Daniel C. Irwin

Environmental Economic Tensions Evidenced by Allegheny Energy, Inc.'s 10-K Filing

Environmental Economics – 0511-481-01
Professor: Dr. Jeffrey Wagner
Due/Submitted: Wednesday, May 10, 2006

Adam Smith's Wealth of Nations explores the idea that societies approach optimal production as the members of society specialize more and more. Today's global climate demonstrates Smith's idea of specialization with increasing precision over time. Nearly all United States citizens rely on the national power grid to provide reliable electric energy for their day-to-day activities, but only a very small percentage of citizens understand its production. With a newfound policy of deregulation in the Pennsylvania power utility market, Allegheny Energy, Inc. (AYE) has several unique opportunities and challenges in the energy market. A brief analysis of AYE's SEC 10-K form for the fiscal year ending the last day of 2005 shows that it has made bold advances in blending lower-sulfur coal for generation and has plans to install scrubbers to further reduce sulfur emissions from its generation. Additionally, AYE has situated itself favorably in the market for the trade of sulfur dioxide emission allowances. However, further analysis shows a questionable environmental policy of carefully scrubbing its largest generation plant while using permits to cover environmental shortcomings at several other plants. An examination of these arguments indicates that AYE has made dubious environmental choices in the past and is atoning for those choices with costly engineering advances en route to cleaner power generation.

The ultimate environmental goal of any rational power utility is to reduce emissions in a way that least impacts its finances. Equation 1 is a definition of emissions.

$$emissions \equiv output \times \frac{input}{output} \times \frac{emissions}{input} \tag{1}$$

In order to decrease emissions, one or more of the three values on the right side of the equation must be reduced. By obtaining cleaner coal, AYE can reduce the emissions per input of its coal-burning power plants. According to AYE's 10-K form, one method to

improve this ratio is blending lower-sulfur Powder River Basin coal at several generation facilities. An interesting economic tradeoff results from this solution. Many eastern United States power utilities are competing in the market for Powder River Basin coal[1], but if cleaner inputs are not used by a given firm, its excess sulfur emissions must be purchased in an already crowded sulfur dioxide permit market. While prices of the cleaner coal have risen 23% for year 2006 delivery, the average price of purchase for a permit to emit sulfur dioxide rose 25.7% from 2005 to 2006[2]. Thus, AYE is charged with minimizing costs given the choice of purchasing coal that is more efficient or purchasing more and more emissions permits – both in competitive rival markets. To complicate the problem, the purchase of higher quality coal is not enough to sufficiently abate sulfur dioxide emissions, so AYE will construct flue gas desulfurization units at its Fort Martin and Hatfield generation plants. Estimates of the cost of the scrubber project at Hatfield are over $600 million. In FY 2005, Allegheny Energy Supply spent 52.5% of its total capital expenditures on environmental controls. Largely due to the scrubbers at Fort Martin, estimates for these figures are 71.5% for 2006 and 80.3% for 2007, not including the cost of the Hatfield scrubber. AYE chooses to purchase the cleaner coal and to build scrubbers because such purchases enable environmental compliance while lowering emissions, instead of buying permits and complying while polluting. Thus, AYE's abatement strategies belie environmental economic choices rooted in solid cost-benefit analysis and Pareto-improvement.

The implementation of various abatement techniques reduces emissions, but it is currently impossible for a coal-burning power plant to operate without emitting some

[1] AP news article located at http://www.billingsgazette.com/newdex.php?display=rednews/2005/04/13/build/wyoming/28-wyocoal.inc
[2] http://www.epa.gov/airmarkets/auctions/

sulfur dioxide gas. Therefore, AYE conducts business in the market for allowances to emit sulfur dioxide. AYE has used current forecasts to estimate an allowance market exposure of less than 10,000 tons in 2006, growing to 20,000 tons in 2007, and skyrocketing to 75,000 tons in 2008. From 2003 to 2004, AYE increased spending on allowances by $7.1 million, showing that it readily purchases allowances when such a purchase is advantageous. The EPA's Clean Air Interstate Rule will accelerate AYE's need to decrease reliance on marketable permits in the near future. Due to this decrease, coupled with AYE's increasingly vigorous environmental controls, a situation will likely exist for AYE to leverage the sulfur dioxide permit market to a competitive advantage. As supply for allowances drops, demand will rise, presuming that production of sulfur dioxide stays even in the market. This assumption may be tenuous since AYE's competitors may also pursue aggressive abatement strategies. As a simplifying assumption, then, as supply drops, demand rises accordingly. The shocking 2008 forecast of 75,000 tons of sulfur emissions could affect the demand equation. If AYE forecasts the need for more permits than it will actually use, the market value that its competitors may face will artificially inflate. While various market conditions could force AYE to generate more electricity, thus emitting more sulfur dioxide, its scrubber technology should still allow it to become a seller in the allowance market. In this way, AYE can use both immediate-use permits and currently held emissions futures to its advantage. Pollution abatement can aid the bottom line more and more than it would by itself because of the sale of valuable marketable permits. By leveraging permits, AYE chooses the best point on its marginal abatement cost function for both the surrounding environment and for itself, and then saves money beyond that point by selling the permits

that it saves by abating. This method of abating and turning a profit appears to be Pareto-optimal if the simplifying assumptions are met and the method is executed quickly.

Despite apparently intelligent economic analysis fueling AYE's choice of environmental economic strategies, one area of its strategy indicates a lack of concern for the environment. The current corporate strategy for compliance is to scrub the Harrison generation facility while purchasing allowances for the Hatfield, Armstrong, and Fort Martin plants.[3] Harrison generates about 13.6 million megawatt-hours (MWh) annually while performing more cleanly than the worst 50 sulfur dioxide and mercury polluters do, and while being more efficient than 160 other plants nationwide in terms of carbon dioxide emission rate. In contrast, the Armstrong facility is the sixth-least efficient plant in terms of sulfur dioxide per MWh and the fourth least efficient in terms of mercury pollution per MWh while generating only 2.1 million MWh. Likewise, the Fort Martin facility is the 13th-worst in terms of sulfur dioxide efficiency while generating 7.7 million MWh and the Hatfield's Ferry facility is the fifth worst in terms of sulfur efficiency while generating 8.4 million MWh. Hatfield's Ferry and Fort Martin are the fifth and 16th biggest coal burning sulfur producers in the country in terms of volume of sulfur emitted while those two plants in addition to Armstrong make up three of the 13 least efficient plants in the country in terms of sulfur emissions. The corporate strategy is financially sound in the short run, but the lack of scrubbers or other forms of abatement abuses the environments that house those three plants. Plans are underway to construct scrubbers for Hatfield and Fort Martin, but Armstrong is still a significant polluter in terms of both mercury and sulfur dioxide. The Coase Theorem suggests that individuals from the

[3] All statistics in this section come from a meta-listing of pollution data at http://www.environmentalintegrity.org/pubs/Dirty%20Kilowatts%20FINAL.pdf

community should seek an audience with AYE to persuade the firm to pursue more environmentally friendly abatement strategies, even if a considerable investment is required. A persuasive argument in the community's favor is that Pennsylvania's electric power market is deregulated, which gives the citizens the freedom to purchase generation from more expensive, green sources. Consumers must evaluate the environmental harm of coal against the financial cost of green power, but as sulfur and mercury emissions accrue, such an outlay will become more and more feasible. Since abatement can be performed in a way that does not negatively impact the firm's long-run bottom line, it would be in its best interest to pursue abatement aggressively, thus aiding the community's environment and keeping its customers from changing to a different firm.

With tighter EPA regulations coming in the near future, starting with the Clean Air Interstate Rule, it is clear that AYE must continue to position itself in the market such that environmental impact is minimized with respect to production. The success of the scrubber at the Harrison facility proves that future development of scrubbers at other generation units is viable. This plan, coupled with burning lower-sulfur coal will aid AYE in reaching its goals of environmental compliance and profit-maximization. Some of the costs of emission-abating technologies can be offset by dealing in the marketable allowance market with futures currently held, and by clever economic analysis of the auction markets in the years to come. One undercurrent of Smith's work is that the wealth of a nation is generated by a mass of productive workers. AYE is perched in a position to provide electric power to the workers in its region at a cost that is competitive in the market and at emission levels that are as friendly to the environment as possible, which will in turn fuel further regional economic growth.