



UNITED STATES GENERAL ACCOUNTING OFFICE  
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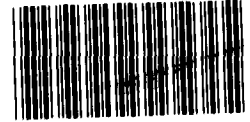
ENERGY AND MINERALS  
DIVISION

September 30, 1982

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B-209052

RELEASED



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The Honorable Robert Walker  
House of Representatives

The Honorable John Heinz  
United States Senate

Subject: Analysis of the Feasibility of Tennessee Valley Authority  
Power Being Made Available through Power Exchange Arrange-  
ments to General Public Utilities (GAO/EMD-82-129)

An issue discussed at March 1982 hearings before the House Science and Technology Committee was the current excess power generation capacity of the Tennessee Valley Authority (TVA). The question arose as to the viability of "wheeling" <sup>1/</sup> excess TVA power to General Public Utilities (GPU). You asked that we make an independent investigation into the feasibility of a sale of TVA power to GPU and any problems that might be involved.

We found that any arrangement involving TVA power that would benefit GPU is unlikely at this time. Economics is the primary reason such arrangements have not occurred and probably will not occur unless TVA makes power available at prices lower than previously discussed with GPU. Even if the TVA power was economically competitive, there are some technical, legal, and institutional constraints which would be involved. For example, the TVA Act precludes a sale of power from TVA to GPU. TVA would have to sell power to systems with whom they had exchange arrangements in 1957. In turn, these systems could make power available to GPU.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to identify the feasibility and practicality of selling power from TVA to GPU. Early in our review, it became apparent that there were economic, technical, legal, and institutional constraints which may impede arrangements whereby GPU could benefit from surplus capacity on the TVA system. Therefore, our review focused on these constraints. Our review was

1/The use of the transmission facilities of one system to transmit power to another system.

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conducted in accordance with the Comptroller General's "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions."

The provisions of the TVA Act (16 U.S.C. 831) do not provide for the sale of TVA power to GPU. As discussed later, GPU would not be precluded from purchasing power from any system which has power exchange arrangements with TVA. Any such arrangements will occur only if TVA's price of power is competitive. We reviewed a price that had been discussed in connection with TVA making power available to other systems with which it has power exchange arrangements and found that it was higher than prices GPU had received from others. We also discussed TVA's price with TVA officials who were knowledgeable about arrangements under which TVA power could be made available to other systems. We also discussed with GPU officials TVA's price in relation to other offers it had received for power. Since each utility system charges to wheel power, we discussed wheeling charges with the American Electric Power System (American), the Allegheny Power System (Allegheny), and the Cleveland Electric Illuminating Co. (Cleveland) in order to determine how wheeling rates could impede an arrangement. We also discussed with the Federal Energy Regulatory Commission (FERC) whether their authority to approve wheeling rates would inhibit any such arrangement.

In analyzing the technical constraints, we contacted utility officials from American, Allegheny, and Cleveland. These utilities would most likely be involved in any arrangement whereby GPU might benefit as a result of TVA power being made available under power exchange arrangements because they either are directly interconnected with GPU or have their own excess power to sell. We could obtain only a general description of their technical capabilities regarding their current demand and supply situation and how power could flow over their transmission networks. To thoroughly review the technical feasibility of power moving from TVA to neighboring systems, and their power in turn being moved to GPU, would require a detailed day-by-day analysis of demand and supply data for each utility system directly or indirectly involved in the arrangement. The cost and time requirements and the need to obtain specific utility data made this approach prohibitive for our review.

We also contacted the North American Electric Reliability Council, and two of its regional councils--the Mid-Atlantic Area Council and the East Central Area Reliability Coordination Agreement--in order to review their demand and supply forecasts and the interregional transfer capabilities among regions regarding a TVA and GPU arrangement. GPU identified for us the contracts it has entered for power purchases and the utilities involved in wheeling power to their systems; they also discussed their analysis of receiving power as a result of TVA power being made available under power exchange arrangements.

In order to address the legal and institutional constraints, we analyzed the TVA Act and met with officials of TVA's Office of General Counsel regarding TVA's ability to sell power outside its service area. We also met with officials of FERC and the Department of Energy (DOE) to determine Federal regulatory authorities and functions, particularly wheeling regulations. We reviewed the Federal Power Act (16 U.S.C. 791a) and regulations concerning filing wheeling rates and the authorities for ordering wheeling. In addition, the Edison Electric Institute and American Public Power Association, which represent private and public owned utilities respectively, provided their views and opinions on the legal difficulties in such arrangements.

An ancillary issue brought out in the March 1982 hearings was the demand charge 1/ DOE was paying to TVA for power contracted for but not now needed at its Oak Ridge, TN and Paducah, KY, facilities. DOE has contracts with TVA to supply power to these facilities through 1995. Because of a decrease in the demand for uranium enrichment services, DOE has not used all the power under the contracts. However, it is paying TVA a demand charge for the power for which it contracted and TVA made available--about \$110 million in fiscal year 1982. DOE believes it may be paying the demand charge for several years without using all the contracted power and thus has begun an effort with TVA to obtain relief from the demand charge. DOE has also considered the possibility of taking the contracted amount of power and marketing it themselves. We discussed the demand charge issue with TVA officials and DOE officials located in Washington, D.C., and Oak Ridge. We also reviewed correspondence between TVA and DOE to determine the reasonableness of both parties' positions. Since we found that legal counsel for both TVA and DOE agreed that DOE was liable for the demand charge, we did no further work on this. We note, however, that DOE is still investigating possible legal avenues for relief.

#### BACKGROUND

GPU--a holding company in the Pennsylvania-New Jersey-Maryland (PJM) power pool 2/--is comprised of three utilities: Jersey Central Power and Light, the Pennsylvania Electric Company, and the Metropolitan Edison Company. GPU has experienced a deficiency in generating capacity since March 1979 when an accident at its Three Mile Island (TMI) nuclear plant unit 2 caused it to

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1/A charge, also known as a capacity charge, designed to cover the fixed cost incurred by a utility for reserving a specific amount of generating capacity on its system for purchase.

2/The PJM pool contains eleven privately owned electric utilities which in many respects operate as a single system.

lose 1,656 megawatts 1/ (MW) of generation from TMI units 1 and 2 --unit 1 which was shut down for refueling has been delayed in restarting. This loss of TMI generation (approximately 24 percent of its generating capacity) has caused GPU to seek power from utilities within and outside the PJM pool. GPU has been able to purchase sufficient short-term power to meet its systems' needs but would like to be assured of a secure source of power on a long-term basis due to the uncertainty of when the TMI units would return to service. Power purchases have been from utilities within the PJM pool and utilities surrounding the pool. Recently, more power has been available from surrounding utilities due to surplus capacity.

TVA has excess generation that conceivably could be utilized by systems with whom it has exchange arrangements. In turn, these systems could make power available to GPU. TVA, like many utilities, has built powerplants to meet expected demands which did not occur. As a result, TVA has deferred four nuclear units under construction and cancelled construction of four others. TVA is constructing four nuclear units currently scheduled to start operation during 1984-1988. With these units added to its system, TVA projects power generating capacity in excess of its needs until 1994 under a high load forecast and beyond 2000 under a low load forecast. Therefore, TVA could be in a position to make power available under power exchange arrangements over a considerably long period of time.

Other utilities near GPU also have excess capacity. American, Allegheny, and the Detroit Edison Co. have all offered to sell power to GPU. In addition, Canada has offered to sell GPU surplus power. In fact, GPU was considering an interconnection linking their system with Ontario Hydro through new lines to be built under Lake Erie, but GPU decided in June 1982 not to pursue this option.

#### TVA'S POWER PRICE HIGHER THAN PRICES FOR NON-FIRM POWER

Between May and August 1981, TVA discussed with GPU the possibility of making available up to 1,000 MW of power. TVA originally discussed this with GPU in May 1981 because it had excess power and GPU was purchasing, at times, high cost, oil-fired power to help alleviate the loss of power from TMI. According to a GPU official, they were interested in arrangements involving TVA power chiefly because it would be available on a long-term basis--until 1995. GPU sought offers for power purchases to 1995 but other systems would only offer power to 1985 or 1990.

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1/One megawatt equals 1,000 kilowatts.

In a June 1981 meeting between TVA and GPU, power demand and supply forecasts were exchanged and technical and legal problems associated with arrangements involving TVA power were reviewed. TVA provided GPU with informal price estimates through 1985 as well as for the years 1990 and 1995. TVA indicated an availability of 1,000 MW of power during 1981-82 at a demand charge of 10 mills and an energy charge 1/ of 30 mills per kilowatt hour (kWh) 2/. Based on these charges, GPU estimated the total cost of power it might be able to purchase as a result of such arrangement would be about 50 mills per kWh when delivered. The 50 mill estimate was based on TVA's 10 mill demand and 30 mill energy charge, plus a wheeling charge of 7 mills to bring power it purchased through two systems.

In late July 1981, GPU told TVA that although such arrangements were being considered, American was more competitive because its offered price was lower than TVA's and one less wheeling charge was required. GPU also advised TVA that negotiations were underway with Michigan and Canada which could reduce to 500 MW the potential power needed. On August 21, 1981, GPU officials advised TVA that it appeared the price under a TVA arrangement would exceed other offers GPU had received for power, and they would notify TVA if any of the lower offers failed to materialize.

After this notice, no further contact concerning power arrangements involving TVA power occurred until May 1982. At that time, TVA again contacted GPU to determine whether conditions had improved for acquiring power from systems with which TVA had power exchange arrangements. GPU told TVA that power reflecting TVA prices was even less economically attractive than before. Reasons given were (1) many utilities had excess capacity that GPU could purchase at more favorable prices, and (2) utilities that were previously unwilling to sell power on a long-term basis were now willing to do so.

In June 1982, GPU contracted to buy 650 megawatts of power from the Detroit Edison Co. at a delivered price estimated at 30 to 33 mills per kWh. The power will be wheeled from the Detroit Edison

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1/The energy charge is the unit cost applied to the production of electricity generally consisting of the annual fuel and variable cost of the generating plant. A specified mark-up of 10-15 percent is usually added to the energy charge; in this case, GPU estimated the mark-up at 3 mills.

2/A measure of an amount of electric energy consumed, delivered, or generated over a period of one hour at the rate of one kilowatt. One kilowatt equals 1,000 watts.

Co. to GPU through the Central Area Power Coordinating Group (principally through the Toledo Edison Company and Cleveland). The contract extends through 1990 with a fixed demand charge for the contract period. GPU is also continuing negotiations with American to buy power on a long-term basis and continues to purchase relatively inexpensive power on a short-term basis from neighboring utilities outside the PJM pool. The cost of this power ranges from 28 to 32 mills per kWh.

#### Basis for TVA's price

Prices at which TVA makes power available under power exchange arrangements reflect the particular conditions and circumstances of the respective transactions. Each sale is considered on a case-by-case basis. In its discussions with GPU regarding the availability of 1,000 MW of power to systems with which it had exchange arrangements, TVA considered this arrangement as a long-term contract, subject to interruption only to protect service for TVA's firm obligations. The price TVA discussed was based on the system average demand charge and on the incremental energy charge of its most expensive 1,000 MW of generation. While this turned out to be higher than prices for power (non-firm power) that could be acquired by GPU under other arrangements, TVA realizes it could have discussed other prices with GPU. TVA points out that prices could have varied under different types of contracts or contract stipulations. TVA said no other prices were mentioned to GPU since no intensive discussion of any such possible arrangement occurred.

#### TECHNICAL, LEGAL, AND INSTITUTIONAL CONSTRAINTS COULD ALSO HAMPER ARRANGEMENTS INVOLVING TVA POWER

In addition to the economics, there are technical, legal, and institutional constraints that could hamper the development of arrangements whereby GPU could benefit from surplus capacity on the TVA system. It is unclear whether these constraints would be the overriding factor since GPU discussions with TVA broke off in 1981 and 1982 due to economic constraints. Both TVA and GPU officials stated that if the economics were worked out arrangements consistent with technical and legal requirements could probably be developed. Nonetheless, we found that

- technical constraints could hamper arrangements because no direct interconnection exists between TVA and GPU, thus requiring power to be wheeled through several systems to reach GPU, and
- legal and institutional constraints exist that limit the types of arrangements whereby remote systems may benefit from power available from the TVA system.

### Technical constraints

No direct interconnections exist between TVA and GPU; any power would have to flow through a minimum of two intermediate utility systems before reaching GPU. The PJM pool--of which GPU is a member--has interconnections with the following utility systems: the New York Power Pool to the north, the Virginia Electric Power Company to the south, and Allegheny and Cleveland to the west. In discussing a possible arrangement, TVA and GPU did not consider wheeling power through either the Virginia Electric System or the New York Power Pool. Virginia Electric lacks the ability to move additional power north into the PJM pool because there are inadequate transmission facilities for moving power across the Potomac River. The New York Power Pool was also not considered an option because being north of PJM, TVA power would have to move through Canada or PJM to get to the New York Power Pool. Thus, Allegheny and Cleveland were the two alternatives considered for wheeling power to GPU from a system having exchange arrangements with TVA.

TVA, however, has no direct interconnections with either Allegheny or Cleveland. Any power coming from TVA would be sold and delivered to American to the north. GPU could then acquire power from American which could be wheeled by Allegheny or Cleveland east to GPU. Consequently, by using this route there would be a minimum of two other utility systems involved with the associated charges being included in the price of power acquired by GPU.

The uncertainty also exists whether American, which has exchange arrangements with TVA, would want to sell power to GPU and whether Allegheny or Cleveland would be willing to wheel power from American to GPU on a long-term basis. By entering into a long-term wheeling arrangement, a utility would have to dedicate a portion of its transmission network for this purpose. This reduces the intermediate utilities' flexibility in operating their systems and planning to meet future demand requirements. For example, the utilities may have excess power of their own that could be sold to GPU. Also, the TVA power flowing through intermediate systems could impair the reliability of their systems or hinder their ability to fulfill existing contracts. The longer the distance power must flow or the greater the number of systems through which it flows, the greater the likelihood that a transfer could affect the reliability of the intermediate systems or impede their operations. Thus, since a utility must first consider the needs of the system and those of its ratepayers/stockholders, it may be reluctant to wheel power for another utility.

### Legal/institutional constraints

The TVA Act, as amended in 1959 limits the number of systems with which TVA can exchange power to 12. However, the Act does

not preclude systems that have exchange arrangements with TVA from entering into agreements to sell power to systems that do not have arrangements with TVA. As a result, transactions resulting from such arrangements involve additional contractual obligations over those involved in selling power from one system to another. In testimony before the Energy and Water Development Subcommittee of the House Appropriations Committee in March 1982, TVA Chairman Charles Dean stated that the TVA Act would not preclude TVA from exchanging power with neighboring utilities who in turn could sell it to other utilities including GPU. For example, during the months January to March 1980, power was delivered to GPU through a series of buy and sell arrangements between TVA, American, Allegheny, and GPU.

FERC's wheeling authorities probably would not prevent GPU's purchase of power from a system having an exchange arrangement with TVA. Section 205 of the Federal Power Act gives FERC the authority over wheeling rates set by utilities providing transmission services. The rates set by the utilities wheeling power to GPU would be subject to FERC approval. According to a FERC official, however, wheeling rates are generally approved if the parties involved agree to them and there are no intervening parties. If GPU could reach an agreement on a purchase and the intermediate utilities were willing to wheel the power, it is unlikely that FERC would disapprove. Under sections 211 and 212 of the Federal Power Act, FERC has the authority to order wheeling but only upon application from utilities and the satisfaction of numerous criteria. FERC has never issued an order to wheel power. It seems unlikely that they would order power, purchased from a system having exchange arrangements with TVA, to be wheeled to GPU due to the numerous criteria involved. However, FERC believes these criteria do not appear insurmountable.

The basic organization and structure of the utility industry can impede the movement of power over a long distance. Each utility is first responsible for meeting the needs of its own customers within its service area and, therefore, has primarily built a generation and transmission network to meet this demand. Power sales from its own system or wheeling power through its system would occur only if its own system reliability is not jeopardized. Arrangements under which GPU could buy power from a company having exchange arrangements with TVA would require the cooperation of many utilities operating within this framework, and utilities must benefit or not be placed at a disadvantage as a result. One approach to moving power over a long distance on a continual basis is through development of direct current transmission interties between regions. Such an intertie exists between the Pacific Northwest and Southwest which transfers large amounts of electricity over a long distance on a continual basis. To develop this transmission line required the cooperation of many utilities in assessing the benefits and costs of the line and then in its



development and operation. Only by the utilities jointly working to develop the line was it achieved. This same cooperation may be needed even more in the future as utilities and regions have excess capacity that could be used in other regions.

AGENCY COMMENTS

A draft of this report was provided to GPU, TVA, DOE, and FERC for comment. GPU stated the report accurately reflected the circumstances surrounding an arrangement between TVA and GPU. However, they provided information to clarify several areas in the report. These comments were incorporated.

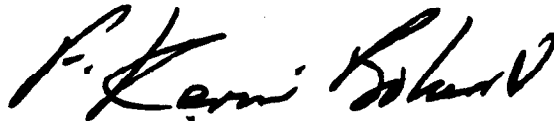
TVA did not provide any overall comments on the report but suggested a number of language changes which they believed would present more clearly the conditions by which TVA could make power available to benefit GPU. We made several changes in the report to accommodate TVA's suggestions. In those cases where changes were not made, we discussed the matter with TVA officials who agreed changes were not needed.

DOE did not provide official comments, but did offer some suggestions regarding their contracts for power purchases from TVA. The changes suggested by DOE have been incorporated into the report.

FERC provided official written comments on the report. (See enclosure I.) FERC staff found the description of the technical, institutional, and legal factors that would impact on a power exchange between TVA and GPU to be consistent with their understanding of such an arrangement. FERC provided comments on the detailed technical aspects of how power could actually flow between TVA and GPU. We believe the report describes, in non-technical terms, the constraints involved in power flowing from TVA to GPU. In addition, FERC provided comments which clarified their authority to order wheeling.

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Unless you publicly announce the report's contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time, we will send copies to interested parties and make copies available to others upon request.



J. Dexter Peach  
Director

Enclosure

## FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON 20426

SEP 28 1982

Mr. J. Dexter Peach  
Director, Energy and Minerals Division  
United States General Accounting Office  
Washington, D. C. 20548

Dear Mr. Peach:

This is in response to your letter of September 20, 1982, requesting comment on a draft report "Analysis of the Feasibility of a Sale of Power from the Tennessee Valley Authority to General Public Utilities".

The Commission's staff has reviewed the report. It finds that the report's description of the technical, institutional and legal factors generally agrees with its own understanding and perceptions. It endorses the report's finding that any problems in these categories are not of sufficient magnitude to prevent such a sale, if it were economic. Major transfers of power always require resolution of reliability and economic impact issues.

The discussion of wheeling on pages 6 and 7 could leave the incorrect impression that TVA and GPU can select the paths of ac power flow between the two systems. In fact, the power flow at any moment will be determined by the impedances of the various parts of the network and the generation and load levels of all the interconnected systems. Even if there were a direct ac interconnection between TVA and GPU, significant effects upon other systems would occur. Although a direct ac interconnection would establish a "contract path", it would not in itself eliminate or compensate for the effects upon other systems. Thus, the discussion on page 10 relates basically to contract paths.

Contract paths ordinarily are selected as those offering the greatest transmission capacity. Systems along the contract path, while they do not control the power flows, benefit from inclusion in the transfer arrangements. Inclusion assists the adjustments needed to accommodate the changed power flows and provides compensation for use of transmission facilities and for any increases in energy losses.

Wheeling contracts with American Electric Power and Allegheny Power Systems, while establishing a contract path, may not compensate Cleveland Electric and its associates in the Central Area Power Coordinating Group (CAPCO) for the effects imposed upon them. Consequently, those systems might intervene

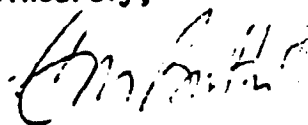
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in FERC proceedings on wheeling rates to assure compensation or protection. As mentioned on page 8 , a dc intertie between TVA and GPU would avoid the impacts on other systems. However, the construction of the line would require the approval of authorities in states along its route. Such approvals can be difficult to obtain if the line does not benefit ratepayers in those states.

The statement on page 8, that it is unlikely that FERC could issue a wheeling order for TVA transfers to GPU, is misleading. While there are a number of criteria to be met, none appears to be insurmountable absent a hearing record to the contrary.

We appreciate the opportunity to offer these comments.

Sincerely,



C. M. Butler III  
Chairman

GAO Note: Page number references in this letter have been changed to correspond with the page numbers in this final report.