

CLEANING UP  
AIR POLLUTION  
FROM  
AMERICA'S POWER PLANTS

THE FACTS





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**NATIONAL ENVIRONMENTAL TRUST • CLEAR THE AIR**

WASHINGTON, DC

## ACKNOWLEDGEMENTS

*Cleaning Up Air Pollution From America's Power Plants: The Facts*, was compiled by staff of the National Environmental Trust under the supervision of Mark Wenzler. The Clean Air Task Force provided research assistance.

This publication was made possible by the generous support of The Pew Charitable Trusts. The opinions expressed in this publication are those of the National Environmental Trust and Clear the Air and do not reflect the views of The Pew Charitable Trusts.

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Clear the Air is a joint project of the Clean Air Task Force, National Environmental Trust, and the U.S. Public Interest Research Group (U.S. PIRG) Education Fund.

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# THE ELECTRIC UTILITY INDUSTRY AT A CROSSROADS

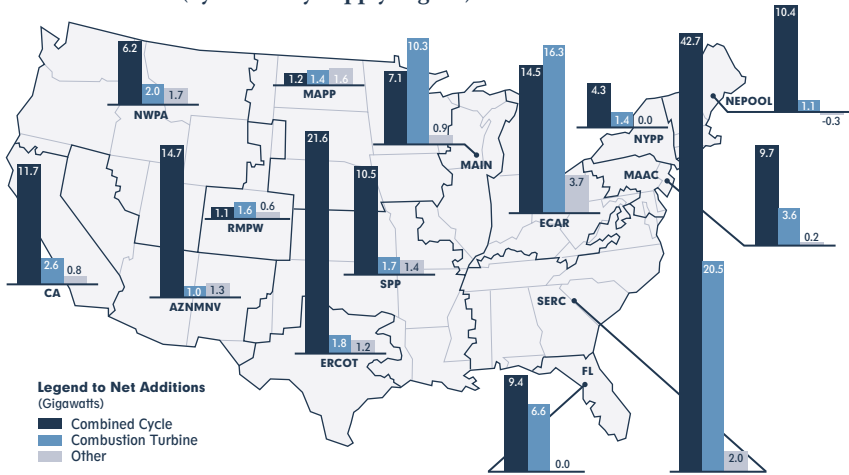


## OVERVIEW

Over the next decade, the United States will make enormous investments in new sources of electricity. The Bush administration projects that as many as 1,900 new power plants will be needed,<sup>1</sup> and industry analysts estimate that electric generating capacity will increase by 40%.<sup>2</sup> While investments in energy efficiency could substantially reduce the number of new power plants needed to meet growing demand,<sup>3</sup> there is no doubt that utilities will be investing billions of dollars in new generating facilities over the coming years.

These new power plants—likely to operate for 50 years or more—mean a future of either cleaner, healthier air or of worsening pollution, depending on decisions that Congress will make in the coming months. Currently, there is no law to ensure new

**FIGURE 1— Projected Electric Generating Capacity Additions by 2006  
(by electricity supply region)**



Projections based on data from The NorthBridge Group and Resource Data International (RDI).<sup>4</sup>

plants will minimize emissions that contribute to problems like global warming. In the meantime, many existing utilities are operating with virtually no pollution controls, making them a major cause of health and environmental damage. Policy makers, however, are considering legislation that would clean up the older plants and ensure that new ones limit their contributions to greenhouse gases and other air pollution problems.

The decisions public officials make now will determine whether air pollution improves or worsens over the next several decades. Power plants operating today are the number one industrial source of several major air pollutants, including:

- **sulfur dioxide**—a pollutant linked to acid rain, haze pollution in parks, and respiratory disease and death



- **nitrogen oxides**—a cause of ozone smog and asthma attacks
- **mercury**—a pollutant linked to developmental problems in children, and
- **carbon dioxide**—a major cause of global warming.

## **CARBON DIOXIDE: A PRINCIPAL CAUSE OF GLOBAL WARMING**

**“Carbon dioxide is probably the single most important agent contributing to climate changes today.”**

**“The [global climate] changes observed over the last several decades are likely because of human activities, for the most part.”**

**“Since the Industrial Revolution, ... atmospheric concentrations of CO<sub>2</sub> have risen about 28 percent ..., principally because of fossil fuel combustion, which accounted for almost 98 percent of total U.S. CO<sub>2</sub> emissions in 1998.”**

**“Carbon dioxide ... [is] more abundant in the Earth’s atmosphere now than at any time during the past 400,000 years.”**

**National Academy of Sciences,**

**“A Closer Look at Global Warming: Are We Changing the Climate?”**

**<http://www4.nas.edu/onpi/webextra.nsf/web/climate?OpenDocument>.**

Without a law to limit pollution from new power plants and to clean up older facilities, America is likely to sustain ever increasing environmental and health damage. In particular, failure now to limit emissions of carbon dioxide from power plants will lead to major increases in concentrations of greenhouse gases that will be difficult to reverse:

- Some analysts predict that carbon dioxide emissions from U.S. power plants could rise anywhere from 14% to 38% by 2007 as a result of the unprecedented growth in electricity generation.<sup>5</sup>
- According to the U.S. Department of Energy, the electric industry could emit an additional 113 million metric tons of carbon dioxide a year by 2010 if it does not cap CO<sub>2</sub> emissions.<sup>6</sup> This *additional* carbon dioxide equals more than is emitted annually by France or Mexico.<sup>7</sup>

**“Because of the age of the current fleet of power plants (two-thirds were built before 1970), there is a great opportunity for ... new, more efficient technologies to be deployed as existing plants are retired and replaced.”**

U.S. Department of Energy, “Scenarios for a Clean Energy Future,”  
November, 2000, p. 7.2

Thus, the electric utility industry—and the nation—stand at a critical crossroads: Will the U.S. continue to rely on the outdated technologies of the last century, thus locking in a future of polluted cities and countryside, as well as increased global warming? Or will utilities clean up older power plants and use cleaner technologies and fuels to reduce both air pollution and global warming?

In 2000, policy makers began to respond to the environmental and health problems from power plant emissions. Serious proposals were advanced to clean up emissions of sulfur dioxide, nitrogen oxides, mercury, and carbon dioxide. Now Congress and the Bush administration will choose between two starkly divergent paths. With one, America has an opportunity to become a leader in the deployment of newer, cleaner electricity generating technologies: combined cycle natural gas, solar, wind, geothermal, biomass, and advanced coal gasification. The other path will lock the U.S., for the next 50 years, into continued reliance on the highly polluting, antiquated technologies of the last century.

The facts are clear: decisions by policy makers in the coming months will determine whether the air in our cities and national parks is healthy. Choices now will determine how much more global warming pollution this nation will produce during the first half of the 21st century.



## POWER PLANTS: HOW MUCH DO THEY CONTRIBUTE TO U.S. AIR POLLUTION?

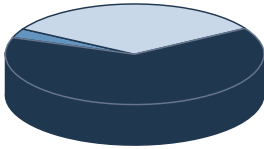
In spite of many decades of efforts to clean up the nation's air, serious pollution problems persist: respiratory disease, acid rain, toxic contamination of the food chain, and global warming. The U.S. Environmental Protection Agency estimates that *over 120 million Americans—43% of the population—live in areas that currently have unhealthy air.*<sup>8</sup>

The electric industry ranks at or near the top of all U.S. sources of air pollution.

- Utilities emit more carbon dioxide, sulfur dioxide, and mercury than any other source.
- Nitrogen oxide emissions from power plants are second only to the combined emissions of every car and truck in the United States—approximately 200 million vehicles.
- The bulk of the electric industry's pollution comes from aging coal-fired power plants. While a little more than half the electric power produced in the United States is generated by coal, these plants are responsible for more than 90% of the industry's pollution.

Recent studies have shown that over 30,000 people die prematurely each year from health problems linked to power plant emissions.<sup>13</sup> To put that number in context, pollution from elec-

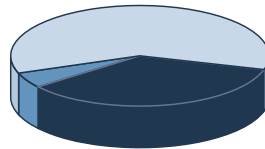
**FIGURE 2— U.S. Emissions of Sulfur Dioxide**



- 64% Coal-fired power plants
- 3% Other power plants
- 33% All other sources

Sulfur dioxide causes acid rain, haze pollution in national parks, respiratory disease, and premature death.

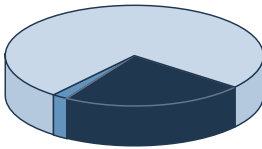
**FIGURE 3— U.S. Emissions of Carbon Dioxide**



- 35% Coal-fired power plants
- 5% Other power plants
- 60% All other sources

Carbon dioxide is the greenhouse gas most closely linked with global warming.

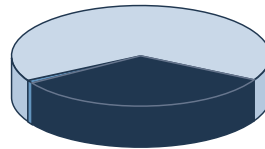
**FIGURE 4— U.S. Emissions of Nitrogen Oxides**



- 23% Coal-fired power plants
- 2% Other power plants
- 75% All other sources

Nitrogen oxides produce ozone smog, a pollutant that causes breathing problems, asthma attacks, and reduced agricultural production.

**FIGURE 5— U.S. Emissions of Mercury**



- 33% Coal-fired power plants
- 1% Other power plants
- 66% All other sources

Mercury contaminates rivers and lakes throughout the United States, making many fish dangerous to eat, and causing developmental disabilities in children.

tric utilities kills more people each year than drunk driving accidents or homicides. By contrast, if older power plants were required to clean up and meet modern standards, more lives could be spared annually than are saved with seatbelt use.<sup>14</sup>

# POWER PLANT AIR POLLUTION: HEALTH DAMAGE IN CONTEXT

FIGURE 6— Unnecessary Deaths

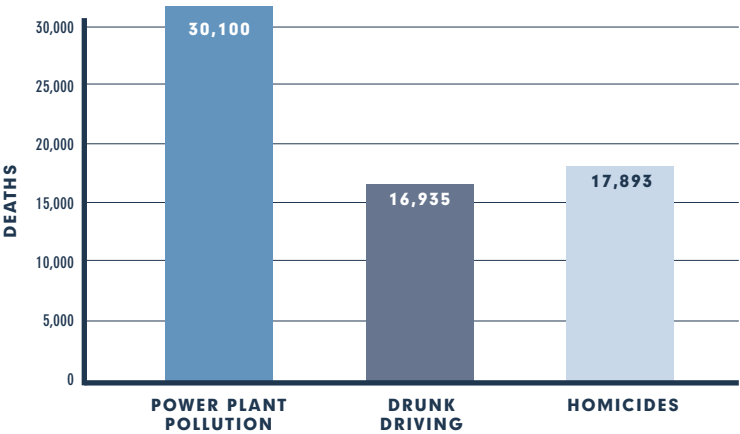
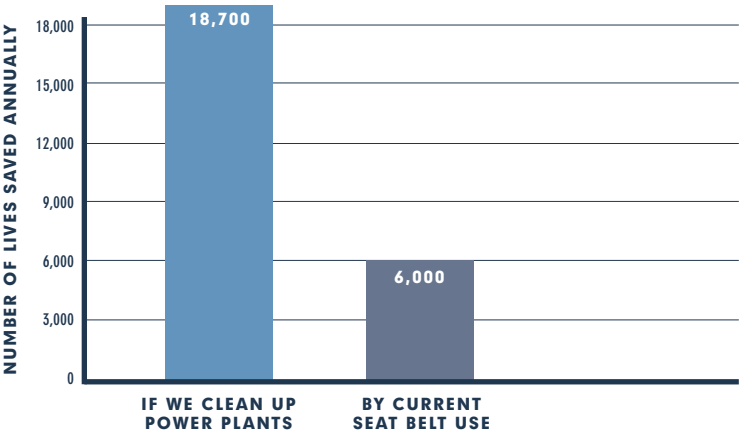


FIGURE 7— Lives Saved



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- 13 Abt Associates, *The Particulate-Related Health Benefits of Reducing Power Plant Emissions*, October 2000; [http://www.clnaf.org/resources/reports/Abt\\_PM\\_report.pdf](http://www.clnaf.org/resources/reports/Abt_PM_report.pdf). For a quick reference to the key findings of the Abt Associates study, see *Clear the Air, Death, Disease & Dirty Power: Mortality and Health Damage Due to Air Pollution from Power Plants*, October 2000, p. 3; <http://cta.policy.net/fact/mortality/mortalitylowres.pdf>.
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## POLICIES AND PROPOSALS



As Congress devises a plan to clean up power plants, it will consider a number of options, including ones backed by the Bush administration, industry, and the environmental and public health communities. These proposals vary greatly in scope, timing, and levels of pollution reduction. Determining which ones offer the greatest degree of public health and environmental protection will require Congress to sort through a host of policy issues. Among these are:

- whether power plants previously exempted from clean air regulations should be allowed to continue operating without modern pollution controls, or be required finally to clean up;

- whether special provisions should be included to prevent some plants from increasing pollution and harming local air quality; and
- whether we should begin now to take steps to address global warming by reducing CO<sub>2</sub> emissions from power plants.

The choices Congress makes will determine the quality of our air for generations to come.

## 2

## CLEAN AIR OBJECTIVES

Legislators will wrestle with several key policy issues in the coming months as they attempt to write a plan for cleaning up power plants. The proposals under discussion address some or all of the following nine objectives.

1. **Reduce nitrogen oxides (NO<sub>x</sub>):** Nitrogen oxides are the primary ingredient in ozone smog, the pollutant that causes “red alert” days in much of the eastern United States during the summer months. Ozone smog is linked to asthma attacks and lung disease, as well as crop damage and degradation of aquatic ecosystems.<sup>1</sup> Power plants are the single biggest industrial sources of NO<sub>x</sub> emissions.<sup>2</sup>
2. **Reduce sulfur dioxide (SO<sub>2</sub>):** Sulfur dioxide is the chief ingredient in fine particulate matter in the eastern United States. Particulate matter is linked to lung disease, asthma attacks, and premature deaths.<sup>3</sup> SO<sub>2</sub> is also linked to acid rain and

haze pollution in national parks.<sup>4</sup> Power plants are the number one source of SO<sub>2</sub> pollution in the United States.<sup>5</sup>

3. **Reduce mercury (Hg):** Mercury contaminates the food chain and is linked to developmental problems in young children.<sup>6</sup> Coal-fired power plants are the number one source of mercury emissions.<sup>7</sup>
4. **Reduce carbon dioxide (CO<sub>2</sub>):** Carbon dioxide is the most prevalent global warming pollutant,<sup>8</sup> and power plants are the number one source of CO<sub>2</sub> in the U.S.<sup>9</sup>
5. **Close the “grandfather” loophole:** Under the 1977 Clean Air Act, facilities were exempted (“grandfathered”) from meeting modern pollution standards as long as they did not undergo major physical or operational changes that resulted in significantly increased emissions. The U.S. Department of Justice has sued 51 power plants for making such changes in violation of the law.<sup>10</sup> The grandfather loophole would be closed after a number of years under some cleanup plans.
6. **Allow emissions “trading”:** In order to meet some or all of their obligations for emissions reductions, power plants would be given the choice of either reducing emissions by installing pollution controls or by switching to cleaner burning fuels, or they could buy emissions “credits” from other plants that have emissions below the required limit.

- 7. Protect local air quality:** One of the potential problems of emissions trading is that some plants may rely too heavily on buying emissions credits from other plants and thereby fail to improve air quality near their plants. Another problem is that some emissions, like mercury, are so toxic that trading could result in a dangerous buildup of this pollutant near certain plants. Some proposals address these problems by limiting trading in areas with poor local air quality, or toxic “hot spots,” and by closing the grandfather loophole to ensure that every plant is eventually cleaned up.
- 8. Encourage renewable power and energy efficiency:** Research by the Department of Energy shows that the overall cost of reducing power plant emissions declines sharply if the reductions are achieved, in part, by increasing reliance on renewable power and energy efficiency measures.<sup>11</sup> Several proposals call for greater use of renewable energy sources and greater energy efficiency.
- 9. Provide electric utilities with regulatory certainty:** Utility executives have complained that their ability to plan and build new, cleaner power plants is hampered by having to comply with different regulatory programs for different pollutants, each with a different compliance schedule. They have asked Congress for one plan that regulates all pollutants on a coordinated time frame. An important objective of all multi-pollutant cleanup plans is to give electric utilities the regulatory certainty they need to plan and build cleaner new power plants.

**FIGURE 8— Power Plant Clean Up Proposals**

(T = TRADING ALLOWED)

Multi-pollutant proposals	NOx Cap	SO <sub>2</sub> Cap	CO <sub>2</sub> Cap	H <sub>9</sub> Cap	Local Impacts Protection	De-grandfathering Provision	Other
Jeffords-Lieberman Clean Power Act (S 556) and Waxman-Boehlert Clean Smokestacks Act (HR 1256)	75% reduction from 1997 levels by 2007. T	75% reduction below full implementation of the Acid Rain Program by 2007. T	Cap CO <sub>2</sub> at 1990 levels by 2007. T	90% reduction from 1999 levels by 2007. <b>No trading</b>	EPA must prevent localized adverse effects on public health and environment.	At the plant's 30th birthday, it must meet modern emission standards.	Calls on EPA to increase the use of renewables and efficiency programs.
Bush "Clear Skies" proposal	67% reduction from 1997 levels by 2018 (2 steps: 2008, 2018). T	73% reduction by 2018 (2 steps: 2010, 2018). T	Not required.	63% reduction by 2018 (2 steps: 2010, 2018). T	No protections.	No. Likely to expand grandfather loophole in several areas.	Eliminates or modifies several Clean Air Act programs, including NSR.
Northeast States proposal (ME, NH, VT, MA, CT, RI, NY and NJ)	80% reduction from current emissions by 2012 (2 steps: 2004, 2009).	78% reduction below full implementation of Acid Rain Program by 2012 (2 steps: 2004, 2009).	Cap CO <sub>2</sub> at 1990 levels by 2010 with additional reductions of at least 10% by 2020.	95% reduction by 2012 (2 steps: 2004, 2009).	States retain authority to prevent local adverse impacts. Federal govt. to remedy interstate impacts.	Not addressed.	Retains Clean Air Act programs for power plants such as NSR, BART and Hg MACT.
Clean Energy Group proposal (a)	50% reduction from current emission levels by 2008. T	60% reduction beyond Phase II Acid Rain Program by 2012. T	Cap CO <sub>2</sub> at 1990 levels by 2012. T	70%-90% reduction by 2012. T	No.	No.	Calls for a number of changes to NSR.
Clean Power Group proposal (b)	66% reduction from current emissions levels by 2011 (3 steps: 2005, 2008, 2011). T	73% reduction from current emission levels by 2011 (3 steps: 2005, 2008, 2011). T	No. But if Congress mandates CO <sub>2</sub> reductions, then 3 steps: (1) 2005- cap at business as usual; (2) 2009- cut growth rate; (3) 2011- declining cap.	77% reduction from current emission levels by 2011 (3 steps: 2005, 2008, 2011). T	EPA to enact "hot spot" protections for mercury only.	No.	Eliminates or modifies Clean Air Act programs, including NSR. However, NSR remains until caps take effect.
Edison Electric Institute proposal (c)	≈ 50% reduction below current emission levels by 2015. T	≈ 50% reduction below Phase II acid rain levels by 2015. T	Not required.	≈ 50% reduction by 2015. T	No.	No.	None.

Efforts to clean up America’s power plants with existing laws have repeatedly met a major stumbling block—the so-called “grandfather” loophole. This exempts older, mostly coal-fired plants granted permits before 1977 from modern air pollution standards. Even after all power plants finally comply with acid rain provisions of the 1990 Clean Air Act (in approximately 2010), grandfathered coal-fired power plants will still emit *six times* more sulfur dioxide pollution than a coal-fired power plant that meets current standards.<sup>12</sup>

The loophole for older facilities was included in 1977 clean air legislation with the understanding that these plants would retire and be replaced by newer, cleaner ones. In agreeing to this exemption, Congress also built a safety net into the law, known as “New Source Review,” to ensure that the oldest plants would eventually be cleaned up, if they were not, in fact, retired. This provision requires that grandfathered power plants upgrade their pollution controls, meeting the same standards as “new sources,” whenever they undertake major modifications to extend the useful life of the plant and significantly increase air pollution. This compromise gave power companies the flexibility to retire their old plants or to gradually modernize pollution controls at the same time they modernized their plants.

A quarter century later, however, virtually none of the plants exempted under the 1977 Act has modernized pollution controls or retired. The economic advantage enjoyed under this loophole

has helped to lock in place older, highly polluting coal-fired facilities as America's leading providers of electricity.<sup>13</sup> The owners have little incentive to build clean new plants as long as they can maximize the amount of electricity—and pollution—produced by their old ones.

The Department of Justice has charged operators of dozens of grandfathered plants with violating the law by substantially rebuilding facilities to generate more electricity without notifying EPA or improving pollution controls as required by New Source Review.<sup>14</sup> Consequently, companies wishing to build new plants face the obstacle of competing with antiquated ones that have been spared the cost of installing and operating modern pollution controls.

Two competing views have emerged in cleanup legislation over how the loophole issue should be resolved. Some of the leading bills in Congress would put an end to the exemption and cap pollution once and for all after a set period of time. The other approach, represented by the Bush administration's "Clear Skies Initiative" and some industry proposals, would cap some pollutants, but leave the grandfather loophole in place and even expand it to permit the oldest plants to continue operating without installing modern pollution controls.

Both the *Clean Power Act*, sponsored by Senators Jim Jeffords (I-VT) and Joseph Lieberman (D-CT),<sup>15</sup> and the *Clean Smokestacks Act*, sponsored by Representatives Sherwood Boehlert (R-NY) and Henry Waxman (D-CA),<sup>16</sup> would put an end to regulatory exemptions for the oldest and most polluting plants. These bills

also require that each individual plant meet modern pollution control standards either by their 30th year of operation or 5 years from enactment of the proposed legislation, whichever is later. These bills not only seek to improve air quality by cleaning up older plants, but also to encourage new plants to enter the market by eliminating the advantages enjoyed by grandfathered plants because of their much lower operating costs.

In contrast to the bills proposed by Jeffords-Lieberman and Boehlert-Waxman, other proposals do not address the problem of grandfathered plants. Notably, the Bush administration's "Clear Skies" plan seeks to expand the grandfather loophole by increasing the number and scope of exemptions available under the New Source Review program. These exemptions provide older coal-fired plants with significant new leeway to expand operations and increase emissions without having to modernize.

The Bush administration claims that New Source Review regulations will not be needed if the "Clear Skies Initiative" becomes law. It maintains emissions caps called for by its proposal will achieve the same degree of emissions reductions as enforcing New Source Review would, but with greater flexibility for industry.<sup>17</sup> However, there are two major flaws in the administration's reasoning.

First, even if the Clear Skies Initiative were enacted today, its pollution caps would not fully take effect until 2018 at the earliest.<sup>18</sup> Furthermore, the administration wants to make immediate changes to New Source Review that would not require congressional approval. Therefore, under the Bush plan, there



## “CLEAR SKIES INITIATIVE” WOULD EXPAND THE GRANDFATHER LOOPHOLE

In announcing his power plant initiative in February 2002, the president did not address whether the oldest plants would be required to clean up under his proposal. Instead, he said his initiative would replace what he termed “a maze of regulations” for power plants. Other administration officials, however, have confirmed that the Bush administration’s plan would either eliminate New Source Review or greatly expand the grandfather loophole.<sup>19</sup>

In January 2002, for example, an EPA official charged with revising the agency’s New Source Review policy, reported that several changes were being considered that would allow plants to emit more pollution and make other equipment modifications without being required to modernize pollution controls.<sup>20</sup> Among these changes are:

- Creating a new exemption allowing utilities to replace equipment without having to install new pollution controls, even if emissions go up as a result, so long as the equipment is below a certain cost.
- Allowing plants to increase their emissions to the highest level they reached in the past 10 years. Currently plants may only increase emissions to the level of the past two years. This is a regressive proposal, because over the last decade, plants have gradually reduced emissions.
- Opening a new loophole that would allow plants to replace certain equipment, even if it results in higher emissions, as long as the new component is similar to the old one.
- Setting a single emissions limit for a plant, instead of the current limit on emissions from each smokestack. This would allow a plant to add or replace equipment without having to install new pollution controls, even if pollution from certain smokestacks increases, as long as total emissions for the plant do not.
- Allowing facilities that have installed state-of-the-art pollution equipment within the last 10 years to replace other parts without having to review whether additional controls were necessary, even if those replacement parts produce more pollution.

could be a period of at least 16 years during which neither full pollution caps nor NSR would keep power plant emissions in check.

Second, unlike New Source Review, the Clear Skies plan does not require each and every “grandfathered” power plant to install state-of-the-art pollution controls if it expands in a way that increases emissions. For instance, the oldest and dirtiest power plants would be able to use the “cap and trade” system of the Bush plan to buy pollution allowances instead of cleaning up.<sup>21</sup>

This is precisely what power plants did under the Clean Air Act’s Acid Rain control program. During the first phase of that program, only a fraction (6%) of power plants installed pollution controls.<sup>22</sup> The vast majority either switched to a slightly less polluting fuel or purchased pollution allowances from the few plants that did install pollution controls.

Congress recognized in 1990 that pollution caps alone are not sufficient to force every plant to lower emissions. That is why it left New Source Review in place—the primary tool of the Clean Air Act for cleaning up grandfathered plants.<sup>23</sup> In doing so, Congress tried to protect local air quality, even while preserving maximum flexibility for industry to make pollution cuts in the most economical ways possible.

In contrast, the Clear Skies Initiative provides no such protection for local air quality, which could have serious localized health

effects. Studies by scientists at the Harvard School of Public Health have shown that health damage can occur among populations living in the immediate vicinity of grandfathered power plants. Based on the findings in these studies, hundreds of lives could be saved each year by closing the loophole and requiring plants to modernize pollution controls.<sup>24</sup>

**FIGURE 9— ESTIMATED DEATHS FROM SELECTED POWER PLANTS AND LIVES SAVED THROUGH LOWER EMISSIONS**

<b>Grandfathered Power Plants Studied by Harvard Researchers</b>	<b>Number of Deaths Caused Each Year by Power Plant Pollution</b>	<b>Number of Lives Saved Each Year If Modern Pollution Controls Are Installed</b>
Nine Chicago, Illinois-Area Power Plants. <sup>1</sup>	300	200
Two Southeastern Massachusetts Power Plants. <sup>2</sup>	159	124

Finally, by expanding the grandfather loophole, the Bush administration’s plan would increase the cost advantage older, dirtier power plants have over new or proposed plants trying to enter a deregulated and highly competitive energy market.

## 4 CARBON DIOXIDE: WHY ACTION IS NEEDED NOW

A major issue surrounding new power plant emissions controls is whether to include carbon dioxide along with other pollutants in the ultimate plan. As a candidate, Mr. Bush initially supported including CO<sub>2</sub> in the cleanup plan, but now as president he opposes this measure.<sup>25</sup>

In contrast, a growing number of electric utilities have recognized that it makes good business sense to adopt a strategy that addresses all pollutants at once, including CO<sub>2</sub>, rather than having to make major capital investments to clean up SO<sub>2</sub>, NO<sub>x</sub>, and mercury pollution now and to undertake a separate initiative for CO<sub>2</sub> at some future date.<sup>26</sup>

Many industry executives recognize that if they fail to address CO<sub>2</sub> emissions, it is only a matter of time before Congress steps in to correct the problem. With all signs pointing to impending

**“[If elected, Governor Bush will] Propose Legislation that Will Require Electric Utilities to Reduce Emissions and Significantly Improve Air Quality. [The] legislation will: Establish mandatory reduction targets for emissions of four main pollutants: sulfur dioxide, nitrogen oxide, mercury and carbon dioxide.”**

Governor George W. Bush,  
“A Comprehensive National Energy Policy,” September 29, 2000.

CO<sub>2</sub> regulation, any plan that omits this pollutant would force utilities to make investments today that may well be obsolete tomorrow. With the industry poised to add as much as 290,000 MW (million watts) of new generating capacity in the next decade—a 40% increase over current capacity<sup>27</sup>—the issue of pollution control becomes even more critical. In the words of one utility consortium, “business and markets hate uncertainty.”<sup>28</sup> That is why so many utilities have been outspoken on the need to include carbon dioxide in the ultimate legislation.

In addition to the bottom-line concerns of utility companies, other factors are having an effect on business executives and government officials as they confront the issue of carbon dioxide in power plant emissions:

- The seriousness of global warming is becoming clearer. The *Third Assessment Report* from the Intergovernmental Panel on Climate Change, released in February 2001, found that over the next 100 years, global average temperatures will rise by between 2.4° and 10.4° F (1.4° to 5.8° C).<sup>29</sup>
- Global warming has already affected ecosystems. “Examples of observed changes include shrinkage of glaciers, thawing of permafrost, ... declines of some plant and animal populations and earlier flowering of trees, emergence of insects, and egg-laying in birds.”<sup>30</sup>
- Global warming impacts could be irreversible. Irreparable damage is occurring to “glaciers, coral reefs and atolls, mangroves, boreal and tropical forests, polar and alpine ecosystems, prairie wetlands, and remnant native grasslands.”<sup>31</sup>

## ELECTRIC INDUSTRY EXECUTIVES RECOGNIZE THE VALUE OF CLEANING UP ALL MAJOR POLLUTANTS IN ONE COMPREHENSIVE PLAN

“A piecemeal pollutant-by-pollutant approach to emissions reductions is costly and inefficient.... In comparison, an integrated strategy would allow electricity generators to optimize their pollution control decisions.”

The Clean Energy Group<sup>32</sup>

“It makes good business sense to know what our CO<sub>2</sub> control obligations might be for a period of time so that we can factor that into our decisions when we comply with the other emissions reductions.... If we know the whole package, including CO<sub>2</sub>, we’d probably make a decision to retire more plants.”

Dale Heydlauff, Senior Vice President for Environmental Affairs, American Electric Power<sup>33</sup>

“Our proposal calls for mandatory, nation-wide emissions caps for nitrogen oxide, sulfur dioxide, mercury and carbon dioxide [emphasis added]; established dates certain for producing necessary emissions reductions; [and] implementation through emissions banking and trading....”

Frank Cassidy, President, PSEG Power, LLC<sup>34</sup>

“The fragmented regulatory framework which now applies to electric power plants emissions is blocking progress toward our long-term energy and environmental goals. There is need for a coordinated multi-pollutant framework for power plant emissions....”

James E. Rogers, Vice Chairman, President, and CEO, Cinergy Corporation<sup>35</sup>

Meanwhile, concerns are growing over the effects of global warming on humans:

- Researchers calculate that greenhouse gas emissions over the next 20 years will contribute to some 64,000 premature deaths, 65,000 chronic bronchitis cases, and 37 million lost “person-days” of restricted work and activity in just four large cities in the Western Hemisphere: São Paulo, Brazil; Mexico City; Santiago, Chile; and New York City.<sup>36</sup>
- A report by Harvard University’s Center for Health and the Global Environment has found that over the past three decades, global warming has contributed to a variety of weather extremes and pest problems. These have caused greater than normal fluctuations in farm income, and researchers say this pattern will likely continue. According to the report, “extreme weather events have caused severe crop damage and have exacted a significant economic toll for U.S. farmers over the past 20 years.... Expected temperature increases are likely to hasten the maturation of annual crop plants, thereby reducing their total yield potential, with extremely high temperatures causing more severe losses.”<sup>37</sup>

Despite the seriousness of the problem, carbon dioxide emissions are on a steady upward trend. The Department of Energy predicts, “Carbon dioxide emissions from energy use are projected to increase at an average rate of 1.5 percent per year, from 1,562 million metric tons of carbon equivalent in 2000 to 2,088 million metric tons in 2020. Projected emissions in 2020 are higher by 47 million metric tons carbon equivalent than in 2001,

due to higher projected energy demand in the commercial and transportation sectors and more coal-fired electricity generation [emphasis added] than in 2001.”<sup>38</sup>

## 5

## CONFRONTING CO<sub>2</sub> AND GLOBAL WARMING

Responding to mounting evidence of the effects of global warming, the 107th Congress has indicated renewed interest in legislation addressing it. In all, 36 separate pieces of proposed legislation containing elements focused specifically on greenhouse gas emissions or climate change have been introduced.

Congress is also preparing or discussing additional legislation, including:

- A bill by Senators McCain and Lieberman to establish a national cap-and-trade system for CO<sub>2</sub>
- A provision, sponsored by Senators Jeff Bingaman (D-NM) and Tom Daschle (D-SD), to create a carbon registry
- Carbon sequestration Programs, particularly for agricultural lands.

Overseas, other nations, frustrated with U.S. foot-dragging, are moving ahead on their own to implement global warming agreements. Despite the withdrawal by the U.S. from the Kyoto global warming treaty, Romano Prodi, the president of the European Commission, announced in early March 2002 that “the Council



has now approved the Kyoto Protocol thus enabling the EU to proceed with its ratification. I am confident that Member States will take the necessary steps in order to allow for a simultaneous ratification together with the European Community before 1 June 2002.”<sup>39</sup> In addition, the Japanese government has affirmed that it, too, will proceed with the Kyoto Protocol.

**“Jeffords to Tackle Global Warming,”** The Associated Press, July 10, 2001. “Vermont Sen. James Jeffords named global warming as his first priority when he formally became chairman of the Senate Environment and Public Works Committee on Tuesday.”

**“Byrd Proposal to Create Office for Climate Control Approved”** *Charleston Gazette*, August 3, 2001. “A key Senate committee has given unanimous approval to climate control legislation authored by Sen. Robert Byrd.”

**“Lieberman, McCain Announce Intent to Draft Legislation Creating Cap-and-Trade System,”** Bureau of National Affairs, *Daily Environment Report*, August 6, 2001. “Two key senators announced Aug. 3 their intent to draft legislation to cap emissions of greenhouse gases and to put in place an allowance trading system they say will encourage innovative technologies for reducing emissions of the gases believed to cause global warming.”

Even though the U.S. has no national policy for mitigating CO<sub>2</sub> emissions, individual states are acting to cut greenhouse gas emissions. At least 25 states and Puerto Rico have begun to develop “action plans” to address global warming, and 19 of them have been completed to date.<sup>40</sup> The plans recommend a number of policies to stem CO<sub>2</sub> emissions, including:

- voluntary measures for energy efficiency,
- tax incentives for fuel switching and cogeneration,
- renewable portfolio standards for utility companies,
- emissions trading, and
- recycling programs.<sup>41</sup>

Some of the plans establish future emission reduction or efficiency goals or call on the federal government to take action, while others set up stakeholder processes to identify appropriate climate change or efficiency actions.

- Massachusetts has established regulations to reduce emissions from the state’s six oldest and dirtiest power plants.<sup>42</sup> This legislation represents the first time that generating facilities have been subject to mandatory CO<sub>2</sub> reductions. Under the provisions that took effect in June 2001, the plants will no longer be “grandfathered,” or allowed to operate with weaker emissions standards than newer plants.

- Illinois has enacted a law intended to limit emissions from older power plants. The legislation could lead to significant cuts in sulfur dioxide, nitrogen oxide, mercury, and greenhouse gas emissions from the aging fleet of coal-burning electric power plants in the state.<sup>43</sup>
- New York Governor George Pataki has directed state agencies to determine what can be done “to combat the emissions of carbon dioxide from power plants and industries” associated with global warming. His directive contrasts with President Bush’s decision to back away from a campaign promise of tougher federal regulation of carbon dioxide emissions.<sup>44</sup>
- The General Assembly of California has passed a bill to control emissions of greenhouse gases. The new law could lead to sweeping changes in how cars sold in America are built, making California the first state to regulate vehicle exhaust linked to global warming.<sup>45</sup>

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## FIGURE 8

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- (b) Clean Power Group companies are: Calpine, El Paso Corp., Enron, NiSource, Trigen Energy.
- (c) Edison Electric Institute (EEI) is an association of 200 U.S. electric companies.

## FIGURE 9


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## POWER PLANT CLEANUP: MYTHS AND FACTS



With so much at stake in the debate over how best to clean up power plant pollution, a number of myths have sprung up that are not consistent with the facts. Contrary to claims by some utilities and members of the Bush administration, comprehensive reductions in power plant emissions are affordable and achievable—and they will not cause electricity shortages. The demand for new, clean power can be met economically and with existing domestic energy supplies. Indeed, coal will continue to make up a large part of our energy mix under any cleanup scenario.

As the facts demonstrate, significant reductions in air pollution from electricity plants can be a win-win solution for the environment and for consumers.

## THE BUSH ADMINISTRATION'S "CLEAR SKIES INITIATIVE" FOR POWER PLANTS

### MYTH

The Bush administration's "Clear Skies" power plant initiative will reduce power plant emissions further and faster than existing programs under the Clean Air Act.

### FACT

Although the Bush plan will reduce some power plant pollutants below today's levels, even larger reductions will result from the existing programs that the president wants to replace.

In February 2002, President Bush announced his "Clear Skies Initiative"—a plan to clean up air pollution from America's power plants. The president described his proposal for reducing three major pollutants—nitrogen oxides, sulfur dioxide, and mercury—as “the most significant step America has ever taken ... to cut power plant emissions ....”<sup>1</sup> But a look at the fine print shows that the president's proposal would actually do less than the current law.

**The President's plan is weaker than the laws it would eliminate.**

The president says his plan will both streamline regulations for industry and provide greater environmental protection.<sup>2</sup> While it is true that replacing many programs with a single one would result in “streamlining,” the ultimate test is whether or not the new program will produce similar or better results.

EPA has analyzed the emissions reductions that would result from full implementation of the Clean Air Act programs that the president's “Clear Skies Initiative” would replace.<sup>3</sup> This analysis shows that the emissions caps proposed under “Clear Skies” are higher than the caps that would be set under the existing Clean Air Act.<sup>4</sup> Thus, the president's proposal would allow more pollution than if existing laws were simply enforced.<sup>5</sup>

- **Sulfur Dioxide – “Clear Skies” cap is 50% higher:** President Bush says his plan will cap sulfur dioxide emissions from power plants at a level 73% below current emissions. But the Bush plan cap is actually 50% *higher* than the cap that would result from full implementation of current programs in the Clean Air Act.
- **Nitrogen Oxides – “Clear Skies” cap is 36% higher:** The president says his plan will cap power plant nitrogen oxide emissions at a level 67% below current emissions. But the “Clear Skies” cap is 36% *higher* than the current Clean Air Act would achieve.
- **Mercury – “Clear Skies” cap is 200% higher:** The president says his plan will cap power plant mercury emissions at 69% below the current emissions level. But the president's cap is 200% *higher* than the emissions limit that would be achieved under current law.

**FACT**

**The president’s plan would delay pollution reductions up to 10 years.**

Under President Bush’s plan, final pollution reductions for the three pollutants covered by his proposal would not be achieved until 2018. Existing laws, however, would produce even deeper reductions up to a decade sooner: Caps for nitrogen oxides would be met by 2010; sulfur dioxide by 2012; and mercury by 2008.

**FIGURE 10— Comparison of Bush Administration “Clear Skies” Power Plant Initiative With Existing Clean Air Act Programs**

	NITROGEN OXIDES (NO <sub>x</sub> )	SULFUR DIOXIDE (SO <sub>2</sub> )	MERCURY (Hg)	CARBON DIOXIDE (CO <sub>2</sub> )
<b>Clean Air Act</b> (existing programs) <sup>1</sup>	1.25 million ton cap by 2010 <sup>2</sup>	2 million ton cap by 2012 <sup>3</sup>	Maximum emission of 5 tons per year by 2008 <sup>4</sup>	
<b>Bush “Clear Skies” Plan</b> (two-step approach) <sup>5</sup>	2.1 million ton cap by 2008 1.7 million ton cap by 2018	4.5 million ton cap by 2010 3 million ton cap by 2018	Maximum emission of 26 tons per year by 2010 Maximum emission of 15 tons per year by 2018	No Limit
Increase allowed by Bush plan over Clean Air Act existing programs (by 2018) <sup>6</sup>	450,000 tons more NO <sub>x</sub>	1 million tons more SO <sub>2</sub>	10 tons more Hg	No Limit
% increase allowed by Bush plan over Clean Air Act existing programs (by 2018)	36% more NO <sub>x</sub>	50% more SO <sub>2</sub>	200% more Hg	No Limit
Delay allowed by Bush plan over Clean Air Act existing programs	8-year delay	6-year delay	10-year delay	

## MYTH

**Carbon dioxide cannot be included in cleanup legislation because it will be too expensive for plant owners and consumers.**

## FACT

**Studies by EPA and the Department of Energy show that it can be affordable to include carbon dioxide in cleanup legislation.**

Both EPA and the U.S. Department of Energy (DOE) have analyzed the cost of implementing cleanup legislation. Although their calculations have been criticized for inflating costs, the agencies' estimates show that including carbon dioxide in the plan is only slightly more costly than excluding it.<sup>6</sup>

(1) The EPA calculated that costs of making significant CO<sub>2</sub> reductions from power plants were “negligible for all cases, and may even result in economic benefits.”<sup>7</sup> A similar analysis by DOE also found that such costs were negligible.<sup>8</sup>

(2) Costs of reducing CO<sub>2</sub> emissions from power plants would be still lower than EPA and DOE project, if flawed assumptions by each were corrected. For instance:

- Both DOE and EPA overstate the costs of reducing CO<sub>2</sub> emissions by attributing construction costs for new natural gas plants to CO<sub>2</sub> reductions rather than to basic market demand for electricity. In fact, about 42% of additional required electricity capacity is already either in operation or under construction.<sup>9</sup> Therefore, if new natural gas plants are being built to meet market demand and are expected to be profitable at market rates, then their construction costs won't increase future production costs for electricity.
- According to the DOE and EPA analyses, total reduction costs for carbon dioxide reflect the price of tradable emissions permits. However, EPA has historically overestimated the cost of permits under a "cap and trade" scheme. For instance, when the Acid Rain Program was proposed in 1990, EPA overestimated the actual cost of SO<sub>2</sub> permits by more than a factor of five.<sup>10</sup> After years of experience implementing this program, EPA acknowledged, "independent studies show that real-life experiences with the program reveal greater cost savings than initially expected, due in large part to the efficiencies achieved through emissions trading."<sup>11</sup> It is reasonable, therefore, to expect that actual permit prices for CO<sub>2</sub> credits would be significantly lower than EPA's projections.

(3) Finally, under every scenario modeled by DOE, additional energy efficiency combined with increases in the percent of electricity generated from renewable sources (*e.g.*, wind, solar,

biomass, and geothermal energy) further reduce CO<sub>2</sub> emissions from the power sector and cut costs to consumers by about 16% compared with the less efficient business-as-usual scenarios that rely more heavily on fossil fuels.<sup>12</sup>

8

## NATURAL GAS AND THE DEMAND FOR CLEAN ENERGY

### MYTH

**The U.S. does not have adequate supplies of natural gas to meet increased demand if power plants are required to reduce carbon dioxide emissions.**

### FACT

**Government data show that the U.S. has abundant natural gas supplies more than adequate to meet future demand, even if power plants are required to reduce CO<sub>2</sub> emissions.**

- The DOE projects that U.S. consumption of natural gas will be 33.8 trillion cubic feet (tcf) per year in 2020 under a “business as usual” scenario that takes into account various growth factors.<sup>13</sup> Some electric utilities claim that a cap on CO<sub>2</sub> emissions will result in a precipitous rise in natural gas consumption if they are required to switch from coal to a fuel source such as natural gas with lower CO<sub>2</sub> emissions. The DOE calculates,

however, that consumption of natural gas will increase less than 10% above business as usual by 2020 if power plant carbon dioxide emissions are capped as part of multi-pollutant legislation.<sup>14</sup>

- Natural gas supplies—both domestic and imported—are more than adequate to meet the increase in consumption projected to occur with a CO<sub>2</sub> cap for power plants. According to the National Petroleum Council, U.S. onshore and offshore natural gas reserves total 1,779 trillion cubic feet (tcf), equal to a 52.6-year supply at 2020 demand levels.<sup>15</sup> If a cap on CO<sub>2</sub> emissions from power plants were to take effect, the additional consumption of natural gas would mean a 48-year supply at 2020 demand levels—only a few years less than with no cap.<sup>16</sup>
- DOE also projects that the additional demand for natural gas due to a cap on CO<sub>2</sub> emissions will be met through higher imports and increases in domestic production.<sup>17</sup> Total domestic production in 2020 is projected to be 1.3 trillion cubic feet higher with a cap on CO<sub>2</sub> emissions from power plants. In addition, DOE projects that there will be significant growth in natural gas imports both from Mexico and other countries such as Canada, Algeria, and Australia.<sup>18</sup>



## MYTH

Deep cuts in emissions of pollutants from power plants—especially carbon dioxide—will drastically reduce or even eliminate coal as a source of electricity.

## FACT

Coal-fired power plants have a number of options for meeting CO<sub>2</sub> reduction targets, all of which allow for the continued use of this fuel source.

There are many ways that coal-fired power plants can comply with CO<sub>2</sub> reductions without having to abandon coal: (1) purchase CO<sub>2</sub> credits from other utilities through the cap-and-trade program; (2) employ advanced coal technologies to reduce CO<sub>2</sub> output or even capture CO<sub>2</sub> before it leaves the plant; and (3) reduce CO<sub>2</sub> emissions by increasing energy efficiency.

### Trading Carbon Emissions Credits

Under an emissions cap-and-trade system, individual power plants can comply with the CO<sub>2</sub> cap either by reducing pollution at their plants (for instance, by installing pollution controls or switching to less-polluting fuels) or by “trading,” purchasing emissions allowances from other plants that have reduced emissions below their required limit. In this way, individual plants can

make the decision that is most economically efficient, given the unique characteristics of each plant (*e.g.*, age, size, fuel use, cost of adding pollution controls, etc.). Many coal-fired power plants will be able to satisfy a significant portion of their CO<sub>2</sub> reduction obligations through the purchase of emissions allowances generated by other plants that install pollution controls or switch to lower carbon fuels. The plants selling credits also earn revenue from the transaction.

### **Advanced Coal Technologies**

While some in the electric industry claim that there are no technologies available to coal-fired power plants for reducing CO<sub>2</sub>, the coal industry's own advisory council says that viable, commercially available technology can substantially reduce CO<sub>2</sub> emissions from coal-fired power plants.

*Increasing Electricity Availability From Coal-Fired Generation in the Near-Term* (May 2001), a publication of the National Coal Council, points to a proven advanced technology—"Integrated Gasification Combined Cycle" (IGCC) steam turbines. IGCC converts coal to a gas and then burns it in a state-of-the-art combined cycle turbine to generate electricity (similar to turbines used by the cleanest natural gas-fired power plants today). Current IGCC technology is capable of reducing CO<sub>2</sub> emissions by 23% over conventional coal-fired power plants, and reductions are expected to reach 57% as the technology improves.<sup>19</sup> Thus, coal can remain an important part of our energy future—even with a cap on CO<sub>2</sub> emissions from power plants.

## Energy Efficiency

If every coal or natural gas fired plant in the U.S. operated 5% more efficiently, greenhouse gas emissions in 2010 could be cut by nearly 40 million metric tons of carbon, approximately 10% of the total reduction target the U.S. negotiated under the 1997 Kyoto climate change agreement.<sup>20</sup>

Today, power plants are only about 33% efficient.<sup>21</sup> U.S. DOE and the Office of Technology Assessment (OTA) examined potential improvements in power plant efficiency and determined that a 5% increase in efficiency could be achieved at little or no cost to utilities because efficiency improvements pay for themselves over time.<sup>22</sup>

If such efficiencies are feasible and cost-effective, why haven't they been implemented before now? One reason is that electric utilities pass increases in the price of fuel directly on to consumers. This has eliminated the market incentive that drives nearly every other industry to conserve raw materials. Another reason is more generic to industry as a whole: There is a reluctance to invest in improvements that have more than a two-year payback.<sup>23</sup> While some efficiency measures easily meet this target, others do not. Recently, however, there have been signs that some businesses are beginning to implement energy efficiency improvements with paybacks as long as five years.<sup>24</sup>

## MYTH

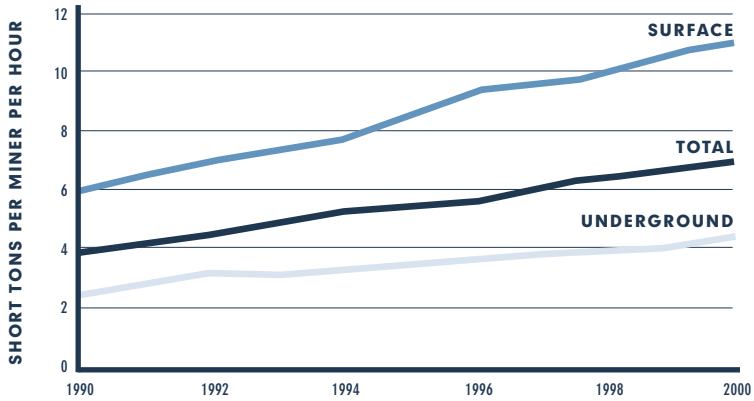
Regulations limiting air pollution from power plants are the main cause of declining coal production and job losses in the mining industry.

## FACT

Coal production in the U.S. has been rising steadily, not declining, for years, and most mining jobs are lost to mechanization, not air pollution regulations.

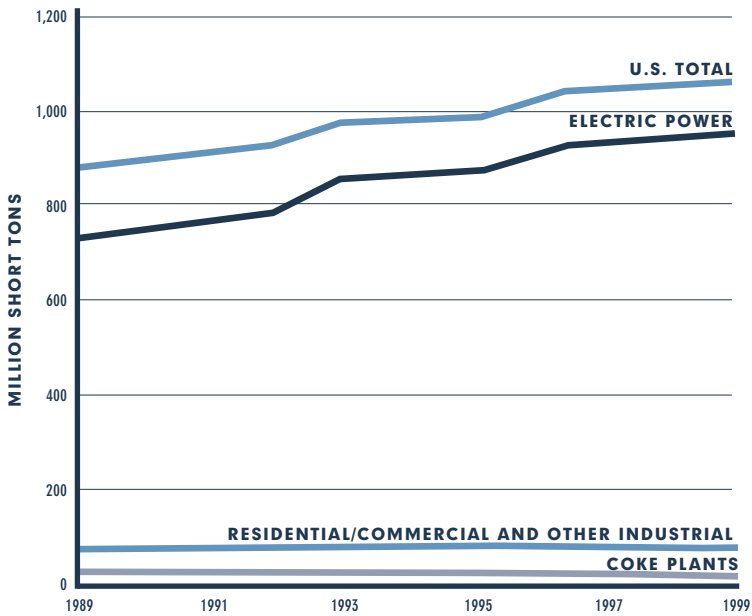
- According to the U.S. Department of Labor, job loss in the coal mining industry over the past decade has been the result of changes within industry itself. The Labor Department reported that mining jobs declined because “new technology and more sophisticated mining techniques increased productivity, allowing growth in output while employing fewer workers.”<sup>25</sup> The Department further stated that “although production of coal is expected to increase, employment should continue to decline, as more efficient and automated production operations require less labor.”<sup>26</sup>
- The coal mining industry as a whole has experienced robust increases in productivity over the past decade, in spite of environmental regulations such as the Acid Rain Program amendments to the 1990 Clean Air Act.

**FIGURE 11— U.S Coal Mining Productivity by Type of Mine, 1990-2000<sup>27</sup>**



- The steady growth in productivity for coal is expected to continue into the future. For instance, in 2000, the industry produced 22.58 quadrillion Btu (British thermal units) worth of energy from coal. The U.S. Department of Energy predicts that number will grow to 26.88 quadrillion Btu by 2020 under a scenario of low economic growth and to 30.08 quadrillion Btu with high growth, an increase of as much as 25%.<sup>28</sup>
- Coal consumption in the U.S. continued to rise throughout the 1990s, in spite of the sulfur dioxide reductions called for by the Clean Air Act Acid Rain Program.

**FIGURE 12— Coal Consumption by Sector, 1989-1999<sup>29</sup>**



- Although the Labor Department claims that stricter environmental regulations for electric power plants have the *potential* to induce plants to replace coal with cleaner fuels, it acknowledges that recent improvements in clean coal technologies such as integrated gasification combined cycle (IGCC) will allow utilities to continue burning coal.<sup>30</sup>
- Finally, in key coal-mining and coal-consuming states like Kentucky and Ohio, the majority of residents do not believe that environmental regulations are to blame for the decline in coal industry jobs. Rather, most say that jobs have been lost mainly because companies have replaced workers with machines that can do the same tasks.

—In Kentucky, only 16% of residents surveyed blamed environmental regulations for lost coal jobs; nearly two-thirds (64%) said job loss was due to workers being replaced by machines.<sup>31</sup>

—Only 16% of residents surveyed in Ohio blamed environmental regulations for a loss of coal industry jobs; 63% said mechanization was the reason.<sup>32</sup>

11

## POWER PLANT CLEANUP AND RELIABLE ELECTRICITY SUPPLIES

MYTH

**Reducing carbon dioxide pollution from power plants is too risky at this time, because it could discourage the development of new power plants needed to ease America’s “energy crisis.”**

FACT

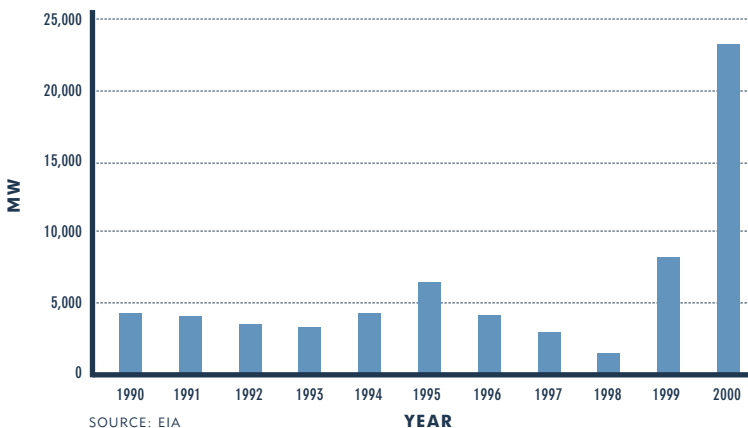
**America is not in an energy crisis: New power plants are being built at a record pace. The industry is investing in more new electric generating capacity now than at any time in history, and can provide more than enough power to meet future needs.**

The notion that electricity shortages might result if utilities were required to reduce carbon dioxide emissions gained national prominence in March 2001. At that time, California’s electricity crisis was at its peak.

Less than six months after declaring a crisis, however, California's problems were over, and many analysts predicted that the U.S. might be building too much new power capacity. U.S. Energy Secretary Spencer Abraham acknowledged early in 2002 that the fears of an energy crisis had passed, and that America was in an unprecedented period of adding new electric generating capacity.

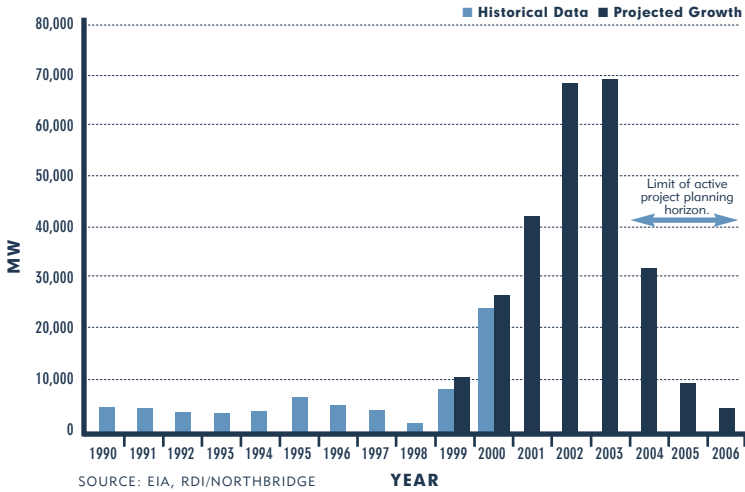
In fact, 74,527 MW of new generating capacity has been built since 1998. As of October 2001, 105,324 MW of new generating capacity is under construction, and an additional 79,902 MW of capacity is under development to go on line by 2006. Annual capacity additions are projected to continue rising to over 60,000 MW of new capacity per year in 2002 and 2003. This is more new capacity than was added in the entire decade of the 1990s.

**FIGURE 13— Electric Generating Capacity Added -1990-2000<sup>33</sup>**

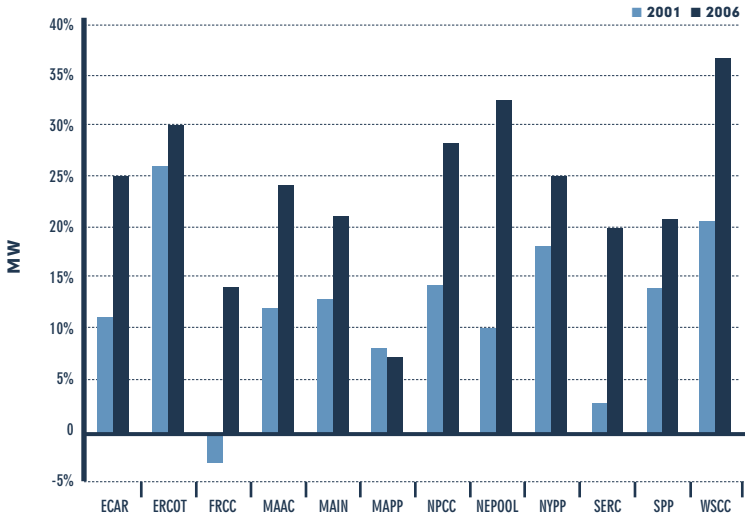




**FIGURE 14— Historical vs. Projected Growth in Generating Capacity: 1990–2006<sup>34</sup>**



**FIGURE 15— Current and Projected Electrical Capacity Reserve Margins<sup>35</sup>**



**“Just months after the Bush administration painted a picture of shortages and called for a power plant a week to be built for the next 20 years, power prices are falling, industry analysts are warning of a surplus of electricity in parts of the country and some companies are reconsidering their plans to build new plants.”**

*“As Prices Fall, Utilities Weigh the Economics of New Plants,”  
The New York Times, August 22, 2001.*

**“Consider what did not happen in 2001. Gasoline prices did not surge; they dropped. Electricity prices did not continue climbing; they dropped. Natural gas prices did not increase; they dropped. In the face of Enron’s collapse, the largest bankruptcy in U.S. history, there were no price spikes, no trading panics, no electricity outages and no gas shortages. On the contrary, we’ve added some 51,000 megawatts of electricity this year and some 99,000 are scheduled to come on line in 2002. That’s more power added to our economy than at any time in history.”**

*Energy Secretary Spencer Abraham, “Deregulation Is Working,” The Washington Post, January 14, 2002.*

## ENDNOTES

- 1 Remarks by President Bush at National Oceanographic and Atmospheric Administration, "U.S. Environmental Policy," February 14, 2002; <http://www.whitehouse.gov/news/releases/2002/02/20020214-5.html>.
- 2 *Ibid.*
- 3 U.S. EPA, "Discussion of Multi-Pollutant Strategy," Meeting with Edison Electric Institute, September 18, 2001; "Comparison of Requirements Under Business-as-Usual and the Straw Proposal," p. 10; <http://www.cleartheair.org/currentstatus.pdf>. EPA prepared this analysis for the Edison Electric Institute, a consortium of the nation's electric utilities. The analysis compares EPA's "straw" proposal for power plant cleanup (an earlier and more stringent version of the "Clear Skies" plan) with the level of cleanup that would occur if existing Clean Air Act programs were fully implemented (the so-called "business as usual" scenario). Although EPA's straw proposal was ultimately rejected by the White House in favor of the weaker "Clear Skies" plan, EPA's "business as usual" analysis remains as a valid measure of emissions caps that would result if current Clean Air Act programs were fully implemented.
- 4 *Ibid.* See Figure 10 for a comparison of "Clear Skies" emissions caps and Clean Air Act "business-as-usual" emissions caps.
- 5 There will be increases in emissions under the Bush "Clear Skies" plan from emissions that would occur under the Clean Air Act "business-as-usual" scenario, because the Bush plan replaces existing Clean Air Act programs rather than supplementing them. In his speech announcing the power plant cleanup plan, the president confirmed that "the Clean [sic] Skies legislation ... will replace a confusing, ineffective maze of regulations for power plants ..."; <http://www.whitehouse.gov/news/releases/2002/02/20020214-5.html>. In testimony before Congress in July 2001, EPA Administrator Whitman confirmed that the administration's power plant cleanup program would replace rather than supplement existing Clean Air Act programs. See [http://www.senate.gov/~epw/whitman\\_0726.htm](http://www.senate.gov/~epw/whitman_0726.htm).
- 6 U.S. EPA, *Analysis of Multi-Emissions Proposals for the U.S. Electricity Sector* (Requested by Senators Smith, Voinovitch and Brownback), November 1, 2001; <http://www.epa.gov/air/meproposalsanalysis.pdf>. In this analysis, EPA looked only at SO<sub>2</sub>, NO<sub>x</sub>, and mercury control costs and found that reductions of these pollutants caused little or no increase in electricity prices. EPA stated, "The impact of the policies on wholesale power price is small, ranging from 0.5 mills/kwh to 0.7 mills/kwh, or 1.9% to 2.4% respectively. The percentage impact on consumers would be less, reflecting the other components of consumer price not affected by these scenarios." *Ibid.*, p. 14. The high end of the price increase range (0.7 mills/kwh) applied to a projected average residential electricity bill in 2010, based on Department of Energy sales and price forecasts, adds 73 cents to the monthly bill. It is difficult to calculate additional costs from CO<sub>2</sub> reductions, because neither EPA nor the Department of Energy has analyzed CO<sub>2</sub> costs independently of other pollution reduction costs. Both EPA and DOE analyze CO<sub>2</sub> reductions as part of an overall package that includes reductions of SO<sub>2</sub>, NO<sub>x</sub>, and mercury. In doing so, however, both agencies recognize that steps for reducing CO<sub>2</sub> will also reduce emissions of the other pollutants. DOE states, for example, that "the cost for NO<sub>x</sub> emission allowances is expected to decline to zero by 2010 because the actions taken to [reduce CO<sub>2</sub>] result in [lower] NO<sub>x</sub> emissions." U.S. Department of Energy, *Analysis of Strategies for Reducing Multiple Emissions from Electric Power Plants with Advanced Technology Scenarios*, October 2001, pp. 23-24; [http://www.eia.doe.gov/oiaf/servicrpt/eppats/pdf/sroiaf\(2001\)05.pdf](http://www.eia.doe.gov/oiaf/servicrpt/eppats/pdf/sroiaf(2001)05.pdf).

- <sup>7</sup> U.S. EPA, *Economic Analysis of a Multi-Emissions Strategy*, prepared for Senators James M. Jeffords and Joseph I. Lieberman, October 31, 2001, p. 27; <http://www.epa.gov/air/jeffordslieberm.pdf>. The reduction target analyzed by EPA was 58 million metric tons of carbon by 2020.
- <sup>8</sup> U.S. Department of Energy, *Analysis of Strategies for Reducing Multiple Emissions from Electric Power Plants with Advanced Technology Scenarios*, October 2001, p. 29, Table 8; [http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf\(2001\)05.pdf](http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf(2001)05.pdf)
- <sup>9</sup> Clean Air Task Force, *Scraping the Bottom of the Barrel for Power: Why There Is No Need to Relax Clean Air Safeguards on Dirty Power Plants to "Keep the Lights On,"* November 8, 2001; <http://cta.policy.net/relatives/18560.pdf>. See Appendix A, "Electric Power New Capacity Additions Update," Erin O'Neill, The NorthBridge Group, October 31, 2001, p. 3, figure 2 ("U.S. Historic and Projected Capacity Additions").
- <sup>10</sup> U.S. EPA, *Progress Report on the EPA Acid Rain Program*, November 1999, p. 4; <http://www.epa.gov/airmarkets/progress/arpreport/acidrainprogress.pdf>.
- <sup>11</sup> *Ibid.*
- <sup>12</sup> U.S. Department of Energy, *Analysis of Strategies for Reducing Multiple Emissions from Electric Power Plants with Advanced Technology Scenarios*, October 2001, p. xiv, Table E2; [http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf\(2001\)05.pdf](http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf(2001)05.pdf).
- <sup>13</sup> U.S. Department of Energy, *Annual Energy Outlook 2002 with Projections to 2020*, December 2001, p. 4; [http://www.eia.doe.gov/oiaf/aeo/pdf/0383\(2002\).pdf](http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2002).pdf).
- <sup>14</sup> U.S. Department of Energy, *Analysis of Strategies for Reducing Multiple Emissions from Electric Power Plants with Advanced Technology Scenarios*, October 2001, p. xiv, Table ES2; [http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf\(2001\)05.pdf](http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf(2001)05.pdf). Compare primary energy consumption of natural gas under the 2020 reference case with emissions limits and without emissions limits.
- <sup>15</sup> National Petroleum Council, *Meeting the Challenge of the Nation's Growing Natural Gas Demand*, December 1999, p.39, Table 3; <http://www.npc.org/reports/ReportVol1.pdf>. Total proved and additional assessed natural gas supplies equal 1,466 tcf for the lower 48 states and 313 tcf for Alaska, for a total of 1,779 tcf for the U.S., as of 1999.
- <sup>16</sup> *Ibid.*, footnotes 14 and 15. If, as DOE states, natural gas consumption will be 33.8 tcf by 2020 without a CO<sub>2</sub> cap and 10% higher with a CO<sub>2</sub> cap, then natural gas consumption will increase to 37.18 tcf by 2020 with a cap. If, as National Petroleum Council states, natural gas supplies are currently (as of 1999) 1,779 tcf, then there will be an approximately 48-year supply of natural gas with a CO<sub>2</sub> cap, as opposed to 52.6 years without a CO<sub>2</sub> cap.
- <sup>17</sup> U.S. Department of Energy, *Analysis of Strategies for Reducing Multiple Emissions from Electric Power Plants with Advanced Technology Scenarios*, October 2001, pp. 25-26; [http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf\(2001\)05.pdf](http://www.eia.doe.gov/oiaf/servicerpt/eppats/pdf/sroiaf(2001)05.pdf).
- <sup>18</sup> *Ibid.*
- <sup>19</sup> R.H. Williams, *Advanced Energy Supply Technologies*, Chapter 8, "World Energy Assessment: Energy and the Challenge of Sustainability," United Nations Development Programme, 2000.

- <sup>20</sup> National Environmental Trust, *Powering the Future: Clean Energy for a Clean Environment*, 1997. This report uses U.S. EPA and U.S. DOE data to calculate emission rates for power plants. The average emissions rates (lb CO<sub>2</sub>/MWh) vary tremendously for coal and for natural gas, as much as 40%. On average, coal-fired plants emit 2,300 lb/MWh, and natural gas-fired plants emit 1,300. Given the current amounts of generation from each fuel, a 5% increase in efficiency means 40 million metric tons of carbon equivalent (MMtC) not released into the atmosphere. This is approximately 10% of the U.S. reduction goal under the Kyoto Protocol. For a copy of this report, contact National Environmental Trust, 202-887-8800.
- <sup>21</sup> Coal-fired power plants are approximately 33% efficient, on average. This means that only 33% of the energy potentially obtained from burning the coal is actually converted to electricity. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, *Scenarios of U.S. Carbon Reductions: Potential Impacts of Energy Technologies by 2010 and Beyond* (Report # ORNL/CON-444, Washington, DC, 1997), pp. 7.28-7.29.
- <sup>22</sup> *Ibid.*
- <sup>23</sup> Capital improvements other than new construction typically require a two-year payback period before investment will occur. New Jersey Department of Environmental Protection, *Evaluation of the Effectiveness of Pollution Prevention Planning in New Jersey*, May 1996. Companies, however, capitalize new construction and new processes over 20 years or more. Many energy efficiency projects have paybacks longer than two years, especially if new equipment is involved. In general, companies choose to treat energy efficiency as any other capital investment, rather than giving it the status of a genuine process upgrade; consequently, it won't necessarily get done.
- <sup>24</sup> For example, see F. Irwin *et al.*, *Taking a Byte out of Carbon: Electronics Innovation for Climate Protection*. World Resources Institute, 1998.
- <sup>25</sup> U.S. Department of Labor, Bureau of Labor Statistics, *Mining and Quarrying* website. See *Nature of Industry*; <http://www.bls.gov/oco/cg/cgs004.htm#nature>; and *Outlook*; <http://www.bls.gov/oco/cg/cgs004.htm#outlook>.
- <sup>26</sup> *Ibid.*
- <sup>27</sup> U.S. Department of Energy, *Coal Industry Annual 2000*, 2000, p. 63, figure 5; <ftp://ftp.eia.doe.gov/pub/pdf/coal.nuclear/05842000.pdf>.
- <sup>28</sup> U.S. Department of Energy, *Annual Energy Outlook 2002 with Projections to 2020*, December 2001, p. 7, Table 1; [http://www.eia.doe.gov/oiia/aeo/pdf/0383\(2002\).pdf](http://www.eia.doe.gov/oiia/aeo/pdf/0383(2002).pdf).
- <sup>29</sup> U.S. Department of Energy, *U.S. Coal Supply and Demand: 2000 Review*, 2000, p. 6, fig. 5; <http://www.eia.doe.gov/cneaf/coal/page/special/feature.pdf>.
- <sup>30</sup> U.S. Department of Labor, Bureau of Labor Statistics, *Mining and Quarrying* website. See *Outlook*; <http://www.bls.gov/oco/cg/cgs004.htm#outlook>.
- <sup>31</sup> The Mellman Group, Inc., "Kentucky 4th Congressional District Voter Attitudes Toward Clean Air Regulations," September 4, 1998. The Mellman Group designed and administered this survey conducted by professional interviewers. The survey interviewed 400 likely November 1998 voters in Kentucky's 4th Congressional District. The survey was conducted between August 19 and 22, 1998. The margin of error is +/- 4.9 percentage points at the 95% confidence level. A copy is available from National Environmental Trust, 202-887-8800.

<sup>32</sup> The Mellman Group, Inc., "Ohio 6th Congressional District Voter Attitudes Toward Clean Air Regulations," September 8, 1998. The Mellman Group designed and administered this survey conducted by professional interviewers. The survey interviewed 400 likely November 1998 voters in Ohio's 6th Congressional District. The survey was conducted between August 25 and 27, 1998. The margin of error is +/- 4.9 percentage points at the 95% confidence level. A copy can be obtained from National Environmental Trust, 202-887-8800.

<sup>33</sup> Clean Air Task Force, *Scraping the Bottom of the Barrel for Power: Why There Is No Need to Relax Clean Air Safeguards on Dirty Power Plants to "Keep the Lights On,"* November 8, 2001; <http://cta.policy.net/relatives/18560.pdf>. See Appendix A, "Electric Power New Capacity Additions Update," Erin O'Neill, The NorthBridge Group, October 31, 2001 ("U.S. Historic and Projected Capacity Additions"). New generation projections in this "Update" are based on a forecast prepared by The NorthBridge Group. Information on plants under construction or in the development process used to prepare this forecast comes from the October update of "NEWGen" database maintained by Resource Data International (RDI). The process for siting, permitting, and constructing a new power plant typically takes four to five years. The status of plants in the early stages of this process is less certain than those in advanced stages of development. Thus, new power plant development projections can only be made based on current market activity through about 2004-6.

<sup>34</sup> *Ibid.*

<sup>35</sup> *Ibid.*

## FIGURE 10

- 1 U.S. EPA, "Discussion of Multi-Pollutant Strategy," Meeting with EEI, September 18, 2001; "Comparison of Requirements Under Business-as-Usual and the Straw Proposal," p. 10; <http://www.cleartheair.org/currentstatus.pdf>.
- 2 *Ibid.* EPA projects that measures to implement the national ambient air quality standard ("NAAQS") for ground-level ozone will lead to a cap on power plant nitrogen oxide (NOx) emissions of 1.09 million tons per year in the so-called "OTAG" region by 2010. "OTAG" is the "Ozone Transport Assessment Group" and covers 37 states in the eastern half of the country. EPA's analysis does not calculate what the cap will be for the entire country. However, informal discussions with EPA air quality officials have indicated that the nationwide cap on power plant NOx emissions by 2010 will be 1.25 million tons per year under existing CAA programs.
- 3 *Ibid.*, p. 10. Sulfur dioxide is the primary cause of fine particulate matter pollution. EPA projects that, in order to meet national ambient air quality standards for fine particulate matter (the "PM 2.5 NAAQS") by 2012, a 2 million ton per year cap on power plant sulfur dioxide emissions will be necessary.
- 4 U.S. EPA, presentation on Section 112 "Maximum Achievable Control Technology" (MACT) rule for mercury, December 4, 2001; <http://www.cleartheair.org/epamercury.pdf>. EPA's analysis shows that the Clean Air Act's MACT rule for mercury will result in a 5 ton per year mercury emissions rate for the electric utility industry. See U.S. EPA presentation, pp. 4-6, where EPA states "If we did MACT now for coal and ... if we subcategorized by coal type ... this would result in ... tons emitted under MACT ... total ~ 5."
- 5 See White House, "Fact Sheet: President Bush Announces Clear Skies & Global Climate Change Initiatives"; <http://www.whitehouse.gov/news/releases/2002/02/20020214.html>.
- 6 There will be increases in emissions under the Bush plan from emissions that would occur under the Clean Air Act "business as usual" scenario because the Bush plan replaces existing Clean Air Act programs rather than supplementing them. In his speech announcing the power plant cleanup plan, the president confirmed that "[t]he Clean Skies legislation ... will replace a confusing, ineffective maze of regulations for power plants"; <http://www.whitehouse.gov/news/releases/2002/02/20020214-5.html>. In testimony before Congress in July 2001, EPA Administrator Whitman confirmed that the administration's multi-pollutant program would replace rather than supplement existing Clean Air Act programs. See: [http://www.senate.gov/~epw/whitman\\_0726.htm](http://www.senate.gov/~epw/whitman_0726.htm)





# IV

## HEALTH AND ENVIRONMENTAL IMPACTS



Of all the reasons driving policy makers to develop plans for cleaning up power plants, the most compelling is the growing body of scientific evidence linking harmful air pollution from these plants with damage to human health and the environment. Heading the list of adverse effects are global warming, asthma attacks, acid rain, and premature death. Recent studies show that significant reductions in major air pollutants from power plants—specifically sulfur dioxide, nitrogen oxides, carbon dioxide, and mercury—will lead to major improvements in public health and environmental quality.

Scientific studies show that there are serious and wide-ranging health consequences from exposure to sulfur dioxide and nitrogen oxides. Unfortunately, millions of Americans regularly breathe unhealthy levels of these contaminants.

Power plant emissions of sulfur dioxide and nitrogen oxides alone are responsible each year for an estimated:

- 30,100 deaths
- 20,100 hospitalizations
- 603,000 asthma attacks
- 5,130,000 lost workdays due to illness<sup>1</sup>

### **Power Plants and Death**

Scientists have been able to demonstrate a link between air pollution from particular power plants and serious health effects, including premature death. For example, researchers at the Harvard School of Public Health found that air pollution from a group of power plants in the Chicago area was responsible for approximately 400 deaths per year. The study found that cleaning up emissions from these plants would save approximately 300 lives per year. This important research was reported in a publication of the Harvard Center for Risk Analysis under its former

director, John Graham. Graham later joined the Bush administration as head of the Office of Information and Regulatory Affairs in the White House Office of Management and Budget.<sup>2</sup>

Death due to fine particle pollution from power plants, most frequently affecting the elderly, follows days when pollution levels are high. Research shows that people living in areas with elevated levels of fine particle soot die months or years earlier than they otherwise would. Death rates in these areas usually remain high for weeks or months following periods of increased pollution.

Studies also show that cleaning up sulfur dioxide and nitrogen oxide emissions from power plants would have enormous public health benefits each year, including:

- 18,700 lives saved
- 366,000 fewer asthma attacks
- 12,200 fewer hospitalizations
- \$100 billion savings from reduced illness and death<sup>3</sup>

Other recent research has shown that ozone caused by nitrogen oxides from power plants and other sources not only triggers asthma attacks but may also contribute to the onset of asthma in healthy children. A new study by the California State Air Resources Board and the University of Southern California points strongly to ozone as a cause in the development of asthma



in young people who did not previously have the disease.<sup>4</sup> Researchers found that children living in communities with high ozone levels who played three or more sports developed asthma at a rate three times higher than those in low ozone areas. Because participation in very physical sports can result in a child drawing up to 17 times the “normal” amount of air into the lungs, young athletes are more likely to develop asthma.

### **Health Impacts Are Worst Near Power Plants**

During the summer of 2000 (the most recent year for which data are available), the health-based standard for ozone smog was exceeded in 39 states and the District of Columbia. In all, there were more than 4,000 violations of the federal health standard for ozone in 2000.<sup>5</sup> There is a strong correlation between high concentrations of ozone smog and proximity to power plants, especially in the Midwest and Southeast, where roughly 60% of the nation’s coal-fired power plants are located. In the Ohio

## Air Pollution from Power Plants Harms Public Health

**Fine Particle Soot:** When power plants burn coal, they produce sulfur dioxide that forms fine particles that are extremely harmful to human health. These particles can be inhaled deeply into the lungs where they lodge, causing severe damage, including asthma attacks, respiratory illness, and premature death. Sulfur dioxide from power plants is the leading cause of fine particle soot in the eastern half of the U.S.<sup>6</sup>

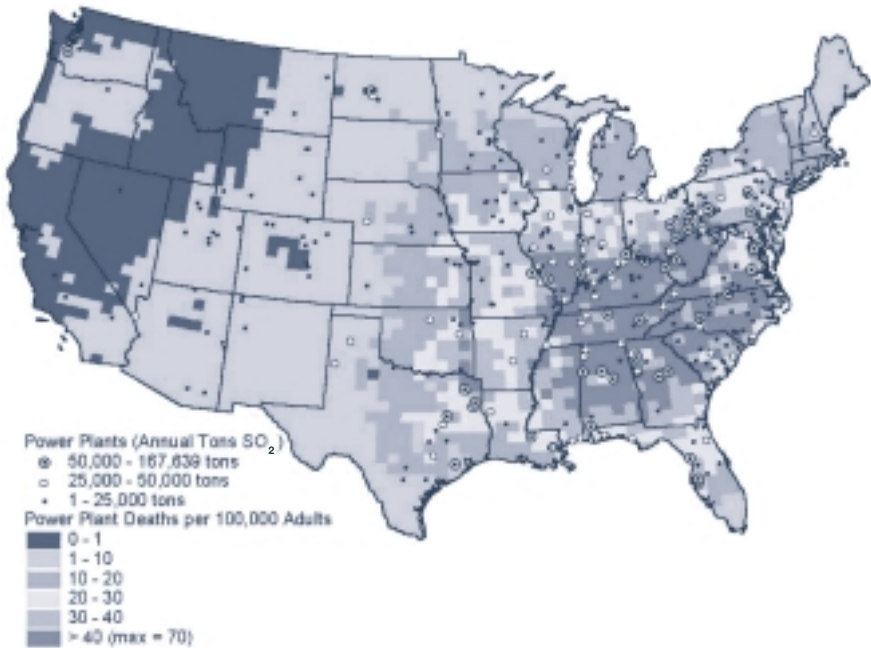
**Ozone Smog:** Power plants produce nitrogen oxides that are transformed into ozone smog on hot summer days, resulting in “code red” conditions in cities and towns throughout the U.S. Ozone smog causes respiratory damage ranging from temporary discomfort to asthma attacks and long-term, permanent lung damage. Coal-burning power plants produce more nitrogen oxide pollution than any other industrial source.<sup>7</sup>

Valley, for example, emissions from coal- and oil-fired power plants account for nearly 50% of elevated ozone levels in the valley, enough *by themselves* to cause violations of the federal health standard for this pollutant.<sup>8</sup>

Likewise, the areas with the highest concentrations of fine particle pollution are also the ones with the greatest number of coal-

fired power plants. In the map, the areas with the highest concentration of deadly particle pollution also contain the greatest number of coal-burning power plants.

**FIGURE 16—Correlation of Deaths From Power Plant Air Pollution and Location of Coal-Fired Power Plants**



Recent studies by researchers at the Harvard School of Public Health have established that people who live within a 30-mile radius of certain large, coal-fired power generators are three to four times more likely to die from air pollution than people who live 30 miles or more from these plants.<sup>9</sup>

In 1990, responding to growing concern over acid rain, Congress and President George H. W. Bush's administration set significant reductions in sulfur dioxide and nitrogen oxide emissions from power plants by amending the Clean Air Act. Although these changes resulted in some reduction of power plant emissions, it is increasingly well documented that the problem of acid rain was not and will not be fixed by these measures alone. Over 150 years of sulfur and nitrogen depositions have taken a serious toll on ecosystems. The most heavily damaged areas in the United States are in the East, including the Adirondack Mountains, Mid-Appalachians, and southern Blue Ridge.<sup>10</sup> There is also some evidence of acid rain damage to high-elevation lakes in the West.<sup>11</sup>

#### WHAT IS ACID RAIN?

When sulfur dioxide and nitrogen oxides are released into the atmosphere, they form acids that return to earth in rainfall. "Acid rain" accumulates in lakes and seeps into soils, causing wide-ranging damage. In addition to killing many fish species and harming others, it contributes to death and disease among several species of trees. Power plants emit about 67% of all sulfur dioxide and 25% of all nitrogen oxides in the U.S., making them the single largest source of acid rain.<sup>12</sup>

## Acid rain causes a swath of damage from Maine to the Carolinas.<sup>13</sup>

*Maine:* Acid rain has contributed to the decline of Atlantic salmon, with the greatest impact on young fish.<sup>14</sup>

*New York and New England:* Forty-one percent of lakes in New York's Adirondacks and 15% of lakes in New England are either chronically or periodically acidic. Nearly 25% of surveyed lakes in the Adirondacks do not support any fish, and many others have less aquatic life and reduced species diversity when compared with less acidic lakes.<sup>15</sup> Acid rain is also the major cause of red spruce death in New York.<sup>16</sup>

*Pennsylvania:* Acid rain has reduced fish diversity in north-west Pennsylvania<sup>17</sup> and is associated with the deterioration and death of sugar maples and red oaks.<sup>18</sup>

*Virginia:* Streams in Shenandoah National Park frequently receive rainfall that is as acidic as lemon juice.<sup>19</sup> American Rivers, for example, placed Paine Run River on its "Most Endangered" list in 2001 because, without further cuts in air pollution, it will become too acidic to sustain brook trout and other aquatic life. Overall, 30% of trout streams in Virginia are acidic, making them either marginal or unsuitable for brook trout.<sup>20</sup>

*North Carolina and Tennessee:* Many high-elevation streams in the Great Smoky Mountains are acidic.<sup>21</sup> Acid rain is also making forest soil chemically imbalanced, endangering high-altitude forests.<sup>22</sup>



Scientists believe that current cuts in sulfur emissions under the Acid Rain Program will be insufficient to protect surface water and forest soils of the northeastern U.S.<sup>23</sup> Recent work by scientists with the Hubbard Brook Research Foundation found that sulfur dioxide emissions from power plants would have to be reduced an *additional 80%* before biological recovery could begin by 2050 in the northeastern U.S.<sup>24</sup>

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## AIR POLLUTION IN AMERICA'S NATIONAL PARKS

Over the past half-century, America's national parks, wilderness areas, and wildlife refuges have become shrouded by haze from air pollution. Today it is rare to experience clear views of distant vistas in these scenic places.

Although haze may appear to occur naturally as a result of heat and humidity, scientists have determined that the haze in our parks is actually caused by the same sulfate particles from power plants that form acid rain and are associated with serious health impacts. According to EPA, power plants are responsible for over two-thirds of the sulfur dioxide that forms the sulfate particles causing haze in the U.S.<sup>25</sup>

Air pollution haze has reduced annual average visibility in our national parks and wilderness areas by about two-thirds in the western U.S. and by three-quarters in eastern states.<sup>26</sup> On low-pollution days, visibility in Virginia's Shenandoah National Park and in the Great Smoky Mountains of Tennessee and North Carolina can be up to 60 miles. But power plant air pollution often reduces summertime visibility to as little as 10 miles.<sup>27</sup>

**FIGURE 17—Visibility Loss from Haze in National Parks and Wilderness Areas<sup>28</sup>**

PARK	WORST DAY	BEST DAY	VISIBILITY LOSS
Acadia National Park (ME)	16 miles	87 miles	82%
Big Bend National Park (TX)	37 miles	118 miles	69%
Glacier National Park (MT)	29 miles	94 miles	69%
Grand Canyon National Park (AZ)	61 miles	145 miles	58%
Great Smoky Mountains Nat'l Park (TN/NC)	60 miles	12 miles	80%
Point Reyes Wilderness Area (CA)	15 miles	88 miles	83%
Shenandoah National Park (VA)	10 miles	54 miles	81%

Since 1988, the EPA, individual states, and federal land management agencies have monitored air pollution and visibility impairment at a number of national parks and wilderness areas across the United States. These data show that air pollution is responsible for major decreases in visibility in these areas.

In addition to reducing visibility, air pollution from power plants costs Americans billions of dollars each year. Tourists to national parks and wilderness areas consistently rate visibility and clear scenic vistas as one of the most important reasons for visiting. In 1998, there were 287 million visitors to national parks, who spent approximately \$35 billion on travel-related purchases and who helped generate approximately half a million jobs.<sup>29</sup> Studies have shown, however, that when visibility in parks declines, fewer people visit, and they spend less time. Recent calculations have found that the economic benefit of eliminating haze in park areas could be over \$4.3 billion dollars a year.<sup>30</sup>

**FIGURE 18—Great Smoky National Park on a Clear Day  
And on a Hazy Day**



**FIGURE 19—Yellowstone National Park on a Clear Day  
And on a Hazy Day**



**FIGURE 20—Economic Losses from Haze in Selected National Parks<sup>31</sup>**

PARK	REVENUE LOSS FROM POWER PLANT HAZE
Great Smoky Mountains National Park	\$1.8 billion
Acadia National Park	\$328 million
Grand Canyon National Park	\$279 million
Shenandoah National Park	\$128 million
Yosemite National Park	\$77 million
Mount Rainier National Park	\$148 million
Glacier National Park	\$65 million
Big Bend National Park	\$42 million

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## POWER PLANTS, TOXIC POLLUTION, AND CHILDREN

Power plants emit dozens of hazardous air pollutants. EPA has identified 67 separate hazardous compounds and chemicals in the flue gas emitted from power plant smokestacks.<sup>32</sup> Of these, 55 are known neurotoxins or developmental toxins (*i.e.*, they affect the development of a child’s brain, nervous system, or body). In addition, 24 are also known, probable, or possible human carcinogens.<sup>33</sup>

Taken together, emissions of these 67 hazardous compounds make power plants the nation’s leading source of toxic air pollution. In 1999, according to EPA’s Toxics Release Inventory database, utility smokestacks emitted 842 million pounds of chemicals into the air, 40% of the nation’s total toxic air pollution.<sup>34</sup>

Of all the chemicals classified by EPA as “hazardous,” mercury has received the most attention from health professionals and policy makers. Commonly found in coal, mercury is released to the environment when coal is burned to produce electricity. Mercury emitted to the air is eventually deposited on land and in waterways, where it accumulates over time, persisting in the environment for 100 years or more. Coal-fired power plants are the source of 33% of all mercury air pollution, more than any other industry.<sup>35</sup>

In 2000, mercury contamination forced 41 states to issue a total of 2,242 fish advisories, warning anglers not to eat certain fish and to limit their consumption of others. In the past seven years, advisories for mercury have increased by 149%. The number of states issuing warnings for mercury has also risen steadily from 27 in 1993 to 41 states in 2000.<sup>36</sup>

### **Health Effects of Mercury on Children**

People are exposed to mercury primarily by eating fish contaminated with methyl mercury formed when airborne mercury interacts with microorganisms in water. Fish absorb and store methylmercury in their fatty tissue.

Consumption of mercury-contaminated fish poses the greatest hazard to humans during prenatal development. Methylmercury interferes with the normal development of the nervous system.<sup>37</sup> Exposed children may exhibit poor performance on tests measuring attention span, fine motor function, language, visual-spatial abilities (*e.g.*, drawing), and memory.<sup>38</sup> According to the National Academy of Sciences, children exposed to mercury

through their mothers will likely have difficulty keeping up in school and might require remedial classes or special education.<sup>39</sup>

A recent survey by the Centers for Disease Control and Prevention found that 10% of women of childbearing age who were tested for mercury exposure measured above the EPA's safe level.<sup>40</sup> Nationally, 6 million women of childbearing age have elevated levels of mercury from eating contaminated fish, and approximately 390,000 newborns are at risk of neurological effects from exposure *in utero* to high levels of this chemical.<sup>41</sup>

## 16

### GLOBAL WARMING

**Power plants are responsible for approximately 40% of all U.S. emissions of carbon dioxide—the pollutant most closely linked to global warming.<sup>42</sup>**

For years, scientists have warned that man-made pollutants were causing global temperatures to rise. While a dwindling number of skeptics continue to challenge the facts, virtually all doubt has been put to rest by two reports released in 2001 by national and international scientific bodies. Studies from the National Academy of Sciences (NAS) and the Intergovernmental Panel on Climate Change (IPCC) both revealed a scientific consensus that man-made pollution is the cause of global warming—a problem with widespread consequences for health, the environment, and the world economy.

**The National Academy of Sciences** was congressionally chartered to advise Congress on scientific and technical questions. Its principal fact-finding arm, the National Research Council, completed *Climate Change Science: An Analysis of Some Key Questions* in June 2001 at the request of President Bush. The report characterized the global warming trend over the last 100 years, examined some of the likely consequences in the 21st century, and discussed the extent to which human activity may be responsible for warming. The panel preparing the report consisted of 11 prominent U.S. climate scientists, including a Nobel laureate.

**The Intergovernmental Panel on Climate Change (IPCC)**, established in 1988 by the United Nations, comprises 2,000 climate experts and scientists from around the world who are charged with assessing the technical issues of global warming and providing policy makers with guidance on mitigation options. Presidents Ronald Reagan and George H. W. Bush endorsed the formation of the IPCC to ensure thorough and fair review of emerging scientific findings on climate change. Building on past reports and incorporating the results of new research over the past five years, the IPCC's *Third Assessment Report*, issued in February 2001, is the most emphatic warning yet about the dangers of global warming.

Among the key findings of the National Academy of Sciences and the Intergovernmental Panel on Climate Change are:

“Surface temperature measurements recorded daily at hundreds of locations for more than 100 years indicate that the Earth’s surface has warmed by about 1 degree Fahrenheit in the past century. This warming has been particularly strong during the last 20 years and has been accompanied by retreating glaciers, thinning arctic ice, [and] rising sea levels” among other effects.<sup>43</sup>

National Academy of Sciences

“Globally, it is very likely that the 1990s was the warmest decade and 1998 the warmest year in the instrumental record, since 1861.”<sup>44</sup>

Intergovernmental Panel on Climate Change

“About three-quarters of the anthropogenic emissions of CO<sub>2</sub> to the atmosphere during the past 20 years is due to fossil fuel burning.”<sup>45</sup>

Intergovernmental Panel on Climate Change

Among the most devastating global impacts are increased flooding and outbreaks of diseases in unexpected regions of the world:

“Global mean sea level is projected to rise from 0.09 meters (4 inches) to 0.88 meters (34 inches) between 1990 and 2100.”<sup>46</sup>  
The “number of people who would be flooded by coastal storm surges” each year is from “75 to 200 million people.”<sup>47</sup>

Intergovernmental Panel on Climate Change



There will be “an increase in the number of people exposed to vector-borne (*e.g.*, malaria) and water-borne diseases (*e.g.*, cholera) and an increase in heat stress mortality.”<sup>48</sup>

Intergovernmental Panel on Climate Change

“The projected climate change would degrade water quality through higher water temperatures and increased pollutant load from runoff and overflows of waste facilities.”<sup>49</sup>

Intergovernmental Panel on Climate Change

“The vulnerability of human societies and natural systems to climate extremes is demonstrated by the damage, hardship, and death caused by events such as droughts, floods, heat waves, avalanches, and storms.”<sup>50</sup>

Intergovernmental Panel on Climate Change

### U.S. Impacts from Global Warming

In the United States, higher temperatures will have a number of negative impacts, primarily declining air and water quality and accompanying harm to public health.<sup>51</sup>

Natural ecosystems throughout the United States appear to be the most vulnerable to the harmful effects of climate change, as there is often little that can be done to help them adapt to the projected speed and amount of change.<sup>52</sup>

- Some ecosystems that are already constrained by climate, such as alpine meadows in the **Rocky Mountains**, are likely to face extreme stress; in some places they will disappear entirely.<sup>53</sup>

- There is a potential for the forests of the **Southeast** to break up into a mosaic of forests, savannas, and grasslands from the stress of climate change.<sup>54</sup>
- Climate scenarios suggest likely changes in the species composition of the **Northeast** forests, notably the loss of sugar maples.<sup>55</sup>

Major alterations to natural ecosystems due to climate change could possibly have negative consequences for our economy, which depends in part on the sustained bounty of our nation's lands, waters, and native plant and animal communities.<sup>56</sup>

## CONCLUSION

As the debate over comprehensive power plant cleanup evolves, we hope that the facts presented here will help define the issues and offer guidance to decision makers.

The facts are clear: Power plant air pollution causes serious public health and environmental damage. Significant reductions in power plant emissions of sulfur dioxide, nitrogen oxides, carbon dioxide, and mercury will save lives, reduce asthma attacks and other respiratory illness, make fish safer to eat, and restore healthy forests and scenic vistas to our natural lands.

Fundamentally, reductions of carbon dioxide must be part of any plan to clean up power plants. The 1992 Framework Convention on Climate Change, signed by President George H. W. Bush and ratified unanimously by the Senate in 1992, committed the United States to capping its greenhouse gas emissions. During the intervening decade, however, U.S. emissions of CO<sub>2</sub> have increased by nearly 13%.<sup>57</sup> America can and should begin to take steps to reduce the threat of global warming. The most efficient and least costly way to achieve a comprehensive cleanup of air pollution emissions from power plants is to include CO<sub>2</sub> reductions in the plan.

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