

# **Clean Coal Regulation and Alternative Energy Development in the San Juan Basin**

*Christopher J. Abbott*

## **Abstract**

*In this paper, I examine the complex relationships among the various levels of government that have jurisdiction over the coal beneath the San Juan Basin, and then examine the technical issues making the process of stripmining coal in the San Juan Basin particularly dangerous to the health of the local community and ecosystem. I will apply an eco-capitalist lens to propose a three-step solution to mitigate the environmental and public health damage being caused by the excavation and burning of coal in the San Juan Basin. First, I assert that the U.S. government should enact a Feed-in-Tariff to accelerate a national transition to clean energy. Second, I propose that the New Mexico state government require the local energy monopoly, PNM, to begin a rapid phase-out of coal and to replace it with renewable energy and natural gas. Third, I argue that the New Mexico state government should create stricter regulations over the current coal production in the state to mitigate the immediate threats coal production poses to public health and the local ecosystem.*

## **Understanding the San Juan Basin**

The San Juan Basin lies in the desert climate of northwestern New Mexico, and suffers from air pollution rivaling that of major cities (Wilkins, Chris and Dan Olson). The Four Corners Power Plant (FCPP) is the single largest source of coal pollution in the country, and the entire process of using coal— the excavation, the burning, and disposal of the sludge— is completed locally. Each step causes serious issues for the environment.

For residents in the area, coal is a matter of life *and* death. The thousands of jobs provided by the coal industry are crucial for this impoverished community, though many of these same people will die because of coal. Certainly death certificates will list the precipitating causes as heart attacks or respiratory disease, but make no mistake: coal kills.

Addressing this crisis will require aggressive immediate action, as coal plants have a 40-year lifespan on average (MacAvoy). A proposal to extend permits for the FCPP through 2041 is under consideration, but allowing this inefficient 50-year-old plant to continue operating for 25 more years would yield disastrous environmental and public health effects

by slowing the state's transition away from coal, which creates 68% of the state's energy compared to 8% renewables.

### *Economic Dependence*

Located in the Four Corners area, where New Mexico, Colorado, Arizona, and Utah all share a border, the San Juan Basin traverses the borders of states, the Navajo reservation, and Chaco Canyon National Historic Park, leading to questions of sovereignty that make this coal seam particularly difficult to govern. However, for the sake of this essay, I will focus on the portion of the San Juan Basin in New Mexico, where the primary zone of strippable coal lies.

In the 1970s, the Bureau of Land Management granted the first permits for companies to mine coal in the region without the consent of the Navajo, as the minerals underneath the land were not protected in Native American reservations (Radford 12). Shortly after permits to mine the Navajo lands were issued, this policy was changed to ensure that the reservation protected all of the resources on the reservation, including those below ground. In fact, the petition to the Secretary of the Interior from the Northern Cheyenne arrived in 1973, at the height of the Arab oil embargo, and a year later, "Secretary Morton resolved this dilemma by suspending the permits and leases" to encourage renegotiation between the Cheyenne and the coal companies ("'Fighting Cheyenne' in the Last Quarter of the 20<sup>th</sup> Century"). However, the permits on the Navajo reservation remain in effect today, as there was no retroactive action to revoke them. It is possible for the Navajo to follow this path and challenge the legality of the coal lease ("'Fighting Cheyenne' in the Last Quarter of the 20<sup>th</sup> Century"). However, this is unlikely to happen because many in the region are dependent on the jobs provided by the coal industry. For instance, the Four Corners Power Plant alone employs 434 workers, 82% of whom are Navajo ("Four Corners"). Additionally, jobs at the San Juan Generating Station and Navajo Coal Mine could be endangered by a lawsuit against the coal industry. While it may seem like this is still relatively few jobs, they are particularly important in an area where the labor force is lower than 60,000 and 21% of those are unemployed ("Quick Facts"). This economic dependence on the coal industry has also contributed to a lack of political power for the Navajo and citizens in the area.

The political marginalization of Native Americans has resulted in a lack of challenges against the coal companies in Chaco Canyon. With the exception of an armed occupation when coal companies blasted through the graves of the family and ancestors of the Navajo in 1980, the coal industry has operated with relatively few interruptions (Radford 12). This lack of protests is largely attributable to the lack of political power caused by the region's weak economy.

In San Juan County, the US Census Bureau reports that 21% live in poverty and 25% lack health insurance, compared to national averages of 14% and 12%, respectively. This indicates a need for a significant amount of government welfare, yet San Juan receives significantly less in the government assistance than most of the country, with an average welfare receipt of \$5,250 per capita versus a national average of \$6,610 (Quick Facts), making the poverty in the region even more severe.

Regulating the coal industry at the state level will also be difficult, as energy production is accountable for 5% of the GDP in the state, making it New Mexico's third largest industry (Maverick), and the energy supplier in the state, PNM, is the largest New-Mexico based company by a factor of 15 (Carlyle). In fact, energy Law professor David Spence points out that the unwillingness of states to create basic regulations led to the need for the US government to implement minimum health and environmental standards. If the states were unwilling to even do this, it is doubtful that they will create stricter regulations than the federal government has already required (Spence). While coal companies have a strong political influence in many states due to the jobs they provide, the process used to mine coal in the San Juan Basin is particularly damaging for the relatively few jobs that are actually created.

### *Environmental Impact and Practices*

In the San Juan Basin, coal is excavated through a process called stripmining, which the University of Kentucky explains requires completely removing the topsoil with high explosives and machines to expose the coal. Then, instead building coal shafts, it is collected at the surface with large earth moving equipment, eliminating the need for many jobs. As the coal is excavated, the topsoil from the newest cuts is placed in the hole from the previous cut where the coal has already been removed ("Methods of Mining"). This technique is often

utilized in the western United States and the Appalachian Mountains because coal seams are often covered by relatively little overburden (< 200'), making it cheaper than underground mining techniques (*Tribal Energy and Environmental Information*). This is also more damaging to the environment than underground mining because it requires completely removing the soil from the ground, and in dry regions where the soil is unable to maintain moisture, the soil often cannot be revegetated, and even if it were it would destroy the ecosystem and habitat that originally existed there.

### **Consequences of Inaction**

There are three major concerns if no action is taken to regulate coal mining and burning in the San Juan Basin and Four Corners area: Local environmental degradation, health consequences, and the ripple effects of coal on the global environment.

#### *Local Environmental Degradation*

An estimated 23,000 acres of land will be strip-mined in the Chaco Canyon area as a result of coal excavation (Radford 13), and plans are in place to expand one mine in the area, the 13,000 acre Navajo mine near the San Juan River (Hernandez et. al). Industry and government officials claim that after the coal is excavated the land will be restored to its productive capacity (Radford 10). However, coal companies exploit this because the desert soil in the San Juan Basin was already unproductive (Schlottmann 75), and concede privately that "revegetation may not be sustainable" (Radford 10). While soil in the Rocky Mountains can be restored after it is stripmined, the alkaline soil in Chaco Canyon does not preserve moisture, and there is not sufficient rain to restore the soil. Generally at least ten inches of rain are needed to restore soil (Schlottmann 75), but Chaco Canyon's five inches per year makes revegetation nearly impossible.

The effects of stripmining coal go beyond the impact on the topsoil that is removed and replaced as well, to include the quality of the air and water nearby. A common problem is disposing the solid waste produced by coal, which is essentially the sludge leftover from coal that does not burn. Nationally, 43% of this waste is recycled for uses such as creating asphalt, but the rest must be disposed of (Chatterjee 3004). A worst-case scenario is if the impoundment where the sludge is disposed of fails. For example, this was the cause of the

widely publicized spill in Tennessee in December of 2008 (Chatterjee 3003), and the 1972 Buffalo Creek disaster, where a dam collapsed and a flood of water and coal killed 125, injured 1,100, and displaced 4,000 within minutes (Lockwood 53). These are not isolated instances, as 65 impoundment failures released 750 million gallons of slurry between 1972 and 2012 (Lockwood 54). While this is a worst case scenario that is somewhat less likely because the San Juan CCW is disposed of in the San Juan Mine rather than a dammed lake, the solid coal-combustion waste (CCW) that is not reused can still have devastating consequences for the environment without a spill.

As a case study of the more probable consequences, I will examine the effects of the solid CCW stored in Belews Lake in North Carolina. The lake was built in 1970 to provide cooling water for a nearby coal-fired power plant, which became operative in 1974. In 1975, researchers monitoring the pond found high levels of selenium, a result of fly-ash from the newly operational power plant. By 1978, 16 of the 20 fish species in Belews Lake had been extirpated (Chatterjee 3003). While in this case the cause of the fish decline was easily attributable to selenium, linking the increase in toxins to the decrease in population can often be much more difficult, since there are 10 to 20 water pollutants from coal that seriously threaten the environment (Chatterjee 3004).

The San Juan ecosystem is one where proving the link between the extraction of coal and the negative environmental impacts is particularly difficult. However, the Center for Biological Diversity, Shiloh Hernandez of the Western Environmental Law Center, and four other partner organizations establish that the endangered Colorado pikeminnow has seen a 64% population decline in the San Juan River, likely due to mercury in the muscle tissue of the fish which impairs reproduction (Hernandez et al.). Despite this, definitively proving that coal pollution is the cause of this decline in fish populations is difficult for lawyers, lobbyists, and scientists.

### *Health Consequences*

Perhaps more difficult than establishing the connection between coal pollution and the environment is the task of establishing the causality between coal pollution and human health. Physician Alan H. Lockwood asserts that the coal “epidemic claims the lives of tens of

thousands of Americans” each year, though ““exposure to coal-derived pollution”” will never be listed on a single death certificate (1). He compares coal pollution exposure to smoking cigarettes, in that both are often conditions for death from various respiratory and circulatory diseases, but they are less visible threats to human health because neither is the precipitating cause of death. Lockwood claims that it is difficult to “link a specific source of a pollutant, notably burning coal, to a health effect in question” (7). Thus, sometimes the best that can be done is to examine the known health risks of pollutants and note the amount of that pollutant that is attributable to burning coal. For instance, in North America, half (78 of 158 tons) of anthropogenic mercury emissions and 95% of anthropogenic sulfur oxide emissions came from stationary sources, primarily coal plants (Lockwood 26, 40). These dangerous chemicals are just some of the 67 hazardous pollutants released into the air from coal plants that the EPA has identified as dangerous (Hernandez et al.).

In fact, modeling strategies on an EPA report estimate over 200 people living within 30 miles of coal-burning utilities will die as a result of air pollutant emissions every year (Lockwood 23). Lockwood also reports that a decrease of 10 micrograms of particulate matter per cubic meter is associated with an increase in life expectancy of  $.61 \pm .20$  years, and attributes 15% of this additional longevity to reductions in small particle concentration (107).

### *Global Impact*

A final impact of coal worth mentioning is its ripple effects on the global environment. While technology exists to make coal cleaner and slightly more sustainable, it is still the dirtiest source of energy available, and paying to make “clean” coal defeats the purpose of using coal as a cheap energy source. In addition to the pollution caused by coal, the basic hydrocarbon structure of bituminous coal (the type most commonly burned for energy) contains a ratio of roughly 1 carbon to 0.8 hydrogen atoms. Conversely, the hydrocarbon structure of oil is  $\text{CH}_2$  and natural gas is  $\text{CH}_4$ , meaning that natural gas produces five times as much energy per unit of  $\text{CO}_2$  as coal (MacAvoy; “Petroleum and Coal”). The Union of Concerned Scientists argues that a transition to natural gas is insufficient to meet U.S. climate goals, and that the fracking of natural gas still poses public health risks (Fleischman 1, 4). In the long-term, they are correct, as natural gas is still a fossil fuel. However, these risks of

fracking are less serious than those of coal, so natural gas could at least serve as a bridge fuel while America transitions to a renewable energy based economy. New Mexico could be a leader in this movement given that the largest proven natural gas reserve in the United States is also under the San Juan Basin (Maverick).

### **Previous Policy Proposals**

Various interest groups, companies, and government agencies have made policy proposals to address the issues in the San Juan Basin. Some of these proposals will be effective, while others need to be revised or discarded entirely. Units one, two, and three of the San Juan Generating Station were shut down as part of the state of New Mexico's Alternative State Implementation Plan, retiring roughly 915 MW of coal energy ("Four corners"; Wilkins, Chris, and Dan Olson). While this energy should be replaced in a sustainable way, PNM's proposal is insufficient to address the public health and environmental crisis in San Juan. The proposal complies with the Renewable Portfolio Standards (RPS) of the New Mexico Renewable Energy Act, but it only nominally promotes renewable energy by developing 40MW of solar photovoltaic energy and 4MW of geothermal. Overall, this leaves the percentage of PNM's renewable energy supply unchanged at 13.8% (Public Service Company of New Mexico 1-3). This proposal fails to transition New Mexico's energy supply to renewable energy, and should be discarded and replaced with a more ambitious goal to promote sustainable development in New Mexico.

Another policy proposal, which will be much more effective in preserving public health and the environment, is to classify solid CCW as a hazardous waste. This proposal has support from the San Juan Citizens Alliance (Wilkins, Chris, and Dan Olson) and the NRDC (Chatterjee 3004). In fact, a proposal to require federal standards for coal-ash ponds was introduced in the U.S. House of Representatives by Rep. Nick Rahall (D-WV) on January 14<sup>th</sup>, 2009 following the collapse of a coal ash pond in Kingston, Tennessee (Chatterjee 3004). However, this resolution (HR 493) failed to pass, despite Democratic control of both houses of Congress in 2009.

### **Proposal**

The ultimate goal is to eliminate the need for mining and burning coal in the San Juan Basin. I therefore propose a three-tiered solution to minimize the ecological and public health threats in the San Juan Basin while maximizing economic growth. First, at the national level, the United States must move towards a renewable energy based economy. This can best be accomplished using a Feed-In-Tariff, which requires energy providers to purchase all renewable energy created at government-set prices above market value. Then the federal government adjusts prices to ensure that each company is effected equally so no state economy experiences a comparative disadvantage due to this law, which prevents states from enacting this policy on their own (Boyle 418). The benefit of this policy is that it is a market-based solution to encourage the development of renewable technology by rewarding innovation while minimizing investment risk. For such a policy to be enacted, legislators would need to be pressured by their constituents. This bill could be introduced by any congressman, but since it would have a direct impact on the San Juan Basin, New Mexico's senators or Congressman Steve Pearce from New Mexico's northern district could be possible sponsors.

This policy has been enacted in many European countries, most notably Germany, where it has great success. In fact, Karapin asserts that from 1990 to 2010, this policy was responsible for one-third of Germany's emissions reductions, not counting those attributable to post-Soviet German reunification (15). This is particularly impressive given that Germany reduced its greenhouse gas emissions more than almost any other industrialized country during this time. Feed-In-Tariffs have been widely praised by policy makers and academics, such as C.G. Dong, who found that Feed-In-Tariffs were more effective than RPS by a magnitude of about 1800 MW, and that the Feed-In-Tariff "has better long-term effects in promoting wind energy, although in the short run RPS could also provide some incentives to the developers" (Dong 484).

Second, in the short term at the state level, New Mexico should strengthen its currently existing RPS to incentivize PNM to transition away from coal. First, the state should require PNM to utilize more than 13.8% of renewables in its energy mix by increasing this amount 1.5% annually. This is a reasonable goal which would keep New Mexico on track for President Obama's goal of a national energy mix composed of at least 30% renewable energy by 2030, and is achievable because New Mexico has a lot of renewable energy potential given



its sunny, windy climate (Brown et al. xvii). Second, New Mexico should reduce the amount of coal produced at a faster rate, as coal poses an immediate ecological and public health threat. This is a common regulation that has been enacted by many states and countries throughout the world. Additionally, there should be a tax on each acre of land that is stripmined, encouraging energy companies to utilize less harmful underground mining techniques. The revenue from this tax should be used to revegetate the land and to diversify the economy in San Juan to decrease the dependence on coal jobs. While it would be preferable to ban stripmining outright, this has not been implemented in any state because it has the potential to completely destroy the coal industry.

Forcing an immediate divestment from coal will encourage more investment in the next cheapest alternative, natural gas. While the Feed-In-Tariff and Renewable Energy Act will create more investment in wind and solar energy, a rapid divestment from coal will also require a bridge fuel while these renewables are developed. Since the largest proven natural gas reserve in the US is beneath the San Juan Basin (Maverick), natural gas should ease this transition. While fracking does pose environmental and public health concerns, they are less serious than the risks of coal. These risks can also be mitigated with regulations to ensure that chemicals are disposed of properly and do not contaminate the groundwater.

Third, the state should create tighter restrictions on coal producers to limit the environmental and public health damages of coal production, and to ensure any damages to the economy of the San Juan Basin due to stripmining and pollution are compensated. One policy to achieve this goal would be to require the use of “scrubbers”, which can reduce up to 90% of sulfur oxide emitted in fly ash (Lockwood 70). Additionally, regulations on carbon capture and storage should be strengthened, as 80-90% of carbon dioxide and other toxins emitted from the burning of coal can be sequestered, but they are often released back into the atmosphere to save money (Lockwood 72). Another regulation to limit the environmental and health risks of coal production is the San Juan Citizens Alliance’s proposal to regulate solid CCW as a hazardous material so it cannot be dumped in excavated coal mines or adjacent to the San Juan River, where heavy metals leach into nearby water supplies. With policies to promote a divestment from coal energy and immediate regulations of the coal and fracking, New Mexico can finally address the issues plaguing the health of the environment and community in the San Juan Basin.

## **Conclusion**

There is an ongoing environmental and public health crisis in the San Juan Basin in northwestern New Mexico, and it is imperative that government at all levels take action to reduce and reverse the effects of this crisis. The process of stripmining coal allows heavy machines to excavate coal, eliminating the jobs that the coal industry promises the community. Additionally, the burning of coal has made the Four Corners Power Plant the largest point source of air pollution in the country (Wilkins, Chris and Dan Olson), and the improper disposal of sludge poses a risk to the environment and health of the community. Despite the fact that many people in the area rely on jobs from coal, the pollution is becoming so bad that it is hard to deny that coal is killing San Juan's citizens. Consequently, I propose stricter regulations on the mining and disposal of coal in New Mexico, a rapid divestment from coal production, and a gradual incorporation of renewable energy at the national level. If New Mexico utilizes eco-capitalist policies to meet these goals, it can finally improve the quality of life of its citizens and improve the quality of the health, economy, and environment of the impoverished San Juan region.

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