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# THE DIRTY TRUTH ABOUT COAL:

Why Yesterday's Technology Should Not Be Part of Tomorrow's Energy Future



## INTRODUCTION

**I**t was more than 100 years ago on the shores of the lower East River in New York City that Thomas Edison opened the Pearl Street Station, the first centralized coal-fired power plant to come on line. More than a century later, coal-fired power plants produce about half of our nation's electricity,<sup>1</sup> and in 2006 a record 1.161 billion tons of coal was mined, most of which went directly to electricity generation.<sup>2</sup> Unfortunately, coal is also one of the most polluting sources of energy available, jeopardizing our health and our environment.

Pollution created by generating electricity from coal does not start or stop at the power plant. It stretches all the way from the coal mine to long after coal is burned and the electricity has been used in our homes and businesses. Mining and burning coal scars lungs, tears up the land, pollutes water, devastates communities, and makes global warming worse.



## MINING HAZARDS

Coal mining causes irreparable harm to our lands, water, and air, and also jeopardizes the health, safety, and economy of nearby communities. In the most destructive type of coal mining, known as mountaintop removal coal mining, a coal company literally blasts apart the tops of mountains to reach thin seams of coal buried below and then, to minimize waste disposal costs, dumps millions of tons of waste rock into the valleys and streams below, causing permanent damage to the ecosystem and landscape. This destructive practice has damaged or destroyed approximately 1,200 miles of streams, disrupted drinking water supplies, flooded communities, damaged homes, eliminated forests, and jeopardizes tourism and recreation.<sup>3</sup>

Coal mining is a major source of water pollution, causing acid mine drainage which occurs when abandoned mines fill with water that mixes with heavy metals and then leaks out into

groundwater and streams.<sup>4</sup> Coal preparation, or “washing,” also causes water pollution when chemicals and water are used to separate impurities from mined coal. Up to 90 million gallons of coal preparation slurry are produced every year in the U.S., most of which are stored in large waste pits known as impoundments.<sup>5</sup> Impoundments leak into local water supplies and can even burst dramatically, sending millions of gallons of wastes barreling down in mudflows and destroying property and lives.

Additionally, coal mining causes air pollution, including dust and particle pollution that can cause respiratory problems like black lung in coal miners. Coal-laden railcars blow coal dust into the air, causing breathing problems and dirtying the landscape of local communities. Coal mining also causes global warming pollution when it releases heat-trapping methane found in coal seams.<sup>6</sup>

## BURNING COAL: OUR NATION'S POWER PLANTS

Coal-fired power plants are one of the largest sources of air pollution in the U.S. The consequences for human health are staggering, especially with regards to particle pollution or soot, one of the most deadly types of air pollution in our country. Soot can trigger heart attacks and strokes, worsen asthma, cause irregular heart-beat, and lead to premature death.<sup>7</sup> Many scientific studies have also shown that communities of color are disproportionately exposed to harmful air pollution, including pollution from coal-fired power plants. The damages from particle pollution continue after it has settled to the ground, where it causes acidification of waters, soil nutrient depletion, and destruction of forests and crops.<sup>8</sup>



Not only are coal-fired power plants a major source of soot pollution, they are also one of the largest contributors to smog in the nation.<sup>9</sup> In addition to health effects like increased risk of asthma attacks, permanent lung damage, and premature death,<sup>10</sup> smog also harms plants and trees. Persistent smog pollution can alter and disrupt plant growth over time, leading to an estimated \$500 million loss due to reduced crop production in the U.S. every year.<sup>11</sup>

## WHAT REMAINS: THE LEGACY OF COAL COMBUSTION WASTES

Burning coal for electricity also creates several different types of liquid and solid wastes that are known collectively as coal combustion wastes. Taken together, the amount of coal combustion wastes produced is staggering: more than 120 million solid tons every year.<sup>18</sup> This waste alone is enough to fill a million railcars every year, or a train that is 9,600 miles long.<sup>19</sup>

Not only is it challenging to find a place to store so much coal combustion waste safely, but even after it is stored coal combustion waste can leak out and pollute the surrounding environment and groundwater. Containing elements like lead, mercury, and arsenic in toxic doses,<sup>20</sup> coal combustion wastes and their pollution have been shown to cause illness and death in plants and animals. In humans, where the greatest exposure risk is from polluted groundwater and drinking water,<sup>21</sup> the toxins have been linked to organ disease, increased cancer, respiratory illness, neurological damage, and developmental

problems.<sup>22</sup> Additionally, coal-fired power plants emit large quantities of toxic air pollutants such as lead and arsenic, and are one of the largest sources of man-made mercury pollution in the U.S.<sup>12</sup> Mercury, which enters our food chain after it rains down into our streams and lakes, poisons fish and seafood and accumulates in the animals and people who eat them. Mercury pollution causes brain damage, mental retardation, and other

developmental problems in unborn children and infants,<sup>13</sup> and has been linked to a greater risk of coronary heart disease in men.<sup>14</sup> The mercury problem in the U.S. is so widespread that every year one in six women of childbearing age has mercury levels in her blood high enough to put her baby at risk.<sup>15</sup>

Burning coal also releases carbon dioxide (CO<sub>2</sub>) pollution, a primary culprit in global warming. Even though coal-fired power plants generate just about half of our nation's electricity, they account for almost 40 percent of our nation's carbon dioxide pollution from all sources including transportation.<sup>16</sup> In fact, coal-fired power plants have the highest output rate of carbon dioxide (or carbon intensity) per unit of electricity among all fossil fuels.<sup>17</sup>



problems.<sup>22</sup> In one study, the EPA estimated that more than 21 million people, including more than six million children, lived within five miles of a coal-fired power plant,<sup>23</sup> a daunting figure considering that most coal combustion wastes are stored onsite.

## CONCLUSION: “CLEAN COAL,” OR AMERICA’S LEAD ENERGY MISNOMER

The coal industry knows it must change or it will be out of business—that is why it is pushing “clean” coal. But, coal as it exists today is anything but clean.

The supposedly “clean coal” technologies that have attracted the most attention in recent years are carbon capture and sequestration (CCS) and Integrated Gasification Combined Cycle (IGCC). As of now, CCS remains an unproven technology, and experts disagree as to how long it will take for this technology to be available for commercial and wide-scale use.<sup>24</sup> IGCC unfortunately emits just as much global warming pollution as other coal plants.

The coal industry is also pushing liquid coal as a clean alternative, yet liquid coal creates almost double the carbon dioxide emissions per gallon as regular gasoline, and replacing just 10 percent of our nation’s fuel with it would require a more than 40 percent increase in coal mining.<sup>25, 26</sup>

The truth is that promises of these and other future technological innovations that will allow us to use coal cleanly are not available today.



The challenge of cleaning up the way we mine and use coal is not small by any means. On average, our country consumes more than three million tons of coal every day, or about 20 pounds of coal for every person in the nation every day of the year.<sup>27</sup> The good news is that we can reduce our dependence on coal by increasing efficiency and relying more on clean energy power like wind and solar, and we can minimize the damage coal causes by ensuring it is mined responsibly, burned cleanly, and does not take us backward on global warming.

1 Energy Information Administration, “Electric Power Annual: Summary Statistics for the United States,” October 2006.

2 Energy Information Administration, “Quarterly Coal Report: October - December 2006,” March 22, 2007.

3 U.S. Environmental Protection Agency, “Draft Programmatic Environmental Impact Statement,” 2003 and “Final Programmatic Environmental Impact Statement,” October 2005.

4 U.S. EPA, “Mid-Atlantic Integrated Assessment: Acid Mine Drainage,” updated March 3, 2006.

5 Id.

6 U.S. EPA, “Coalbed Methane Outreach Program,” accessed April 4, 2007 at <http://www.epa.gov/cmop/>

7 Id.

8 Id.

9 U.S. EPA, “NOx: How Nitrogen Oxides Affect the Way We Live and Breathe,” September 1998.

10 American Lung Association, “State of the Air: 2006.”

11 Id.

12 U.S. Environmental Protection Agency, “EPA to Regulate Mercury and Other Air Toxics Emissions from Coal- and Oil-Fired Power Plants,” December 14, 2000.

13 Agency for Toxic Substances and Disease Registry, “ToxFAQs for Mercury,” April 1999.

14 American Heart Association, “Mercury, Fish Oils, and Risk of Acute Coronary Events and Cardiovascular Disease, Coronary Heart Disease, and All-Cause Mortality in Men in Eastern Finland.” November 11, 2004.

15 U.S. Environmental Protection Agency, “Methylmercury: Epidemiology Update,” presentation by Kathryn Mahaffey, PhD at the National Forum on Contaminants in Fish, San Diego, CA, January 25-28, 2004.

16 U.S. Environmental Protection Agency, “Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005,” April 2007. Based on calculation of CO<sub>2</sub> emissions from tables 3-1 and 3-3. .

17 U.S. Department of Energy and U.S. Environmental Protection Agency, “Carbon Dioxide Emissions from the Generation of Electric Power in the United States.” July 2000.

18 National Research Council, “Managing Coal Combustion Residues in Mines,” 2006.

19 Id.

20 Id.

21 Id.

22 Id.

23 Id.

24 See for example, MIT, “The Future of Coal,” March 2007.

25 Williams, Robert et al., “Synthetic fuels in a world with high oil and carbon prices,” 8th International Conference on Greenhouse Gas Control Technologies, June 2006.

26 The National Coal Council, “Coal: America’s Energy Future,” March 2006.

27 Calculation based on U.S. coal consumption (see EIA “Quarterly Coal Report: October - December 2006”) and U.S. population. Inspired by similar calculation performed by the Union of Concerned Scientists.



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