The information presented here reflects EPA's modeling of the Clear Skies Act of 2002. The Agency is in the process of updating this information to reflect modifications included in the Clear Skies Act of 2003. The revised information will be posted on the Agency's Clear Skies Web site (www.epa.gov/clearskies) as soon as possible.

## CLEAR SKIES IN OHIO[1]

**Human Health and Environmental Benefits of Clear Skies:** Clear Skies would protect human health, improve air quality, and reduce deposition of sulfur dioxide ($SO_2$), nitrogen oxides ($NO_x$), and mercury.[2]

- Beginning in 2020, over $6 billion of the annual benefits of Clear Skies would occur in Ohio. Every year, these would include:
  - approximately 800 fewer premature deaths;
  - approximately 500 fewer cases of chronic bronchitis;
  - approximately 20,000 fewer days with asthma attacks;
  - over 700 fewer hospitalizations and emergency room visits;
  - over 130,000 fewer days of work lost due to respiratory symptoms; and
  - over 900,000 fewer total days with respiratory-related symptoms.

**Clear Skies Benefits Nationwide**

- In 2020, annual health benefits from reductions in ozone and fine particles would total $93 billion, including 12,000 fewer premature deaths, far outweighing the $6.49 billion cost of the Clear Skies program.
- Using an alternative methodology results in over 7,000 premature deaths prevented and $11 billion in benefits by 2020—still exceeding the cost of the program.[3]
- Clear Skies would provide an additional $3 billion in benefits due to improved visibility in National Parks and wilderness areas in 2020.

- There are currently 15 counties in Ohio expected to be out of attainment with the annual fine particle standard and 26 counties expected to be out of attainment with the 8-hour ozone standard.

- By 2010, based on initial modeling, Clear Skies would bring 3 counties (Mahoning, Summit, and Trumbull—population over 1 million) into attainment with the annual fine particle standard.[4]

- By 2020, based on initial modeling, Clear Skies would:
  - bring 6 additional counties (Butler, Franklin, Lawrence, Lucas, Montgomery, and Stark—home to almost 3 million people) into attainment with the annual fine particle standard;
  - reduce fine particle concentrations substantially in the counties projected to remain out of attainment, including Cuyahoga, Hamilton, Jefferson, and Scioto counties.

- The other counties in Ohio are expected to come into attainment with the fine particle and ozone standards under the existing Clean Air Act by 2010. Clear Skies would, however, achieve additional reductions in fine particles and ozone in those counties that will further protect human health.

- Clear Skies delivers numerous environmental benefits by 2020:
  - visibility would improve 1-2 deciviews throughout Ohio (a change of 1 deciview is a perceptible change in visibility);
  - sulfur deposition would decrease by 30-60% throughout southern portions of the state, and by 15-30% throughout the rest of the state;

[1] The projected impacts are the results of extensive emissions and regional air quality modeling and benefits analyses as summarized in the *Technical Addendum: Methodologies for Benefit Analysis of the Clear Skies Initiative, 2002*. While the policy analyses tools EPA used are among the best available, all such national scale policy assessments are subject to a number of uncertainties, particularly when projecting air quality or environmental impacts in particular locations.

[2] All human health and environmental benefits are calculated in comparison to existing Clean Air Act programs.

[3] The two sets of estimates reflect alternative assumptions and analytical approaches regarding quantifying and evaluating the effects of airborne particles on public health. All estimates assume that particles are causally associated with health effects, and that all components have the same toxicity. Linear concentration-response relationships between PM and all health effects are assumed, indicating that reductions in PM have the same impact on health outcomes regardless of the absolute level of PM in a given location. The base estimate relies on estimates of the potential cumulative effect of long-term exposure to particles, while the alternative estimate presumes that PM effects are limited to those that accumulate over much shorter time periods. All such estimates are subject to a number of assumptions and uncertainties. It is of note that, based on recent preliminary findings from the Health Effects Institute, the magnitude of mortality from short-term exposure (alternative estimates) and hospital/ER admissions estimates (both estimates) may be overstated. The alternatives also use different approaches to value health effects damages. The key assumptions, uncertainties, and valuation methodologies underlying the approaches used to produce these results are detailed in the *Technical Addendum* noted above.

[4] To permit comparisons among various analyses, the air quality data used in this analysis was fixed as the most complete and recently available as of mid-2001 (1997-1999 ozone monitoring data and 1999-2000 PM2.5 data). More complete and more recent air quality data for ozone and fine particles (1999-2001 data) indicates some differences in the likely attainment status of some counties. Future analyses of Clear Skies will incorporate the most recent data available.

- nitrogen deposition would be reduced by 15-30% throughout the state; and
- mercury deposition would decrease up to 25% throughout the state and over 25% in certain regions.

**Changes in Emissions Under Clear Skies:** Clear Skies is projected to result in significant emissions reductions from power generators by 2020:

- In Ohio, Clear Skies is projected to significantly reduce emissions from power generators by 2020 (relative to 2000 emissions):
  - $SO_2$ emissions would be reduced by 81%;
  - $NO_x$ emissions would be reduced by 83%; and
  - mercury emissions would be reduced by 80%.

**Nationwide Emissions under Clear Skies in 2020**

- $SO_2$ emissions from power generators are projected to be 3.9 million tons (a 65% reduction from 2000 levels).
- $NO_x$ emissions are projected to be 1.7 million tons (a 67% reduction from 2000 levels).
- Mercury emissions are projected to be 18 tons (a 63% reduction from 2000 levels).
- At full implementation, the emission reductions would be 73% for $SO_2$, 67% for $NO_x$, and 69% for mercury.

***Figures 1a, 1b and 1c.*** *Existing Clean Air Act Regulations (base case[5]) vs. Clear Skies in Ohio in 2010 and 2020*

***Figure 1a. $SO_2$***

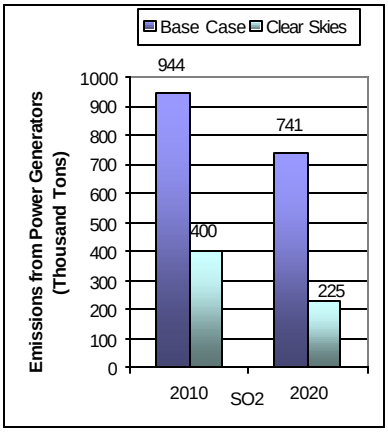



***Figure 1b. $NO_x$***

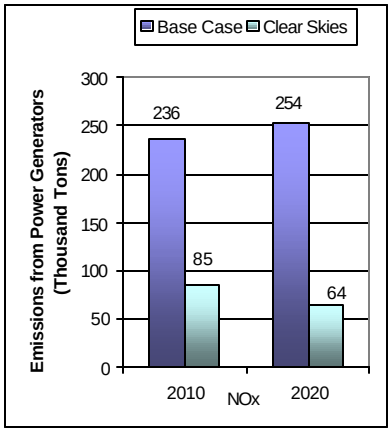
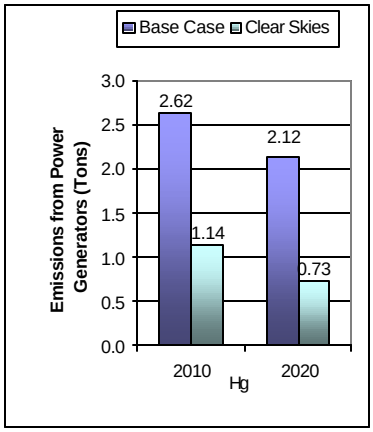



***Figure 1c. Mercury***




- Emissions rates in Ohio in 2010 and 2020:

***Table 1.*** *Projected Emissions Rates in 2010 and 2020 in Ohio*

| Year | | $SO_2$ | $NO_x$ | | | Hg |
|---|---|---|---|---|---|---|
| | | Coal | All | Coal | Gas | Coal |
| | | lbs/MMBtu | lbs/MMBtu | lbs/MMBtu | lbs/MMBtu | lbs/TBtu |
| 2010 | Base Case | 1.37 | 0.34 | 0.34 | 0.11 | 3.81 |
| | Clear Skies | 0.58 | 0.12 | 0.12 | 0.11 | 1.64 |
| 2020 | Base Case | 1.01 | 0.33 | 0.34 | 0.10 | 2.88 |
| | Clear Skies | 0.31 | 0.08 | 0.08 | 0.10 | 1.01 |

**Costs:** Nationwide, the projected annual costs of Clear Skies (in $1999) are $3.69 billion in 2010 and $6.49 billion in 2020.[6]

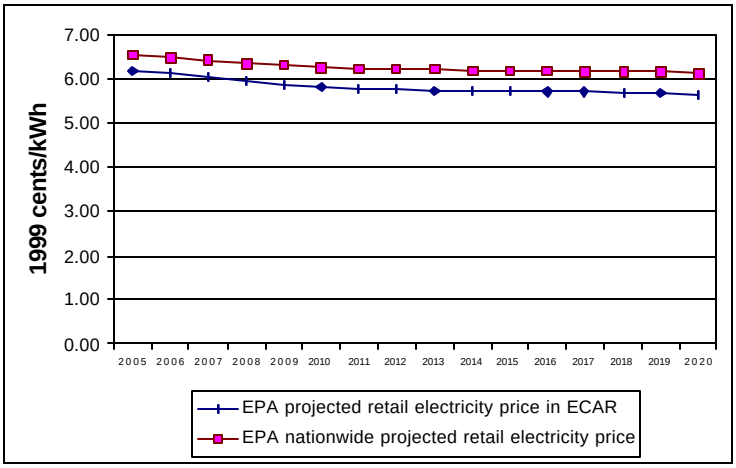
[5] The base case includes Title IV, the $NO_x$ SIP call and State-specific caps in CT, MO and TX. It does not include mercury MACT in 2008 or any other potential future regulations to implement the current Clean Air Act.

[6] EPA uses the Integrated Planning Model (IPM) to project the economic impact of Clear Skies on the power generation sector. IPM disaggregates the power generation sector into specific regions based on properties of the electric transmission system, power market fundamentals, and regional environmental regulations. These regions do not conform to State or EPA region boundaries making some compliance options, such as dispatch, and associated costs impractical to differentiate at a State or Regional level.

**Changes in Projected Retail Electricity Prices Under Clear Skies**: Electricity prices in Ohio would not be significantly affected by Clear Skies.

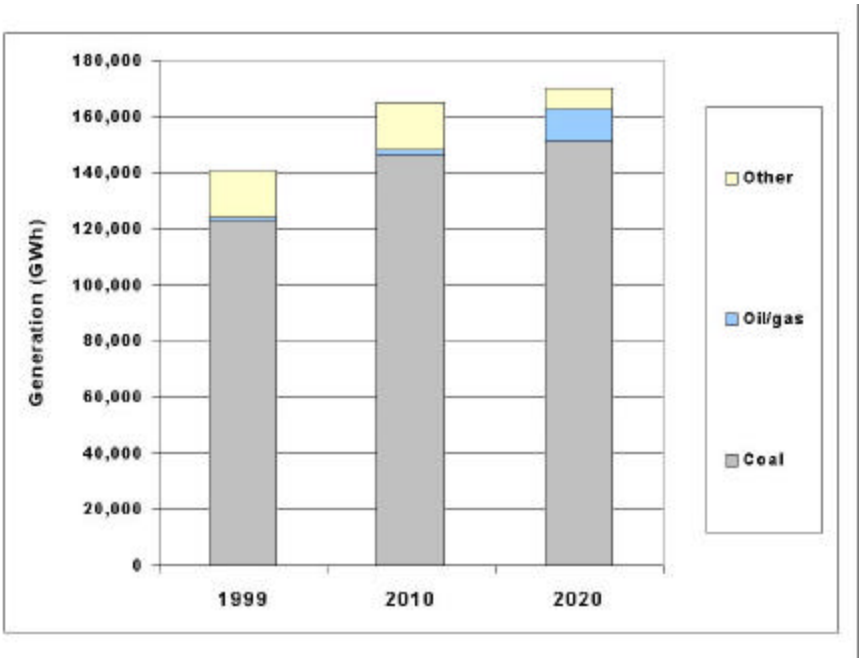
- In 1999, the average retail electricity price in Ohio was approximately 6.40 cents/kWh, which was slightly less than the average *national* retail price of approximately 6.66 cents/kWh.[7] As shown in Figure 3, retail prices in ECAR (the North American Electric Reliability Council (NERC) region that contains Ohio) are projected to decrease and remain below the national average between 2005 and 2020.[8]

***Figure 2**. Projected Retail Electricity Prices in ECAR under Clear Skies (2005-2020)*




**Generation in Ohio Under Clear Skies**: Coal-fired power plants currently produce 87% of the electricity generated in Ohio. Although , coal-fired generation would increase under Clear Skies, the portion of the total generation contributed by coal-fired generation would remain relatively unchanged. This level of coal-fired generation is projected to be approximately 89% through 2020.

***Figure 3**. Current and Projected Generation by Fuel Type in Ohio under Clear Skies (GWh)*[9]




[7] Source: 1999 EIA data at http://www.eia.doe.gov/cneaf/electricity/page/fact_sheets/retailprice.html.
[8] State-level retail electricity prices vary considerably across the United States. Variation in prices can be caused by many factors including access to low cost fuels for generating power, State taxes, and the mix of power plants in the States.
[9] Source: 1999 data from EIA at http://www.eia.doe.gov/cneaf/electricity/st_profiles/ohio/oh.html (Table 5).

- EPA does not project that any facilities in Ohio would switch from coal to natural gas in response to the Clear Skies emissions caps. Instead, sources in Ohio would reduce their emissions through the installation of control technologies.
  - By 2010, coal-fired capacity in Ohio is projected to be approximately 22,000 MW under Clear Skies. Approximately 15,600 MW of Ohio's coal capacity is projected to install Selective Catalytic Reduction (SCR) and 7,900 MW are projected to install scrubbers.
  - Between 2010 and 2020, an additional 2,900 MW are projected to install SCR and 5,200 MW are projected to install scrubbers.

- 85% of Ohio's coal-fired generation is projected to come from coal units with emission control equipment in 2010, and 93% in 2020. [10]

**Coal Production in Ohio**: Ohio currently produces approximately 2% of the nation's coal supply, and has about 5% of the nation's coal reserves. [11]

- EPA projects a *nationwide* 7.2% increase in coal production by 2020, relative to 2000. Preliminary analysis shows an increase in total coal production in Appalachia between 2000 (421 million tons) and 2020 (461 million tons) of 9.5%.[12]

- Based on preliminary analysis, EPA projects a slight increase in jobs by 2020 in Appalachian under Clear Skies, relative to the base case.

**Major Generation Companies in Ohio**: The ten largest plants in the State -- each over 1,200 MW -- are all coal-fired. The major generation companies include: Ohio Edison Co. (FirstEnergy), Cincinnati Gas & Electric Co. (Cinergy), Ohio Power Co. (AEP), and Dayton Power & Light Co.



[10] Emissions control equipment includes, where applicable, scrubbers, selective catalytic reduction, selective non-catalytic reduction, gas-reburn and activated carbon injection.
[11] 2000 Coal Industry Annual, Tables 1 and 33
[12] Because coal supply regions generally do not confirm to State boundaries, it is impractical to project coal production at a State-level.