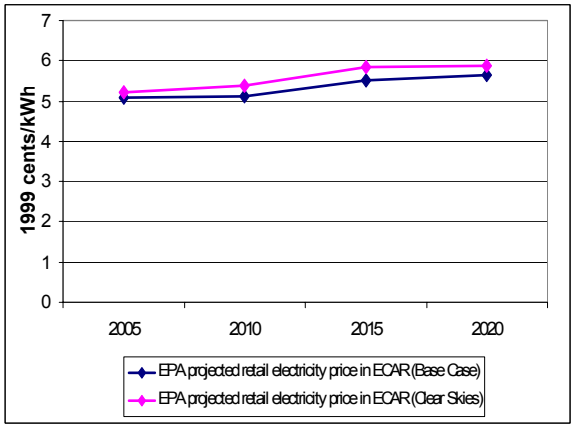
# Electricity Prices in Ohio under Clear Skies

- **With or without Clear Skies, retail prices in the North American Electric Reliability Council (NERC) ECAR region (the electricity supply region that contains Ohio) are projected to increase between 2005 and 2020.**
- **With Clear Skies, retail prices are projected to be approximately 2.4 – 6.4% higher between 2005 and 2020 than in the absence of the legislation.**

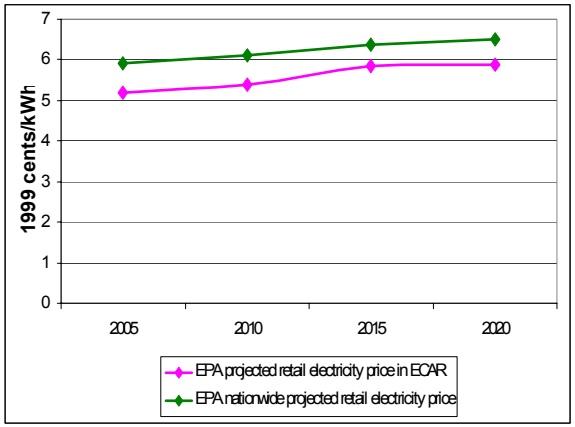
**NERC Regions**




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




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




**In 2000, the average retail electricity price in Ohio was approximately 6.5 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 Ohio under Clear Skies

## Benefits Outweigh the Costs

- **In Ohio, Clear Skies is projected to cost approximately $568 million annually by 2020 while providing health benefits totaling approximately $7.9 billion annually**.
- **The increases in production costs under Clear Skies represent only a small percentage of total retail electricity sales revenue in Ohio.**
  - Retail electricity sales revenue in Ohio was over $10.3 billion in 2000.
  - Adjusting these sales revenues by the same growth rate used for the modeling of costs would result in revenues of $15.9 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 alternative 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