WHY RESTRUCTURING MIGHT HARM THE ENVIRONMENT

1. **Price competition → pressure to reduce costs → pressure to reduce any <u>discretionary</u> environmental compliance costs**

2. **<u>If</u> IRP ceases, then environmental considerations are limited to complying with environmental laws and regulations - no additional consideration in utility planning and operation (e.g., use of externalities)**

3. **Competition → focus on <u>short term</u> costs → less investment in capital intensive technologies like DSM and renewables, even if cost-effective using "regulated" discount rates → greater use of fossil fuel**

4. **Competition → higher investment risk → higher cost of capital → shorter planning horizon → more CTs than CCs in new resource mix → higher capacity factors for dirty, high variable cost coal units**

5. **Anything less than 100% recovery of stranded costs will incentivize utilities to build load to recover a higher percentage of fixed costs**

6. Market pricing for generation based on <u>total</u> costs → dirty units with high variable costs might operate at much higher capacity factors than previously → disruption of economic dispatch of units through power pools will occur under "real direct access" in poolcos

7. Sellers of electricity might restructure rates when competing with fossil fuels at the end-use to win load, even if not cost-effective → more fossil fuel use and higher emissions

8. Real time pricing could decrease peak usage, but increase off-peak usage → higher emissions since off-peak units often are dirtier than gas-fired on-peak units

9. Open transmission access and "obligation to build" new power lines could increase land use impacts

10. Discretionary research, development, and demonstration funds for cleaner technologies may be eliminated due to price pressure

GENERAL CONCLUSIONS

1. Existing environmental laws and regulations are not sufficient to prevent significant environmental deterioration under restructuring.

2. Range of policy instruments to ensure environmental quality under restructuring is only slightly constrained under wholesale competition only - PUCs can continue to play a significant role to influence new resource selection and system-wide emissions (e.g., can continue to apply IRP principles).

3. Vigorous retail competition will likely require policies not within the power of state PUCs to implement – e.g., regional emissions caps or emissions taxes – though some policies like system benefits charges can go far to deal with environment under PUC auspice.

4. Coordination with environmental agencies and legislative bodies becomes ever more important, for PUCs under retail competition – but some policies could be "voluntarily" adopted by utilities under negotiated state-level agreements.

5. An adequate array of environmental protection policies exist to cope with any restructuring scenario – but implementation may be difficult politically.

HISTORICAL MEANS OF PROTECTING ENVIRONMENT

1. **Command and control technology - specific requirements on power plants.**
2. **Clean Air Act SO_2 national emissions cap.**
3. **National Ambient Air Quality Standards - local compliance efforts.**
4. **State energy facility siting agencies.**
5. **Other federal, state, and local pollution standards.**
6. **State implementation of IRP, including DSM and some fuel switching at generation units and end-use.**

THE PRIMARY BENEFITS OF ENERGY EFFICIENCY

- Reduced resource waste;
- Lower bills through decreased consumption;
- Slowed growth of total generation, delaying needs for additional generating capacity;
- Targeted load reductions, relieving pressure on distribution bottlenecks;
- Reduced generation and associated reduced pollution emissions;
- Increased affordability for low income customers;
- Decreased uncollectible bills for utilities;
- Increased competitiveness (and job retention) for energy-efficient businesses;
- Local job development.

Stranded Benefits in Electric Utilities Restructuring
National Council on Competition and the Electric Industry
October, 1996, p. 36.

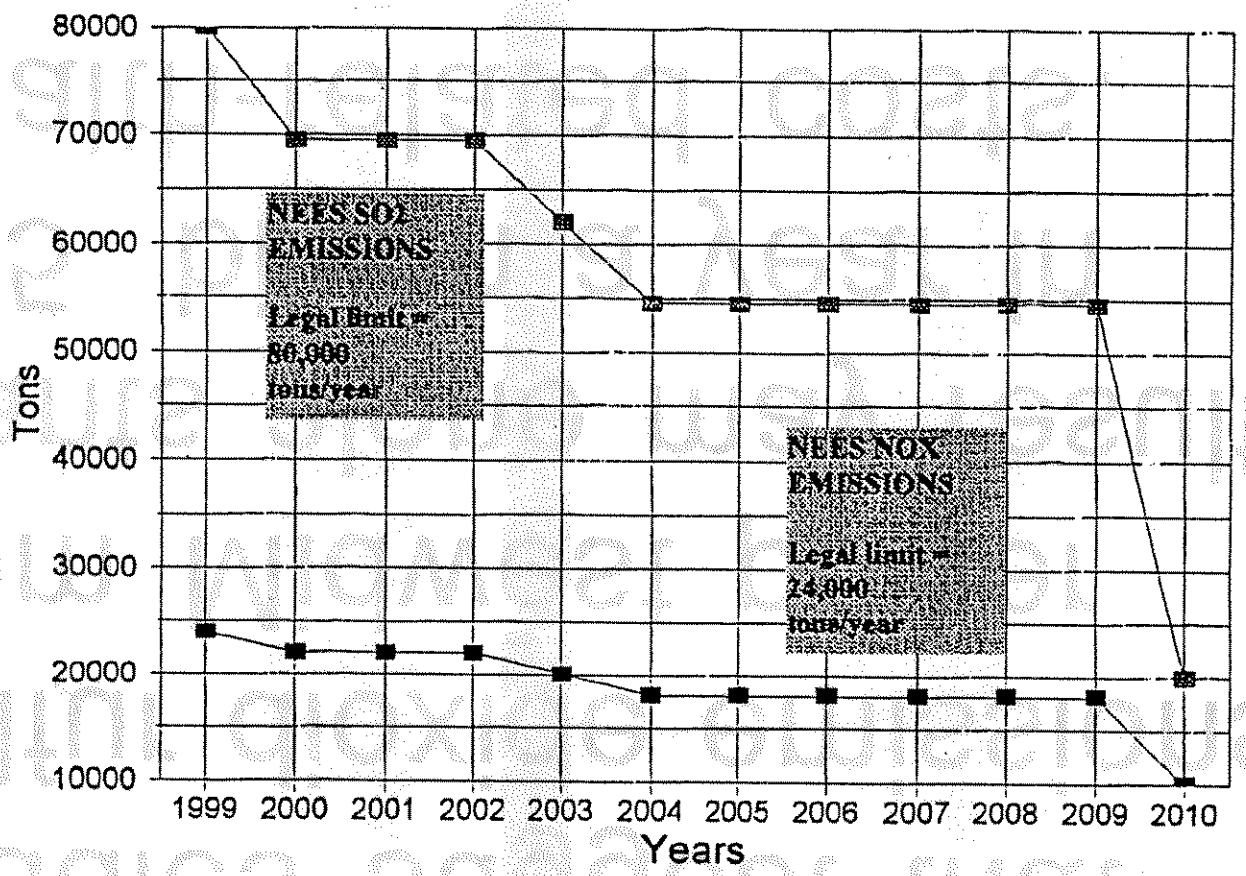
FOUR PRIMARY BENEFITS FROM MOST RENEWABLES

- Price stability at the wholesale and retail levels;
- Environmental benefits, including decreases in point source and windborne pollution;
- Potential to slow depletion of fossil fuels through substitution;
- Local job development.

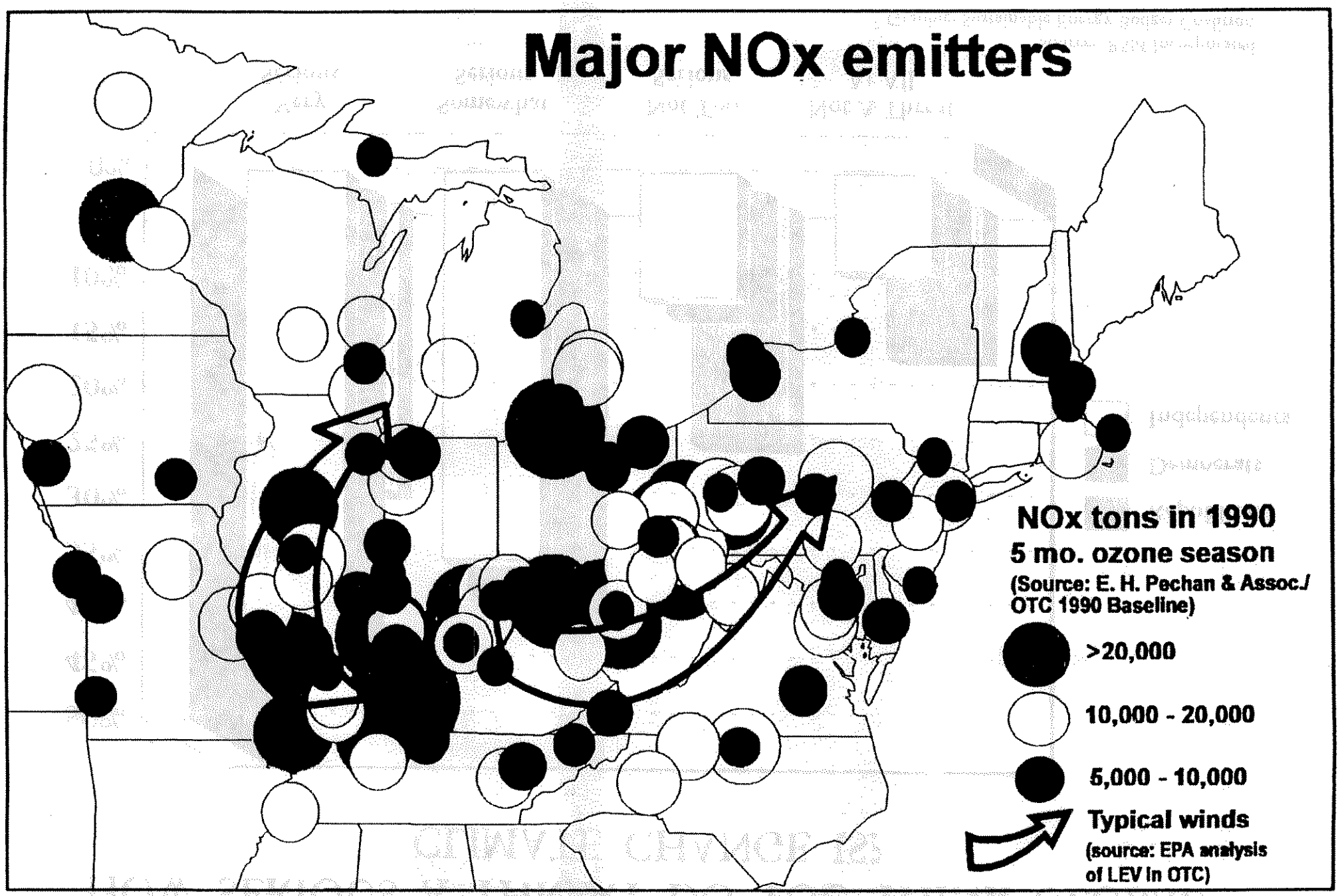
Stranded Benefits in Electric Utilities Restructuring
National Council on Competition and the Electric Industry
October, 1996, p. 38 (as modified by the addition of the fourth bullet).

SO2 and NOx Emission Trajectory

NEES OSR Settlement

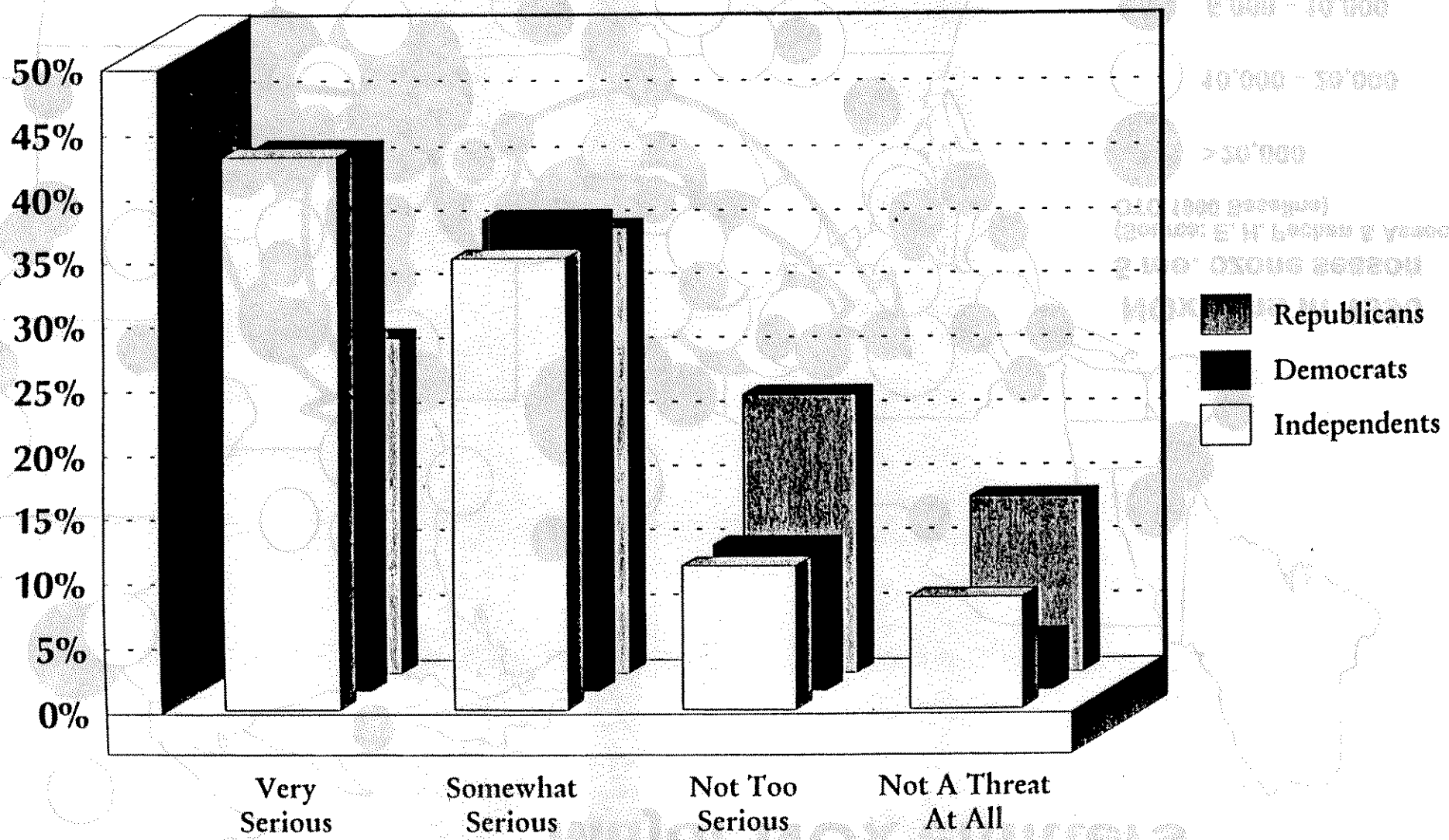


Studies suggest that sulfur dioxide emissions from Midwest power plants alone may result in $25 billion a year in health-related costs.


Major NOx emitters
NOx tons in 1990
5 mo. ozone season
(Source: E. H. Pechan & Assoc./
OTC 1990 Baseline)
>20,000
10,000 - 20,000
5,000 - 10,000
Typical winds
(source: EPA analysis
of LEV in OTC)

GRAPH 3.

HOW SERIOUS A THREAT DO YOU THINK GLOBAL CLIMATE CHANGE IS?

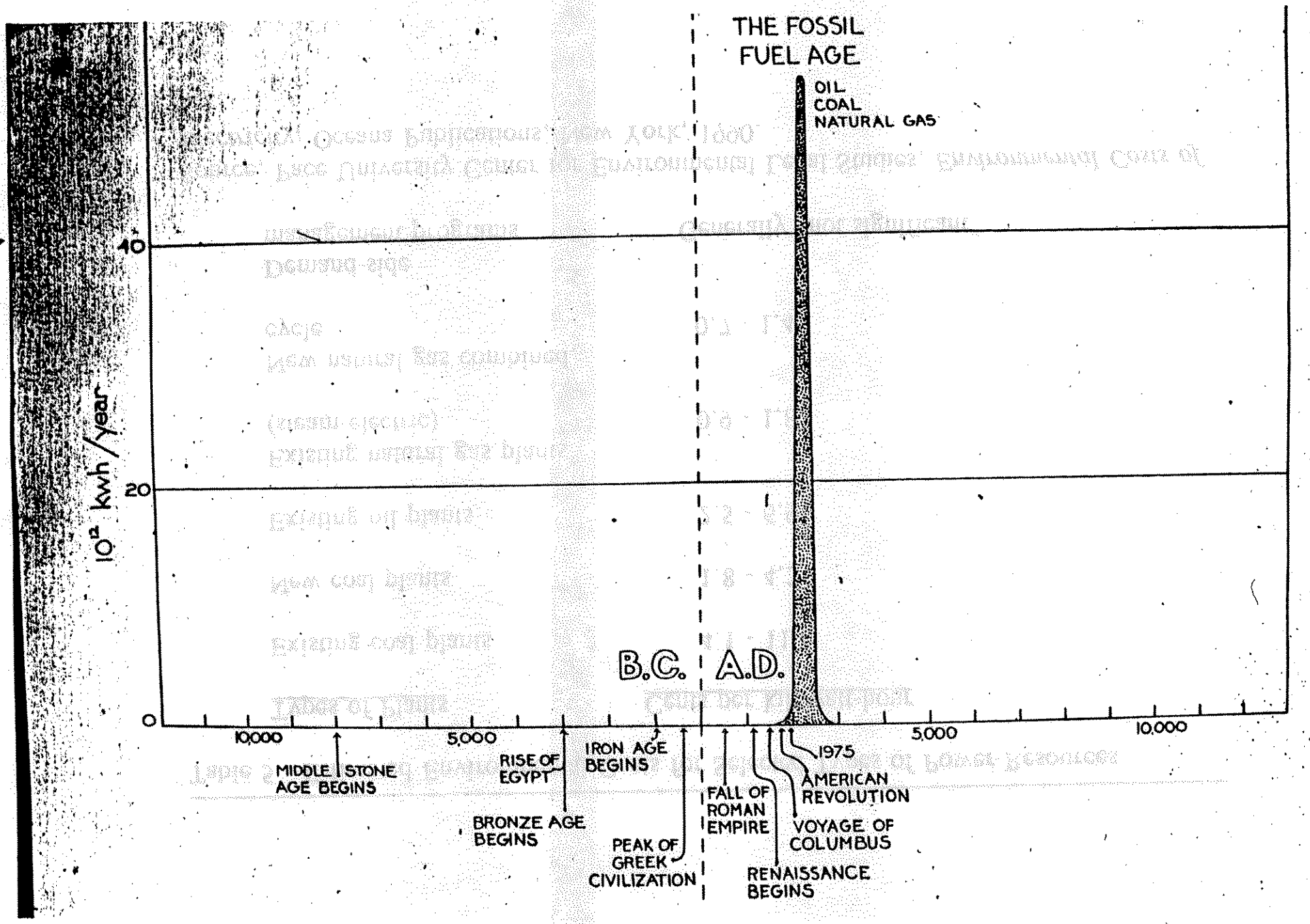


Source: RSM Incorporated
Graphic: Sustainable Energy Budget Coalition

Table 5. Estimated Environmental Costs for Selected Types of Power Resources

Types of Plants	Cents per kilowatt-hour
Existing coal plants	4.1 - 11.4
New coal plants	1.8 - 4.3
Existing oil plants	2.5 - 6.9
Existing natural gas plants (steam-electric)	0.9 - 1.8
New natural gas combined cycle	0.7 - 1.4
Demand-side management programs	Generally "not significant"

Source, Pace University Center for Environmental Legal Studies, *Environmental Costs of Electricity*, Oceana Publications, New York, 1990.


THE FOSSIL FUEL AGE
OIL
COAL
NATURAL GAS
10
20
0
10^{12} kwh/year
B.C.
A.D.
10,000
5,000
5,000
10,000
MIDDLE STONE AGE BEGINS
RISE OF EGYPT
IRON AGE BEGINS
BRONZE AGE BEGINS
PEAK OF GREEK CIVILIZATION
FALL OF ROMAN EMPIRE
RENAISSANCE BEGINS
1975
AMERICAN REVOLUTION
VOYAGE OF COLUMBUS

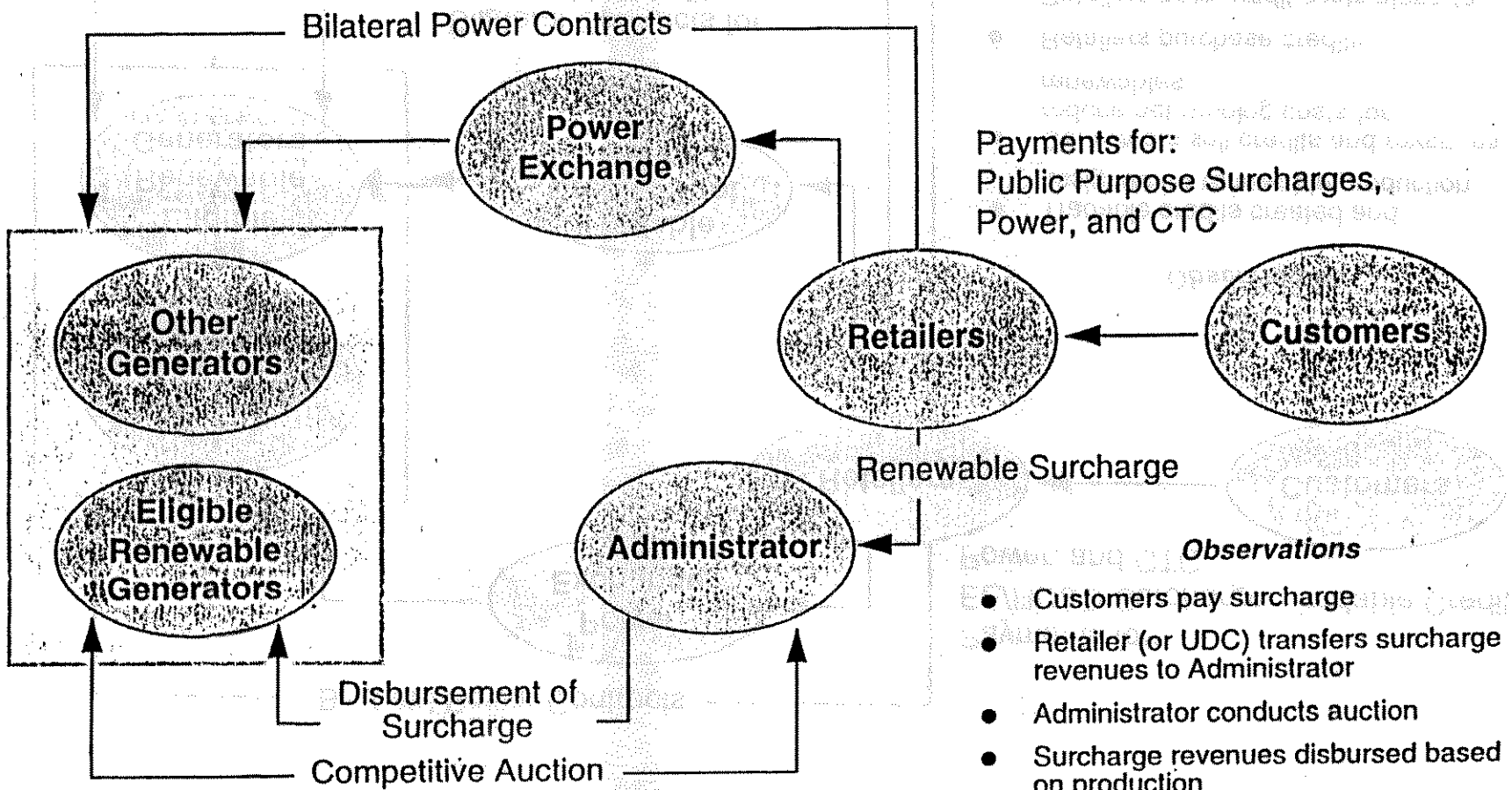
Renewable Energy: Some Key Policy Drivers

Utility Restructuring:	Competitive power markets could challenge the economics of renewables; portfolio "standards" and wires charges could spur renewable viability.
Environmental Issues:	Rio and Berlin Climate Conferences focus world attention on environmental impacts of power production. New air standards for ozone and particulates could help boost clean renewables.
DOE Elimination:	The 105th Congress may examine options for institutional reform or restructuring.
Line Item Veto:	The line item veto will give the Administration more flexibility to support renewables and other sustainability programs.
Renewable Energy Caucus:	Bipartisan support for renewable energy development; currently includes 90 House members, expected to expand to 125 members. The REC could play key role in determining legislative outcomes.

How Renewables Can Fit into a Restructured World

- Renewables can play an important and growing role in a restructured power market
  - Environmental motivating factors
  - Public demand, customers can choose renewables
- Proposed restructuring legislation includes a role for renewables
  - Schaefer Bill (H.R. 3790) requires 2% of renewable generation in 2000 increasing to 4% in 2010
  - California restructuring legislation signed by Governor Wilson includes funding for renewable technology
- Challenges faced by renewables include cost and intermittent availability

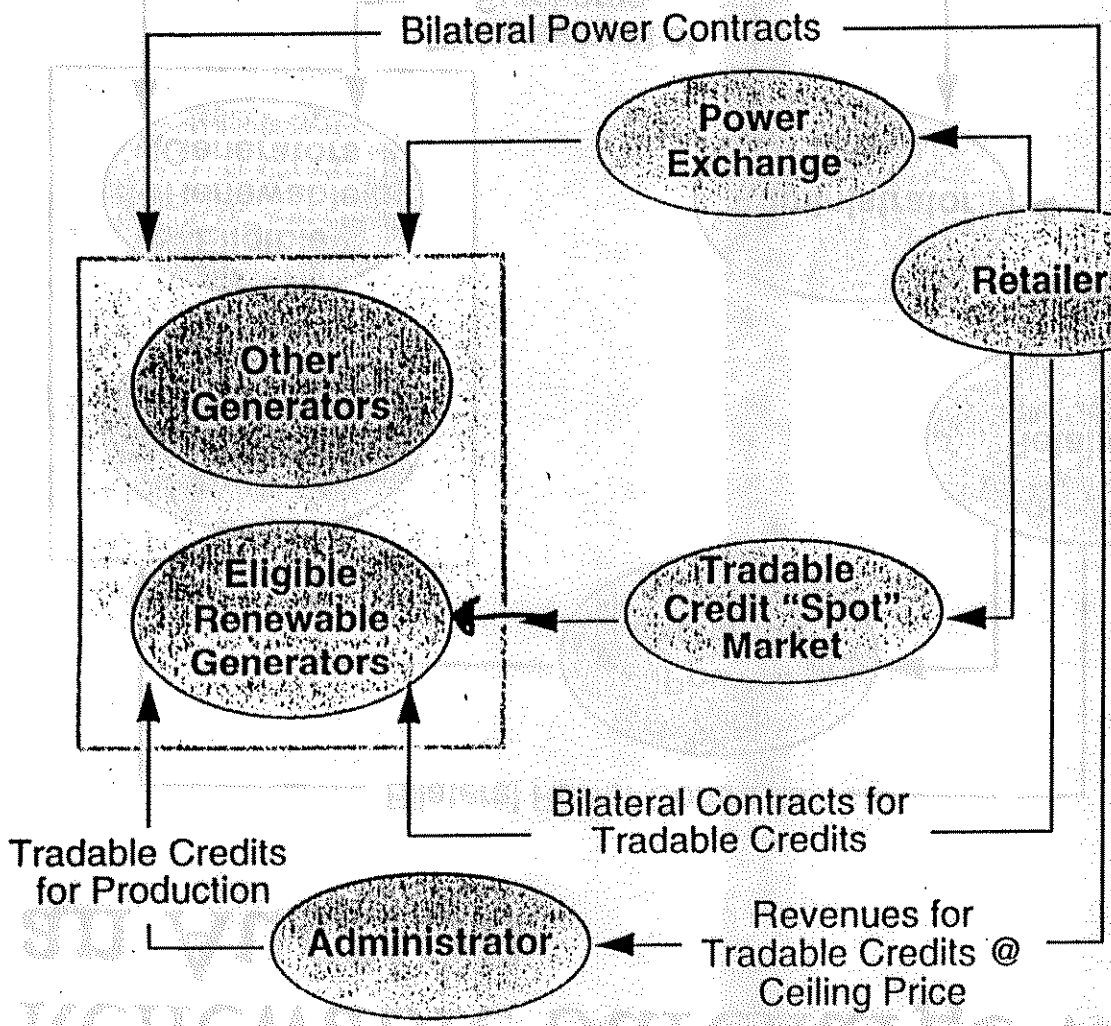
Renewable Surcharge with an Auction



Observations

- Customers pay surcharge
- Retailer (or UDC) transfers surcharge revenues to Administrator
- Administrator conducts auction
- Surcharge revenues disbursed based on production
- Sunsetting contingent on auction contract commitment

Minimum Renewables Requirement with Tradable Credits



Observations

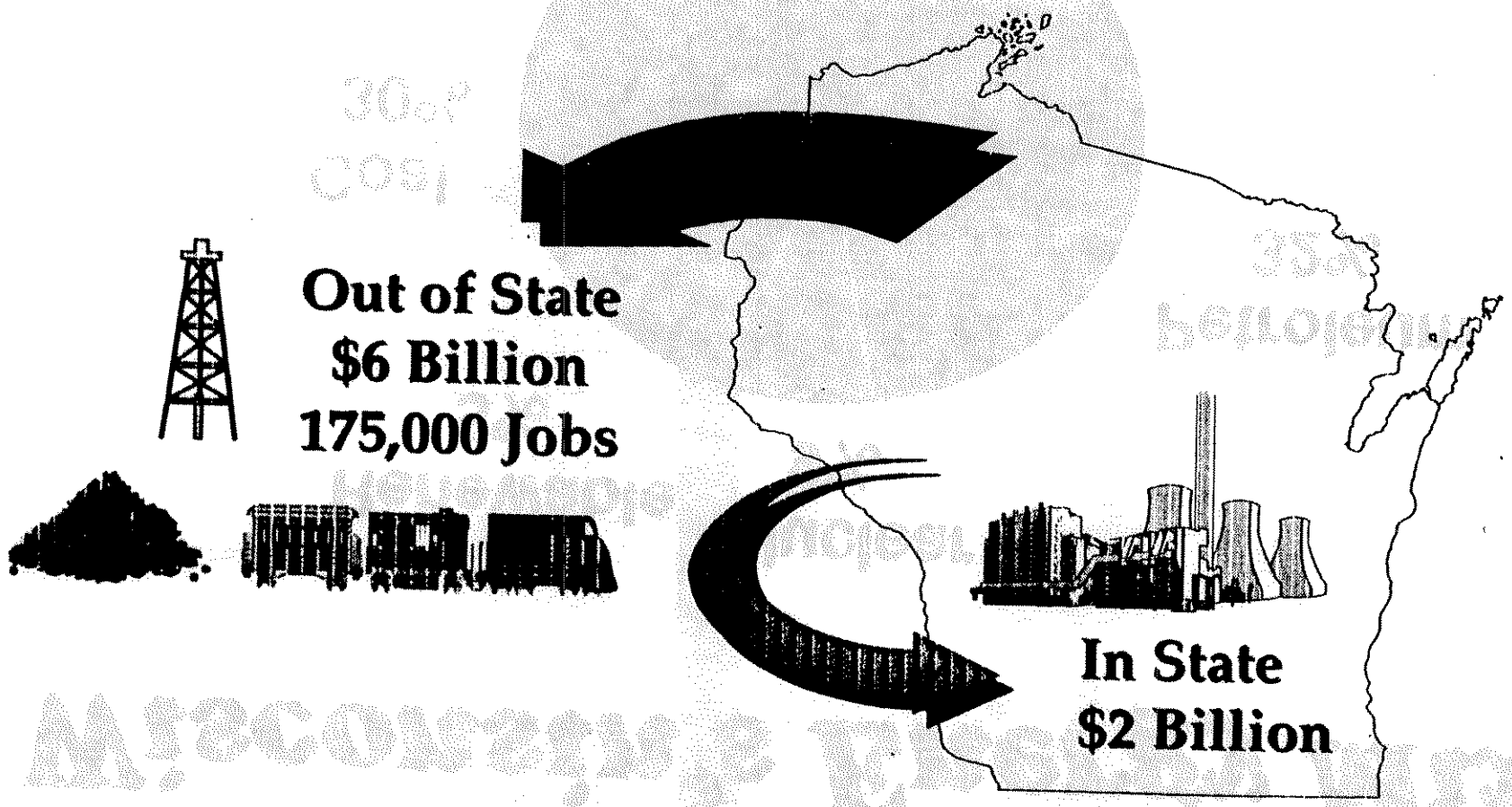
- Tradable credits created and assigned for renewable production
- Generators sell credits and revenues reduce net running costs for renewables
- Retailers purchase credits
- Retailers pass credit costs along to customers
- Administrator creates and sells "deficiency" credits at ceiling price
- Progarm can be sunset at any time

The Congress: Guarded Optimism for Renewables Support

- Key Committee assignments appear to favor support for renewable energy development
  - **House Appropriations** (Energy and Water Subcommittee) Representative Joe McDade (R-PA) has a record of support for sustainable energy
  - **House Commerce** (Energy and Power Subcommittee) Representative Dan Schaefer (D-CO) is a strong supporter of renewables
  - **Senate Energy and Natural Resources** Senator Frank Murkowski (R-AK) has a record of support for renewables
  - **Other** Ranking minority members in key subcommittee roles include Markey (D-MA), Pallone (D-NJ) and Bumpers (D-AR), all of whom support renewables development

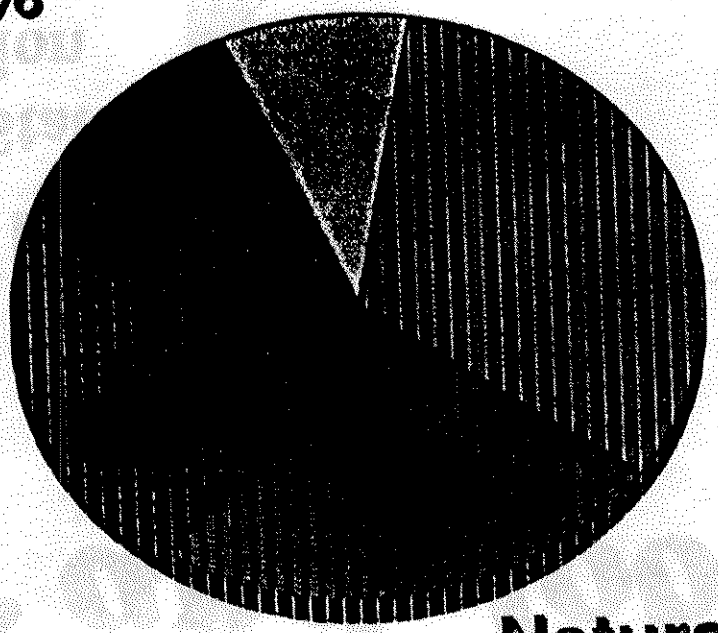
There's no question that the governors will insist that conservation and renewables be included in any consensus.

Wisconsin's Energy Dollar and Job Drain



Wisconsin Energy Bureau

Wisconsin's Energy Mix



Wisconsin Energy Bureau

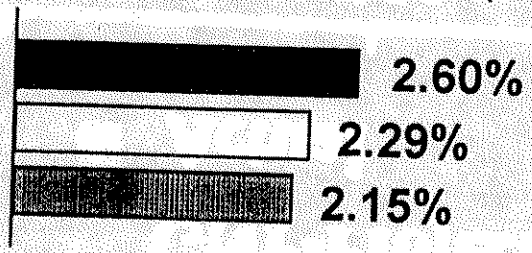
States that have strong environmental standards have higher economic growth, on average, than states with moderate to weak environmental records.

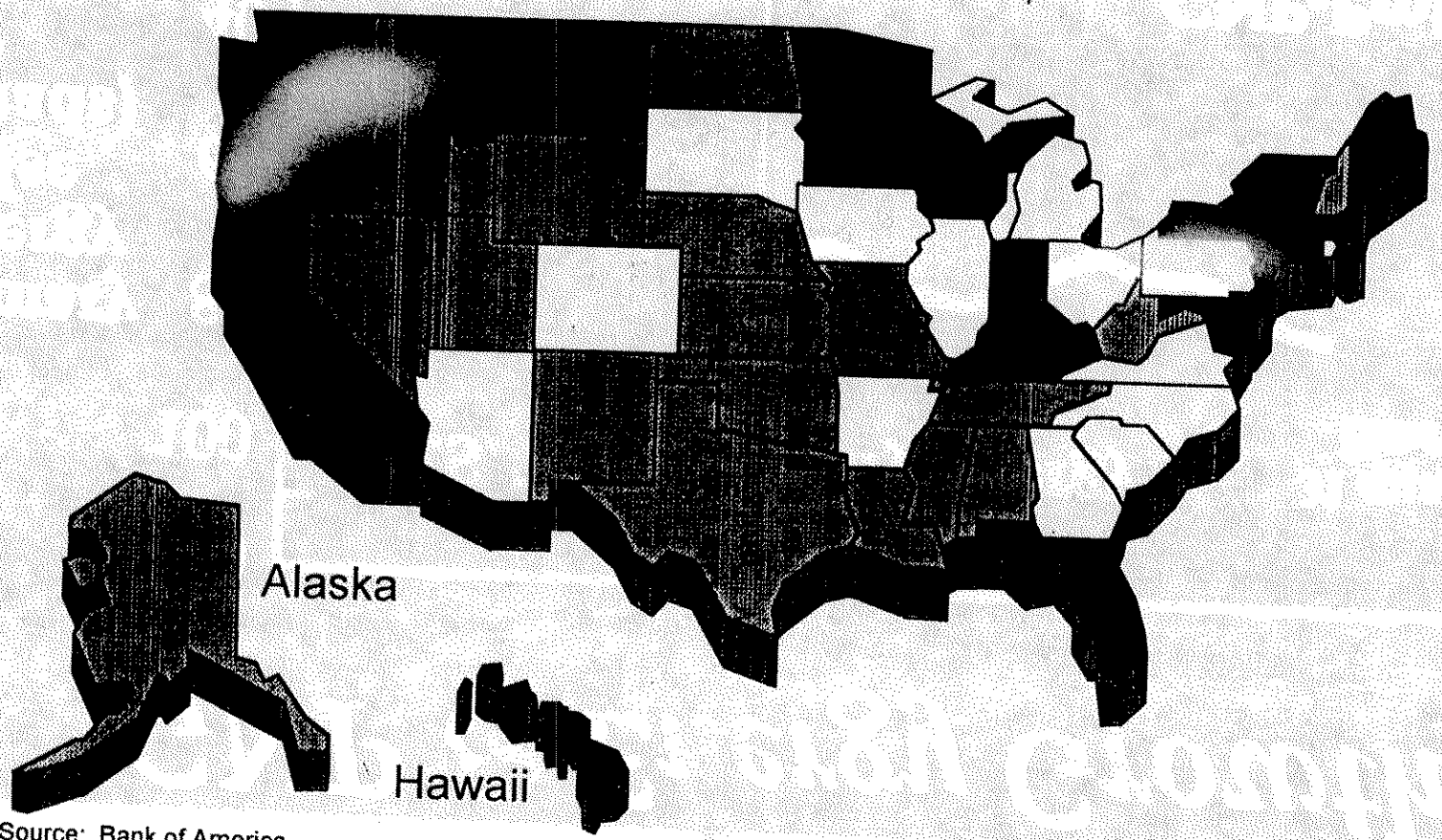
KEY TO ENVIRONMENTAL STANDARDS

Strong Moderate Weak

Comparing growth

Average economic growth rates 1978-1991 for states, based on environmental standards, in percent.

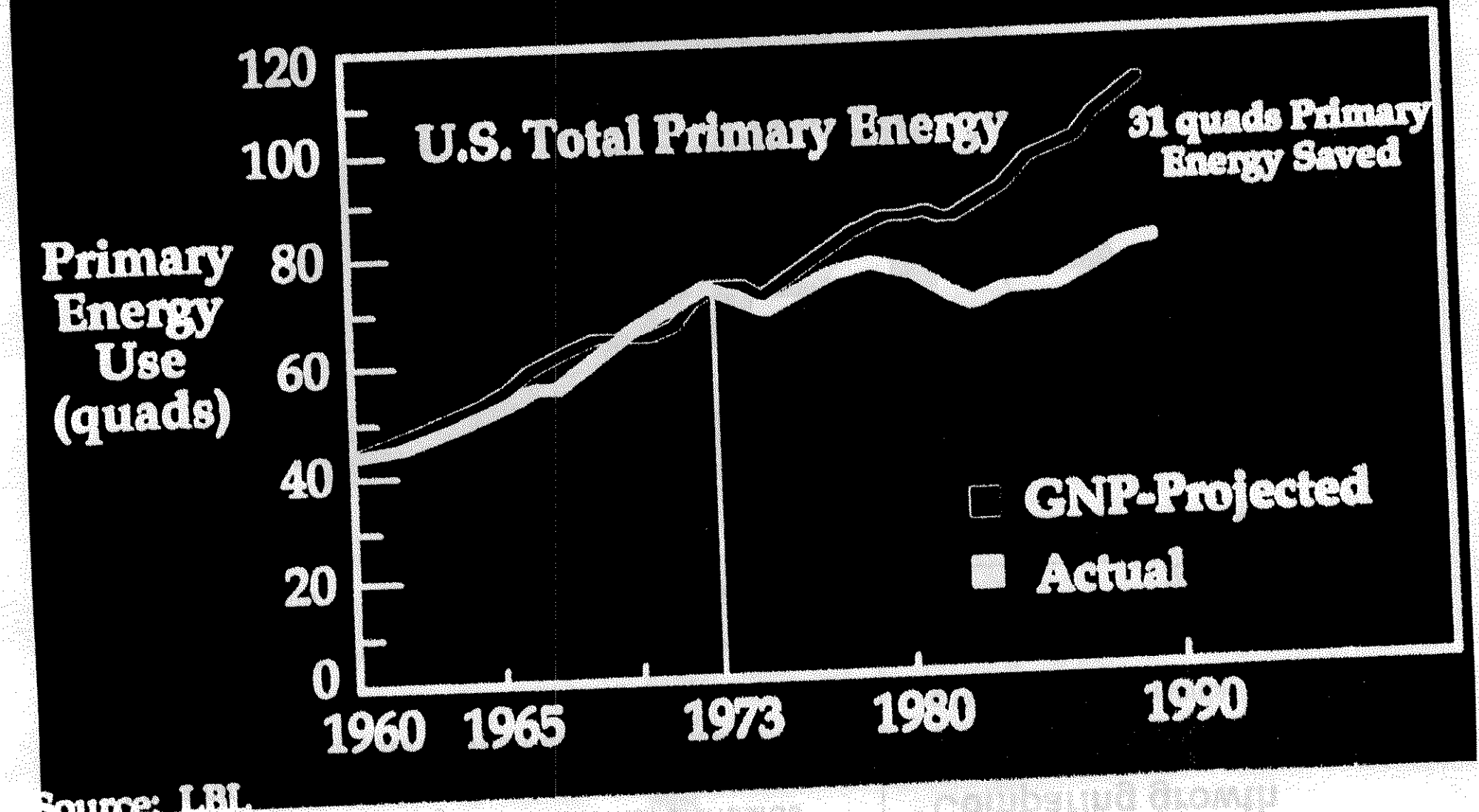




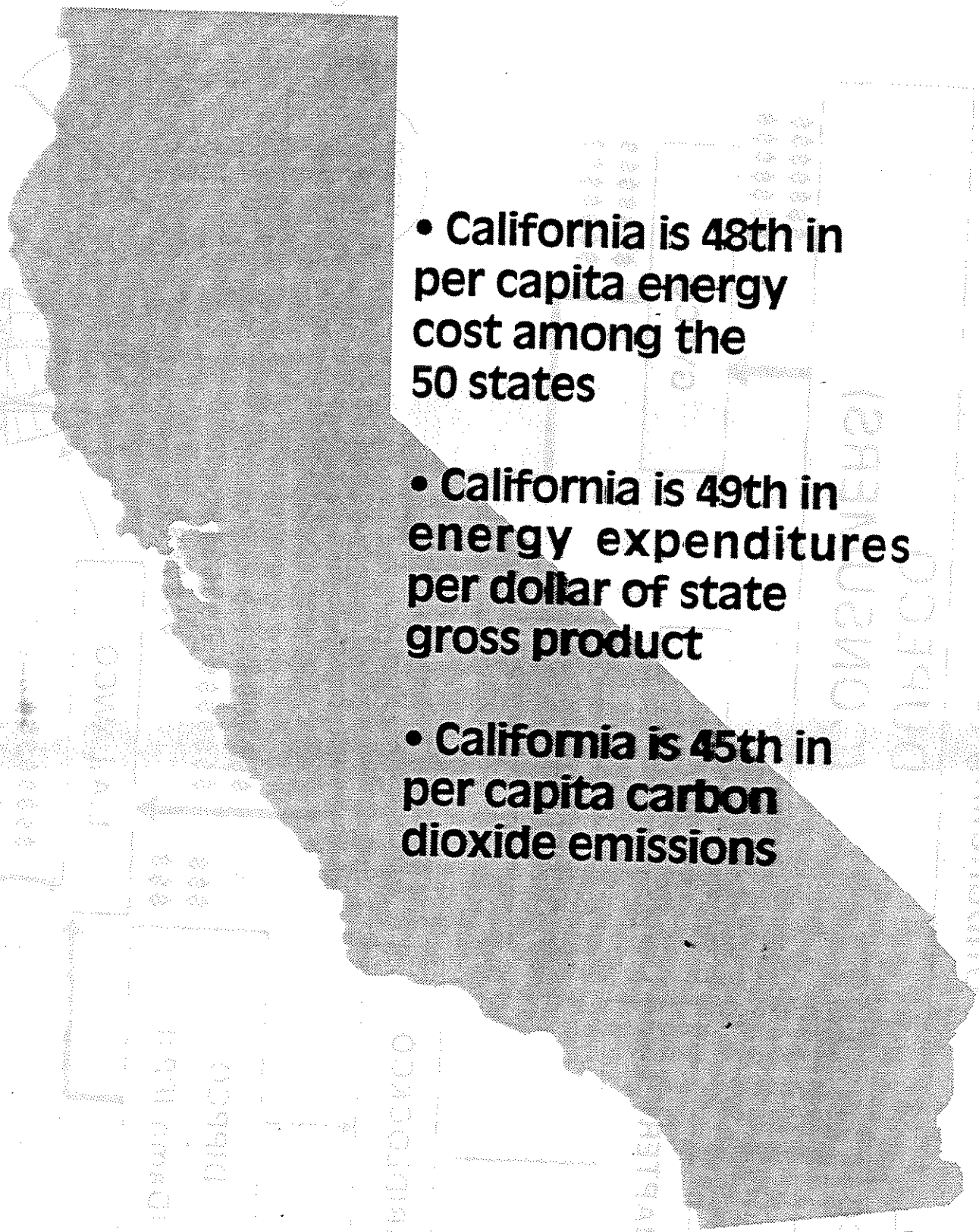
Source: Bank of America

BY STEVE KEARSLEY/THE CHRONICLE

GNP & Energy Growth



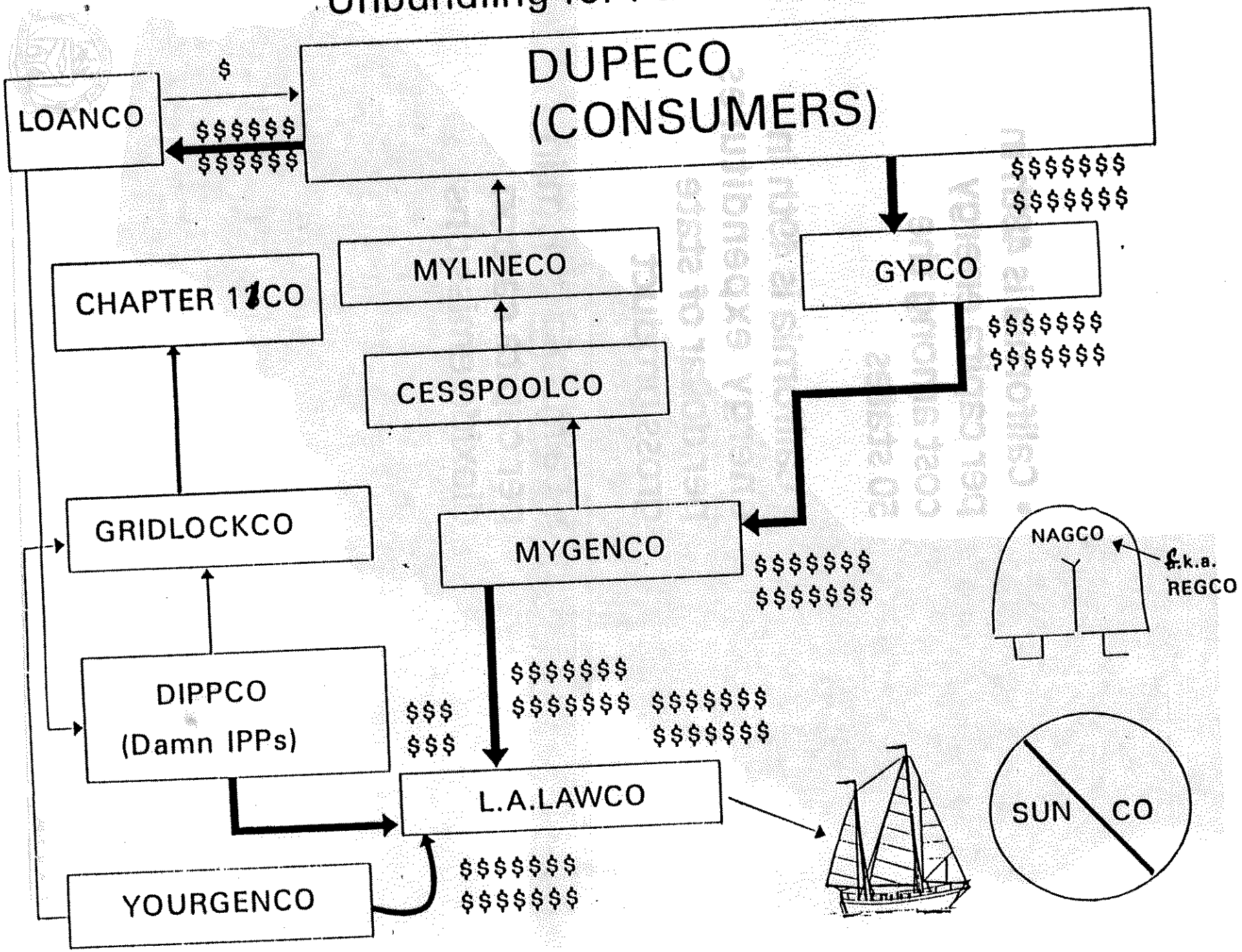
Source: LBL



- California is 48th in per capita energy cost among the 50 states
- California is 49th in energy expenditures per dollar of state gross product
- California is 45th in per capita carbon dioxide emissions

D. A. R. 7/95

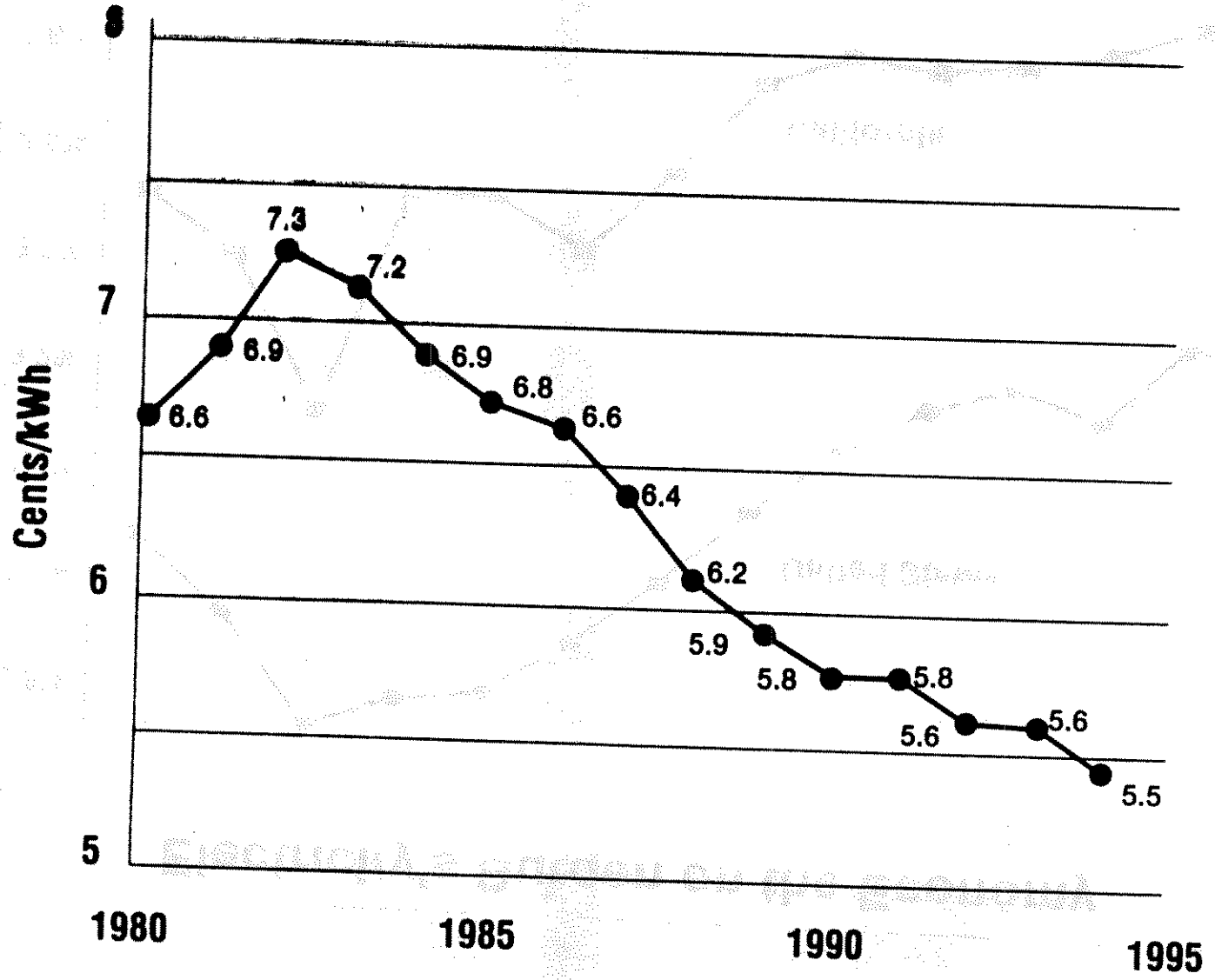
Unbundling for Fun and Profit



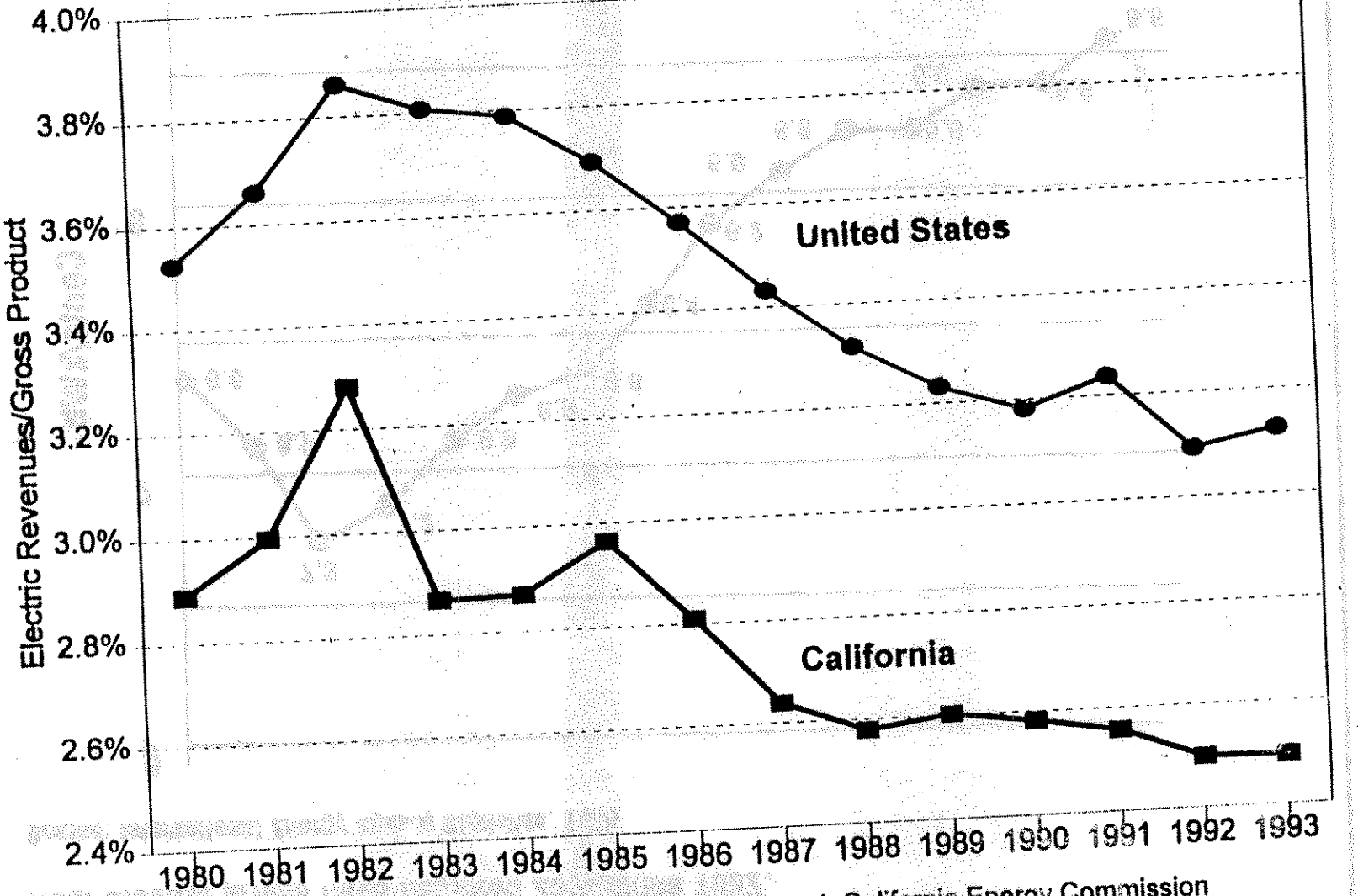
Electricity Prices Have Declined

U.S. electricity prices have been dropping steadily.
Real electric prices have declined 25% since 1982.

Source: International Energy Agency Statistics, 1995

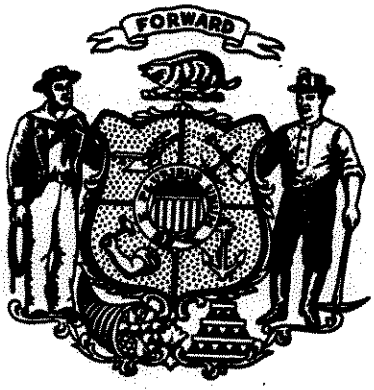


Electricity's Burden on the Economy



Sources: California -- Quarterly Fuel and Energy Report, California Energy Commission
United States -- National Energy Information Center, U.S. DOE

END



END

New Air Quality Standards: Good News for Wisconsin

What impact will the new standards have on Wisconsin?

In addition to approving EPA's revision to the standards, in July President Clifton issued a directive detailing what steps will be taken over the next ten years to achieve cleaner air. The basic elements are threefold: substantially reduce NOx from old power plants, maintain progress in reducing emissions in existing nonattainment areas and begin monitoring and planning in additional areas anticipated to have poor air quality

In October EPA will incorporate the findings of the recently completed Ozone Transport Assessment Group (OTAG) and possibly the Grand Canyon Visibility Project into NOx emission requirements for most states. Because OTAG was a project initiated by Wisconsin and other states impacted by air pollution transported from distant upwind sources, the NOx initiative has been endorsed by diverse spectrum of Wisconsin interests -- including Gov. Thompson, informed industries, and environmental groups. These new NOx reductions and other programs required to be developed by the existing Clean Air Act -- such as new diesel emission standards, acid rain controls, cleaner vehicles and new fuels -- will most likely result in areas such as Madison, Beloit, the Fox River Valley and Green Bay achieving the new standard for ozone by the year 2005

While these initiatives will also significantly improve air quality in existing ozone nonattainment areas, the Gary-Chicago-Milwaukee corridor will be required to continue to reduce ozone precursor emissions for several years to come. Reducing air pollution from the transportation sector will continue to be the key to attaining the ozone standard -- with or without revisions to the ozone standard Likewise, sound transportation planning and investment will be key to maintaining clean air in smaller urban areas throughout the upper Midwest.

Finally, the President's directive established a timeline for establishing a more comprehensive air quality monitoring network to identify the extent of and major sources of PM pollution. States will be allocated funds to design a monitoring network for fine particulate matter over the next two years, collect data from 1998 - 2003 and develop additional emission reduction plans if necessary from 2002-2008. In the interim, EPA will also complete another 5-year review of the standard for PM by the year 2002. While no areas will be designated nonattainment for PM until after 2002, ongoing programs to reduce ozone and acid rain precursors will significantly reduce regional levels of PM and its precursors. States could, however, initiate additional local or regional cost effective emission reduction programs.

Why the "Goal posts" move

The Clean Air Act requires EPA to review air quality standards every five years and ensure that the standards protect the most sensitive populations with an adequate margin of safety. These standards serve as national goals for acceptable air quality. Regulations and strategies are then developed and implemented at the federal, state and local levels to reduce emissions sufficient to attain those standards

Based upon hundreds of peer-reviewed clinical, laboratory and epidemiological studies, US EPA and the public health community concurred that the old standards for ozone and PM needed revision and modification. While lower (0.08 ppm vs 0.12 ppm) the new standard for ozone is calculated over longer periods of exposure (8 hours vs 1 hour). Also, the fourth highest reading for each monitor is averaged over a three year period to smooth out high readings due to "hot" summers. Likewise, the PM standard will be based on more "averaging" of monitoring over longer time periods. More importantly, our focus will shift to monitoring and reducing the smaller particles, those less than 2.5 microns in size.

Most urban areas in the Eastern US -- including Milwaukee, Madison, Appleton and Green Bay -- have numerous days each year with levels of ozone pollution now considered unhealthy. Given the paucity of monitoring data for fine particulate matter, it is not possible to accurately predict which urban areas consistently have unhealthy levels of fine particles and will fail to comply with the new PM standard.

Air Pollution is a Killer:

Ozone can impair people's ability to breath and cause shortness of breath, chest pain, wheezing and coughing. People with respiratory problems are most vulnerable, but even healthy people can be affected while working or exercising outdoors. Children with asthma and adults with respiratory disease are at greatest risk, with exposures often resulting in increased medical care, emergency room visits and even premature death. Ozone also is responsible for damage to

foliage and crops, impacting white pine stands and soybean yields in Wisconsin.

Fine particles have been linked to 60,000 premature deaths annually in the US, killing perhaps 1,000 Wisconsin residents every year [*Breathtaking*, NRDC, 1996]. Exposure to PM has also been linked to increased hospital admissions for respiratory and cardiovascular problems. A recent study has even linked particulate matter to increases in the incidence of Sudden Infant Death Syndrome. Children and elderly adults with cardiopulmonary disease are highest risk from PM.

Ozone and PM are Complex Problems with Common Solutions

Ground level ozone forms when other pollutants called precursors -- nitrogen oxides (NOx) and volatile organic compound gases (VOCs) -- react on warm sunny days. These pollutants come from factories, solvent usage, consumer products, combustion sources, power plants and motor vehicles. Some fine particles are directly emitted from industrial and residential combustion, diesel engines and other motor vehicles. Fine particles also can be formed from complex chemical reactions among pollutants from many of the major sources of ozone precursors, especially power plants and vehicle exhaust. Some constituents of PM -- such as sulfates and acid aerosols, are more culpable for significant adverse health impacts.

for more information, contact:
G. Alex Johnson
Citizens Commission for Clean Air in the Lake Michigan Basin
414.271.7467
or
Caryl Terrell
Sierra Club - John Muir Chapter
608.256.0565

Cleaner Air Will Protect Our Children's Health

The Environmental Protection Agency is proposing stricter air quality standards to protect America's children from air pollution. The EPA estimates its recommended reductions in soot and smog will reduce serious respiratory problems in children by 250,000 cases a year.

Children's health is disproportionately affected by air pollution:

Children spend more time outdoors than adults.

They inhale more pollutants per pound of body weight.

Their bodies, lungs and immune systems are still developing.

Exposure to pollution at an early age puts their health at risk for years to come.

An overwhelming body of scientific evidence — more than 3,000 health studies — demonstrates that existing air quality standards do not adequately protect Americans' health from smog and soot in the air. Children are particularly vulnerable to smog and soot.

Soot is caused by burning oil, coal, wood and gasoline and creates small particles that become embedded in the lungs.

Researchers at Brigham Young University found that when soot level rose, hospital admissions for children with respiratory illness tripled.

Breathing smog, which is formed when sunlight hits chemicals emitted by burning oil, coal and gasoline, makes children's lungs swell and redden and causes coughing and shortness of breath. Continued exposure can scar and severely damage children's lungs.

A Harvard study of children at summer camps across the country found smog damaged healthy children's lungs, even at levels well below what is currently allowed. The study also showed that children with asthma suffered more and needed to use their medication more often when smog levels climbed.

Asthma is the leading cause of repeated absences from school, according to the American Lung Association.

The health benefits of cleaner air for our children are clear and well documented. American must have stricter air quality standards to protect our families and our future.

Reductions in smog and soot will reduce serious respiratory problems in children by 250,000 cases per year.

PRINTED ON RECYCLED PAPER **JANUARY 1997** / #2A

Sierra Club

NATIONAL HEADQUARTERS: 85 Second St. ■ San Francisco, CA 94105 ■ (415) 977-5653
WASHINGTON OFFICE: 408 C St., NE ■ Washington, DC 20002 ■ (202) 547-1141

Cleaning the Air: The Benefits Are Clear

The Environmental Protection Agency is proposing stricter air quality standards to protect Americans from the health threat posed by air pollution. For just pennies a day, the EPA's recommended reductions in soot and smog will prevent an estimated 20,000 respiratory-related deaths and reduce serious respiratory problems in children by 250,000 cases a year.

The EPA's proposals to strengthen clean air protections will cost 10 to 12 cents per person a day, just $31 to $41 per person a year.

The new protections will save between $51 billion to $112 billion each year in medical costs, fewer sick days and lost productivity.

The benefits of the Clean Air Act, the landmark environmental program enacted in 1970, have far outweighed its costs.

According to the EPA, for every dollar spent on the Clean Air Act from 1970 to 1990, we received a $20 return on the investment. In fact, the EPA estimates Americans have realized benefits 70 times greater than the costs of implementing the program. In 1990 alone, tailpipe and smokestack controls saved an estimated 79,000 lives and resulted in an estimated 15 million fewer respiratory illnesses, including:

13 million cases of hypertension;

18,000 heart attacks;

10,000 strokes; and

146,000 respiratory symptoms.

For just pennies a day per person, the EPA's proposal could save more than $50 billion each year in medical costs, fewer sick days and lost productivity.

Historically, polluters have overstated the costs of cleaning the air. The Clean Air Act works at an economic cost much lower than industry had predicted. Specifically:

In the late 1980s, industry leaders complained that reductions in sulfur dioxide emissions, which cause acid rain, would cost $1,500 a ton. The cost is now actually less than $100. The industry estimate was 10-15 times higher than the actual cost.

The lead business lobby fighting the Clean Air Act Amendments of 1990 claimed that those amendments would cost industry between $51 billion to $91 billion a year. Compliance costs are now estimated by the EPA to be just $25 billion annually, half to one fourth of what industry claimed.

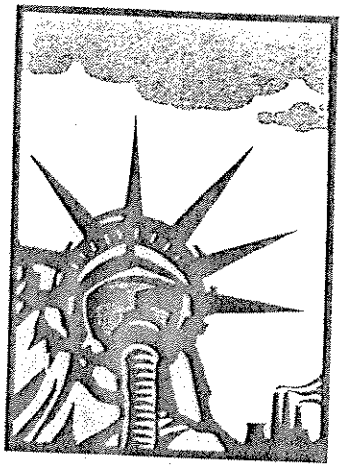
The fact is we cannot afford to stop the progress we have made cleaning America's air. The cost in lives lost and risks to our children's health is too high. Americans must have stricter air quality standards to protect our families and our future.

PRINTED ON RECYCLED PAPER **JANUARY 1997 J #2C**

Sierra Club

NATIONAL HEADQUARTERS: 85 Second St. ■ San Francisco, CA 94105 ■ (415) 977-5653
WASHINGTON OFFICE: 408 C St., NE ■ Washington, DC 20002 ■ (202) 547-1141

Science Shows Stricter Air Quality Standards Are Needed Now



The Environmental Protection Agency is proposing stricter air quality standards because an overwhelming body of scientific evidence — more than 3,000 health studies — demonstrates that existing air quality standards do not adequately protect Americans' health from smog and soot.

According to the EPA's 1996 National Air Quality Trends Report, three in 10 Americans still breathe unhealthy air, even though the Clean Air Act was passed more than 20 years ago.

Current levels of smog and soot in our nation's air are threatening children with asthma and older Americans with heart and lung diseases, according to the independent panel of scientists, the Clean Air Scientific Advisory Committee (CASAC) that reviewed 3,000 health studies conducted over the last 15 years before recommending the EPA adopt stricter air quality standards.

Studies confirm a direct relationship between declines in air quality and increases in hospital admissions and emergency room visits for respiratory problems, especially among the young and the elderly. For example:

An American Lung Association study of 13 cities found that hospitalization of people with asthma and heart disease doubled during the summer, when smog is heaviest.

The Natural Resources Defense Council's analysis of Harvard University data shows that soot in the air shortens the lives of 64,000 Americans annually. Lives are not just being shortened by days or weeks, but by an average of one to two years in the most polluted areas.

The scientific data is overwhelming: existing air quality standards don't adequately protect Americans' health.

A Harvard study of summer camps found that summertime pollution is linked to declines in lung function in **all** children, even when smog levels were below presently acceptable levels.

Researchers at Brigham Young University discovered that when soot levels in the air rose, hospital admissions of children with respiratory illnesses tripled.

A study conducted by the UCLA School of Medicine concluded that air pollution's damage to lung function resembles the damage done by smoking tobacco.

Right now, more is known about the devastating health effects of soot on people's lungs than was known thirty years ago when the U.S. Surgeon General first warned Americans about the dangers of smoking tobacco. Sound and comprehensive scientific research has concluded that more must be done, that stricter air quality standards must be adopted to protect our families and our future.

PRINTED ON RECYCLED PAPER **JANUARY 1997** J #2B

Sierra Club
NATIONAL HEADQUARTERS: 85 Second St. ■ San Francisco, CA 94105 ■ (415) 977-5653
WASHINGTON OFFICE: 408 C St., NE ■ Washington, DC 20002 ■ (202) 547-1141

Clearing the Air *July 1997*

one in a series of fact sheets on dirty power plants

A Summary of Research on the Ecological Impacts of Air Pollutants in the Northeast United States

Compiled by Dr. Ellen Baum, Bowdoin College

ACID DEPOSITION

Clean Air Act Amendments (CAAA) of 1990 may not protect surface waters and forest soils in Northeastern US

Long-term data from the Hubbard Brook Experimental Forest in New Hampshire suggests that large quantities of calcium and magnesium have been lost from the soil complex and exported by drainage water as a result of inputs of acid rain and declines in atmospheric deposition of base cations. Reductions anticipated by the CAAA of 1990 may only result in very slow ecosystem recovery.

Likens et al. "Long-Term Effects of Acid Rain: Response and Recovery of a Forest Ecosystem." Science 1996; 272:244-246.

Increases in soil aluminum and decreases in available calcium makes red spruce vulnerable to insect and diseases

Acidic deposition, through its capacity to leach calcium (and other base cations) out of the rooting zone and increase availability of aluminum in soils, can alter soil environments and cause aluminum-induced inhibition of nutrient uptake and fine root mortality. In high elevation red spruce forests, this weakens trees, making them more vulnerable to common stresses.

Shortle et al. "Aluminum-Induced Calcium Deficiency Syndrome in Declining Red Spruce." Science 1988; 240: 1017-1018.

Acid deposition linked to crown dieback in Vermont Sugar Maple stands

A study of four sugar maple forests in Vermont concluded that the combination of acidic soils and high levels of acidic deposition means that maples on some sites are more likely to have cation deficiencies that can cause crown dieback and loss of tree vigor.

Ellsworth et al. "Photosynthesis and Canopy Nutrition of Four Sugar Maple Forests on Acid Soils in Northern Vermont." Canadian Journal of Forest Research 1994; 24:2118-2127.

GROUND-LEVEL OZONE

Reductions in forest productivity predicted at ambient ozone levels

Using mean ozone data obtained from the US EPA for the years 1987 through 1992, an ecosystem model found decreases in forest productivity ranging from 2 to 17 percent. Greatest reductions occurred in southern New York and New England where ozone levels and photosynthesis potential were greatest.

Ollinger et al. "Predicting the Effects of Tropospheric Ozone on Forest Productivity in the Northeastern U.S." Proceedings from the USDA Forest Service Meeting of the Northern Global Change Program 1995.

NITROGEN SATURATION

Excess nitrogen from fossil fuel combustion stresses biosphere

Excess nitrogen from deposition represents a unique form of stress of several types of forest ecosystems in temperate regions. It has the potential of leading to reductions in production and contributing to forest decline as forests become net sources rather than sinks of nitrogen.

Aber, et. al. "Nitrogen Saturation in Northern Forest Ecosystems" Bioscience 1989;39:378-386.

Forest decline from nitrogen inputs could have a rapid onset

Increased anthropogenic nitrogen inputs may result in a dramatic drop in the ability of microbial and plant communities to handle the harmful effects of nitrate. Research suggests that the negative response in forest ecosystems to elevated nitrates could occur very rapidly and result in decline symptoms and decreased growth and vigor..

Hedin. "Stable Isotopes, Unstable Forest" Nature 1994;372:725-726.

Nitrogen deposition contributes to water quality degradation

Data from numerous studies in the Adirondacks, Catskills and mid-Appalachian mountains show that increases in nitrogen deposition has contributed to an acceleration of nitrogen export from forested watersheds. These particularly vulnerable sites have progressed from early stages of loss to later stages where elevated concentrations of nitrates are found in streams throughout the year.

Stoddard. "Long-Term Changes in Watershed Retention of Nitrogen." Environmental Chemistry of Lakes and Reservoirs 1994; 223-284.

HEAVY METALS

Red Spruce damage tied to heavy metals

This study revealed elevated levels of phytochelatins in red spruce forests in the Adirondacks and Green Mountains where declines in rates of tree growth and tree mortality have been particularly severe. The study found that plants produce phytochelatins to defend themselves against cell damage from heavy metals.

Gawel et al. "Role for Heavy Metals in Forest Decline Indicated by Phytochelatin Measurements." Nature 1996; 381:64-65.

Clearing the Air August 1997

one in a series of fact sheets on dirty power plants

Ozone Transport Assessment Group (OTAG): Accomplishments and Shortcomings in Reducing Regional Power Plant Emissions

Ozone is a regional problem we need to solve

Ground-level ozone, the main ingredient in smog, is a pervasive air pollution problem. Ozone is formed when sunlight reacts with nitrogen oxides (NOx) and volatile organic compounds (VOCs). The main sources of NOx emissions are power plants, trucks and cars; VOC sources include solvents, paints, and many industrial processes.

Ozone burns the lungs and can cause or exacerbate respiratory disease. Although healthy adults are affected by ozone, those most harmed are children, the elderly and those with respiratory diseases, such as asthma and emphysema.

In 1990, 98 metropolitan areas did not meet national air pollution standards for ozone. Of these, all but 4 areas were located in the Eastern U.S. or California. Most of the remaining areas have made some progress in cleaning their air. However, regional controls are needed to meet clean air goals because ozone pollution is transported hundreds of miles by prevailing winds.

Curbing unhealthy smog levels will require significant emissions reductions from power plants (which are 30% of the problem), trucks and cars (30-50% of the problem).

How OTAG became the solution

When Congress amended the Clean Air Act in 1990, it required states to submit plans to EPA in November 1994 on how they would reduce ozone forming pollutants to meet the federal national ambient air quality standard. Many Eastern and Midwestern states did not submit these "attainment demonstration" plans in a timely or complete fashion. Noting the limitations of local controls, a number of states cited upwind NOx emissions as major contributors to their ozone problem.

Environmentalists sued EPA to require submission of plans in a timely manner. In response, EPA proposed a Phase I emissions reduction plan in March 1995. States who had not submitted plans had to take measures to reduce emissions of ozone precursors by 9 percent from 1996-1999. By July 1996, 11 states had not completed their emission reduction plans, which triggered EPA's 18-month sanction clock. Affected states included: Connecticut, New Hampshire, New Jersey, New York, Delaware, Maryland, Virginia, District of Columbia, Illinois, Indiana and Wisconsin.

At the same time EPA proposed Phase I, the agency created the "Ozone Transport Assessment Group" (OTAG) in March 1995, consisting of the environmental commissioners from 37 states. They met for two years to analyze and discuss smog transport and develop regional solutions. The states included: Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Oklahoma, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, West Virginia, Wisconsin and Vermont.

OTAG determined that NOx reductions were critical to reducing regional ozone levels, and that large stationary sources, rather than transportation sources, could be more appropriately controlled at the regional level. Attention focused on NOx emissions from electric utilities, since they are the largest source and cost effective control technologies exist.

Subcommittees within OTAG ran a series of models to better understand the nature of transported NOx and ozone. OTAG concluded that "[r]egional NOx reductions are effective in producing ozone benefits; the more NOx reduced, the greater the benefit. ...VOC controls are effective in reducing ozone locally and are most advantageous to urban nonattainment areas." OTAG found that, "the range of transport is longer in the North than in the South." [1]

As a result of detailed modeling, OTAG divided states into two groups: fine grid states that would be subject to regional controls, and coarse grid states which would be exempt. The coarse grid states were found not to contribute to NOx transport affecting the East, and included: North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Minnesota, Iowa, Arkansas, Louisiana, Mississippi, Florida, and portions of Maine, New Hampshire, Vermont, New York, Michigan, Wisconsin, Alabama, and Georgia.

By June 1997, at the end of the OTAG process, the 37 commissioners voted on a series of recommendations that were forwarded to EPA for action. The most controversial and important recommendation was the need to control utility NOx emissions. The commissioners developed a range of options since they could not reach consensus. OTAG's proposal ranged from keeping the utility industry's current obligations under the Clean Air Act (which includes New Source Performance Standards and the Acid Rain Program requirements) to the least stringent of either 85% reductions from the 1990 rate (lb/mmBTU) or .15 lb/mmBTU.[2]

While it was disappointing that OTAG did not agree to the .15 lb/mmBTU as the sole control measure, environmentalists were pleased that it was included in the range of options submitted to EPA. OTAG also made some recommendations regarding a NOx trading program, the need to reduce diesel emissions, and expansion of inspection and maintenance programs for cars. In the end, 32 states approved the final set of recommendations, 5 opposed (Alabama, Kentucky, Michigan, West Virginia and Virginia), and 1 state was absent (Nebraska).

OTAG made no specific recommendations on how to implement a regional NOx control program. No consensus was reached, although there was general recognition that the implementation mechanism would be market-based, involving statewide tonnage budgets. similar to the Acid Rain Program.

Next Steps: The Ball is in EPA's Court

Now that OTAG has made its final recommendations, EPA must take the next step. EPA intends to issue a call for State Implementation Plans (SIPs) from all fine grid states. However, since OTAG has no authority under the Clean Air Act, nothing in the law compels EPA to act on OTAG's recommendations.

Nevertheless, the final OTAG recommendations figure prominently in President Clinton's accompanying memorandum to the new ambient air quality standards for ozone and fine particles. The White House memo reads that EPA will issue a rule in September 1997 requiring fine grid "states in the OTAG region...to submit SIPs to reduce their interstate pollution."[3] This memo makes no reference to the requirements that EPA may impose on coarse grid states.

The memorandum does not specify what EPA will include in this rule. Recent court decisions appear to limit EPA's ability to promulgate a highly specific and directed rule. Thus, the rule will most likely propose setting the level of reductions needed, rather than mandating detailed control strategies. The rule will be finalized in September 1998.

The time frame for implementing OTAG strategies is unclear. If an area qualifies as "transitional" (a new category established under the revised ozone standard for areas currently meeting the one-hour standard but not the new 8-hour standard) then OTAG-based regional reduction strategies will play a key role. For some areas, a SIP that outlines measures for achieving reductions required by the OTAG rule may fulfill the SIP requirements under the new ozone rule. Under its original concept, OTAG was designed to help areas meet the current standards, so the deadlines for implementation would follow the current course.

Unanswered Questions

- How will EPA resolve the coarse vs. fine grid distinction?
- What will the implementation mechanism be? What will be the level of involvement for the states?
- What level of control will EPA select for utility NOx controls? Will EPA incorporate other OTAG recommendations?

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[1] Ozone Transport Assessment Group, Recommendation: Major Modeling/Air Quality Conclusions.
[2] Ozone Transport Assessment Group, Recommendation: Utility NOx Controls.
[3] Implementation Plan for Revised Air Quality Standards, White House Memorandum, July 16, 1997.

This is one in a series of fact sheets on the impacts of dirty power plants on air quality.
For more information, contact the Clean Air Network, an alliance of over 900 citizen environmental, public health, religious, and other community groups working to protect the air we breathe, 202/289-2429.

Legislative Briefing on the Revised Ozone Standard and Regional Ozone Transport

September 1997

Ozone Briefing Outline

- Ozone Standard
- Regional Transport
- Wisconsin's Impact

Background on the National Ambient Air Quality Standards

What Are NAAQS?

- Title I of CAA directs EPA to establish National Ambient Air Quality Standards (NAAQS) for commonly occurring air pollutants posing public health threats.
- NAAQS set national levels for acceptable concentrations of specific pollutants in outdoor air.
- These are known as "criteria pollutants."
- CAA directs EPA to review each NAAQS once every 5 years

Steps in NAAQS Review Process

Step 1: EPA Develops Criteria Document
Step 2: EPA Develops Staff Paper
Step 3: CASAC Reviews CD and Staff Paper
Step 4: EPA Decides Whether or Not to Revise Standard
Step 5: EPA Issues Proposed Decision for Public Review
Step 6: EPA Issues Final Standard

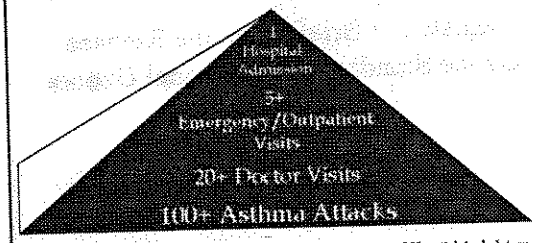
Final Standards (July 1997)

- Revised Ozone Standard
- Revised PM_{10} Standard
- New $PM_{2.5}$ Standard
- New $PM_{2.5}$ Monitoring Strategy

Health Effects of Ozone

- When inhaled at harmful levels, ozone can:
  - Pose health problems for children, asthmatics, the elderly and even healthy adults;
  - Cause acute respiratory problems;
  - Aggravate asthma, emphysema and bronchitis;
  - Lead to hospital admissions and emergency room visits; and
  - Impair the body's immune system defenses.

Hospital Admissions Are Just the Tip of the Iceberg



Cite: US Department of Health and Human Services (1994) National Hospital Ambulatory Medical Care Survey: 1992 Summary. The NY Electricity Externality Study (1995) Rowe et al.

Environmental Effects of Ozone

- Adversely affects forests, plant life and ecosystems.
- Reduces agricultural yields for many economically important crops.
- Reduces visibility by 70% in many parts of the U.S.
- Causes soiling and damage to materials.

EPA's Final Ozone Standard (7/97)

EXISTING	FINAL
0.12 ppm	0.08 ppm
1-hour std.	8-hour std.
Exceedance-Based Form: No more than 1 exceed. per year, averaged over 3 years	Concentration-Based Form: 3-year avg. of **4th** highest daily concent. at a site

Determining Compliance: An Example

Year	1st High Daily Concent. (ppm)	2nd High Daily Concent. (ppm)	3rd High Daily Concent. (ppm)	**4th High Daily Concent. (ppm)**
1997	0.105	0.103	0.103	**0.102**
1998	0.104	0.103	0.092	**0.091**
1999	0.103	0.101	0.101	**0.097**
Avg.				**0.097***

* Area is n.a. because 3-yr. avg. of 4th highest daily 8-hr. concentration exceeds 0.08 ppm.

New Ozone Standard

- More Protective of Public Health
  - 8 hour averaging time protects people from longer exposures to lower levels of ozone concentrations
- More "Robust"
  - Concentration-based form tempers effects of extreme weather conditions
  - More directly related to actual concentrations

- Insert "4th Highest Daily Peak 8-hr Rolling Averages..." Map

Presidential Memo to EPA on Implementation

- Maximize common sense, flexibility and cost effectiveness.
- Maintain current progress and respect agreements already made by states, communities and businesses to clean up air.
- Reward early action to reduce air pollution.
- Address transported pollution; minimize burden on areas where problems are regional, not local.
- Encourage control strategies that keep costs under $10,000 per ton.

New Designations

- Areas will be designated in 2000 based on data from 1997-1999.
- Three categories
  - Attainment areas
  - Transitional areas
  - Nonattainment areas

Transitional Areas

- Areas which meet 1 hour standard (by 2000) but not 8 hour standard if they are able to meet new standard through:
  - Regional transport strategy and submit transport SIP by 2000
  - Regional transport strategy plus local measures and submit attainment SIP by 2000

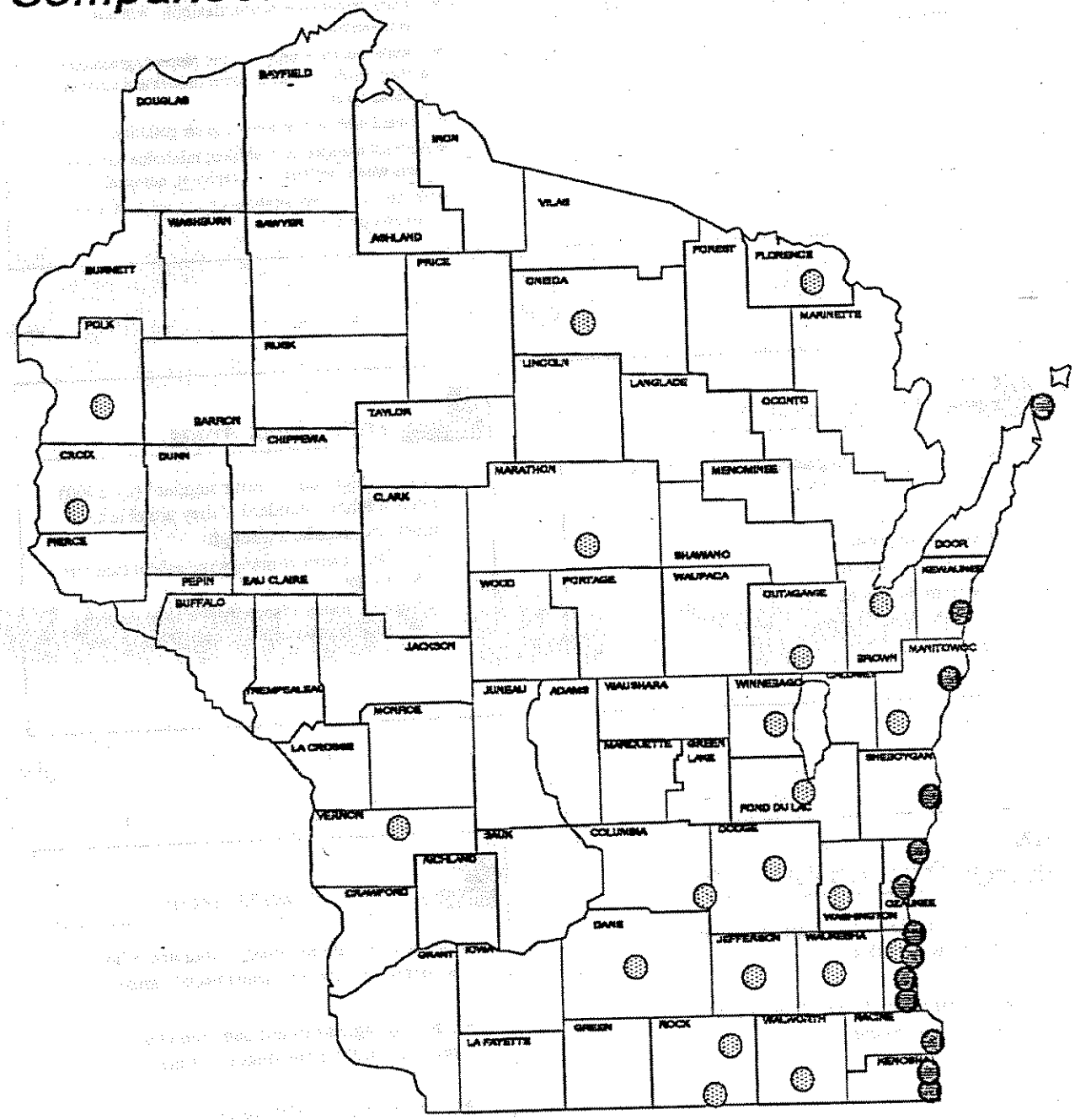
Transitional Areas (con't)

- Expect regional transport reductions to be achieved by 2004
- Modified New Source Review, offsets and conformity to apply

Nonattainment Areas

- Areas which do not meet 1 hour and 8 hour standard and are not "transitional" areas
- 1 hour designations and requirements retained until 1 hour standard is met
- 8 hour attainment SIP due by 2003

4th Highest Daily Peak 8-hr Rolling Averages
Wisconsin Ozone Monitoring Sites
1994 -1996 Average
Comparison With 8-hr Ozone NAAQS Criteria



● *Ave. of Annual 4th Highest Ozone 8-hr Rolling Aves., 1994 - 1996* ≥ *.085 ppm*

○ *Ave. of Annual 4th Highest Ozone 8-hr Rolling Aves.,1994 - 1996* < *.085 ppm*

Nonattainment Areas (con't)

- Additional reductions needed to attain 8 hour standard can occur after 1 hour attainment date (2007 for SE Wisconsin)
- Attainment date for 8 hour standard is 2010 (possible 2 year extension)

Ozone Timeline

EPA Publishes Proposed O3 Transport SIP Call	Sep 97
States Comment on Proposed Transport SIP Call	Sep 97 - Jun 98 (?)
States Submit 9% SIP	Dec 97
States Submit 1 Hour Attainment Demo SIP	Apr 98 (?)
EPA Publishes Final O3 Transport SIP Call	Sep 98
States Submit O3 Transport SIP	Mar 00

Ozone Timeline (con't)

EPA Designates 8-Hour Nonattainment Areas	2000
States Submit 8-Hour Attainment Demo SIP	2003
O3 Transport Reductions Achieved	2004
1-Hour Attainment Date (SE Wisconsin)	2007
Implement 8-Hour Attainment SIP	2007 -2010
8-Hour Attainment Date (SE Wisconsin)	2010
Possible Extension to 8-Hour Attainment Date	2012

To Attain the Standard

- Regional NOx Controls
- Addition Local Control Measures
- High Quality Technical Work
- Partnerships

Ozone Transport Assessment Group (OTAG) Briefing

OTAG Key Points

- Transport of ozone and ozone precursors is a significant problem in the eastern United States.
- Implementation of the OTAG recommendation will help many areas attain the ozone standard.
- Regional NOx control is the most effective strategy for reducting transported ozone.
- VOC reductions are an effective local ozone control strategy.

Cooperative Effort

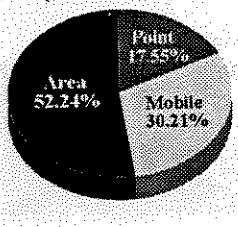
- 37 States
- USEPA
- Stakeholders
- Public Interest Groups

Consensus Efforts

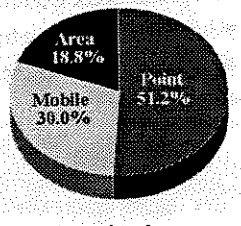
- Agreed to Four Modeling Episodes
- Agreed to Modeling System
- Compiled a National Inventory

OTAG Emission Summary

OTAG VOC Emission Summary (Total Emissions)



OTAG NOx Emission Summary (Total Emissions)



Source: Illinois EPA with E.H. Pechan & Associates, Inc.

Major Modeling Conclusions

- Regional NOx Control Beneficial in Reducing Ozone
- More NOx Control - More Benefit
- Air Quality Benefits Diminish with Distance from the Source
- Elevated and Low Level NOx Control Are Both Effective
- VOC Reductions Are Beneficial Locally
- Coarse Grid Impacts on the Fine Grid May Be Minimal

Major Data Analysis Conclusions

- Ozone Transport Is Pervasive and Widespread
- Ozone Aloft Is Carried Over from Day to Day
- Generally the Range of Transport Is Greater in the North than South

Recommendations on Additional Modeling and Air Quality Analysis

- States must have:
  - Opportunity for Additional Modeling & Air Quality Analysis
  - Develop and Propose Appropriate Level & Timing of Controls
- High Priority Given to Transport Reductions in Lake Michigan, The Northeast and Atlanta
- NOx Waivers
- Initial Tonnage Budgets May Be Revised on Additional Modeling or Analysis

- Additional Public Health and Environmental Collateral Benefit of NOx Control
  - Acid Deposition
  - Eutrophication
  - Nitrification
  - Fine Particulate Pollution
  - Visibility

Utility NOx Control Recommendations

- Fine Grid Controls between Clean Air Act and The Less Stringent of 85% Control or 0.15 lb/MM BTU (1990 Base)
- EPA Has Indicated Controls to be Implemented through Statewide Tonnage Budgets
- OTAG Modeling Shows that Ozone Transport Is Greater in the North
- If Trading Is Allowed, Public Interest Stakeholders Want 10% Allocation to Energy Efficiency or Renewable Projects

- Insert "OTAG Region: Areas Exempted from Utility Nox Controls" Map

Non-Utility Point Source Control Recommendations

- Non-Utility Controls Established Equitably with Utility Controls
- Establishes Definition of Large and Medium Size Sources

OTAG's Non-Utility Point Source Sector Recommendation

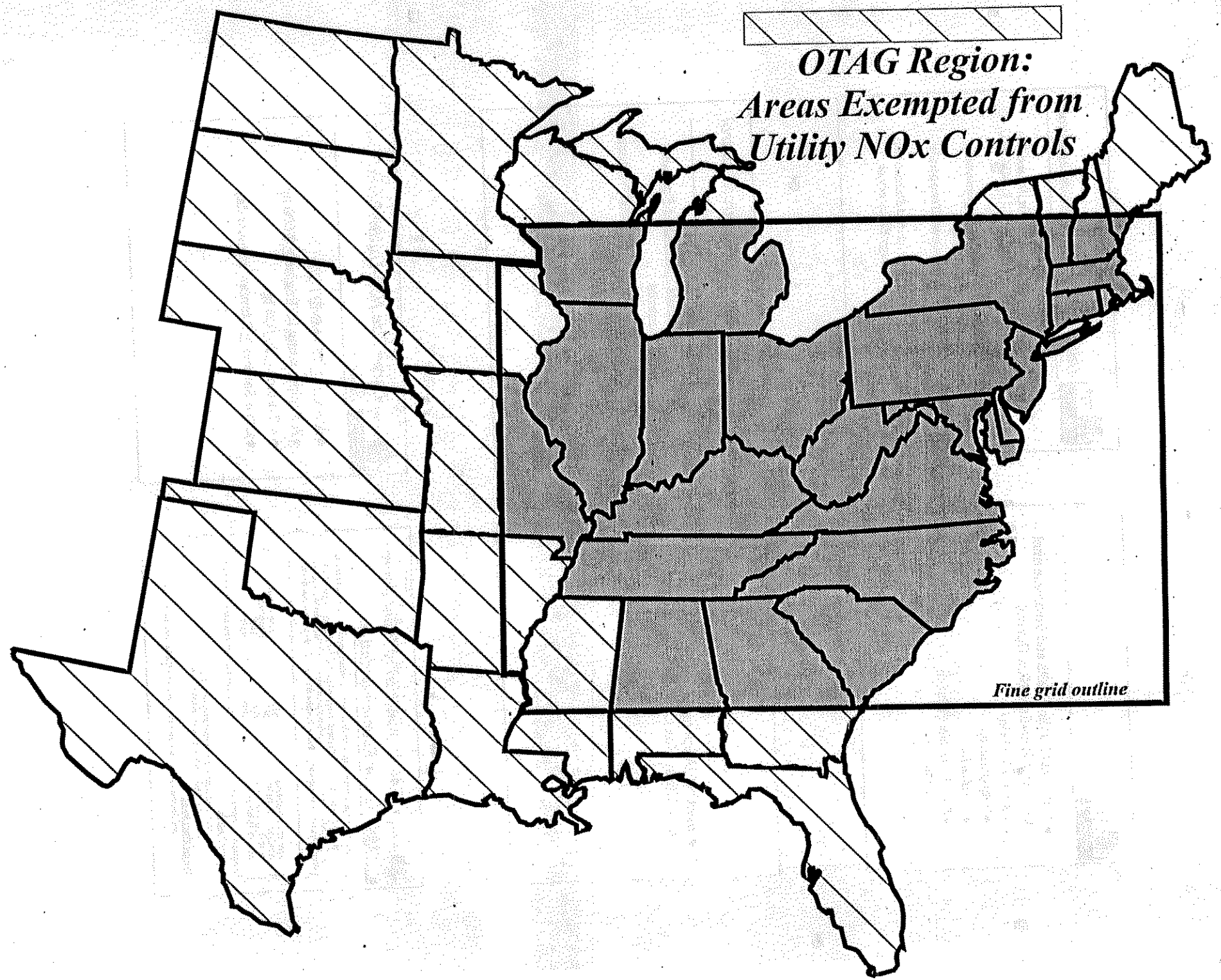
Reference Utility Control Level (Coal Fired Power Plants)	Control Targets for the Large Non-Utility Point Source Sector	Control Targets for the Medium Non-Utility Point Source Sector
55% (0.35 lb/MMBtu)	55%	Uncontrolled
65% (0.25 lb/MMBtu)	60%	Uncontrolled
75% (0.20 lb/MMBtu)	65%	RACT
85% (0.15 lb/MMBtu)	70%	RACT

Control Targets:
- expressed as an emission reduction percentage
- should be based on uncontrolled emission rates

Budget Component:
- not intended to be an allocation for the sector OR for individual units

Large Size Non-Utility Point Sources

- A Boiler $\geq$ 250 MMBTU/hr
- A Reciprocating IC Engine $\geq$ 8,000 hp
- A Turbine $\geq$ 20,000 hp
- Other Sources $\geq$ 2 ton/av. summer day


OTAG Region:
Areas Exempted from
Utility NOx Controls
Fine grid outline

Medium Size Non-Utility Point Sources

- A Boiler > 100 MMBTU/hr and < 250 MMBTU/hr
- A Reciprocating IC Engine > 4,000 hp and < 8000 hp
- A Turbine > 10,000 hp and < 20,000 hp
- Other Sources > 1 ton/av. summer day and , 2 ton/av. summer day

- Insert "Utility Units in Wisconsin" Map

- Insert "Large Non-Utility Sources of NOx in Wisconsin" Map

National Measures Recommendations

- USEPA to Continue to Develop and Expeditiously Adopt Federal Measures

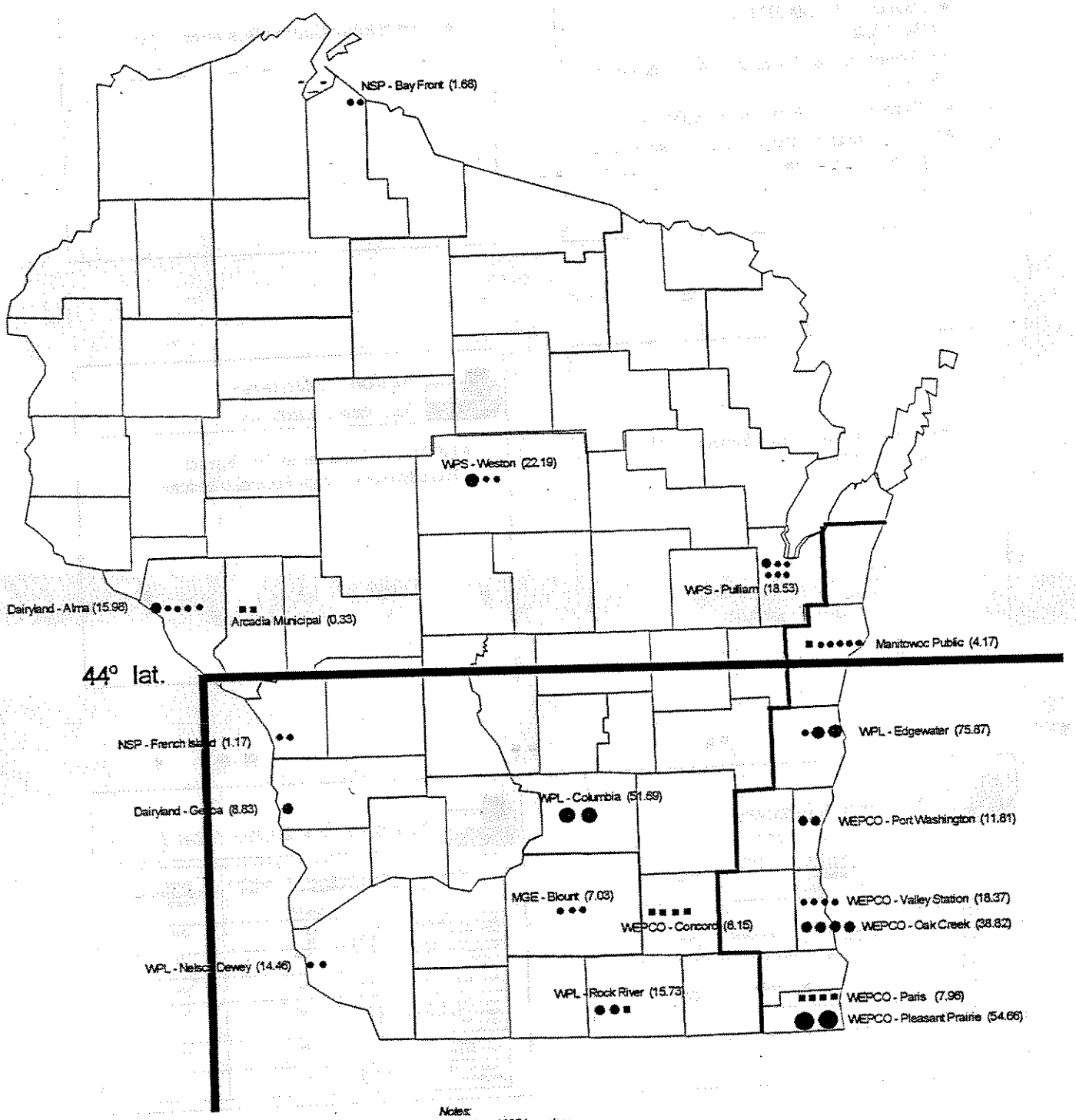
National Measures

MEASURE	REDUCTIONS ASSUMED IN THE MODELING		ADOPTION DATE	START / IMPLEMENTATION DATE
	%[1]	Tons [2,3]		
ARCH & INDUSTRIAL MAINTENANCE (AIM) COATINGS • Phase I • Phase II	20% VOC 38% VOC	607 861	November 97	January 98/ 2003
Consumer/Commercial Products • Phase I • Phase II	20% VOC 30% VOC	885 1281	November 97	March 98/ 2003
Autobody Refinishing • Phase I • Phase II	37% VOC 53% VOC	281 391	August 97	January 98 2003

National Measures (con't)

MEASURE	REDUCTIONS ASSUMED IN THE MODELING		ADOPTION DATE	START / IMPLEMENTATION DATE
	%[1]	Tons [2,3]		
Reformulated Gasoline (RFG) Phase II	25% VOC[4] 6.8% NOx	na[5] na		2000
Phase II Small Engine Standards	43% VOC	1343		2007
Marine Engine Standards	23%VOC	398		1998
Heavy Duty Highway 2g Standard (Equivalent to a 4g standard in 2007)	Varies by Engine Family	na[5]		2004
Heavy Duty Nonroad Diesel Standard	37% NOx	1499		2004
Locomotive Standard with Rebuild	43% NOx 10% NOx	na[6] 126		1997

Utility Units in Wisconsin



Notes:
- based on 1995 inventory
- circles are external combustion,
rel. size circle --> rel. size boiler
- squares are internal combustion

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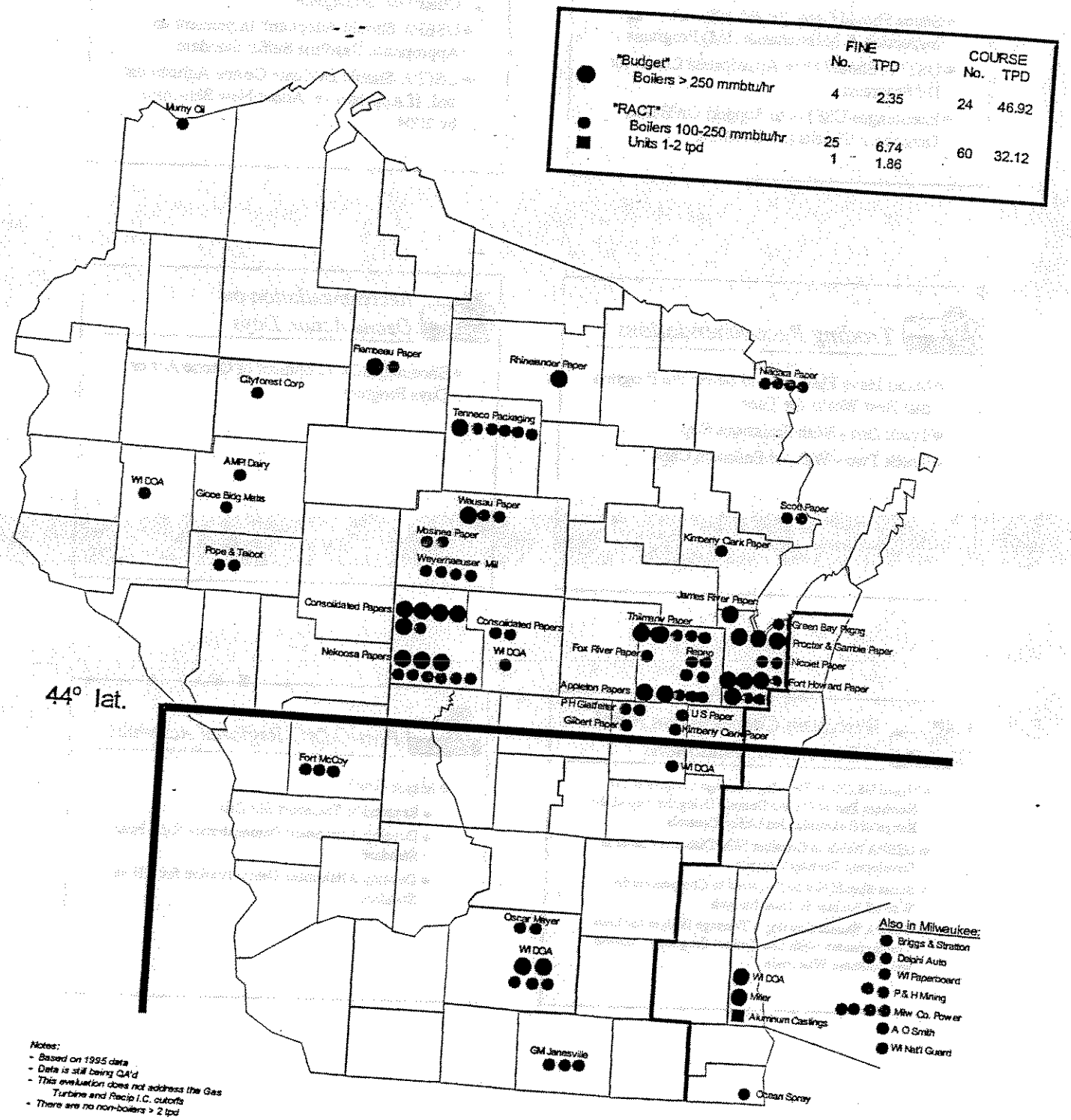
Large Non-Utility Sources of NOx in Wisconsin



Notes:
- *Based on 1995 data*
- *Data is still being QA'd*
- *This evaluation does not address the Gas Turbine and Recip I.C. cutoffs*
- *There are no non-boilers > 2 tpd*

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Recommendation on Vehicles

- OTAG Encourages Implementation of a National Low Emission Vehicle Program
- States Should Consider Adoption of Inspection & Maintenance (IM) Programs
- USEPA Should Give Appropriate Credit for IM Programs
- Encourages USEPA to Support On Board Diagnostic Checks as Part of IM

Recommendation of Fuels

- Supports States Flexibility and Encourages Opt-In to Federal Reformulated Gasoline or Other Fuel Strategies
- USEPA Should Adopt and Implement an Appropriate Gasoline Sulfur Standard
- USEPA Should Evaluate Cetane Adjustment and, If Appropriate, Adopt New Standards by 2004

Trading Recommendations

- States Have Flexibility to Select the Program that Best Works for Them
- Track One - With Emissions Caps
- Track Two - Without Emission Caps

Recommendation on Ozone Action Days

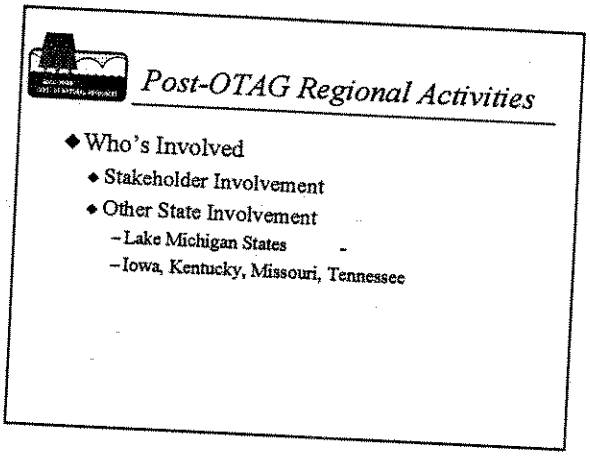
- Encourages Development of Ozone Action Days Programs

Wisconsin Comments on Final OTAG Recommendations

- Urged USEPA to Develop Tonnage Budgets in the Northern Part of OTAG Domain Using the Top of the Range of Recommended Utility Controls
- USEPA Needs to Consider NOx Disbenefit Issue in Developing Tonnage Budgets
- States Should Not be Required to Compensate for Waived Sources in Their Budgets
- USEPA Should Develop a Tonnage Budget for Iowa Commensurate with The Control Program in Illinois and Southern Wisconsin

Post-OTAG Regional Activities

- Major Goals
  - Respond to Transport SIP Call
  - Develop Attainment Demonstration for 1 Hour Standard
  - Develop Attainment Demonstration for 8 Hour Standard


Post-OTAG Regional Activities
Who's Involved
Stakeholder Involvement
Other State Involvement
–Lake Michigan States
–Iowa, Kentucky, Missouri, Tennessee