



# **The Clear Skies Act of 2003**

**Pennsylvania and Clear Skies**



# Highlights of Clear Skies in Pennsylvania

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- **Pennsylvania sources would reduce emissions of SO<sub>2</sub> by 81%, NO<sub>x</sub> by 68%, and mercury by 75% by 2020 due to Clear Skies.**
- **The health benefits in Pennsylvania would total \$9.3 billion (\$1.8 billion under the alternative estimate) and include approximately 1,200 fewer premature deaths (700 under the alternative estimate) and 1,800 fewer hospitalizations/emergency room visits for asthma.**
- **In addition, Pennsylvania would receive environmental benefits, including improved visibility and 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 Pennsylvania are expected to remain below or near 2000 prices.**

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

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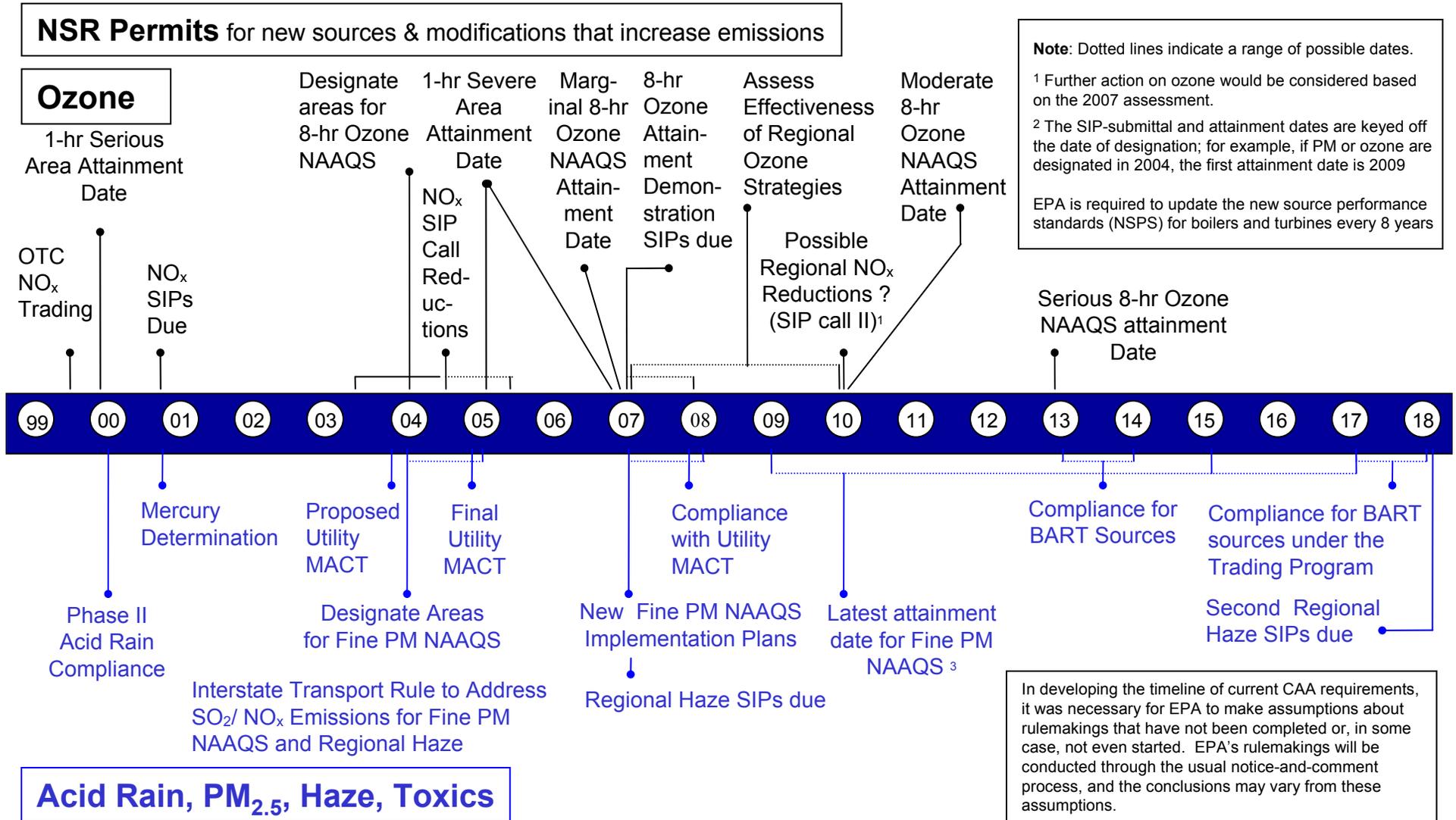
## Why Clear Skies?

- **Air quality has improved, but serious concerns persist**
  - Pennsylvania'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**
  - Pennsylvania sources would substantially reduce emissions of SO<sub>2</sub>, NO<sub>x</sub>, 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<sub>x</sub> SIP call (summertime NO<sub>x</sub> cap in 19 Eastern States + D.C.)**

**2004**

The existing Title IV SO<sub>2</sub> 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<sub>x</sub> 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<sub>2</sub> Phase I (4.5 million ton annual cap with a national trading program)**

**2018: Clear Skies NO<sub>x</sub> 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<sub>2</sub> Phase II (3.0 million ton annual cap with a national trading program)**

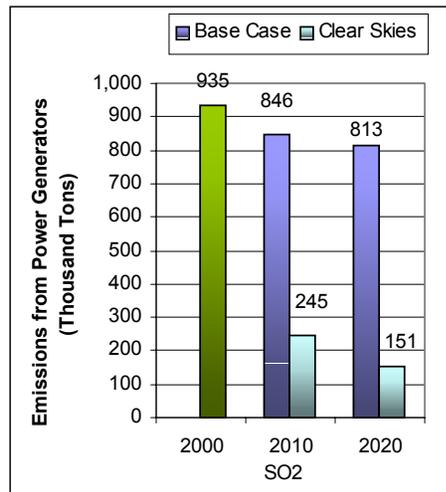
# Emissions in Pennsylvania under Clear Skies

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

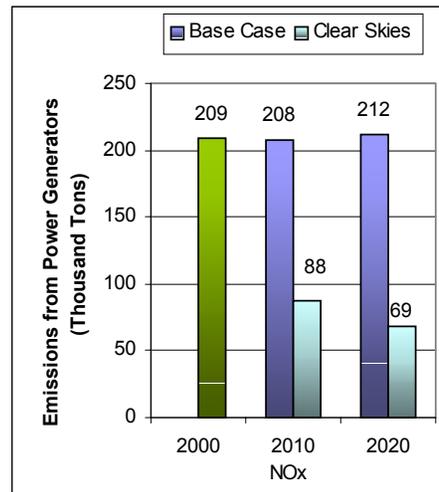
- 84% reduction in SO<sub>2</sub> emissions
- 67% reduction in NO<sub>x</sub> emissions
- 75% reduction in mercury emissions

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

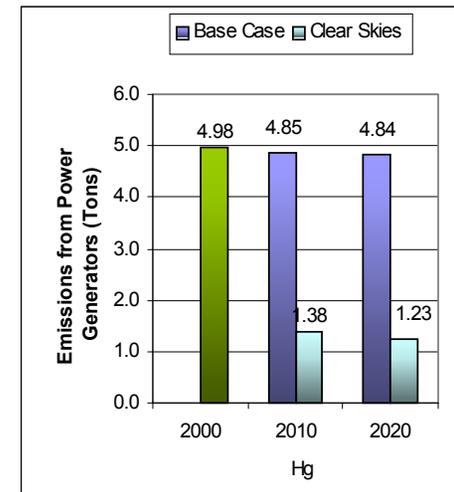
Sulfur dioxide



Nitrogen oxides



Mercury



Note: The base case using IPM includes Title IV, the NO<sub>x</sub> 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 Pennsylvania

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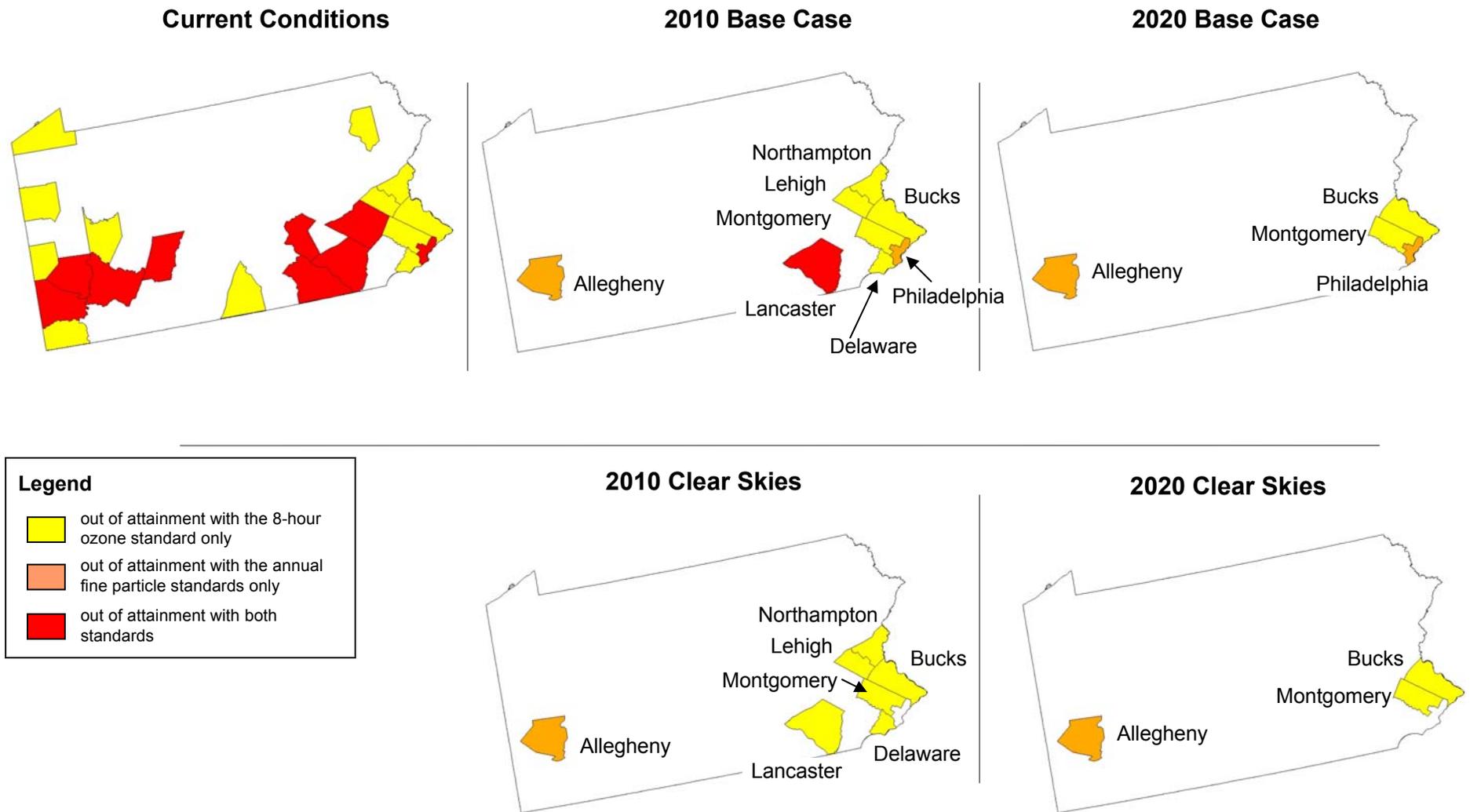
## Improve Public Health

- **Reduced ozone and fine particle exposure** by 2020 would result in public health benefits of:
  - approximately 1,200 fewer premature deaths each year<sup>1</sup>
  - approximately 700 fewer cases of chronic bronchitis each year
  - approximately 2,200 fewer non-fatal heart attacks each year
  - approximately 1,800 fewer hospital and emergency room visits each year
  - approximately 110,000 fewer days workers are out sick due to respiratory symptoms each year
  - approximately 7,800 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 Pennsylvania's rivers and lakes.

**By 2020, Pennsylvania would receive approximately \$9.3 billion in annual health benefits from reductions in fine particle and ozone concentrations alone due to Clear Skies.<sup>1</sup>**

1. An alternative methodology for calculating health-related benefits projects approximately 700 premature deaths prevented and \$1.8 billion in health benefits each year in Pennsylvania by 2020.

# Counties Projected to Remain Out of Attainment with the PM<sub>2.5</sub> and Ozone Standards in Pennsylvania



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<sub>x</sub> 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 in 2007 or any other potential future regulations to implement the current ambient air quality standards or other parts of the Clean Air Act.

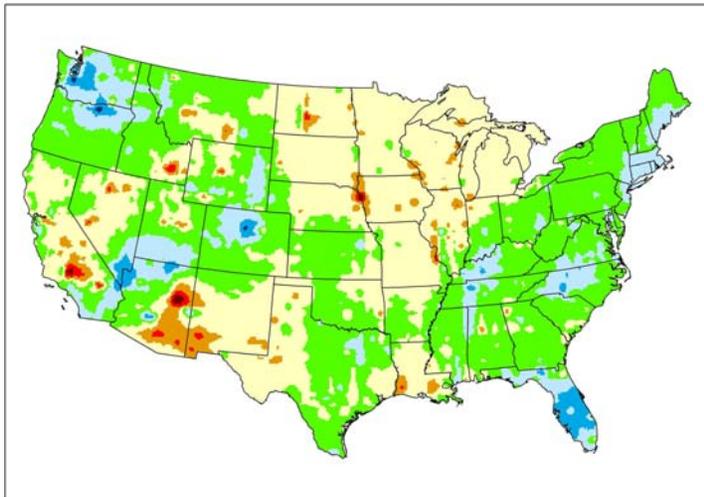
# Clear Skies Would Help Pennsylvania Meet Air Quality Standards

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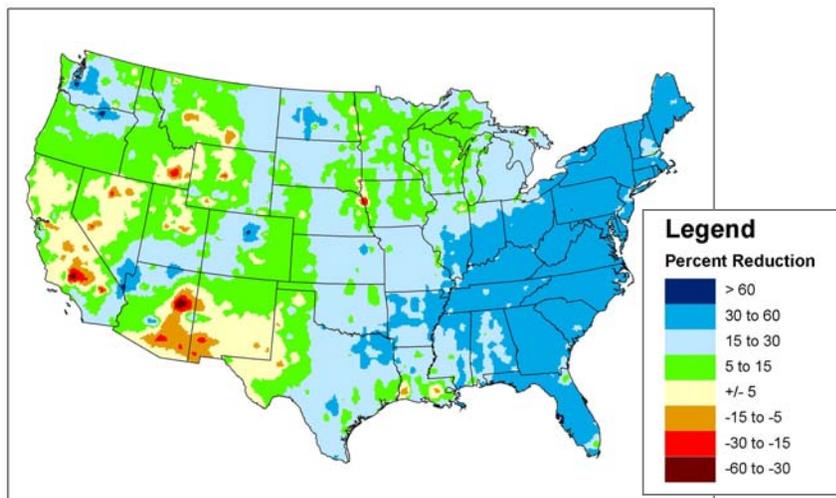
- Currently there are 9 counties exceeding the annual fine particle standards and 21 counties exceeding the 8-hour ozone standard.
  - Most of these counties are expected to be brought into attainment with the fine particle and ozone standards under existing programs.
- **Clear Skies would significantly improve air quality in Pennsylvania** beyond what is expected from existing programs.
  - By 2010, Clear Skies would bring 2 non-attainment counties (Lancaster and Philadelphia counties--population approximately 2 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 non-attainment counties in Pennsylvania (Allegheny, Bucks, and Montgomery counties) closer to attainment.

# Clear Skies Environmental Benefits in Pennsylvania

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



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



## Clear Skies Would Provide Substantial Environmental Benefits in Pennsylvania

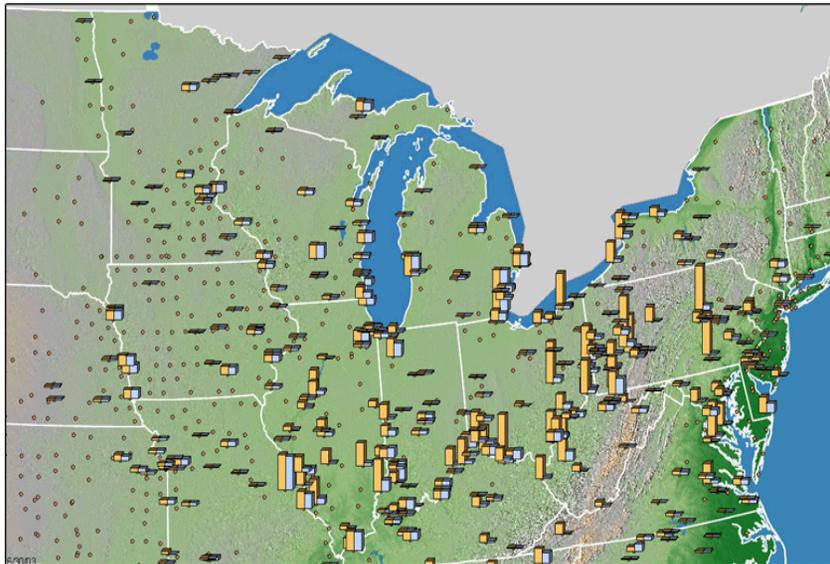
In comparison to existing programs;

- **Visibility would improve** perceptibly across the state. The value of this benefit for Pennsylvania residents who visit America's National Parks and Wilderness Areas is \$100 million.
- **Sulfur deposition, a primary cause of acid rain, would decrease** by 30-60% across most of the state.
  - Clear Skies would speed recovery of acid-sensitive streams in Pennsylvania.
- **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 5 to 20%.
- **Mercury deposition would decrease** by 15-30% in many areas of the state and by up to 60% in some areas.\*

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

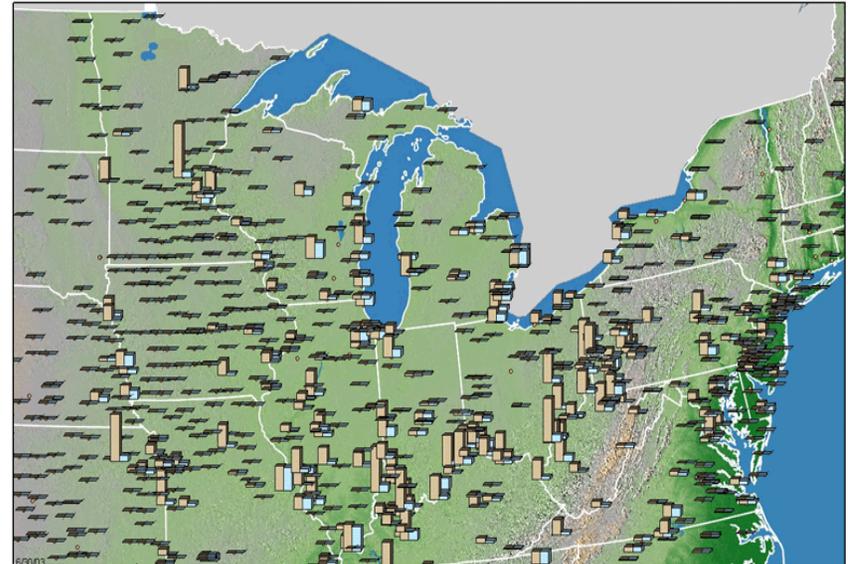
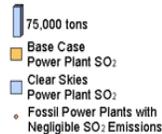
# SO<sub>2</sub> and NO<sub>x</sub> Emissions Reductions under Clear Skies

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



Projected SO<sub>2</sub> Emissions from Power Plants with the Base Case and Clear Skies (2020)

Midwest



Projected NO<sub>x</sub> Emissions from Power Plants with the Base Case and Clear Skies (2020)

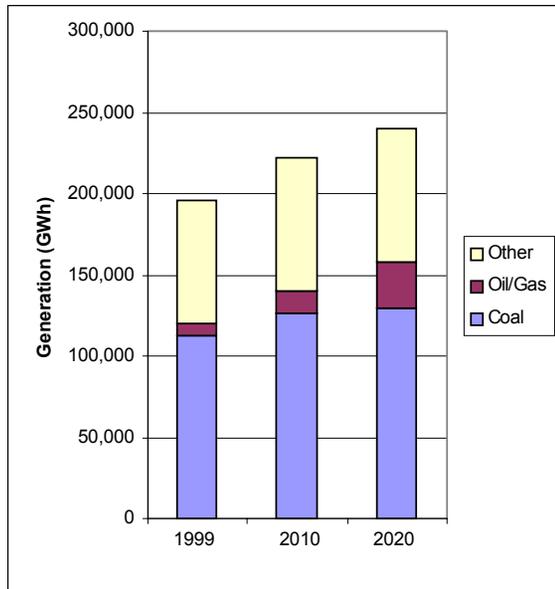
Midwest



Note: The base case in IPM includes Title IV, the NO<sub>x</sub> 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.

# Electricity Generation in Pennsylvania under Clear Skies

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

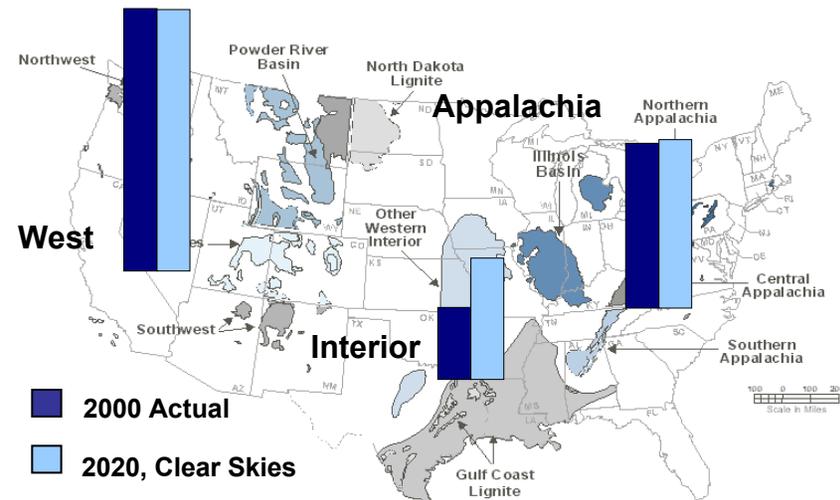


- Pennsylvania's electricity growth is projected to be met by increases in gas-fired and coal-fired generation. Clear Skies does not significantly alter this projection.

- Electricity from coal-fired generation will increase by 15% from 1999 to 2020.

- Pennsylvania'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, 78% of Pennsylvania's coal-fired generation is projected to come from units with advanced SO<sub>2</sub>, NO<sub>x</sub> and/or mercury control equipment; in 2020, the percentage is projected to increase to 93%.

Current and Projected Coal Production for Electricity Generation



Scale: Appalachia 2000 = 299 million tons

# Emission Controls in Pennsylvania under Clear Skies

## • Under Clear Skies by 2020...

- 8% of coal-fired capacity would install SCR
- 47% would install scrubbers
- 1% would install mercury controls

## • The major generation companies in Pennsylvania include:

- Orion Power Services
- Allegheny Power
- Reliant Energy
- Conectiv Energy
- PPL Energy

## • Total coal-fired capacity in Pennsylvania is projected to be 18,626 MW in 2010.

## Units in Pennsylvania Projected to be Retrofitted due to Clear Skies by 2020

Plant Name	Unit ID	Technology
BRUNNER ISLAND	1	Scrubber
BRUNNER ISLAND	2	Scrubber
BRUNNER ISLAND	3	Scrubber
CHESWICK	1	Scrubber*
Colver Power Project	COLV	Scrubber/ SCR
HATFIELD'S FERRY	1	Scrubber
HATFIELD'S FERRY	2	Scrubber*
HATFIELD'S FERRY	3	Scrubber*
HOMER CITY	1	Scrubber*
HOMER CITY	2	Scrubber*
KEYSTONE	1	Scrubber*
KEYSTONE	2	Scrubber*
MONTOUR	1	Scrubber*
MONTOUR	2	Scrubber*
NEW CASTLE	5	Scrubber/ SCR
Northhampton Generating Company L P	GEN1	Scrubber/ SCR
PORTLAND	2	Scrubber
SHAWVILLE	1	Scrubber/ SCR
SHAWVILLE	3	Scrubber/ SCR
SHAWVILLE	4	Scrubber/ SCR
EDDYSTONE	1	SCR*
EDDYSTONE	2	SCR*
SHAWVILLE	2	SCR*
Ebensburg Power Company	GEN1	ACI*
Kline Township Cogen Facil	GEN1	ACI*
Piney Creek Project	GEN1	ACI*
Wheeler Frackville Energy Company Inc	GEN1	ACI*

\* Retrofit was installed under Clear Skies by 2010

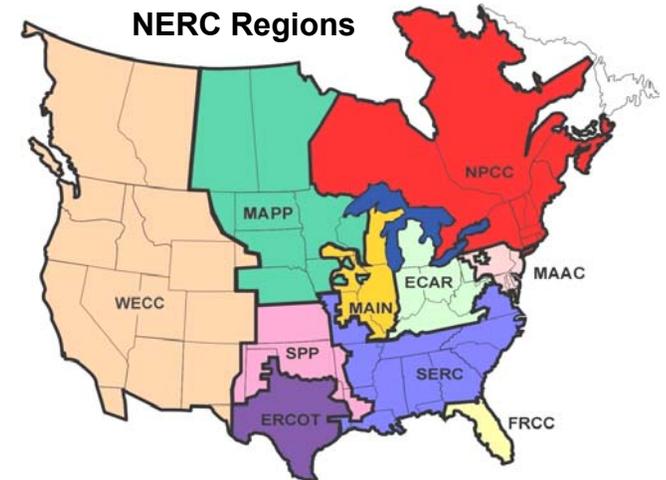
Notes:

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

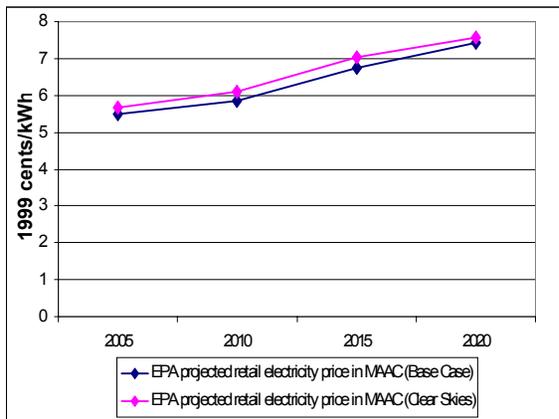
[2] Hunlock Pwr Station unit 1, Martins Creek units 1-2, Portland unit 1, Seward units 12 & 14, and Sunbury units 1A/1B/2A/2B and units 3 and 4 are projected to be removed from operation by 2005 with Clear Skies due to excess gas-fired capacity in the marketplace, unless otherwise needed for voltage 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 Pennsylvania under Clear Skies

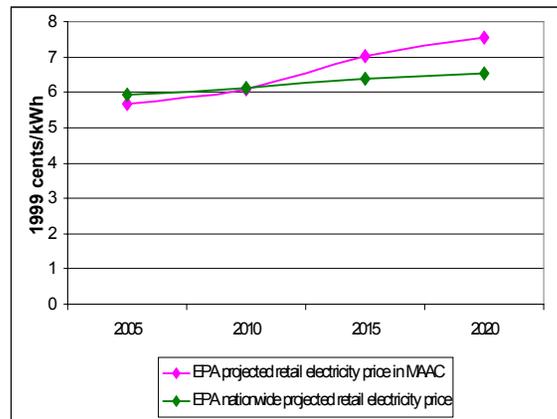
- With or without Clear Skies, retail prices in the North American Electric Reliability Council (NERC) MAAC region (the electricity supply region that contains Pennsylvania) are projected to increase between 2005 and 2020.
- With Clear Skies, retail prices are projected to be approximately 2.1 – 4.2% higher between 2005 and 2020 than in the absence of the legislation.



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



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



In 2000, the average retail electricity price in the region that included Pennsylvania was approximately 6.6 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<sub>x</sub> 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 Pennsylvania under Clear Skies

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## Benefits Outweigh the Costs

- **In Pennsylvania, Clear Skies is projected to cost approximately \$364 million annually by 2020 while providing health benefits totaling approximately \$9.3 billion annually.**
- **The increases in production costs under Clear Skies represent only a small percentage of total retail electricity sales revenue in Pennsylvania**
  - Retail electricity sales revenue in Pennsylvania was almost \$7.4 billion in 1999
  - Adjusting these sales revenues by the same growth rate used for the modeling of costs would result in revenues of over \$11.4 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

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- 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<sub>x</sub> 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>

