Transport of Coal by Rail vs. Transmission for Electricity Generation: An Application of Hybrid LCA Comparative Analysis

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The USA mines almost one-billion tons[7] of coal each year to produce 52%[8] of its electricity supply. A major question for the industry is whether to build generating plants near the mine or near electricity customers. I have built a model to evaluate this question. To demonstrate the use of this model, I examine the most important example, the shipment of coal from the Powder River Basin (PRB) in Wyoming to Texas. Currently, 50 million tons[9] of PRB coal is shipped annually to generation plants in Texas by unit trains. I investigate whether a new 1,000 megawatt plant (producing electricity to meet demand growth) burning 3.3 million tons of PRB coal annually should be built near the mine mouth or near the Texas customers in terms of the cost and environmental implications. I assume that new transmission lines are required but that the existing railroad bed has sufficient capacity to accommodate the increased traffic. I find that the annualized cost of building this new transmission system is roughly equal to the cost of maintaining and operating the existing rail system (between $92 and $117 million/yr). This is primarily due to the high capital costs involved in constructing the transmission system. I also find that the additional power that would be required in order to compensate for the losses of electricity from the transmission lines would add to the cost of the transmission system and the environmental emissions significantly. In addition, there is an equity issue involved in this decision, should the residents of Wyoming bear power plant emissions and a power line to provide power for residents of Texas? There are some key assumptions which, if changed could impact this analysis. Examples of these include carbon sequestration, reduction of transmission losses and new rail construction. These tradeoffs are examined within this paper.

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[7] Energy Information Administration. Department of Energy. USA. Coal Production by State, 1991, 1996-2000. http://www.eia.doe.gov/cneaf/coal/cia/html/t1p01p1.html.

[8] Energy Information Administration. Department of Energy. USA. Percent of Electricity Generated at U.S. Electric Plants by Energy Source and State, 2000 and 1999**.** http://www.eia.doe.gov/cneaf/electricity/epav1/generation.html#tab7.

[9] Energy Information Administration. Department of Energy. USA. Table 59. Domestic Distribution of U.S. Coal by Coal-Producing Region and State, and Destination Census Division and State, 1996-2000. http://www.eia.doe.gov/cneaf/coal/cia/html/t59p01p12.html.