

The Public Health Impact of a Renewable Electricity Standard (RES) in Indiana

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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.

Tess Weathers, M.P.H. obtained her Master of Public Health degree in Epidemiology through the Indiana University School of Medicine, Department of Public Health. She spent more than 10 years as the chief clinical research administrator for the Indiana University Cancer Center. Since joining the staff of the Department of Public Health in 2003, her work has focused on advancing the practice of evidence-based public health in Indiana. Her work was presented nationally at the American Public Health Association meeting in 2005.

The Public Health Impact of a Renewable Electricity Standard (RES) in Indiana

Introduction:

The Indiana State Legislature is hearing testimony regarding a “Renewable Electricity Standard” (RES). I am here to testify, as a medical expert and advocate for the public’s health, that the increasing usage of clean, renewable energy will yield substantial benefits to the public in terms of improved health outcomes, economic benefits, and decreased health expenditures.

Where are we now?

- 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
- In April 2005, the EPA identified 17 counties in Indiana that failed to meet the 1997 air quality standards for health protection regarding fine particles (“non-attainment” areas for PM_{2.5}).⁴ These counties are home to more than 2.5 million Hoosiers - more than 40% of the state’s total population.⁵
- In recognition of the preponderance of evidence documenting the adverse health effects of fine particle pollution, the EPA just issued (9/21/06) a more stringent standard for fine particle emissions that states must meet by 2015.⁶

What is the health impact?

Combustion of fossil fuels is the primary source of fine particle emissions.⁷ In 2004, power plants were responsible for roughly two-thirds of sulfate emissions, about 40 percent of carbon dioxide emissions, and 22 percent of nitrogen oxides. Because of their small size, fine particles can be inhaled deeply into the lungs, and may enter the bloodstream.⁸ “**Over 2,000 peer-reviewed studies** published since 1996 provide overwhelming evidence of the many adverse health effects of particulate pollution...”⁹ There is broad scientific consensus that fine particle pollution endangers our health. These health effects range in severity from minor symptoms to chronic, serious and fatal outcomes.^{6, 10,11,12}

Fine particle pollution:

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

Children, the elderly, and people suffering from chronic illnesses are particularly vulnerable to the adverse health effects of air pollution.^{10,12,13} “Poor and minority communities are also disproportionately affected by air pollution” because they often live closer to the emission sources.¹¹ Well over 1 million children in Indiana live within 30 miles of a coal-fired power plant, the area associated with the highest health risks. Over 60,000 of these 1 million children have asthma.¹⁴

What is the economic impact from these health effects?

As a result of fine particle pollution, the costs associated with premature mortality, illness, and lost productivity in Indiana exceed five billion dollars each year.^{2,11,12,15} Conservative Indiana-specific value estimates for selected health-related outcomes of fine particle pollution are shown below. Most of the cost is due to premature deaths. Known health endpoints not valued below include hospitalizations, severe asthma attacks requiring ER visits, acute bronchitis and non-asthmatic respiratory symptoms, as well as lost school days. While the selected costs shown in Table 1 do not capture the full economic impact of PM-related health damages, these costs are compelling.

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

What are the projected public health benefits from adopting a “Renewable Electricity Standard”? “Epidemiological studies have reported a linear relationship between exposure and effects. In other words, the higher the concentration of particles, the greater the effect on the health of populations,” and the lower the concentration of particles, the lesser the health effect.¹⁸ **A reduction in emissions achieved through substitution of clean energy would clearly improve the health of our citizens.** Renewable energy sources are not equivalent in their capacity to improve the public’s health and lower the economic burden. To achieve maximum benefit, the cleanest energy source(s) should be substituted for the most polluting energy. In this regard, energy derived from the wind is particularly appealing, since there are essentially no harmful emissions of air pollutants.¹⁹

Exactly how much improvement would the proposed RES provide? The methods to scientifically estimate the benefits of proposed air pollution regulations have been developed and applied elsewhere in the U.S.^{12,20} However, to apply this methodology, one would need to project the relative proportion of various renewable energy sources that would be integrated into

an energy strategy, as well as the current sources of non-renewable energy that would be displaced. Once this has been determined, the economic benefits can then be quantified.

From an economic standpoint, the EPA documented that “the benefits of the Clean Air Act and associated control programs substantially exceeded costs.”²¹ While substitution of renewable energy is a somewhat different strategy for emission reduction than that prescribed by the Clean Air Act, it is reasonable to assume a similarly positive cost benefit ratio.

Concluding Recommendation:

As a medical professional and public health expert, I strongly support the adoption of a renewable electricity standard in Indiana as a means of reducing the substantial health effects our citizens suffer from fine particle pollution. We commend the legislature for considering adoption of a “Renewable Electricity Standard.”

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Appendix A. Key Organizations Supporting Public Health Improvement Through Reduction in Air Pollution

✚ American Medical Association

H-135.998 AMA Position on Air Pollution

“Our AMA urges that ... maximum feasible reduction of all forms of air pollution, including particulates, gases, toxicants, irritants, smog formers, and other biologically and chemically active pollutants, should be sought by all responsible parties.”

Weblink:

http://www.ama-assn.org/apps/pf_new/pf_online?f_n=browse&doc=policyfiles/HnE/H-135.998.HTM

✚ 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