

Documents which should be used as references for examining the issues in  
Kentucky's PSC Case 2007-00477

The articles categorized below are on the data CD which accompanies this filing. We believe they provide important information that should be used in analyzing the issues of this study.

These issues include the comparison of life-cycle energy, economic, public health, and environmental costs of various strategies for meeting future energy demand; encouraging diversification of utility energy portfolios, and the goals of achieving energy efficiency and lowest life-cycle energy costs for all ratepayer classes.

We provide selected references listed in sections titled to indicate which issue the reference deals with.

We emphasize that this is not an exhaustive list, but an illustrative list. For example there is an active discussion in the economics literature on the question of how to place a monetary value on things that are not traded in markets, like environmental qualities, with many, many articles that could be cited.

## 1. The Public Health Impacts of Power Plants

**Cost Benefit Analysis: Replacing Ontario's Coal-Fired Electricity Generation**, Ontario Ministry of Energy, DSS Management Consultants Inc., RWDI Air Inc., 2005

[http://www.energy.gov.on.ca/english/pdf/electricity/coal\\_cost\\_benefit\\_analysis\\_april2005.pdf](http://www.energy.gov.on.ca/english/pdf/electricity/coal_cost_benefit_analysis_april2005.pdf)

Presents figures for the cost of premature deaths, and for the long-term health impacts from coal burning power plant emissions. This study found that the costs from long-term exposure were approximately seven times those from premature deaths alone. The study found that the environmental and health costs accounted for 77% of total generation costs, i.e., \$0.126 CAD/kWh [2005 dollars] out of total levelized cost of \$0.164 CAD/kWh for coal-fired generation in Ontario. This study is significant, because Ontario decided to phase out all coal-fired generation as a result of it. Chapters 6 and 7 discuss health and environmental costs. The total levelized cost (\$/MWh) is shown in the table on page 4.

**State of the Air: 2007**, American Lung Association, NY 2007.

This report provides an overview of the human health impacts from coal-fired power plants, with references to major studies that support the costly human health impacts. **Both the ALA report and the referenced reports are on the CD.**

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*“Breathing ozone may shorten your life: ...researchers found that the risk of premature death increased with higher levels of ozone. They estimated that over 3,700 deaths annually could be attributed to a 10-parts-per-billion increase in ozone levels.<sup>1</sup> Another study, published the same week, looked at 23 European cities and found similar effects on mortality from short-term exposure to ozone.<sup>2</sup>”*

[Referenced studies:]

1. Bell ML, McDermott A, Zeger SL, Samet JM, Dominici F. **Ozone and short-term mortality in 95 US urban communities, 1987-2000.** *JAMA* 2004; 292:2372-2378.
2. Gryparis A, Forsberg B, Katsouyanni K et al. **Acute Effects of Ozone on Mortality from the “Air Pollution and Health: a European approach” Project.** *Am J Respir Crit Care Med* 2004; 170: 1080-1087.

p. 53, ALA:

Old coal-fired power plants are among the biggest industrial polluters, especially in the eastern half of the United States... [The Abt Associates] analysis released in 2004 attributed 24,000 premature deaths *each year* to power plant pollution. In addition, the research estimates that over 550,000 asthma attacks, 38,000 heart attacks and 12,000 hospital admissions are caused annually by power plant pollution.

[Referenced study:]

**[Power Plant Emissions: Particulate Matter-Related Health Damages and the Benefits of Alternative Emission Reduction Scenarios](#)**, Abt Associates, (June 2004).

<http://www.catf.us/publications/index.php>;

This study estimates reduction in health effects from several regulatory policy scenarios using target dates of 2010 and 2020. The most useful scenario is the "No EGU" (electric generating units) scenario which quantifies the effects of existing power plants. The essential results are in Tables 6-1 thru 6-4 (pp. 6-2 thru 6-5) which break down the number of cases by specific health effect and quantify the costs in total dollars. This report estimates the avoidable health effects of power plants due to exposure to fine particulate matter with the same analytical methods that the EPA used in 2003 to prepare an analysis of the potential health effects of the proposed Clear Skies Act

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**Premature Mortality from Proposed New Coal-fired Power Plants in Texas**, Public Citizen [Texas] and the Sustainable Energy and Economic Development (SEED) Coalition. November 2006, p. 2

<http://cleartheair.org/documents/TxDDAPreortFINAL.pdf>

This study found that 240 premature deaths could be expected for emissions of 67, 730 tons of SO<sub>x</sub> and 33,521 tons of NO<sub>x</sub> from 19 coal-fired power plants in Texas. That is 0.00237037 deaths per ton of pollutant. The EPA uses a figure of \$6 million per premature death. That calculates to a dollar cost of \$14,222 per ton of pollutant from these two pollutants.

MSB Energy Associates performed the analysis using the Environmental Protection Agency's published methodology for calculating the health benefits of air quality improvements. The emissions figures used for this analysis come from the permit applications filed for each power plant or unit, and were collated by Public Citizen's Texas office and the Sustainable Energy and Economic Development (SEED) Coalition.

**The Benefits and Costs of the Clean Air Act 1990 to 2010: EPA Report to Congress**

<http://yosemite1.epa.gov/EE/Epa/eerm.nsf/02cd87ee96d1c215852567620003bd8d/9add3221c1a0064d8525643c007e4076!OpenDocument>

This is often cited as the definitive work on the costs of air pollution from generating electricity.

**The Importance of Population Susceptibility for Air Pollution Risk Assessment: A Case Study of Power Plants Near Washington, DC** Jonathan I. Levy, Susan L. Greco, and John D.

Spengler, Department of Environmental Health, Harvard School of Public Health, Boston, Environmental Health Perspectives • VOLUME 110 | NUMBER 12 | December 2002

The researchers estimate that over 250 premature deaths per year are associated with fine particulate matter air pollution from five power plants in Washington D.C., Maryland and Virginia. Disadvantaged groups were found to be especially vulnerable to air pollution; while only 25 percent of the population studied has less than a high school education this group suffers approximately half of the mortality attributed to the plants. The study calculated three health end points: additional premature mortality, cardiovascular hospital admissions (CHA) in the elderly, and pediatric asthma emergency room visits (ERV).

**Electricity-Generating Alternatives in Arkansas: An Economic Analysis**, Ernie Niemi, Cleo Neculae, and Sarah Reich, ECONorthwest Economics, October 2007

Table on p. 14 shows health costs per ton of pollutant, calculated using the methodology developed by Mathews and Lave. Matthews, H.S. and L.B. Lave. 2000. "Applications of Environmental Valuation for Determining Externality Costs." *Environmental Science and Technology* 34 (8) 1390-1395.

Cunningham, K; Deck, L; **Monetary Impacts of Health Effects Resulting from Baldwin Power Plant Emissions from 1982 to 2003**; Abt Associates 2002

The direct medical costs totaled \$47 million from the health impacts of the excess emissions from the Baldwin Power plant, which had violated the clean Air Act,

## 2. Environmental Costs

### **Carbon Costs**

**The Dirty Truth About Coal**, Sierra Club, June 2007

Page 12: coal-fired power plants have the highest output rate of carbon dioxide (or carbon intensity) per unit of electricity among all fossil fuels.<sup>97</sup> The dangers of carbon dioxide pollution and global warming are becoming clearer every day, and scientists continue to report on the effects of global warming that are already being observed around the world.<sup>98</sup>

**Gambling with Coal**, B. Freese, S. Clemmer, Union of Concerned Scientists, September 2006.

The Executive Summary presents the main points of this report:

1. Utilities should factor future CO2 costs into their resource planning, use alternatives, and defer construction of coal power plants;
2. Regulators should insist that utilities take the steps in #1 and they should protect rate payers from the cost of coal fired power plants that are constructed on the regulatory conditions of the past, not the future;
3. Investors/shareholders in utilities should recognize the inevitability of CO2 regulations and should demand utility management plan for future costs due to carbon risks;
4. Ratepayers and consumer groups should realize the likelihood of much greater potential future costs from coal power plants, and protect themselves by demanding that utilities invest in non-coal alternatives, efficiency and renewables.

The article also contains projections of future costs associated with CO2 emissions.

**Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning**, Synapse Energy Economics, Cambridge, Mass., March 2007. Their analysis of likely

fees for CO2 emissions supports a mid-range projection of \$25/ton in 2020, with a low case of \$10, and a high case of \$40. p. 9-11, and p. 37-52.

## **Other Environmental Costs**

### **The Impacts on Water Quality From Placement of Coal Combustion Waste In Pennsylvania Coal Mines, Clean Air Task Force**

In a multi-year study, the Clean Air Task Force (CATF) examined 15 coal mines where coal ash was placed. The study concludes that Pennsylvania the state's beneficial use program, whose primary goal is to improve the environmental condition of mines by adding of massive quantities of CCW, is failing. At 10 of the 15 minefills examined in the study, monitoring data indicate the coal ash contaminated groundwater or streams. Pages 1-4

### **3. Goals of Achieving Energy Efficiency and Lowest Life-Cycle Cost**

#### **An Overview Of Kentucky's Energy Consumption And Energy Efficiency Potential**

Kentucky Pollution Prevention Center, University of Louisville & American Council For An Energy-Efficient Economy, Aug. 2007

Contains a brief overview of Kentucky's energy usage. A useful discussion of the potential for energy savings in the industrial sector is presented on pages 14-20.

**Vision for 2025: Developing a Framework for Change**, Leadership Group of the National Action Plan for Energy Efficiency. Well-presented vision has achievable efficiency targets in the endnotes to Chap. 3., p. 43.

#### **Four Years Experience of the Nation's First Energy Efficiency Utility: Balancing Resource Acquisition & Market Transformation Under a Performance Contract**, Blair Hamilton,

Michael Dworkin, *Proceedings - 2004 ACEEE Summer Study on Energy Efficiency in Buildings*.

Efficiency Vermont has achieved impressive results, described in this article. Reductions in peak load and its contribution to Vermont's electrical needs are shown on page 14. The levelized cost of these savings is \$.026 per kW, with a net economic benefit to Vermont of \$81 million. (p. 15).

**Testimony to Indiana Regulatory Commission on Duke-Vectren IGCC**, B. Biewald, (Synapse) May 2007. Testimony before Indiana Regulatory Commission provides many qualitative arguments for the advantages of renewable and efficiency technology over additional coal-fueled power. Quotes from Florida and Texas studies on greater number of jobs from implementing efficiency technology over coal (pp. 8-9). Table of new employment numbers and economic impact from efficiency technology (p. 10)

**Testimony to Indiana Regulatory Commission on Duke-Vectren IGCC**, P. Mosenthal (Optimal Energy, Inc.) May 2007. The chief architect of the Vermont energy efficiency utility provides testimony concerning economic and consumer benefits of efficiency programs for utility ratepayer, and the accompanying environmental benefits. Summarized on pages 5-9.

**Saving Money And Reducing Pollutant Emissions Through Greater Energy Efficiency**

Steven Nadel, Howard Geller, ACEEE, September, 2001. Although slightly dated, the Executive summary of this work contains a number of thoughtful recommendations for energy efficiency policies.