

II. Introduction

President Kennedy suggested in early 1962 that coal slurry pipelines might represent a way of transporting coal more economically, thereby improving the depressed condition of the coal mining industry. Since that time, a substantial measure of public debate has centered on the desirability of applying this technology as an alternative to transportation by rail. Two such pipelines have been built and put into operation in this country. One was closed after the introduction of competing unit trains and the approval by the Interstate Commerce Commission (ICC) of a separate rate structure for this more efficient form of rail service. Another has been carrying coal for 6 years and has demonstrated that a coal slurry pipeline of the size required to serve a large electric generating station is economically feasible.

A slurry pipeline involves the pumping of finely ground coal suspended in water or other liquid medium through a pipe over a long distance. At the terminus the coal and liquid are separated and the coal is prepared for combustion or other use. The primary rail competitor of slurry pipelines is the unit train, a complete train of dedicated cars operating on a regularly scheduled movement between a single origin and a single destination. It contrasts with ordinary carload movements in which many commodities are combined and recombined in one train as they are transported from many origins to many destinations.

Most of the current public controversy surrounds legislative proposals at both the Federal and State levels to grant the power of eminent domain for right-of-way acquisition to coal slurry pipeline enterprises and to impose certain restrictions and requirements upon their activities. Against this background the Chairmen of the Senate Committee on Energy and National Resources, the Senate Commit-

tee on Commerce, Science, and Transportation, and the House Committee on Interstate and Foreign Commerce requested this assessment of the potential economic, environmental, and social implication of coal slurry pipeline development and the implications of legislating Federal eminent domain authority.

At least three major sets of policy questions must be addressed to arrive at a legislative conclusion. The first involves the desirability from social, economic, and environmental standpoints of developing a coal slurry pipeline industry. The second is related to the extent to which the present regulatory and institutional arrangements would have to be altered to provide for the allocation of coal traffic between pipelines and railroads in a way that would represent the least cost to society. The third concerns the balance of Federal and State control over such areas as water resource allocation, land ownership, and local environments, and how conflicting regional interests might be resolved.

The purpose of this assessment is to clarify these issues in order to assist Congress in making a judgment concerning the general desirability of coal slurry pipelines and the utility of eminent domain legislation as a means of facilitating their development. The study should also provide an analytical framework against which a public licensing or regulatory agency might evaluate specific individual pipeline proposals and their alternatives.

Resolution of the foregoing questions and development of an analytical framework for evaluating specific pipeline projects require a comparison analysis of the costs, impacts, and institutional and legal setting of the two modes. The desirability of mining, transporting, and using coal is not addressed here. A forthcoming OTA study on coal utilization will examine many of these questions. In addition,

modes with which long distance slurry pipelines would not be likely to compete significantly, including trucks, belt conveyors, and barges have not been considered in detail. Finally, the transportation market in this analysis is confined to steam coal for use by domestic electric utilities, which constitute the principal customers that could receive large enough volumes of slurry coal for economical pipeline operation.

Four interrelated studies contributed to the analysis. One examined the legal regulatory provisions relevant to rail and pipeline competition, water rights, environmental protection, and eminent domain. Another established baseline forecasts to the year 2000 of volumes of utility steam coal to be transported from nine producing regions to each consuming State based on hypothetical demand growth, environmental regulation, and coal-use assumptions. A third study provided rail and pipeline cost estimates and plausible traffic scenarios, which were examined to predict the impact of slurry pipeline development on the cost of electric power, the cost and quality of service in the railroad industry, employment levels, and other economic measures. A fourth investigation identified and evaluated the water resource, environmental and social impacts of transporting hypothetical quantities of coal by pipeline as contrasted with the corresponding effects of moving the same amounts by rail. Finally, the coal volume forecasts were subjected to a sensitivity analysis to determine what effect the findings of the economic study might have on the original projections. Complete reports on these individual studies comprise the second volume of this report.

In the legal and regulatory study, the existing legal systems, including relevant statutes, regulatory policies, and judicial precedents, were discussed with particular attention to contrasting the framework for coal slurry pipelines with the regulatory environment for other similar or competing transportation modes. Issues examined included the implications of common carrier status, rate

setting, and contractual arrangements between carriers and shippers. In addition, provisions of water law were explored to determine what access a pipeline operator would have to water sources under a variety of conditions and how much control could be exercised over the use of water for slurry pipeline purposes by State agencies as opposed to the Federal Government. Provisions of environmental law related to pipeline and rail construction and operation were also investigated, as were precedents for and implications of granting the power of eminent domain for acquisition of transportation right-of-way at the Federal and State level.

Assessing the potential economic and environmental consequences of coal slurry pipeline development necessitated forecasting the coal transportation market in which coal pipelines would compete. Although large industrial facilities, gasification plants, and foreign countries represent possible future customers for slurry coal, this assessment concentrated on coal for steam production by domestic electric utilities, since they represent the predominant present users which could receive coal in quantities that would take advantage of pipeline economies. A model of utility industry behavior at the powerplant level provided estimates of how much coal would be purchased from what sources to meet both hypothetical demand growth and environmental requirements at the lowest cost. These results were aggregated to arrive at total projected coal flows from nine producing regions to 48 consuming States at 5-year intervals through the year 2000.

With this measure of demand for transportation as a starting point, the economic analysis sought to establish relative cost relationships for railroads and pipelines and to hypothesize a plausible share of the traffic which pipelines might capture if their development were not constrained by institutional or legal factors. Potential savings to customers served by pipelines could then be estimated, as well as the impacts of diverting the traffic in question from the railroad industry. The impacts of

pipeline development were evaluated as they would affect the cost and quality of rail service, availability of water for other uses, demands on related industries and markets, levels of employment, and regional economic development. Simplifying assumptions were necessary to carry out the market, cost, and impact analyses. Those related to markets and costs are summarized at the end of chapter IV. The impact analysis also depends on major assumptions, detailed in chapter V and in the appendix, including an approximately 2.9 percent annual rate of growth in both rail revenue traffic and GNP, as well as continuation of present trends in some elements of rail costs.

To complement the economic analysis, a simultaneous study encompassed the environmental impacts of constructing and operating coal pipelines, as contrasted with the corresponding effects of moving the same volumes of coal by railroad. With regard to pipelines, particular attention was focused on water use and disposal and construction impacts. Principal impacts unique to railroads included traffic accidents and interruption at grade crossings, train-caused fires, diesel emissions, and land-use interference. Energy and materials use, occupational health and safety, and social impacts and perceptions were explored for both modes.

The coal-flow forecasting model mentioned earlier embodied preliminary assumptions about the cost of transportation, and addi-

tional analysis was therefore necessary to determine what effect findings from the economic analysis related to rail and pipeline costs might have on the coal transportation demand projections. This later work also incorporated some improvements in the model and included data from the President's National Energy Plan, which became available after the first set of coal flows were derived.

In order to facilitate consideration of legislative options, a number of specific policy issues are identified and analyzed. These comprise the subject of the third chapter. Chapter IV includes descriptions of coal slurry pipelines and unit trains followed by the coal flow forecasts, cost comparisons, and traffic assumptions on which the economic and environmental analyses are based. Economic impacts are treated in chapter V and the appendix, and chapter VI covers environmental and social impacts. The last chapter contains the results of the legal and regulatory analysis. As mentioned above, Volume I I consists of complete reports on the research results contributing to the assessment.

A predominately technical analysis such as this one takes inadequate account of human perceptions of, and attitudes toward, the facts presented. Ultimately, the impacts of technology are, directly or indirectly, impacts on people. Opportunities for citizen participation and public comment based on this material would contribute an important perspective.