RESEARCH NEEDS IN THE TRANSPORTATION OF ENERGY

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During the last day and a half, we've heard of a number of problems in the transportation of energy. some problems are short run in nature, while others are long run. Some problems are macro in nature and some are micro. Some problems are capital investment related, whereas others are management control oriented. Some problems are engineering - technology oriented while others are economics oriented. Hopefully, as the result of this conference, we can give a push to some of these ideas and increase their funding possibilities (or alternately learn from others - present and non present at this conference which research ideas are currently being undertaken or have been completed - because the field is so vast and not as well organized as some would like).

In the short run transportation demand is a derived demand. Thus to understand the transportation problems of energy, one has to know the supply locations of energy sources, the demand locations for consumption of energy, the substitutability of one source of the same type of energy for another, the substitutability of one type of energy for another, and the characteristics (physical and economic) of the transportation supply modes.

In the longer run sources of supply not yet opened or discovered can be brought on line. New technologies for using existing energy types can be developed, new types of energy can be developed, existing transport technologies can be built in new markets, and new transportation technologies can come on line.

Thus a major research task is to assess the demand for energy transportation by origin-destination, by energy type, by mode, and by time frame.

The movement of energy materials is subject to both economic and safety regulation. The economic regulation is undertaken by various agencies and varies in degree. Movement by barge is technically regulated by the Interstate Commerce Commission (ICC) but because of the bulk commodity exemption from regulation, oil and coal movement by water is almost always exempt from ICC regulation. Movement by truck is also regulated by the ICC. However, since much of this movement is short haul and within a single state, within commercial zones or is done by private carriage, it is not subject to ICC regulation. Energy movements by rail are regulated by the ICC. Although more freedom from regulation has been granted by the 4R Act, the Administration and many others feel it is not enough and have pressed for more relaxation of ICC regulation of rail. The relaxation to date (and some would say that the intent of less regulation has been frustrated by the ICC) of the 4R Act has led to a market dominance question especially in the case of coal.

Thus a major research question becomes what are the economic regulatory impediments to or economic regulatory protections needed to insure that energy materials move and are developed at the socially optimal level.

Non economic regulation also plays a major role. Safety questions arise when flammable fuels are moved and nuclear wastes are transported. Environmental questions arise from the building of new modes, to the medium used to transport (water for slurries), to the operation of the mode (noise, air pollution), and community disruption (unit trains). These problems can be handled by regulatory fiat or by allowing the violators of some societal norm to "buy" society's favor - presumably using the payment to purchase something to abate the social bad caused by the event.

A major research task would thus be to investigate the economic cost of non economic regulations. Knowing such costs would presumably enable society to determine whether it would be worth the price to save the snail darter or preserve the water table levels in Wyoming or the cost of maintaining the Jones Act, etc.

Social investment plays a major role in transportation, especially waterway and highway improvements. Transportation of energy materials occurs on existing social capital and new social capital may be necessary to move new sources, new fuels, or for new modes. Should such new areas and traffic be accommodated? What is the cost of accommodating such traffic? Should the users that impose the spending of social capital be made to pay the costs of such investments in terms of user fees? Such a payment process, recently introduced on the waterways (albeit at a level much too low) and already implemented on the highways (at likely too low a level), if at the appropriate level, will make the consumers of energy pay the increased resource costs required to serve their demands for energy (or adjust their energy consumption or consumption of goods which use energy accordingly). If society pays the capital and operating costs of transportation investment, then heavy users of energy are likely subsidized by lighter users of energy.

Thus an appropriate research task is an investigation of the appropriate funding base for transporting energy materials.

Safety regulation is certainly a non economic regulation and its discussion could be assumed in the discussion above. But is is so important that it deserves some special treatment. Specific items are: tanker safety - to crew and environment, cost of double bottoms, superport development; nuclear shipments - prime and wastes; movements of pressurized gases by all modes.

Safety also relates to protecting the integrity of the product shipped. Which modes are less likely to spill (lose) the product? Which modes are most immune to disaster, sabotage, etc?

Both a macro and a micro study of optimal modal investment are needed. On a macro basis this relates to such questions as rail versus slurry pipelines. On a macro basis it relates to keeping branch lines open versus highway improvements. A Senaca(1) type of analysis on lowest resource costs is necessary with externalities internalized.

The interdependence between modes is also important. Because of economies of density shown by Harris,(2) the possibility exists that diversion of energy traffic from rail, may impose higher costs on other rail users. Likewise, the inability of rail to win new energy transportation (artifically - through regulatory restrictions) may mean that shippers are deprived of these economies of density. This interdependence needs to be investigated through a Seneca type of analysis.

ute the costs and benefits associated with moving coal from mine to consumer and the disposition of the waste by-products from coal power generation.

[1]Senaca, Rosalind, "Inherent Advantage, Costs, and Resource Allocation in the Transportation Industry", American Economic Review, December, 1973, PP945-956.

[2]Harris, Robert, "The Economics of Traffic Density in the Rail Freight Industry," The Bell Journal of Economics, Vol. 8, #2, 1977.

Research Needs From Conference

1. Impact of relaxed environmental controls; who benefits, who bears the costs; how can those who benefit compensate those who lose?

2. Nuclear safety issue - Who pays for what level of safety?

3. Problems caused by unit trains

4. How will the President's speech impact transportation of energy? A. Shuster - not much. B. Cardullo - a lot.

5. Where is the money for all the new rail investment to come from? Other modes have a trust fund. Even if other modes have user charges, are they the appropriate ones - reflecting property taxes, government subsidy of motor carrier risk?

6. Coal train dynamics - first 50 cars create a dynamic effect and second 50 pound

7. How to compensate the states who bear the costs but have neither the origin or destination. 1. How can the gainers compensate the losers efficiently?

8. How can ultimate receiving end of coal shipped be brought up to speed to jibe with origin facilities especially on the lakes?

9. Since existing infrastructure is being built by utilities, how do we avoid the A-J over-capitalization effect?

10. Will there be sufficient crude to run a West to East pipeline after absorption by West Coast refineries?

11. What are the true economics of Great Lakes winter navigation and lock expansion?

12. What would be benefits of reorienting northbound coal southbound? CSX merger.

13. How can institutional problems be solved with respect to utilities? Now stockholders, customers, state commissions, FERC tend to view local problems rather than looking at the big picture - sub-optimum vs. global optimum.

14. Constitutional issues of authority of feds over states in many of these issues.

15. What change in distribution will occur due to President's plan? 1. Ports, syncrudes, markets, pipelines. 2. Despite Ed Bentz's NTPSC studies.

16. What are the unintended effects of synfuels? 1. Highway taxes lost: impacts building program 2. Diversion of land from prime purpose/impact on prices of prime and by-product markets - systems impacts.

17. Truck size and weight issues. 1. Impact of coal trucks on maintenance and building standards 2. How to enforce, collect users taxes, incidence?

18. If the end use products of energy shift, will change distribution patterns. 1. But need to know sensitivity of models to assumptions, growth rates, not meeting standards, etc. 2. How will market areas change?

19. Oil shale extraction technology

20. Is raw shale oil pipelineable?

21. What would impact be on pipeline system capacity of shale oil development? 1. What type of rail and truck interim transportation would be necessary (optimal) if these are temporary modes until you get pipeline volumes?

22. Need transportation plans of inputs/outputs for shale areas of Wyoming, Utah, Colorado.

23. What to do with waste generated by the various new methods - shale, coal scrubbings, gasahol? 1. Cost, location, transportation.

24. Where should site of alcohol distillery be? Where should it be mixed with gas? What is the possibility for in-transit mixing (using transportation as a more productive part of the production process)?

25. What is the potential of forest products as energy producers - impact on transportation and other forest markets?

26. What type of reporting systems should be devised for hazardous materials, how should it be assessed, what should it contain, how could compliance be enforced, what would it cost? 1. What are true benefits of this and cost effectiveness?

27. Cost effectiveness of compliance of truck enforcement of hazardous, truck size and weight, etc., regulations.

28. What is cost of not moving some materials as the result of moving energy materials, e.g., LNG tie up in Boston?

29. Rise analysis and uncertainty. Do we look at expected value or should the results be weighted somehow? Expected value can be the same but variance of probability distribution can be vastly different.

30. What is a cost effective way to increase the awareness of public authorities and the general public?

31. How are the institutional problems solved? How do we handle the constitutional right to dissent? This is a compensation problem in most cases.

32. What are the costs of not following the law of comparative advantage with respect to energy (what are the implied costs of more energy self sufficiency)?

33. What are the costs of making mistakes?