

EX POST FINANCIAL ANALYSIS OF THE PERFORMANCE OF THE HARTWELL RESERVOIR PROJECT

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Abstract. Some Federal multiple purpose water projects have performed more favorably in financial terms than forecast in initial plan formulation documents. This analysis evaluates the economic and financial performance of the Hartwell project by providing a preliminary estimate of the consumer surplus associated with selected project features. The base condition used for evaluation is the initial project benefit study. Project benefits were compared to actual project revenues over the first 30 years of operation, 1963 through 1992. In financial terms, hydropower and recreation benefits have significantly outperformed ex-ante estimates.

BACKGROUND

The Hartwell project was planned as a multiple purpose water project on the Savannah River. The Savannah River forms the border of South Carolina and Georgia and discharges into the Atlantic Ocean at the Port of Savannah, Georgia. The project was part of a comprehensive basin plan authorized by the Flood Control Act of 1944. Pre-construction planning began in 1951 and construction began in 1955. The project became operable in 1962 but capacity was not marketed until 1963.

Hartwell was the second of four projects planned for the Savannah River. Clark Hill (now Thurmond) lies well below Hartwell and became operable in 1962. Two projects were planned to be built between Hartwell and Thurmond but detailed planning replaced them with a single project, Richard B. Russell.

Project Benefits. As planned, authorized benefits of basin development included hydropower, navigation and flood control. Non-authorized benefits included wildlife, industrial development and recreation. Although recreation was not an authorized project purpose, a significant portion of benefits have become attributable to this purpose.

Project Revenue. Several project features are sources of revenue. Hydropower generates a majority of revenue. Recreation, water supply, and timber sales are incidental sources of revenue.

Analysis. This study calculates a preliminary estimate of consumer surplus by comparing planned project benefits to actual benefits. Hydropower consumer surplus was estimated as the difference between the cost of hydropower to preference customers and the most likely thermal alternative. Hydropower is the only project purpose discussed in detail.

The recreation consumer surplus was estimated by comparing estimated revenue figures to benefits. Revenue data was not available prior to 1982. Annual O&M and capital cost proxied as an estimate for revenue. Benefits were estimated using unit day values which were provided by the Corps of Engineers and visitation figures. Recreation had the highest benefits of any project purpose.

The original project formulation included benefits for navigation and flood control. Calculation of the consumer surplus associated with flood control and navigation were estimated by using Corps of Engineers O&M and benefit data.

Project storage was and continues to be reallocated to water supply on a case by case basis. Estimating the consumer surplus of water supply was beyond the scope of the study.

Hydropower Benefits. Revenues are based on actual revenues that are attributable to the project. Hartwell's capacity contribution to the Georgia-Alabama-South Carolina system is 15 percent above its 250 MW nameplate. Market based alternative values are based on actual lifecycle costs incurred at a 250 MW coal-fired steam plant that became operable in 1962.

The period of study is 50 years. The study started in 1962 and goes through 2011. Actual values were used for the first 30 years and projected values were used for the following 20 years.

Consumer Surplus. The consumer surplus on a good is the difference between the maximum a consumer would be willing to pay for his current consumption of it and the amount he actually pays.

To estimate the preference customer's consumer surplus for electricity, we relied upon Southeastern's revenue records and area utility FERC Form 1 data. The time series data allowed the comparison of rates on a composite basis between the two sources of power over a 28-year period.

CONCLUSION

Alternative Power Source. In selecting a suitable alternative power source, we analyzed FERC Form 1 data for surrounding utilities to locate a 250 MW coal-fired unit that came on line at approximately the same time as the Hartwell project. An acceptable unit was located, but upon examination of the records the plant was discarded because its capacity was significantly increased several years later. A second alternative was located that came on line in 1953.

Capacity and Energy Rates. The Form 1 data provided capacity data on a total cost per KW basis and production expense data on a cost per KWH basis. Capacity cost is made up of the cost of plant which includes land and land rights, structures and improvements and equipment costs. Production expense data includes: operation, maintenance and fuel expense.

Capacity Rates. Regulated utility capacity rates are calculated based on a return on investment plus a component to cover income taxes. Based on experience with area utilities, we applied a figure of 15 percent to the cost per KW to estimate the annual capacity cost component to be recovered. The 15 percent figure includes 11 percent for return on investment and 4 percent to cover income taxes. The annual capacity rate was further broken down to a KWH charge in order to compile a composite rate.

Energy Rates. The energy component of the rate was taken directly from the FERC Form 1. The operating cost includes the variable components: operation, maintenance and fuel expenses.

Representative Unit. To compare the capital cost of the thermal capacity to the hydropower capacity, we divided the capacity cost by the number of hours that were generated by the hydropower project. Representing the capacity cost on a KWH basis allowed us to combine it with the operating cost to yield a composite rate.

Hydropower Values. The hydropower rates were presented on a composite basis as well and represent the average cost of system operation. Presenting the rates on an average cost per KWH, though simple, illustrates the impact that periods of low water have on the consumer surplus. Capacity cost is spread out over fewer hours, resulting in a higher composite rate.

Results. In terms of nominal dollars, authorized project purposes have generated a consumer surplus. To avoid overestimating the consumer surplus, the original forecast benefits for Flood Control and navigation were indexed for inflation. Flood Control consumer surplus increased from \$15,000 in 1962 to \$292,000 in 1992 and navigation consumer surplus increased from \$13,000 in 1962 to \$231,000 in 1992.

Large scale Federal water projects have benefitted the nation in many different ways and some have performed better than expected. Over the last 30 years the Hartwell project has generated a consumer surplus of hundreds of millions of dollars which has been put to use in developing the national economy.

Further study should be undertaken to estimate the environmental externalities associated with this and other projects taking into consideration the riparian environment as well as air quality.