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United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on Energy and Power, Committee on Energy and Commerce, House of Representatives

June 1988

SYNTHETIC FUELS

Comparative Analyses of Retaining and Selling the Great Plains Project

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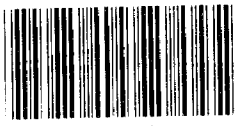

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GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-207876

June 10, 1988

The Honorable Philip R. Sharp
Chairman, Subcommittee on
Energy and Power
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

As requested in your April 1, 1987, letter and in related meetings with your office, we have performed cash-flow analyses to determine (1) the value to the government of retaining the Great Plains coal gasification project and (2) the estimated price that would be needed to equal the project's retention value if the project were sold. We also determined the effect that federal tax provisions would have on the federal budget if the project were sold for hypothetical prices ranging from $250 million to $700 million. We did not address the issue of whether it is proper for the Department of Energy (DOE) to continue to operate the project or whether the project competes with the gas production industry. On April 13, 1988, we testified before your subcommittee on the results of our cash-flow analyses.

In summary, under continued DOE ownership, our cash-flow analysis showed that net revenues would total about $1.5 billion over the project's remaining 22-year operating life. The $1.5 billion would have a present value of about $569 million. For the government to be as financially well off from selling the project as it would be from retaining ownership (the point where the government would be indifferent to retaining or selling the project), we estimated that the project would have to be sold for about $1 billion. Further, at a $350 million hypothetical sale price, the government would only net about $56 million in present value dollars because a new owner would be entitled to tax credits of about $697 million to offset federal income tax liabilities.

DOE owns the Great Plains project because the partnership that built the project defaulted on a $1.5 billion DOE-guaranteed loan in August 1985. The ANG Coal Gasification Company, the plant operator, has continued to operate the project for DOE and receives a $3 million annual fee. The project has been operating well and produced an average of about 145 million cubic feet of synthetic gas a day in January 1988. Under 25-year contracts, four pipeline companies are required to buy all the gas that the project produces at prices determined by specified formulas. These

prices have been higher than market prices. From August 1985, when DOE assumed control of the project, through December 1987, the project had generated net revenues of about $100 million.

DOE has retained Shearson Lehman Hutton, Incorporated, to assist it in selling the Great Plains project. To estimate the project's market value, Shearson developed a financial computer model and used its own economic and operating assumptions. We used Shearson's computer model in making our cash-flow analyses. We also used economic projections developed by Wharton Econometrics and Data Resources, Incorporated, to analyze the project's financial outlook under public and private ownership. The cash-flow and present value calculations presented in this report are based on Wharton's projections, which yielded lower cash-flow and present value results than Data Resources' projections.

Our cash-flow analysis showed that from 1988 through 2009, the project would generate about $6.9 billion in total revenues and incur about $5.4 billion in total operating and capital expenses, which would result in future net revenues of about $1.5 billion.

In making our cash-flow analysis for determining the retention/sale indifference point, we calculated that about $1 billion would be needed to provide the government with an income equal to the $569 million present value of the future net revenues. At a $1.029 billion sale price, we estimated that a private investor would earn about $621 million in income before taxes and owe about $188 million in future income taxes. However, the new owner would be entitled to production tax credits worth about $697 million. Consequently, net federal tax proceeds would be negative because the project-related tax credits of $697 million would exceed the federal income taxes of $188 million by about $509 million. The present value of the negative net tax proceeds would be about $460 million. Therefore, the present value to the government from selling the project for $1.029 billion would be about $569 million.

In making our present value analysis, we used Wharton Econometrics' projected 20-year Treasury bond interest rate of 8.1 percent for bonds issued in 1988. That period is fairly comparable to the project's remaining 22-year operating life. GAO has historically used the yield on Treasury securities in making present value analyses. Our rationale is discussed in appendix III. We also tested the sensitivity of our present value calculations by using a higher discount rate. The results of that analysis are discussed in appendix IV.

If the project were sold, it would continue to affect the federal budget during the next 22 years. To illustrate this effect, we calculated the net proceeds the government could receive using a series of hypothetical sale prices. For example, at a $350 million sale price, our cash-flow analysis showed that because of production tax credits of about $697 million and other tax concessions that a private owner would be entitled to receive, the government would net about $68 million over the life of the project. The net proceeds would have a present value of about $56 million.

A comparison of the potential financial return to the government from retaining the Great Plains project or selling the project for $350 million is shown in appendix V.

If DOE sells the project, the government would, in effect, be trading net revenues that it would receive from continued ownership for the net sale proceeds and tax revenues that it would receive over the operating life of the project. This would reduce the federal deficit in the year of the sale, but over the longer term, a low sale price would tend to increase the federal deficit because future cash and tax revenues would be less than the revenues from continued federal ownership.

We, therefore, recommend that the Secretary of Energy, in determining a fair price for the Great Plains project, consider the financial value of the project under continued federal ownership, as discussed in this report, and the effect of production tax credits on the federal budget.

We discussed the report's contents with DOE officials and made clarifications where appropriate. As agreed with your office, we did not obtain official agency comments on this report.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 7 days from the date of the letter. At that time, we will send copies to the Secretary of Energy and other interested parties. We will also make copies available to others upon request.

This work was done under the direction of Keith O. Fultz, Senior Associate Director. Major contributors to this report are listed in appendix VI.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

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Abbreviations

ANG	ANG Coal Gasification Company
Btus	British thermal units
DOE	Department of Energy
GAO	General Accounting Office
RCED	Resources, Community, and Economic Development Division

Background

The Great Plains Project

The Great Plains project was built by the Great Plains Gasification Associates, a partnership of five energy industry companies, at a cost of about $2.1 billion, of which $1.5 billion was financed by a construction loan issued by the Federal Financing Bank and guaranteed by the Department of Energy (DOE). The project, located near Beulah, North Dakota, is the nation's only commercial-scale coal gasification plant built to produce synthetic natural gas of pipeline quality. The ANG Coal Gasification Company (ANG) began operating the Great Plains plant in 1984. On August 1, 1985, the partnership terminated participation in the project and defaulted on its DOE-guaranteed $1.5 billion loan. DOE assumed control of the project and subsequently obtained title. ANG has continued to operate the Great Plains project for DOE and receives a fee of about $3 million a year.

According to DOE, the project is a technical success. In January 1988, it produced an average of about 145 million cubic feet of synthetic natural gas a day. However, the project is having difficulty meeting the North Dakota State Department of Health sulfur emission limitations that were established specifically for the project. DOE and ANG are working with the health department to reduce sulfur emission levels and to obtain a higher approved sulfur emission level.

The gas the project produces is sold to four pipeline companies under separate 25-year contracts that have been held valid in federal courts. Several pricing formulas in the contracts control the price the pipeline companies will pay for Great Plains gas. The contracts guarantee that all the gas produced will be bought at formula prices, which have been, and are expected to remain, higher than market prices. For example, in December 1987 the project received $3.96 per million British thermal units (Btus) of gas produced, compared with the estimated national average wellhead price of $1.75 per million Btus. The Great Plains partners financed the construction of a 34-mile pipeline to connect the project to the interstate pipeline system that connects to the four pipeline companies' systems.

From August 1985 through December 1987, the project received $510 million in revenues and incurred $414 million in operating expenses, exclusive of depreciation. As of February 29, 1988, the project had a cash balance of about $128 million.

Objectives, Scope, and Methodology

Our objective was to demonstrate and compare the potential cash flow and present value to the federal government from retaining and selling the Great Plains project. In making our cash-flow analyses, we used a variety of hypothetical sale prices and projections of crude oil and natural gas prices and inflation and interest rates developed by two recognized econometric forecasters—Wharton Econometrics and Data Resources, Incorporated. We substituted these sale prices and economic projections into Shearson Lehman Hutton's financial computer model of the project to generate net cash-flow and present value calculations. The results of our analyses are discussed in appendixes III and IV.

We reviewed Shearson's financial model to enhance our understanding of and confidence in the model's outputs. We did not attempt to validate the model because policy-assisting models such as the Shearson model cannot, by their very nature, be validated to the extent that their outputs can be relied upon as exact predictors of the future. Instead, we reviewed the assumptions implicit in various input data values, such as inflation rates, plant operating efficiencies, and energy prices. We reviewed all calculations in Shearson's model and discussed selected issues with Shearson and DOE personnel. Within the limits of our review, we observed no major problems with the model. However, this does not attest to the validity of Shearson's model.

Shearson's model computed our cash-flow projections based on the pricing formula contained in the four separate gas purchase agreements that commit the pipeline affiliates to purchase all the gas produced by the project. We assumed that—as provided in their contracts—the pipeline companies would buy Great Plains gas at a price equal to the highest 10-percent of all natural gas they purchase in the lower 48 states for most of the project's remaining 22-year life. We also assumed that this price would be 10 percent higher than the average wellhead price of gas.

This report focused on our calculations derived from using Wharton Econometrics' 2nd Quarter 1987 economic projections. In developing our cash-flow calculations, we selected January 1988 for the base year of our analyses. We also assumed that

- equity capital would be used to purchase the project,
- the new owner would be capable of realizing the full benefit of the production tax credits and depreciation deductions,
- the project would produce 145 million cubic feet of synthetic gas per day, and
- the project would operate until the end of 2009.

We have assumed that the project's sulfur emissions problem would be resolved and that federal and state tax treatment of the project would not change. We have not estimated the cost of bringing the plant into environmental compliance or the potential cash-flow benefits from developing alternative by-products.

We discussed project operations and financial performance with DOE and ANG officials. We also obtained and reviewed reports and other pertinent documents from DOE and ANG.

Results of Analyses

Estimated Financial Return Under Federal Ownership

Our undiscounted cash-flow analysis showed that if ANG continued to operate the project under DOE ownership, the government's net financial return from gas sales, by-product sales, and pipeline transportation fees would be about $1.5 billion over the project's operating life. The federal government is a tax-exempt entity and, therefore, would not pay taxes on project revenues or receive tax credits. The government's expected financial return would be the difference between total revenues less total expenses over the project's remaining 22-year operating life.

Our cash-flow analysis showed that from 1988 through 2009 the Great Plains project would generate about $6.9 billion in total revenues. We estimated that the four pipeline companies' purchases of synthetic gas would account for about $6.6 billion, or about 95 percent of the project's future revenues.

The Great Plains project produces several by-products, including ammonia, sulfur, and liquid nitrogen, that are sold on the open market. In making our cash-flow analysis, we assumed that revenues from future production of these by-products would be consistent with current levels, adjusted for inflation. We calculated that revenues from the sale of by-products would total about $122 million and comprise about 2 percent of the project's future revenues.

At the time we performed our analysis, the Great Plains project was paid a fee of 16.5 cents per thousand cubic feet of gas delivered to Northern Border's interstate pipeline to pay for the construction cost of the project's pipeline. We, therefore, assumed that the project would continue to receive this pipeline transportation fee and estimated that revenues would total about $192 million, or about 3 percent of the project's future revenue. The pipeline transportation charge was revised in November 1987 to require the four pipeline companies to pay a fixed fee of $257,125 per month, plus 8 cents per thousand cubic feet of gas delivered to the interstate pipeline. The revised rate would reduce our estimate of future pipeline transportation revenues by about $25 million to $30 million.

We estimated that the project would have total operating and capital expenses of about $5.4 billion over the life of the project. In making our cash-flow analysis, we used Shearson's projections of the plant's future operating and capital expenses that are fixed in nature. We also assumed that the project's variable expenses would be consistent with current levels, adjusted for inflation.

Present Value Analysis

Discounting is the process of determining the present value of future cash flows. Present value analysis essentially converts the cash outlays and receipts that occur at different times from an investment into comparable form—their present value equivalent. The present value of a future payment or receipt is the amount of money that, if invested today at a specific interest rate (termed the discount rate), would grow to equal that future payment or receipt.

Using discounted cash-flow analysis, we calculated that if DOE retained ownership of the project over its operating life, the government's net financial return of about $1.5 billion would have a present value of about $569 million.

Selecting an appropriate interest rate for discounting in making present value calculations has been the subject of much debate. Because the present value of any particular investment increases as the discount rate is reduced and decreases as it is raised, the choice of an interest rate is very important. For federal government investment analyses and decision-making, arguments have been presented for interest rates ranging from the cost of borrowing by the U.S. Treasury to rates of return that can be earned in the private sector of the economy.

GAO historically uses the average yield on outstanding marketable Treasury obligations with remaining maturities comparable to the period of the analysis. We used this basis because decisions concerning government investments or divestitures must be viewed economically from a governmentwide perspective. Interest is a cost related to all government expenditures. Because most government funding requirements are met by the Treasury, the government's estimated borrowing cost is a reasonable basis for establishing the discount rate to be used in converting future cash flows into their present value equivalents. We, therefore, used the 20-year Treasury bond interest rate for bonds issued in 1988, which Wharton Econometrics had projected to be 8.1 percent, as the rate for discounting the government's future cash flow from selling or retaining the project. That period is fairly comparable to the project's remaining useful life of 22 years (1988 through 2009).

Estimated Sale Price at Which the Government Would Be Indifferent to Retaining or Selling the Project

For the federal government to be as financially well off from selling the project as it would expect to be from retaining ownership, we estimated that the project would have to be sold for about $1 billion. Primarily because of the production tax credits associated with the project, a $1.029 billion sale price would be needed for the government to receive an income that would equate to the $569 million present value figure that we calculated as the project's retention value.

Our cash-flow analysis for determining the indifferent sale price was essentially based on the same economic and operating assumptions that we used in our federal retention case. We substituted different sale prices into Shearson's financial computer model until we identified a price that, along with the cash flow from future tax effects, resulted in future income to the government that would have a present value of about $569 million. The model calculated the government's financial return from a sale by combining the present value of the future net tax proceeds—the difference between future federal income taxes and tax credits—with the sale proceeds.

At a $1.029 billion sale price, we estimated that a private investor would earn about $621 million in income before taxes and owe about $188 million in future federal income taxes during the life of the project. However, the new owner would be entitled to production tax credits worth about $697 million, which, as discussed below, would be used by the year 2000. Consequently, net federal tax proceeds would be negative because project-related tax credits would exceed federal income taxes by about $509 million. The present value of the negative net tax proceeds would be about $460 million. Therefore, the present value to the government from selling the project for about $1 billion would be about $569 million ($1.029 billion less $460 million).

Estimated Financial Return at a Sale Price of $350 Million

If the Great Plains project were sold, the project would continue to have an impact on the federal budget during the next 22 years of operations because of tax consequences. In the years that project-related federal tax credits exceeded income tax liabilities, the net tax proceeds accruing to the government would be negative. The net tax proceeds accruing to the government would be positive in any years that the reverse were to occur.

To illustrate this effect, we calculated the net proceeds the government could receive using a series of hypothetical sale prices. For example, our analysis using a hypothetical price of $350 million indicated that

because of production tax credits and other tax concessions, the government would net about $68 million, as discussed below. The net proceeds would have a present value of about $56 million.

Net Sale Proceeds

At a hypothetical sale price of $350 million, the net sale proceeds to the government would be $348 million, which is the difference between the selling price and a $2 million commission that would be due to Shearson. Under the terms of its agreement with DOE, Shearson is entitled to a fee of 1 percent of the first $50 million of the selling price ($500,000) and one-half percent of the next $300 million ($1.5 million), less payments received in advance.

Federal Income Taxes

Our cash-flow analysis showed that over the life of the project a private owner who purchased the project for $350 million would earn about $1.3 billion in income before taxes. We estimated that after adjustments for tax allowances, including depreciation, a private owner would owe the government about $417 million in federal income taxes from project operations.

Production Tax Credits

The Crude Oil Windfall Profit Tax Act of 1980 provides for tax credits for the production of nonconventional fuels through the year 2000. A tax credit of $3 per 5.8 million Btus of energy (the approximate energy content of a barrel of crude oil) is provided for the domestic production and sale of qualified fuels. Production tax credits are adjusted to reflect annual changes in the Gross National Product Implicit Price Deflator. These credits materially enhance the economic return to an investor because they can be used to reduce tax liabilities; conversely, they represent tax losses to the U.S. Treasury.

For the Great Plains project, production tax credits would be determined on the basis of the project's future gas production and would be independent of the project's future profitability. Our cash-flow analysis indicated that a private owner would be eligible to receive production tax credits associated with the project totaling about $697 million through the year 2000.

Net Tax Proceeds

Our cash-flow analysis showed that the government would lose about $697 million in future tax revenues as a result of production tax credits allowed a project owner from 1988 through 2000 and gain about $417

million in project-related federal income taxes. Therefore, the government would lose about $280 million in net tax proceeds, which would reduce the government's undiscounted net proceeds from $348 million to $68 million. As previously indicated, the $68 million would be worth about $56 million in present value terms.

It should be noted that the estimated present value of the net proceeds to the government from selling the project for $350 million would be about $513 million less ($569 million minus $56 million) than the estimated present value that we calculated from retaining federal ownership.

DOE has asked us not to release information about the estimated value of the Great Plains project to preclude creating the impression among potential buyers that there is a floor or ceiling on a sales price. It is therefore very important to keep in mind that we did not estimate the present value of the project's future cash flow to a private investor and that our hypothetical sale price does not reflect our judgment on the project's market value.

Other Hypothetical Sale Prices

We also made cash-flow analyses using other hypothetical sale prices ranging from $250 million to $700 million. Using Wharton's economic projections, we calculated that a $250 million price would net the government about $3 million and a $700 million price would net the government about $303 million in undiscounted proceeds.

Sensitivity Analyses

We tested the sensitivity of our present value calculations by using Wharton's economic projections with the same operating assumptions and increasing the discount rate from 8.1 percent to 12.5 percent. We also generated alternative cash-flow analyses using different energy price and inflation rate projections.

We used a 12.5-percent discount rate for our sensitivity test after talking with representatives from several private and public organizations knowledgeable about energy investments. We asked them about the range of discount rates currently being used to evaluate energy assets that have certain characteristics similar to the Great Plains project. We also took into account information that we gathered on the after-tax returns on equity realized by a number of energy companies.

Using Wharton's economic projections and the same operating assumptions, we calculated that increasing the discount rate from 8.1 percent to 12.5 percent would reduce the project's present value under continued federal ownership from about $569 million to about $387 million, or about 32 percent. The purchase price that would be needed to provide the government an income equal to the retention value would be reduced from about $1 billion to about $729 million, or about 27 percent.

Increasing the discount rate had the opposite effect on our calculation based on selling the project for a hypothetical $350 million price. Instead of lowering the value to the government from selling, the higher discount rate increased the present value from about $56 million to about $87 million, or about 55 percent. The 12.5-percent discount rate reduced the value of the revenues lost from production tax credits by more than it reduced the revenues gained from federal income taxes. Because production tax credits are equivalent to cash outlays, lowering the value of these credits increases the government's return from a project sale.

Projections of the project's financial performance are also very sensitive to the assumptions made about future energy prices and inflation rates. To demonstrate this sensitivity, we substituted Data Resources' spring 1987 energy price and inflation and interest rate forecasts into Shearson's model to analyze the effect on the project's expected financial performance. Data Resources' energy price and inflation projections were on the average higher than Wharton's projections. Data Resources also forecasted a 8.4-percent yield on 20-year Treasury bonds issued in 1988, which was slightly higher than Wharton's 8.1-percent forecast.

Using Data Resources' projections, we calculated that the net financial return and present value to the government from retaining the Great Plains project would be about $3.4 billion and $825 million, respectively. Our calculations showed that the project would need to be sold for about $1.3 billion to provide a present value equal to $825 million. Our analysis also showed that if the project were sold for a hypothetical price of $350 million, the present value would be about $134 million. Increasing the discount rate from 8.4 percent to 12.5 percent would reduce our present value calculations by an average of about 38 percent.

Comparison of Potential Financial Return to the Government From Retaining the Great Plains Project or Selling the Project for $350 Million

Dollars in millions

	Undiscounted value	Discounted present value 8.1 percent	Discounted present value 12.5 percent
Assumed sale price	$350	$350	$350
Less sale commission	(2)	(2)	(2)
Plus federal income taxes owed	417	126	72
Less production tax credits	(697)	(418)	(333)
Equals net sale proceeds and tax revenues from selling project for $350 million	**$68**	**$56**	**$87**
Future net revenues under continued federal ownership	$1,500	$569	$387
Present value of net sale proceeds and tax revenues from selling project for $350 million		56	87
Present value of federal revenues lost by selling project for $350 million		**$513**	**$300**
Sale price that would be needed to match project's retention value		**$1,029**	**$729**

Major Contributors to This Report

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