

Regulatory Flexibility Committee
August 14, 2007, 9:00 A.M.
Indiana State House Chambers

Subject: ICREED Testimony

Information prepared for questions regarding the adverse effects of IN coal-based power utilities on the health of the public.

Introduction

In 2005, more than one billion tons of coal was consumed in the U.S., generating 54% of our electricity and producing the single largest source of environmental degradation and pollution, adversely affecting the quality of air, terrestrial and aquatic environments, water resources, human health, and climate.

At every stage of coal mining, processing, transportation, storage, combustion, and solid and liquid waste processing, major environmental pollution and adverse health effects occur. Improvements in pollution and health have been realized over the past 40 years as a result of legislative and other regulatory initiatives (Clean Air and Water Acts, etc) Large numbers of Americans, however, are daily exposed to pollutants that exceed federal standards.

Not subject to regulation are Carbon Dioxide (CO₂) emissions from power plants, which account for about 40% of U.S. CO₂ emissions. Adverse health effects of CO₂ are due primarily to the effects of CO₂ on the atmosphere and climate change (global warming).

In 2005, federal funding for health and environmental protection accounted for less than 10% of the total federal funding in coal-related R & D.

Indiana

(Adapted from Report to IN Regulatory Flexibility Committee, Sept. 26, 2006: The Public Health Impact of a Renewable Electricity Standard (RES) in Indiana, by S. Jay, G. Steele, T. Weathers, IU School of Medicine Department of Public Health.)

In Indiana, the adverse health and economic costs of coal-based power generation are substantial:

- Almost all (94%) of the electricity produced in Indiana is coal-fired. Less than 1% is produced from a renewable source.¹ “Indiana’s power plants place it among the nation’s **top five** polluting states in the country.”^{2,3}
- In comparison to all other states, Indiana ranked **3rd highest** for emission of sulfur dioxide, **3rd highest** for emission of nitrogen oxides, and **4th highest** for emission of carbon dioxide in 2005.³

For fine particle (PM 2.5) pollution in Indiana, one of the major pollutants produced by coal-fired power plants causes the following:

- premature death in people with heart and lung disease, accounting for more deaths in the U.S. each year than either drunk driving or homicide (23,600);^{6,11}

- thousands of heart attacks each year;^{6,11,12}
- worsening of respiratory symptoms: coughing, wheezing, shortness of breath, and triggering > **20,000 asthma attacks** per year in Indiana;^{6,10,11}
- excess hospital admissions, emergency room visits and clinic visits for respiratory diseases and cardiovascular diseases;^{6,11,12}
- lung function abnormalities, especially in children and people with lung diseases such as asthma;^{6,11}
- abnormal changes in heart rate variability and irregular heartbeat;^{6,11}
- the development of chronic respiratory disease in children.^{6,11}

The economic costs of fine particle pollution in IN exceed five billion dollars each year.^{2,11,12,15}

Table 1. Selected Particulate Matter-Related Health Damages Annually in Indiana^{2,11,12,15}

Health-related Endpoint	Annual Estimated Cases	Lowest Value Estimate per Case	Estimated Value for All Cases
Premature mortality	887	\$5.63 million	\$ 4,993,810,000
Heart attacks (non-fatal)	1,491	\$63,325	\$ 94,417,575
Chronic bronchitis	618	\$331,000	\$ 204,558,000
Asthma attacks (not requiring ER visit)	20,258	\$122 ^{16,17}	\$ 1,215,480
Lost work days	123,098	\$106 per day	\$ 13,048,388
		Annual Estimate:	\$ 5,307,049,443

The enclosed chart summarizes the major toxic pollutants from coal, including the primary sources, adverse effects and factors that increase risk for human toxicity, disease, and death.

Research shows that reduction in toxic pollutants (as through adoption of clean energy policies) would improve substantially the health of the public. (18-21)

Some adverse health effects of coal power *

<i>Toxic Pollutant</i>	<i>Nature of Pollutant</i>	<i>Sources</i>	<i>Adverse Effects</i>	<i>Increased Risk for Toxicity</i>
Fine Particulate Matter (PM2.5)	Airborne mixture of solid & liquid droplets: 1/30 th width of human hair, which penetrate deep into the lungs.	Coal-fired power plants (CFPP) (50% of total); Combustion activities: power plants; vehicles; wood burning, etc.	Premature death (lung cancer; cardiovascular; respiratory); Exacerbation of heart or lung disease (eg. angina or asthma)	1 in 3 in U.S.; Young & old persons; preexisting heart or lung disease; physical activity outdoors
Nitrogen Oxides (NOx)	Highly reactive gases contain Nitrogen & oxygen; contribute to ozone; react to form fine PM	CFPP: (18% of total). Combustion of fossil fuels; diesel vehicles; other industrial.	Respiratory diseases: asthma; bronchitis; worsening lung & heart symptoms & diseases	Children; elderly; work or exercise outdoors; pre-existing heart or lung disease
Sulfur Dioxide (SO ₂)	One of the sulfur oxide gases (SO _x); dissolves in water to form acid; forms sulfate fine PM	CFPP: (59% of total); other sources of fossil fuel combustion	Respiratory disease; aggravation of existing heart & lung symptoms & disease	Children; elderly; preexisting heart & lung disease
Carbon Dioxide (CO ₂)	Gas exhaled by animals; used by plants. Greenhouse gas (absorbs infrared waves of sun). Contributes to global warming	CFPP (39% of total-2.5 B tons/yr in U.S.); Industrial byproduct: fermentation; sodium phosphate manufacturing; byproduct in ammonia & hydrogen plants	Indirect via global warming: heat related disease; storm injuries; food & water-borne diseases; air pollution; infectious diseases (ID): reemergence of vector-borne ID; allergic diseases; cold-related diseases. CO ₂ lethal in high concentrations.	Children; elderly; preexisting heart & lung diseases
Ozone (O ₃) (Ground-level) (Main ingredient of Smog)	Free radical of oxygen; produced by chemical reaction of sunlight, NO _x & volatile organic compounds (VOCs)	Not emitted directly in air; formed by chemical reaction with NO _x & VOC from power utilities; vehicle exhaust; other industrial	Premature death; respiratory diseases; aggravation of preexisting heart & lung symptoms & disease.	Children; elderly; those with preexisting heart & lung diseases.
Mercury	Neurotoxic metal; exists in several forms	CFPP: largest man-made source in U.S.; Other combustion of fossil fuels; contaminated fish	Brain damage & various neurological disorders: mental retardation; deafness; blindness	Fetuses; young; pregnant women; women of childbearing age
Residues of combustion/gasification: arsenic, lead, cadmium, uranium, nickel, etc.	Elements exist in coal	CFPP: other combustion/gasification	Cancer; brain & other neurological disease	Fetuses; young children;

***Data from multiple sources: U.S. EPA; National Institutes Environmental Health Sciences (NIEHS) ; Centers for Disease Control & Prevention (CDC) ; American Academy of Pediatrics, National Research Council (NRC) and other peer-reviewed literature. SJJ Aug 14, 2007.**

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Peer-reviewed statements by national health professions' science based organizations:

American Academy of Pediatrics

Ambient Air Pollution: Health Hazards to Children (Policy Statement)

"This policy statement summarizes the recent literature linking ambient air pollution to adverse health outcomes in children...and concludes with recommendations to the government on promotion of effective air-pollution policies to ensure protection of children's health." One such recommendation is the development of alternative, low-emission fuels "critically... determined to have a good safety profile."

Source: Pediatrics 2004; 114(6):1699-1707.

Weblink: <http://pediatrics.aappublications.org/cgi/content/abstract/114/6/1699>

American Public Health Association

99-LB-5: Confirming Need for Protective National Health-Based Air Pollution Standards

This statement recognizes the many adverse health effects of air pollution, as well as the availability of "feasible and affordable solutions ...to significantly reduce air pollution." It urges the implementation of national emission-reducing strategies.

Weblink: <http://www.apha.org/legislative/policy/99policy/PDF>

2004-6: Affirming the Necessity of a Secure, Sustainable, and Health-Protective Energy Policy

"Noting the ...correlation between air pollution created by the burning of fossil fuels and human health impacts," APHA urges the "development of renewable energy technologies" and strengthened controls for hazardous pollutants.

Weblink: <http://www.apha.org/legislative/policy/2004/2004-6.pdf>

American Cancer Society

Air Pollution Linked to Deaths from Lung Cancer (news release 3/6/2002)

Based upon results of a study of over 100,000 people in the American Cancer Society's Cancer Prevention Study II, "there was no level of air pollution that was safe, and the more air pollution increased, the higher the risk became of dying from lung cancer, heart disease, or from any cause." Study co-author C. Arden Pope III, PhD, concluded that "further public policy efforts to improve air quality will result in significant benefits."

Source: JAMA 2002; 287(9):1132-1141.

Weblink:

www.cancer.org/docroot/NWS/content/NWS_1_1x_Air_Pollution_Linked_to_Deaths_From_Lung_Cancer.asp

American Heart Association

Air Pollution and Cardiovascular Disease: A Statement for Healthcare Professionals from the Expert Panel on Population and Prevention Science of the American Heart Association.

"Epidemiological studies have demonstrated a consistent increased risk for cardiovascular events in relation to both short- and long-term exposure to...ambient particulate matter." This statement presents a "comprehensive review of the literature on air pollution and cardiovascular disease," and discusses "these findings in relation to public health and regulatory policies..."

Source: Circulation 2004;109:2655-2671.

Weblink: <http://circ.ahajournals.org/cgi/reprint/109/21/2655>

American Lung Association

American Lung Association State of the Air 2006

"Thousands of studies have documented that the current limits on particle pollution do not protect the health of the public...The toll of death, disease and environmental destruction caused by coal-fired power plant pollution continues to mount." The American Lung Association recommends lowering the limits for fine particles and strengthening of the Clean Air Act to further reduce hazardous emissions.

Weblink: http://lungaction.org/reports/sota06exec_summ.html

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Gregory Steele, M.P.H., Dr.P.H. obtained his Doctorate in Epidemiology from the University of Alabama-Birmingham. He has done extensive work and publishing on the health risks associated with a variety of environmental agents. Dr. Steele also has served on several U.S. EPA, CDC, and ATSDR advisory committees regarding the human health concerns resulting from toxic environmental and occupational exposures. Dr. Steele served as the Indiana State Epidemiologist for the Indiana State Department of Health and the Senior Epidemiologist for the Marion County Health Department prior to joining the faculty of the Indiana University School of Medicine, Department of Public Health.

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