

US EPA ARCHIVE DOCUMENT



# The Clear Skies Act of 2003



## Maryland and Clear Skies



# Highlights of Clear Skies in Maryland

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- **Maryland sources would reduce emissions of SO<sub>2</sub> by 90%, NO<sub>x</sub> by 70%, and mercury by 69% by 2020 due to Clear Skies.**
- **The health benefits in Maryland would total \$3.9 billion (\$730 million under an alternative estimate) and include 500 fewer premature deaths (300 under an alternative estimate) and 1,000 fewer hospitalizations/emergency room visits for asthma.**
- **In addition, Maryland would receive significant environmental benefits, including reductions in nitrogen deposition that would benefit the Chesapeake Bay.**
- **Clear Skies does not significantly impact electricity prices. With or without Clear Skies, electricity prices in the electricity supply region that includes Maryland are expected to increase.**

# 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**
  - Maryland'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**
  - Maryland 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

## 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

Possible Regional NO<sub>x</sub> Reductions ? (SIP call II)<sup>1</sup>

**Note:** Dotted lines indicate a range of possible dates.

<sup>1</sup> Further action on ozone would be considered based on the 2007 assessment.

<sup>2</sup> 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



OTC NO<sub>x</sub> Trading

NO<sub>x</sub> SIPs Due

NO<sub>x</sub> SIP Call Reductions

Phase II Acid Rain Compliance

Mercury Determination

Interstate Transport Rule to Address SO<sub>2</sub>/ NO<sub>x</sub> Emissions for Fine PM NAAQS and Regional Haze

Proposed Utility MACT

Designate Areas for Fine PM NAAQS

Final Utility MACT

New Fine PM NAAQS Implementation Plans

Regional Haze SIPs due

Compliance with Utility MACT

Latest attainment date for Fine PM NAAQS<sup>3</sup>

Compliance for BART Sources

Compliance for BART sources under the Trading Program

Second Regional Haze SIPs due

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.

## Acid Rain, PM<sub>2.5</sub>, Haze, Toxics

# 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)**

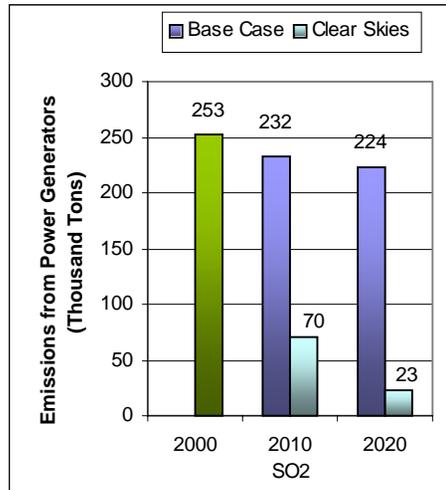
# Emissions in Maryland under Clear Skies

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

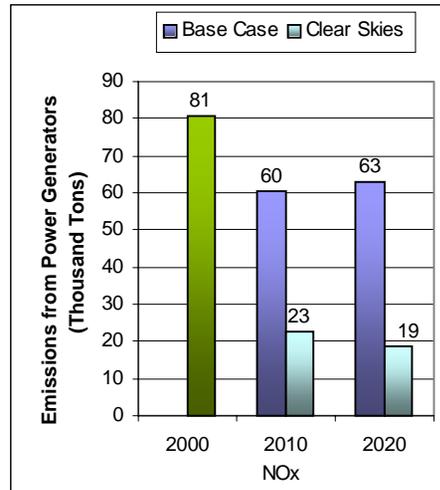
- 91% reduction in SO<sub>2</sub> emissions
- 77% reduction in NO<sub>x</sub> emissions
- 71% reduction in mercury emissions

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

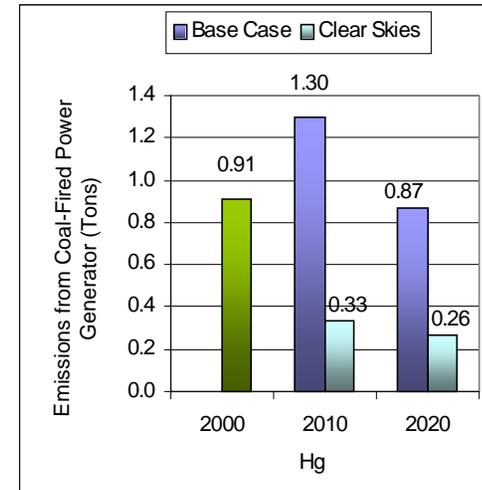
**Sulfur dioxide**



**Nitrogen oxides**



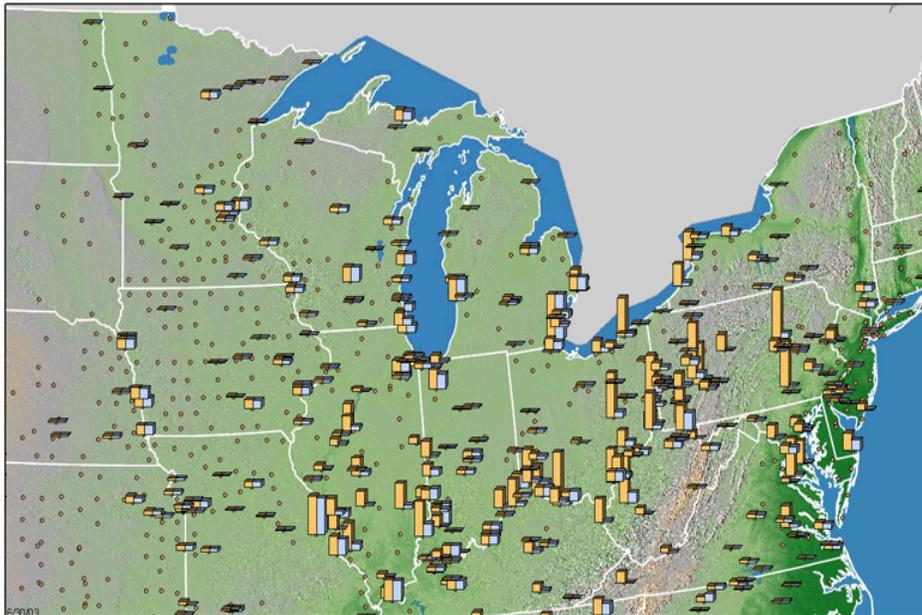
**Mercury**



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.

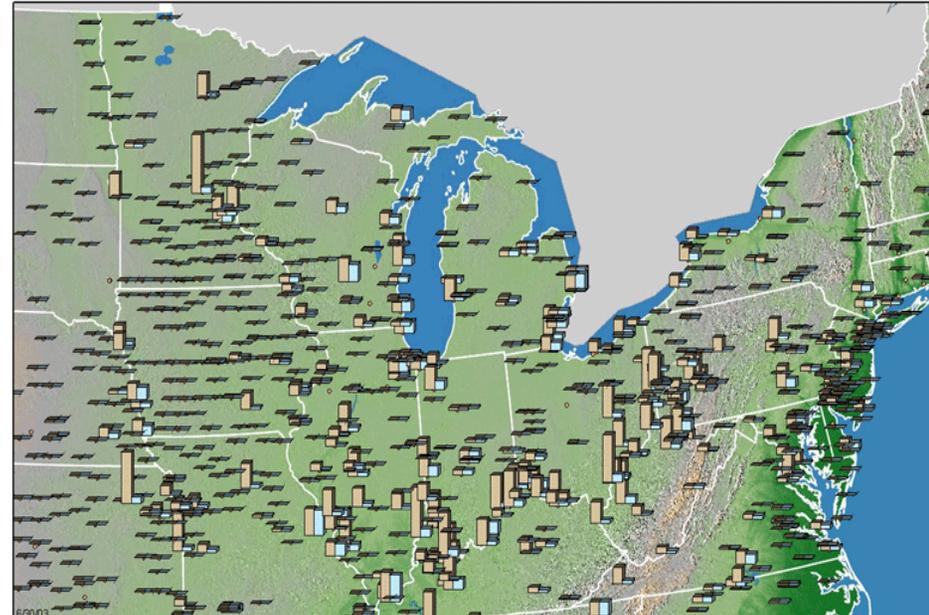
# Emission Reductions under Clear Skies

Emissions in Maryland and surrounding states would decrease considerably. These emission reductions would make it much easier for Maryland 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.

# Clear Skies Health Benefits in Maryland

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## Improve Public Health

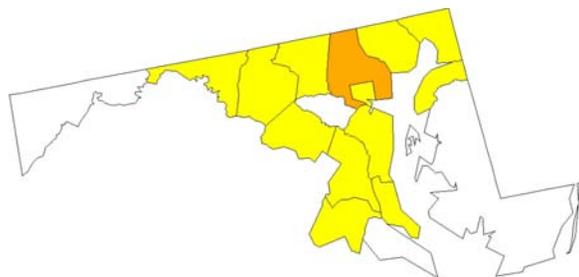
- **Reduced ozone and fine particle exposure** by 2020 would result in public health benefits of:
  - approximately 500 fewer premature deaths each year<sup>1</sup>
  - approximately 300 fewer cases of chronic bronchitis each year
  - approximately 700 fewer non-fatal heart attacks each year
  - approximately 1,000 fewer hospital and emergency room visits each year
  - approximately 63,000 fewer days workers are out sick due to respiratory symptoms each year
  - approximately 4,100 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 Maryland's lakes and streams.

**By 2020, Maryland would receive approximately \$3.9 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 300 premature deaths prevented and \$730 million in health benefits each year in Maryland by 2020.

# Counties Projected to Remain Out of Attainment with the PM<sub>2.5</sub> and Ozone Standards in Maryland<sup>1</sup>

**Current Conditions**



**2010 Base Case**



**2020 Base Case**



**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

**2010 Clear Skies**



**2020 Clear Skies**



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

Note: 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 Maryland Meet Air Quality Standards

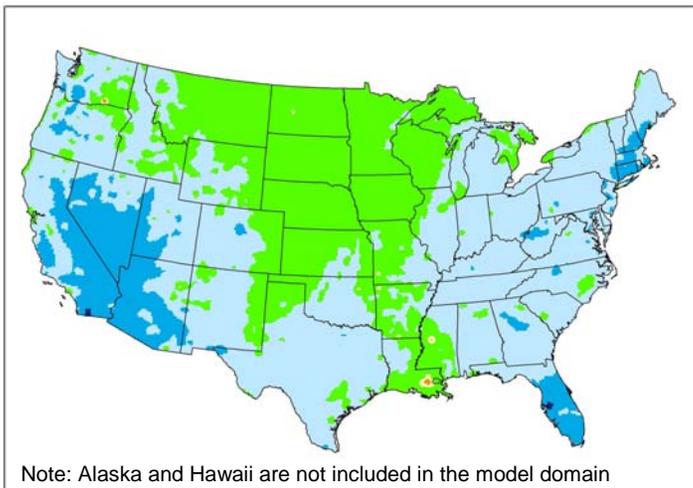
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- Currently there is 1 county (Baltimore County) exceeding the annual fine particle standard and 12 counties exceeding the 8-hour ozone standard.
  - Most of these counties are expected to be brought into attainment under existing programs.
- **Clear Skies would significantly improve air quality in Maryland** further and more quickly than what is expected from existing programs, bringing all remaining non-attainment counties into attainment with both standards by 2020.
  - By 2010, Clear Skies would bring Baltimore County (population approximately 750,000) into attainment with the annual fine particle standard.
  - By 2020, Clear Skies would bring Harford County in Maryland (population 220 thousand) into attainment with the 8-hour ozone standard.
  - In addition, Clear Skies would reduce ozone and fine particle concentrations in counties throughout the state.

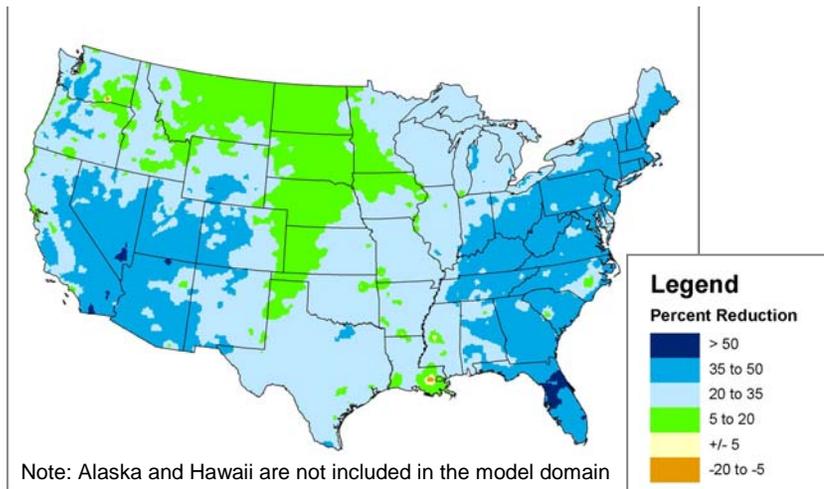
Note: Based on 1999-2001 data of counties with monitors that have three years of complete data.

# Clear Skies Environmental Benefits in Maryland

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



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



## Clear Skies Would Provide Substantial Environmental Benefits in Maryland

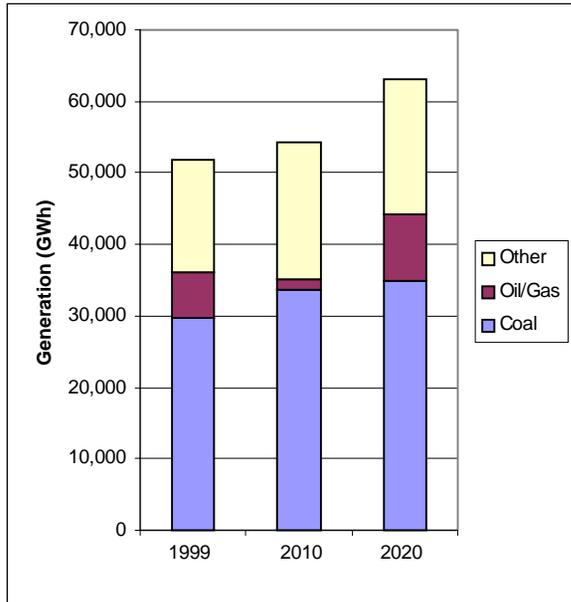
In comparison to existing programs,

- Visibility would improve perceptibly in Maryland.
  - The value of improved visibility for Maryland residents who visit National Parks and Wilderness areas throughout the country would be \$93 million each year by 2020.
- Sulfur deposition, a primary cause of acid rain, would decrease by 30-60%.
- Oxidized nitrogen deposition to the Chesapeake Bay watershed would be reduced by up to 20%.
  - Chesapeake Bay States, including NY, VA, MD, PA, DE, WV and DC, recently agreed to incorporate the nitrogen reductions resulting from Clear Skies legislation as part of their overall plan to reduce nutrient loadings to the Bay.
- Mercury deposition would decrease by 5-15% across much of the state and up to 60% in some areas.\*

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

# Electricity Generation in Maryland under Clear Skies

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



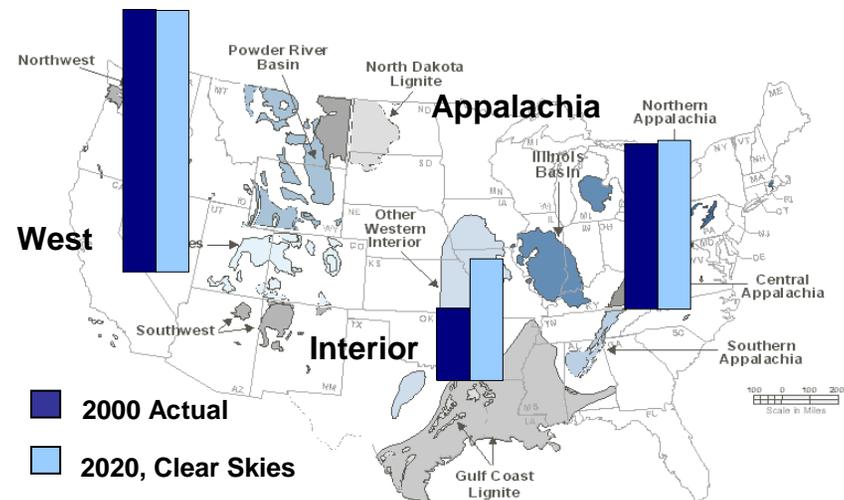
- **Maryland's electricity growth is projected to be met by increases in gas-fired and coal-fired generation. Clear Skies does not significantly alter this projection.**

- Electricity from coal-fired generation will increase by 18% from 1999 to 2020.

- **Maryland'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, 82% of Maryland's coal-fired generation is projected to come from units with advanced SO<sub>2</sub> and/or NO<sub>x</sub> control equipment that also substantially reduce mercury emissions; in 2020, the percentage is projected to increase to 94%.

Current and Projected Coal Production for Electricity Generation



Scale: Appalachia 2000 = 299 million tons

# Emission Controls in Maryland under Clear Skies

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

- 14% of coal-fired capacity would install SCRs
- 67% would install scrubbers

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

- Constellation
- Mirant
- Allegheny Power

- **Total coal-fired capacity in Maryland is projected to be 4,740 MW in 2010.**

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

Plant Name	Unit ID	Technology
C P CRANE	1	Scrubber
C P CRANE	2	Scrubber
CHALK POINT	1	Scrubber*
CHALK POINT	2	Scrubber*
DICKERSON	1	Scrubber/ SCR
DICKERSON	2	Scrubber/ SCR
DICKERSON	3	Scrubber/ SCR
HERBERT A WAGNER	2	Scrubber/ SCR
HERBERT A WAGNER	3	Scrubber*
MORGANTOWN	1	Scrubber*
MORGANTOWN	2	Scrubber*

\* Retrofit was installed under Clear Skies by 2010

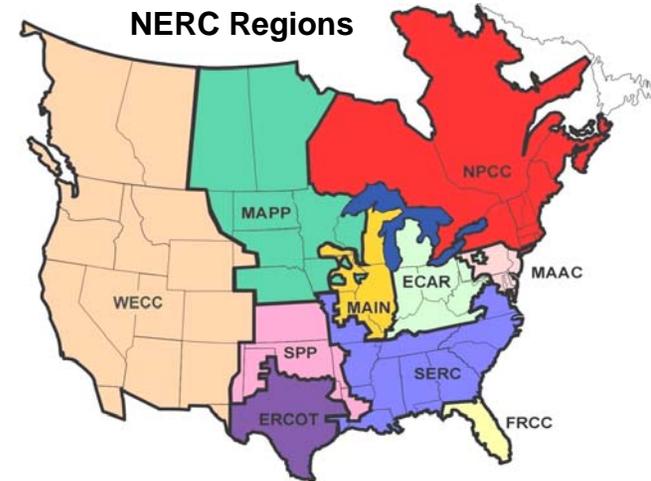
Notes:

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

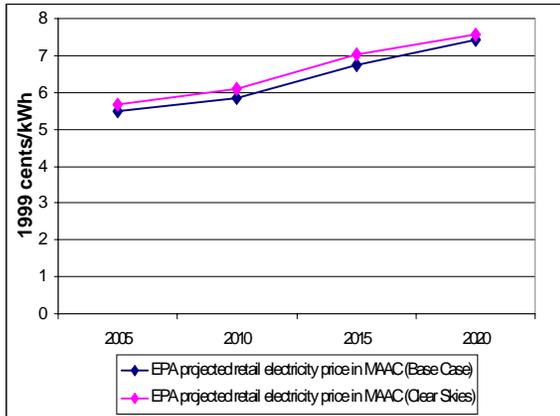
[2] RP Smith unit 9 is projected to be removed from operation by 2005 with Clear Skies due to excess gas-fired capacity in the marketplace, unless otherwise needed for voltage purposes. The recent overbuild of gas-fired generation reduces the need for less efficient units operating at lower capacity 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 Maryland under Clear Skies

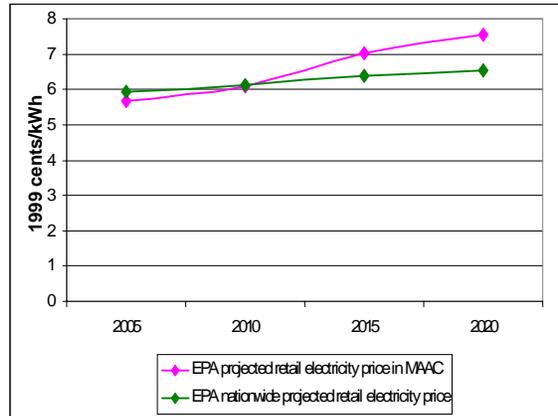
- With or without Clear Skies, retail prices in the North American Electric Reliability Council (NERC) MAAC region (the electricity supply region that contains Maryland) are projected to increase between 2005 and 2020.
- With Clear Skies, retail prices are projected to be approximately 2.1 – 4.2% higher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



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



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



In 2000, the average retail electricity price in Maryland was approximately 6.7 cents/kWh, which was the same as the average *national* retail price of approximately 6.7 cents/kWh.

# Costs and Benefits in Maryland under Clear Skies

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## Benefits Outweigh the Costs

- **In Maryland, Clear Skies is projected to cost approximately \$305 million annually by 2020 while providing health benefits totaling approximately \$3.9 billion annually.**
- **The increases in production costs under Clear Skies represent only a small percentage of total retail electricity sales revenue in Maryland.**
  - Retail electricity sales revenue in Maryland was almost \$4.1 billion in 2000.
  - Adjusting these sales revenues by the same growth rate used for the modeling of costs would result in revenues of over \$6.3 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>)

