Coal Burning and its Effects on the Environment

David Song

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Steve Teeter and Sandie Brundin

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Abstract

Coal is a combustible sedimentary rock that is used for heating and electricity. From millions of years ago, coal is formed from the heat and compression of plant life. Coal has the element carbon in the rock. The level of carbon in the coal determines their type of coal. Coal is used to make steam in the electricity generation process. The extraction and burning of the coal cause major negative environmental impact. Though there is a few creation of “green” technology that may reduce the effects of coal.

Coal is one of the most essential and abundant types of rocks used today. With the composition of carbon, coal is mainly used as a fossil fuel to produce electricity and heat. As of the present, coal is one of the world's major sources of power generation. Native Americans have been using coal since the early 1300s for cooking and heating, but it was not utilized to its fullest extent until the start of the Industrial Revolution in the 1800s when electricity became a necessity (Coal's Past, Present, and Future, 2010). Through the coal burning process, coal creates electricity which is put to use by the world. Coal use was not proven to be detrimental to the environment until the late 20th century when environmental science became a new field in the scientific world. The controversy of the use of coal, due to its environmental effects, is being determined by the creation of new "green" technology.

Coal is a sedimentary rock made from ancient flora life compressed in the earth's layers for several million years. Partial decay of these ancient organisms resulted in the formation of coal along (Coal, 2010).The type of early life forms used in the coal formation process has two theories, the autochthonous and allochthonous. Both of these theories have some sort of proof that it is true. Autochthonous theory says that the ancient life was from freshwater swamps or peat bogs and never moved. This theory is more favored due to the evidence of the similarity of the coal in most areas. The allochthonous theory says that the ancient life was moved from its origins to a different place by any means. Uncommon cannel coal proves this theory because it contains organic matter that is evident that it has been moved. During the coal formation process, the early life forms under water are partially decomposed due to the lack of oxygen. The partially decomposed matter accumulates and forms the substance, peat, which would be compressed and heated for millions of years to form coal. The rank of the coal cannot be determined by the area

where it was formed except for anthracite coal. During the lag time before the peat is compressed, we do not known about what changes happened that could have affected the peat so the rank of the coal is not known based on location alone. Only anthracite coal is known to form in sharply folded rock beds (Pettijohn, 1957).

Coal is differentiated through their rank. The rank of the coal is determined by the severity of coalification, the process of peat transforming into coal. The rank is directly proportional to the carbon levels of the coal. The varied percentages of coal depict the group that the coal belongs to. The higher the degree of coalification makes the coal higher in carbon content (Tucker, 2001). The groups of coal are anthracite, bituminous, sub-bituminous, and lignite. The carbon content for each type of coal are 86 to 98 percent for anthracite, 45 to 86 percent for bituminous, 35 to 45 percent for sub-bituminous, and 25 to 35 percent for lignite (Coal Types, 2002-3). The carbon content is indirectly proportional to the volatility. Volatility is the gases of the coal that are combustible. Volatile gases in coal are hydrogen (H2), carbon dioxide (CO2), and methane (CH4). That means that since anthracite has the most carbon content, it would be harder to ignite than lignite coal (Tucker, 2001).

Each type of coal has a purpose. Lignite, sub-bituminous, and bituminous coals are used in the electricity generation process. About 56 percent of the United States' electricity is generated by coal. Coal is burned to produce steam to spin the turbines to generate electricity. Carbon in the coal gives the energy to be able to make the steam. Bituminous coal leaves a residue called coke, which is used in the steel industry for smelting the iron ores together (Connor, 1997). Anthracite is used for heating due to its attribute of burning slowly (Coal's Journey, 2010). The bituminous coals are the most abundant type of coal in the United States. About 52 percent of the United States' reserves are made up of bituminous coal (Coal).

The process it takes to extract the coal from the earth takes a toll on the environment. The two types of coal mining are underground and surface mining. Animal habitats and landscapes are scarred with coal mining. The clearing of the land for mining disturbs the natural animal habitats and forcing animals to migrate to other areas. The constant human interference would destroy the landscapes with the drilling, new roads, and the destruction of the plant life in the region. Underground mining sometimes take up numerous square miles of land to be mined. The land would be stripped of their plant and animal life and replaced by the mines. The actual depth of the underground mine would also possible contaminates the region's aquifers. The coal extraction process may also be a dangerous one. The methane gas produced by the coal can spontaneously combust which would cause mine fires and possible endanger the lives of the mine workers. The leakage of methane, carbon dioxide, and other types of greenhouse gases from these coal mines is affecting the world's atmosphere with global warming (Coal, 2010).

After the extraction of coal, coal is used primarily to generate electricity. The coal burning process releases these greenhouse gases such as carbon dioxide and methane into the atmosphere. Global warming is caused by the accumulation of carbon dioxide and other greenhouse gases in the earth's ozone layer. Global warming is when the earth's average temperature is heating up. The greenhouse effect is good for the environment except when the levels of greenhouse gases are constantly rising at a fast pace. This would deteriorate the earth's ozone layer thus causing ultraviolet rays to be able to penetrate more. As a result, skin cancer along with other skin diseases would arise from the high ultraviolet ray levels. Global warming also because the extreme weather conditions due to the warming of the global climate. About forty percent of all carbon dioxide is from power plant burning coal (Slatick). Coal burning is about 3.7 million tons of carbon dioxide released into the ozone layer each year (Global

Warming). Along with global warming, coal is also a major contributor for acid rain. The mixture of sulfur dioxide (SO2) and nitrogen oxide (NO2) are the main factors in acid rain. There are two ways acid rain can occur: wet and dry deposition. Wet deposition is made when the acidic factors are in a wet climate. The wet climate would be able to form acid rain, snow, fog, and mist. Dry deposition is when the acidic factors enter a dry climate and is blown at objects. Weathering from rainstorms would wash away the acidic dust in the form of runoff (What Causes Acid Rain, 2007). Both types of acid rain effects the environment by raising the pH levels of the area thus disturb the ecosystem. The flora life would die out due to the raise in pH in the soil. The water would be contaminated. The animal life would either die or adapt to the new environment. The entire ecosystem of that region would changes due to the acidic rain that is caused by coal burning plants. Coal burning emits dangerous greenhouse gases in the process which has a huge impact on the environment.

The coal burning process is greatly damaging the earth's environment but there are solutions to reduce the negative effects of coal. "Greener" technologies are still being created right now. The Clean Coal Technology Incorporation is said to have created a cleaner burning processing unit that helps reduce the greenhouse gases up to 90 percent (The Pollution Solution, 2007). These technologies are still being developed. There might still be a future in coal if the technology reduces the emissions. The clean coal projects are expensive that is hard to fund for. The United States are currently funding about 12 billion dollars for clean coal research (Clean Coal Technology Research All Over America , 2010). If the "green" technology helps withhold the greenhouse effects then the power plants would be able to continue to work. The landscape problem can be solved with the process called reclamation. The United States has ratified the Surface Mining Control and Reclamation act in 1977 which enforces the mine companies to

rebuild the original environment before it was cleared for mining. The reclamation is planned before the actual mining (Coal Mining, 2008). The land restoration would be inhabitable again and it would contain the acid leakage. “Green” technology depicts the future of use of coal.

Coal is a combustible rock primarily used in electric generation by the world. In the United States, 56 percent of electricity is made from coal burning plants (FAQs About Coal, 2010). Though coal's attribute of natural heating is excellent for electricity generation, coal has a dire impact on the earth's environment. Power plants produce gigantic amounts of green house emissions because of coal. The entire process of coal has an impact on the environment. The extraction process destroys the landscape and ecosystem. The coal burning process has the emissions which causes global warming and acid rain. The solutions to amend the negative affects of coal are still pending but are still possible.

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