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INCREASING THE TENNESSEE VALLEY AUTHORITY BOND CEILING

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HEARING BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE NINETY-SIXTH CONGRESS

FIRST SESSION

ON

S. 436

A BILL TO AMEND SECTION 15(d) OF THE TENNESSEE VALLEY
AUTHORITY ACT OF 1933 TO INCREASE THE AMOUNT OF
DEBT WHICH MAY BE INCURRED BY THE TENNESSEE VALLEY
AUTHORITY

FEBRUARY 23, 1979

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INCREASING THE TENNESSEE VALLEY AUTHORITY BOND CEILING

FRIDAY, FEBRUARY 23, 1979

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, D.C.

The committee met at 10 a.m., pursuant to call, in room 4200, Dirksen Senate Office Building, Hon. Howard H. Baker, Jr., presiding.

Present: Senators Randolph, Baker, Stafford, Domenici, and Chafee.

Senator Randolph [presiding]. Good morning, ladies and gentlemen. We welcome our witnesses. It is our privilege to have the minority leader of the Senate, Senator Baker, a long time member of the Environment and Public Works Committee, with us today. I hope that you, Howard, will chair this hearing.

Senator BAKER. Mr. Chairman, thank you.

Senator RANDOLPH. Would that be agreeable?

Senator BAKER. I would be happy to.

Senator RANDOLPH. This is a hearing that we think is necessary because of the request of the Tennessee Valley Authority to increase the bonding ceiling established in 1959 under the Self Financing Act. The request is to raise it to \$30 billion.

As we understand it, the recommendation is supported by the administration and is contained in the President's budget for fiscal 1980.

The Tennessee Valley Authority is a major supplier of energy in the Tennessee Valley region. I must not be nostalgic, except to say that I am the only Member of the Congress serving today who voted for the Tennessee Valley Authority, a few years ago, when it came into being.

I think that both the Authority and we on the committee believe that we have a question that needs answering: Is there the capacity to meet the demand as projected over the next 20 years?

The increase in the bond ceiling would allow us to make the improvements that are necessary for the construction of new generating facilities which will meet the demand in the 1990s.

So from that standpoint, Senator Baker and I have some discussions and good fun and humor often about nuclear versus coal or coal versus nuclear, but we don't get out of hand on that subject.

Senator BAKER. Mr. Chairman, we don't get out of hand. When the chairman speaks, I usually stop.

Senator RANDOLPH. There is no member of this committee, or this Senate, more knowledgeable, more understanding, closer to the

Tennessee Valley Authority than Senator Baker. He is intensely interested in what we do and that we do it with full accountability and based upon the facts. So this is the information which we hope will come to us today and then, if it is thought wise within this committee, recommend such action to the Senate.

Thank you, Senator Baker. I am very appreciative of your taking over today.

Senator Baker [presiding]. Thank you, Mr. Chairman, very much. I appreciate the opportunity to chair these hearings. I am always grateful to you, Mr. Chairman, for the close attention that you pay to the interests of our region for in so many ways Tennessee and West Virginia share much of the same heritage, background, interests and traditions.

The Tennessee Valley Authority has been an extraordinary national asset. It is a matter of pride to you, I know, and admiration by me for your role in the creation of the Tennessee Valley Authority and the protection of its future over the years.

Senator RANDOLPH. May I say, Senator Baker, there was not unanimity at the time.

Senator BAKER. No. It was a pretty controversial matter at the time.

Senator RANDOLPH. Yes, it was.

Senator BAKER. It is far less controversial now than it was for many years. I know you recall this well when my father was in Congress.

Senator RANDOLPH. And your mother also.

Senator BAKER. Yes. Even at that time, in the fifties, TVA was highly controversial. Passage of the TVA Self Financing Act was a major legislative undertaking. It was through your efforts and those of Senator Sherman Cooper from Kentucky and a number of others that this matter cleared the Senate. A bipartisan effort on the House side produced a similar result.

The TVA has come a long way, Mr. Chairman. Much of its growth and success is attributable to the shepherding of their interests by you and others like you in the Congress over the years.

I wish to express my gratitude to you on behalf of the people of my State, and I believe all the States in the Tennessee Valley.

Mr. Chairman, we have with us today, and with your permission I will proceed to conduct these hearings, two of the three members of the Board of Directors of the Tennessee Valley Authority.

As you know, sir, the third member has now been selected by President Carter. I have praised President Carter for his selection of Bob Clement. I hope when that nomination reaches the committee we will proceed with hearings in an early and expeditious way.

Senator RANDOLPH. You will remember we did so with both of the present members of the Authority.

Senator BAKER. We did indeed. I believe we have also consistently over the years taken the occasion to examine perspective Directors of TVA on a careful and thorough basis, not only because we want to be prudent in the confirmation of these appointments but because the appointment of Directors serves as a crossroads in time to the examination of TVA policy. So I would expect that our examination of Bob Clement will be just as thorough as it has been

for those nominees who have gone before, both those who were confirmed and those who were not confirmed.

But I think the President made a good choice. I look forward to those hearings at an early time.

**OPENING STATEMENT OF HON. HOWARD H. BAKER, JR., U.S.
SENATOR FROM THE STATE OF TENNESSEE**

I am especially pleased, Mr. Chairman, to see that the Board of Directors of TVA as presently constituted has made this recommendation regarding the President's request for an increase in TVA's debt authority from \$15 billion to \$30 billion.

This is the fourth time in the past 20 years the agency has required an increase in its debt authority, and Congress has used this authority for periodic review of the growth of the power program and the policies which frame its regional impact.

TVA supplies electricity to consumers in seven States. It services virtually all of the State of Tennessee. Its power and nonpower programs significantly affect the daily lives of the 2 million families in its service area. The rates it charges for electricity can enhance or diminish economic activity in the region, the standard of living, and the quality of the environment.

The ability of the corporation to meet the demand for electricity in its service area with adequate financial resources determines to a substantial degree the potential for economic growth within that area.

The ready availability of financial resources for growth in capacity also determines the costs of that future capacity. So the increase in TVA debt authority is of singular importance to my State and the entire Tennessee valley region.

Inflation in fuel, capital and energy costs over the past decade has outgained the general inflator, and electricity in the valley now consumes a higher percentage of the family budget, especially elderly or impoverished families, than in the past. This has generated concern over the potential impact of an increase in the debt load of TVA upon the rates charged by TVA—a concern which I hope and expect the Board will address this morning.

The process by which TVA forecasts demand has received considerable analysis and commentary over the past several months. Several alternative forecasts have been developed by the GAO and other economic analysts.

I note that TVA's current predicted annual growth rate of 4.6 percent is approximately half the rate the agency has used as recently as the late 1960's, and the forecast has been reflecting a slowing demand growth over the past several years. To the extent this decrease represents a reduction in unnecessary use of electricity, I am delighted. To the extent it reflects or possibly contributes to a slowing of economic growth and vitality in the region, I am concerned. I hope the Board will comment on this trend in the course of their testimony.

TVA has recently concluded a settlement of its clean air compliance strategy with the Environmental Protection Agency. That settlement should be judicially approved in the next several weeks. The effects of that settlement on electric rates, the environment of

the valley and upon the industry of the region are of fundamental importance.

A portion of the debt authority sought by the agency would finance the costs of that agreement, assuming that the agreement is approved. I would invite the board to address those aspects of that settlement.

I have a number of further questions, but I state these areas of discussion to promote a colloquy with the Board.

I thank you, Mr. Chairman, once again for the privilege of participating in this hearing. I look forward to the presentation by Mr. David Freeman and Mr. Richard Freeman and their associates in this respect.

Senator RANDOLPH. Mr. Chairman, it would be appropriate at this time to mention that Senator Muskie, a member of our committee, has a statement he wishes placed in the record. I will place it in full, with your agreement, in the record. In it he mentions the fact that the Council on Wage and Price Stability has generated letters criticizing elements of the agreement. You know about the agreement. These letters have become the basis of public and private criticism of the agreement. He thinks that is an unfortunate situation.

He says further that the proposed settlement, which is pending in the Federal courts in several States in the TVA service area, as he understands it, represents one of the most significant steps made in over a decade of enforcement under Federal environmental statutes.

For years TVA has been among the largest polluters in the Nation. You might address yourselves to that question a little later.

The recalcitrance of the TVA was an embarrassment to those of us who believe the public mission of the agency demanded a broader, more progressive view of power production.

TVA has come to the brink of bringing about a comprehensive settlement of those issues. This settlement calls for a substantial commitment by the agency, a commitment which certainly will result in some increase in power production costs.

The costs of the program have been carefully and fully evaluated by both EPA and TVA. The increase in costs to the average residential consumer of TVA will be well within the value of the benefits to the family. Clean air is well worth this investment.

Senator Muskie goes on to say it is easy to second-guess the decision so complex as this settlement. It is easy to speculate that costs may be saved, especially if one does not have to take responsibility for the environmental impacts, the operability of systems employed, or the social impacts of the program.

"I cannot imagine," says Senator Muskie, "two parties who, by expertise or mission, are better equipped to design a program of clean air compliance than TVA and EPA. Their interests in the dispute which the consent agreement proposes to settle led to a thorough review."

He concludes:

I cannot imagine that the commentary of the Council on Wage and Price Stability will enhance the technical quality of the agreement or lead to any other constructive result. It is time for this kind of meddling to halt.

I ask unanimous consent that the statement be placed in the record.

Senator BAKER. Mr. Chairman, that presents me with a procedural matter I have never faced. That is, how do you grant to the chairman consent to include a statement in the record? I will assume that it is done.

Senator RANDOLPH. Without objection.

[Senator Muskie's statement follows:]

STATEMENT OF HON. EDMUND S. MUSKIE, U.S. SENATOR FROM THE STATE OF MAINE

Mr. Chairman, these hearings are to review the proposed increase in debt authority of the Tennessee Valley Authority contained in the President's budget.

A portion of the proceeds of the bonds which TVA will issue under the additional authority contained in the President's recommendation will be used to purchase equipment for compliance with the proposed clean air settlement between TVA and EPA.

It has come to my attention that the Council on Wage and Price Stability has generated letters criticizing elements of this agreement and that these letters have become the basis of public and private criticism of the agreement. I think this is a most unfortunate occurrence.

The proposed settlement, which is pending before federal courts in several States TVA serves, represents one of the most significant steps made in over a decade of enforcement under federal environmental statutes. For years TVA had been among the largest polluters in the nation. Their recalcitrance was an embarrassment to those of us who believe that the public mission of the agency demanded a broader, more progressive view of power production.

Now TVA has come to the brink of bringing about a comprehensive and final settlement of those issues. This settlement calls for a substantial commitment by the agency, a commitment which certainly will result in some increase in power production costs.

But the costs of the program have been carefully and fully evaluated by both EPA and TVA. The increase in costs to the average residential consumer of TVA will be well within the value of the benefits to his family. Clean Air is well worth the investment.

It is easy to second-guess a decision as complex as this settlement. It is easy to speculate that costs might be saved, especially if one does not have to take responsibility for the environmental impacts, the operability of systems employed, or the social impacts of the program.

I cannot imagine two parties who, by expertise or mission, are better equipped to design a program of clean air compliance than TVA and EPA. Their interests in the dispute which the consent agreement proposed to settle led to a thorough review.

I cannot imagine that the commentary of the Council on Wage and Price Stability will enhance the technical quality of the agreement or lead to any other constructive result. It is time for this kind of meddling to halt.

Senator BAKER. Mr. Chairman, I have a witness list that consists of Mr. S. David Freeman, the Chairman of the TVA, Mr. Richard Freeman, a member of the Board of Directors, and Mr. Dan Feather of the Tennessee Valley Energy Coalition.

I note Senator Stafford of Vermont has joined us here. We would be happy to hear any statement he may wish to make before we begin.

Senator STAFFORD. Thank you very much, Howard, and Mr. Chairman. I thought it was about time I showed up and proved that I was still alive and kicking and again ready for duty.

I have no other statement, except that I am glad to be back with the committee.

Senator BAKER. Mr. Chairman, if you would permit me, I would welcome Bob Stafford back. As you know, I am sure, he had reconstructive hip surgery. He has graduated now from a hospital bed to crutches to a cane, which he uses only occasionally, and it appears to be a lethal weapon. We are happy you are back.

Senator STAFFORD. Thank you.

Senator BAKER. We are prepared now to receive a statement from the witnesses. Mr. Freeman, do you have a statement you would wish to make?

STATEMENT OF S. DAVID FREEMAN, CHAIRMAN, TENNESSEE VALLEY AUTHORITY; ACCOMPANIED BY RICHARD M. FREEMAN, BOARD MEMBER; LEON E. RING, GENERAL MANAGER; HUGH G. PARRIS, MANAGER OF POWER; GEORGE H. KIMMONS, MANAGER, ENGINEERING DESIGN AND CONSTRUCTION; AND HERBERT S. SANGER, JR., GENERAL COUNSEL

Mr. FREEMAN. Yes, Mr. Chairman, I do.

Before I introduce my colleague and staff who are with us today, I would like to express on behalf of everyone in the Tennessee Valley Authority our really deep appreciation to you, Chairman Randolph, and to you, Senator Baker, for affording us this opportunity to present our case today and for introducing the legislation, the Baker-Randolph bill, S. 436, which embodies TVA's request for raising our ceiling from \$15 to \$30 billion.

This agency is very fortunate to have the Senate Environment and Public Works Committee as an oversight committee. We neophyte Board members hope in some small way to measure up to the committee's record of accomplishment in the public interest as we carry out our tenure.

We have with us this morning, in addition to my colleague on the Board, Richard Freeman; Leon Ring, General Manager; Hugh Parris, Manager of Power; Mr. George Kimmons, Manager of Engineering Design and Construction; and Herb Sanger, General Counsel.

Senator BAKER. If I may interrupt, gentlemen, welcome. We are happy to have you here.

Mr. FREEMAN. We have I think a happy combination of new people and continuity that will enable us to try to measure up to the yardstick this committee set for TVA.

We are pleased to be here to discuss S. 436 with you this morning. The President has given his support to this legislation.

The central fact in our presentation, Mr. Chairman, is that the TVA power system is self sufficient. In fact, 1979 marks the 20th anniversary of the self financing legislation, which this committee originated. That legislation authorized TVA to use revenue bonds in place of congressional appropriations for its power system capital needs.

We are not here to ask the Federal Government for money. We are simply asking that the ceiling be raised so TVA may continue to use its own credit to borrow money needed to fulfill its utility responsibility to the 6 million people that are dependent on TVA for their power supply.

I think it is worth a moment to look at the history of that 1959 self financing legislation. It had two basic results. For the rest of the Nation, it meant that taxpayers no longer provided the capital funds for TVA's power system. For the people and the economy of our own region, it meant assurance that TVA could plan and finance the facilities needed to serve regional economic growth without the uncertainty of the annual appropriation process. The legislation also limited TVA's service territory to the area we served 20 years ago and ended lingering concerns about TVA expansion into territory served by the private power companies.

TVA bonds are not financial obligations of the U.S. Government. They are backed only by the credit of TVA and its customers. Income to the bondholders is subject to Federal income tax. The TVA yardstick is 36 inches long. While the 1959 self financing legislation ended the TVA power program's dependence on the American taxpayer, it subjected the TVA power program to continuing oversight by the Congress as well as the critical judgment of the financial marketplace.

TVA reports to the Congress on its power operations each year. More to the point of this hearing, Congress placed a ceiling on our authority to borrow. This means that at about 5 year intervals we must, in a sense, renew our charter from the Congress by obtaining legislation to permit us to carry out our electric utility responsibility.

The TVA power program today is not the same program it was in 1959. It has tripled in size. But just as important; then it had a Division of Power Marketing; today it has a Division of Energy Conservation. Both the national energy problem and the realities of today's power supply costs dictate that we put the greatest possible emphasis on effective programs to encourage power conservation—by conservation I mean more efficiency and not doing without—as well as the use of alternative energy sources. TVA has conservation programs underway, and this agency intends to be the leader in this national effort.

At the same time, TVA still has the same responsibility as any other power supplier, to meet the demands of its consumers—to keep the lights and the heat on and to keep the equipment functioning that provides the region's jobs in business and industry.

That job requires large amounts of capital to build new facilities, and it requires that we plan future facilities with the assurance that funding will be available over the very long lead times some of these projects require.

That responsibility to meet future demands for electric energy is particularly acute in the Tennessee Valley, an area largely dependent upon electricity from domestic coal and uranium for energy supply rather than gas or imported oil. Sixty-eight percent of all energy generated by TVA is consumed in the commercial and industrial sector. In a very real sense TVA is the lifeline of the region's economy.

The TVA power system, in our opinion, has turned out to be a very good investment for the Nation. I don't hear anyone suggesting that TVA be sold these days. That may be because the market value or replacement cost of our assets is estimated to be some \$30 billion. The book value alone is some \$10 billion and if our debt is subtracted, TVA has a net worth of \$2.2 billion, simply on the basis of book value. By contrast, TVA's total power assets in 1959 were \$1.7 billion.

Last year TVA sent the Treasury a check for \$82 million, and our power program received no funding from the Congress. I might add, Mr. Chairman, that the \$82 million was more than the combined total Federal income taxes paid in 1976 by the 12 privately owned electric utility companies serving nearby areas.

From 1961 to date, TVA has repaid \$1.255 billion to the Treasury under the self-financing legislation which this committee originated—\$290 million was applied toward the \$1 billion appropriation investment repayment. Interest payments on the appropriations investment have totaled \$965 million through September 30, 1978. I might add, Mr. Chairman, we are paying interest at the current rate even though the Government borrowed the money some time ago at much lower rates of interest. I have no apologies to make for TVA's contributions to the Federal Treasury in our self-financing status.

I should also point out that TVA also pays 5 percent of its gross revenues to State and local governments in lieu of taxes as prescribed in the Tennessee Valley Authority Act. Last year these payments amounted to about \$80 million.

This year marks TVA's fourth request for an increase in our debt ceiling. The \$750 million ceiling established by the 1959 amendment was increased in 1966 by \$1 billion. In 1970 the ceiling was raised to \$5 billion and in 1975 to the current \$15 billion ceiling. This sequence roughly parallels the legislative intent of the 1959 amendment; that the debt ceiling be reviewed at approximately 5-year intervals.

The bill now under consideration would raise the current debt ceiling from \$15 billion to \$30 billion. While this increase appears to represent a tremendous jump in borrowing authority, in reality it represents no more than another 5-year increment to meet our best judgment of what our expansion needs might be. If you remove the effects of inflation and examine the buying power of the \$15 billion, it is equivalent to approximately \$10.2 billion in 1975 dollars—the size of the last increase—or to roughly \$7 billion in 1970 dollars.

The proposed increase would provide the capital needed to complete the power plants now under construction and would provide full funding for about 7,200 MW of additional generating capacity at an average cost of about \$1,500 per kW. The figure of \$1,500 per

kW represents the inflated costs at the time the equipment would be purchased. Mind you, we are speaking about equipment that would be ordered and delivered in the late eighties and early nineties.

Senator BAKER. Just out of curiosity, what is that figure in dollars? How much did you inflate those estimates?

Mr. FREEMAN. We used an inflation factor of 7 percent a year.

Senator BAKER. An annual 7 percent rate?

Mr. FREEMAN. Yes; we are before you today, having been overwhelmed by inflation rates that, quite frankly, were not anticipated the last time we were here, and we are trying to learn through bitter experience.

Senator BAKER. How many years are involved?

Mr. FREEMAN. We believe that this will enable us to fully fund the required new plants for 5 additional years.

Senator BAKER. So you added 5 years at 7 percent or 35 percent compounded?

Mr. FREEMAN. When you look at the years when the equipment would be received, it takes us into the nineties, so it is much more than 5 years. Roughly speaking, we are paying about \$800 a kilowatt for capacity now. So at \$1,500 per kW, we are practically doubling the cost of new capacity.

Senator BAKER. You are estimating a doubling of costs for deliveries in the nineties?

Mr. FREEMAN. Yes, sir.

Senator BAKER. Let me interrupt just for another minute. I don't want to mutilate your statement, but what will happen if inflation turns out to be substantially in excess of 7 percent, which it appears to be at this time?

Mr. FREEMAN. Unfortunately, we will be back before this committee sooner than 5 years from now.

Senator BAKER. Thank you.

Mr. FREEMAN. The nature of these plants, of course, cannot be identified at this time, but they obviously could be either conventional coal-fired plants or nuclear-generating stations, which constitute the major portion of our present system. However, they could include, if they are already commercialized, more advanced technology such as fluidized-bed combustion boilers, cogeneration facilities, the fuel cells, along with some solar as well as other alternatives. The actual types of plants will be determined later in the planning period as our knowledge of needs and costs of various options becomes more specific.

Senator BAKER. Let me interrupt one more time. Maybe it is not one more, but another time.

Implicit in this statement, though, is the assumption that, say, well into the nineties, TVA will depend more or less on conventional systems. You don't see a technological breakthrough of major dimensions, say, before the year 2000 for TVA's power generation.

Mr. FREEMAN. We certainly can't rely on it. We can hope for it and we will commercialize the most cost-effective, energy-efficient technology that our hard-nosed power people believe can keep the lights on at the lowest cost to our customers.

Senator BAKER. But this is currently based on light-water reactors and coal-fired powerplants?

Mr. FREEMAN. That is right, sir. At the moment, if we order today the capacity and utilize the best resources, it would be light-water reactors and coal-fired plants. We would hope some co-generation could be accomplished to use the waste heat more efficiently. We are looking at the new technologies. But today these are the only two reliable sources of energy for TVA.

As I pointed out, in the Tennessee Valley, electric energy supplies a much larger proportion of total energy than for the rest of the country. If I might digress for a second, the Nation as a whole derives three-quarters of its energy from petroleum, the stuff we are running out of. The Tennessee Valley gets only half of its energy from petroleum. Half of the valley's total energy is supplied by coal, uranium, and hydro, through our electric system. So we are in a sense much more self-sufficient, and we hope to continue to lead the Nation in that direction.

Senator STAFFORD. If the Senator would yield, a question occurred to me, Mr. Chairman, and that is, do you contemplate at this time any future gas- or oil-fired plants in your 7,200 megawatts of potential future power?

Mr. FREEMAN. No, sir.

Senator STAFFORD. Thank you.

Mr. FREEMAN. I think we can say absolutely no.

We suffer today from having about 2,000 megawatts of peaking capacity which burns oil. When we have to run those plants to meet peak loads we pay a horrible price. I shudder to think of having to pay the price for oil in the nineties.

We will also need capital for conservation and energy alternative investments, for additional environmental protection facilities, for plant improvements, and the continued development of fuel resources for both coal-fired and nuclear generating plants. The type of generation is not the issue. What is at issue is the ability to add capacity at the time it is needed. Approximately 10 to 12 years is presently needed to plan and build power supply facilities. This long leadtime requires that TVA be ready now to begin making commitments to power needs in the 1990's.

Admittedly, there is some uncertainty about the exact rate of growth in electric power demand which will occur. Even so, we must have the financial capacity to meet what we consider to be a reasonably probable pattern of growth.

TVA has a utility responsibility. We must be able to serve whatever loads might develop, and in our opinion, we must have the authority and the plans to meet any foreseeable contingency. This is not to say that we will make commitments to borrow and spend money simply because we have the authority. Future capacity will be ordered only when we are confident that it is needed. We will use the \$15 billion only as it is needed. But there can be no doubt, Mr. Chairman, that the legislation before you is urgently needed now.

The harsh truth is that inflation has eroded the purchasing power of the dollar to the point that we need additional borrowing authority to complete the powerplants we currently have under construction. We now have 18,000 megawatts of nuclear power capacity in various stages of construction. Those plants are vital to our needs in the 1980's. TVA also must be in a position to order

new capacity as it is projected to be needed in the decade of the 1990's.

Like others in the business of building new electric generating capacity, TVA has experienced perhaps the most frustrating period in the history of heavy construction. Inflation, unexpected difficulties with new technologies, and changing regulations for the protection of man and his environment have delayed completion of units now under construction and have increased their costs. Quite frankly, these factors have led to increased costs beyond our earlier estimates.

TVA, we believe, has responded to these changes in a positive manner. Our costs for new generating facilities have been and, even with inflation, remain the lowest or among the lowest in the electric utility industry. But certainly this management believes there is room for improvement, and we are taking vigorous action to cut costs in every possible way. Director Richard Freeman will elaborate on that point in just a moment.

Inflation and rising costs have taken their toll on power rates as well as construction costs. TVA is duty bound under the law to provide electric power at the lowest feasible rate and we are making every effort to hold down the cost of electric energy. Our goal is to hold power rate increases to no more than the rate of inflation. To accomplish this it will be necessary to use existing facilities as efficiently as possible, encourage as much conservation as we can, avoid commitments to facilities which we do not absolutely need, hold down the increase in fuel prices to the extent that we can, and in everything we do, we must conduct our activities with a deep regard for what cost increases mean to the power consumer.

We have launched an energy conservation program which we consider to be the most aggressive and comprehensive in the Nation. We anticipate electricity savings from this program in the 15 to 20 million kilowatt range by 1990. These savings will reduce power supply costs and will offset the need for more expensive generating facilities. Such a program is not without cost. We estimate that up to \$1 billion of capital could be needed to support our conservation program over the next 5 years, but this would offset the need for larger investments in generating capacity. Even with this conservation we will be needing large blocks of generating capacity. Our best estimate at the moment is 7,200 megawatts.

Senator BAKER. What was the estimate before, the previous estimate of this same period?

Mr. FREEMAN. Prior to the embargo in 1973, electric power use in the Tennessee Valley was growing at a rate of 6 to 7 percent, or doubling every 10 years. More recently our growth has reflected the changed circumstances, so that now we are projecting growth at about 4.6 percent per year. In recent years, I should mention, we were criticized for having a single estimate for projecting load growth. We now have an array of estimates.

I believe you will agree that in order to meet our responsibilities under the Tennessee Valley Authority Act, we must plan for the most reasonable maximum forecast that we feel is likely to occur. We would be derelict in our duty if we did not come to this committee with assumptions and projections which assure that the

Tennessee Valley Authority would be facilitating the economic growth that the region's economy may generate. We should not be a stumbling block to progress.

We are not going to be a stumbling block. As I will explain in a moment, we are planning for a full employment economy in the valley.

Senator BAKER. I am not challenging that. I am just trying to identify how circumstances have altered the projection of required capacity for the same period.

Mr. FREEMAN. What has happened is that the impact of the higher rates and the beginning of a conservation ethic among people has slowed the rate of growth sharply since 1973. We are now projecting a growth rate of 4.6 percent. This figure represents a reasonable level taken from a range of alternatives. We believe it will adequately track the region's needs.

Senator BAKER. I won't delay you any longer because we are going to have to move on with the statement. But can you give me a figure that corresponds with 7,200 megawatts of new capacity during this period based upon growth rates which cost prior to, say, the 1973 embargo?

Mr. FREEMAN. It would have been in the order of 10,000 to 11,000 megawatts.

Senator BAKER. Thank you.

Mr. FREEMAN. Mr. Chairman, with your permission, I would like to submit for the record the description of TVA's conservation efforts prepared by Robert Hemphill who directs that effort for TVA.

Senator BAKER. We would be happy to have it. Thank you. [See p. 49.]

Mr. FREEMAN. In addition to that, I would like to submit for the record a statement by Dr. Lynn C. Maxwell of the TVA staff which details the array of load forecasts we have made and sets forth the assumptions behind them.

Senator BAKER. Fine. We will be happy to have that, too. [See p. 60.]

Mr. FREEMAN. Thank you.

In examining the future power needs, as I stated, we are looking at an array of alternatives. We believe that a reasonable basis for our presentation today is that we must plan to meet any contingency that appears likely to happen.

We have selected a forecast of 4.6-percent growth between 1978 and 1990 and a 3.8-percent growth from 1990 to the year 2000.

I might say, Mr. Chairman, that this is approximately the same forecast as the maximum forecast that the GAO made in their analysis.

It assumes a high level of economic growth as represented by a full employment economy within the region, a moderate amount of substitution of electricity for natural gas, electricity prices increasing no faster than inflation, and TVA implementing an aggressive conservation program.

The proposed \$15 billion increase will be used primarily for this 7,200 megawatts of new capacity which we estimate may be needed. But some \$2 billion will be needed to complete the projects under construction. To be quite frank, with inflation continuing

unabated, that \$2 billion figure could very well increase to \$3 billion or \$4 billion. The balance would be used to finance conservation investments, environmental protection facilities, and the development of fuel resources.

I would like to emphasize again, that we have financial obligations which must be met prior to and in addition to the construction of additional plants. We need additional borrowing authority for completion of plants under construction and to fund our conservation efforts.

Let me summarize, if I may. The Tennessee Valley Authority is not asking the Federal Government for money. We are asking for the authority to move forward with plans for the future. The ability to borrow money to carry out those plans, and the timing of the planning, the capacity to act in a timely manner, is crucial; 1990 is literally on our desk in the next few months or a year. The actions we take now will determine the region's power supply for 10 or 12 years hence. We are here on behalf of 6 million people in the Tennessee Valley who depend upon us for electricity supply needs which affects their jobs.

We believe that TVA's performance has demonstrated the wisdom of the Self Financing Amendment of 1959, both to relieve the taxpayers of their burden and to assure the valley of a reliable source of power supply. The TVA has become the Nation's largest purchaser of coal.

Senator RANDOLPH. Thank you for mentioning coal. Thank you very much.

Mr. FREEMAN. And if I may add, we also have under construction the largest amount of nuclear generating capacity in the Nation.

Senator BAKER. We thank you for that as well. [Laughter.]

Mr. FREEMAN. The Nation faces a petroleum crisis. The Tennessee Valley Authority is leading the way toward self-sufficiency through conservation and the use of the coal and uranium resources which are found in this country. We obtain a much smaller share of our total energy from petroleum than the Nation generally. We want to encourage our energy supply from domestic sources. We want to continue our effort of adequate supply at the lowest feasible rate. All we ask is the authority to borrow the money and take the risk with our own credit. The White House advises us that the enactment of this legislation would be in the President's program and has the administration's full support.

Mr. Chairman, we respectfully urge prompt and favorable action.

Senator RANDOLPH. I want to say at the outset that I strongly support this legislation. It is not a cursory action on my part to join as cosponsor with Senator Baker in presenting this in the Senate. I hope for prompt and favorable action. I think the need is there. I think that the inflationary spiral continues, shockingly unabated. We don't have all of those answers. When you speak of \$2 billion, possibly \$3 or \$4 billion, I think you are not just tossing figures around. I think you are conscious of what is happening.

Mr. FREEMAN. Yes, sir.

Senator RANDOLPH. We all are. I shall now be provincial. What do you anticipate, Chairman Freeman, as the amount of coal to be purchased from West Virginia mines during the next 10 years?

Mr. FREEMAN. As you know, Mr. Chairman, we now are part of the market for West Virginia coal. This is an outgrowth of the TVA Board having taken action to put this agency in compliance with the air quality law. Our compliance plan is developed in anticipation of using Eastern coal in accord with the administration's policy and in accord with common sense, I might add. As a result we now have approximately 13 million tons of West Virginia coal under contract to serve our Shawnee steam plant and other facilities. These contracts mean that we will be paying approximately \$400 million for West Virginia coal over the next 5 to 10 years. As you know, we are obligated under our statutes to use the competitive bidding system so it is not possible for me to say with any assurance what the additional volumes will be. I would expect that since West Virginia coal has proven itself to be competitive in the TVA market over the last year, West Virginia coal will continue to be competitive and will get a share of our 35 to 40 million ton a year market for coal. We have entered a new era in a sense.

Senator RANDOLPH. Enlightened era.

Mr. FREEMAN. I think so, Mr. Chairman. There has been some criticism of our settlement agreement by Mr. Bosworth of the Council on Wage and Price Stabilization. His principal criticism was we did not use western coal. To suggest that we should put ourselves at the mercy of the large oil companies that now own that western coal, and at the mercy of western railroads that would be hauling the coal, would be unthinkable. To put the people in our area out of work in order to buy coal in the West would be even more unthinkable. Beyond that, western coal is so full of ash that burning it results in our losing 20 percent of the capacity of our powerplants. His arguments, I respectfully suggest, are not persuasive. They were not persuasive to the TVA Board. We are committed to a policy of using eastern coal. I should add that I am authorized to say that our settlement is consistent with the policies of the administration.

Senator RANDOLPH. Mr. Chairman, those purchases that you are mentioning, which were made in 1978, were they for the Shawnee station?

Mr. FREEMAN. Yes, sir.

Senator RANDOLPH. Now the Shawnee station is receiving coal from West Virginia by barge. Is that correct?

Mr. FREEMAN. The two contracts are both barge contracts.

Senator RANDOLPH. That is my understanding. That helps to make it an economical purchase, does it not?

Mr. FREEMAN. It certainly does. It is an added byproduct of the investments that were made with the support of this committee over the decades. Investments in improving navigation which are now paying dividends.

Senator RANDOLPH. We, in this committee, are conscious of the value of navigation on the inland waterways in this country. Sometimes when expenditures for locks and dams are considered, which are authorized here, there is a feeling that once again the term "pork barrel" slides off the tongue very easily. But the navigation strengths of our inland water system are something we need. Is that right?

Mr. FREEMAN. It is vital. All one has to do is to look at the communities like Decatur, Alabama, and others along the Tennessee River that have flourished as a result. On the Tennessee River, we document these savings, and our staff have backup to show that the savings of the shippers have now grown to the point that they are \$100 million annually.

Senator RANDOLPH. Chairman Freeman, during 1977 the Authority opened a purchase office in Charleston, West Virginia, to facilitate the purchase of the coal that was available. That office, I am not critical at the moment, has been closed. I know you had good intentions when you opened the office. Why was it closed?

Mr. FREEMAN. We did open an office in Charleston so that we could have someone on the spot to explain TVA's purchasing policies and procedures to the West Virginia producers. That function has been served. The West Virginia producers now know how to do business with TVA. Quite frankly, the office received no inquiries or no phone calls for a period of a couple of months, so it was closed. If someone calls the telephone number, they are given the number at our Chattanooga Purchasing Office. The Charleston office seems to us to have served its function. The West Virginia people are now bidding in our competitive offers. We feel that we have broken the ice, so to speak, and have returned to our centralized purchasing operation, but we left the phone number intact so that if anyone calls, we can still respond.

Senator RANDOLPH. Chairman Freeman, I am not criticizing the closing because I had contacted those who speak for and with you in this matter. I understand and I agree with you. It is just that I wanted the record to indicate that you were not pulling away from West Virginia coal.

Mr. FREEMAN. No, we are not. I appreciate the opportunity to explain. We closed the Charleston office because the West Virginia producers now know us and are doing business with us like other producers. We have no local offices in other places. West Virginia producers and those from other locations work with our purchasing office in Chattanooga. We feel that we are in intimate contact with the West Virginia producers of coal. As our market for coal continues in the future they have every opportunity to bid.

Senator RANDOLPH. Mr. Chairman, I presume I have violated the 10-minute rule. I will defer to someone else.

Senator BAKER. I presume you can do anything you want to, Mr. Chairman.

Senator DOMENICI. Mr. Chairman, I think you just ought to keep right on asking.

Senator RANDOLPH. Thank you.

I have read and re-read the letter that you received from Barry Bosworth of the President's Council on Wage and Price Stability. I read it three times. This letter, in fact, questions the Tennessee Valley Authority's purchase of coal from West Virginia, saying that it has an inflationary impact. You have already addressed yourself, in part, to that. Is it not a part of the TVA Act that support of the region's resources is a mission of TVA, forgetting the inflation for just a moment?

Mr. FREEMAN. The economic and social well being of the people of the valley and adjoining areas is part of our charter. I certainly

don't shy away from that. But beyond that, our position, and the basis to our decision, is that the purchases of coal from West Virginia is an economically viable and acceptable option. One has to look at the cost of the option over the life of contracts and over the life of one's commitment. The very notion that we are going to be able to make out well from a coal market that is dominated already by an oligopoly, the concentration of power, the inflation in rail rates that was to take place, the very idea of using our precious petroleum to haul coal halfway across the country at a time when we are importing oil is offensive as a matter of policy. But the point that I stress; and one that is completely overlooked, is the fact that Western coal is so dirty that in burning it, we would, in effect, reduce the putput of our Shawnee power plant by 20 percent at a time that we are short of power. Using Western coal does not make economic sense for TVA. We feel that we are carrying out a policy that is in the best interest of the Nation, as well as TVA.

Senator DOMENICI. Where does that dirty coal come from?

Mr. FREEMAN. Not New Mexico.

Senator DOMENICI. From Wyoming?

Mr. FREEMAN. Wyoming.

Let me be more explicit. If you design a plant for Western coal, it works fine. But we designed the Shawnee plant for eastern coal. The idea of switching fuel and hauling it halfway across the country in order to burn it in a plant that wasn't designed for that kind of ash and moisture content is not an economical option for our point of view. We have had very poor experience in terms of the reliability of our generating units when we use fuel other than that for which they were designed. TVA is located in and around a wealth of coal resources. We feel that our best long-term economies stem from being able to burn the abundant coal resource that exists in the eastern part of the country.

Senator RANDOLPH. I want to say to Senator Domenici, who always speaks well for, not only his own State, but to all States, that he must recognize that the coal of which we speak, the western supply, is of high ash content and very low BTU. This is what you are addressing yourself to.

Mr. FREEMAN. That is correct. Perhaps the word dirty was more colorful than I should have used.

Senator DOMENICI. Well, it can be dirty for a lot of different reasons.

Mr. FREEMAN. All coal is dirty. You are right, Senator Domenici, that was not an accurate description.

Senator DOMENICI. Mr. Chairman, let me just say this: I perked up when we talked about dirty western coal, but not in this respect. I am not a proponent of shipping western low BTU, high sulphur coal to eastern America. You know that. I said in the speech I made on the Senate floor when I came here that it seems ridiculous to me that we ought to do that. On the other hand, I do believe inflation is a major American problem. I plan to attend next week the hearings that are contemplated with reference to the White House's authority in terms of the Environmental Protection Agency. I haven't made up my mind yet, but I am firmly on the side of the President having broad authority in terms of fighting inflation. I want to hear these arguments that he has no

jurisdiction to interfere and ask EPA and others what they are doing in terms of enforcing our regulations. So I thought I would get a little background here today. That is why I came.

Senator RANDOLPH. Senator, it is very helpful. I want to pursue it a moment.

Mr. FREEMAN. I would like to say that the TVA Board's primary goal at the moment, and at any moment, is to fight inflation. We operate under a statute that commands us to produce electric energy at the lowest feasible cost. The settlement we have worked out with EPA is designed to save our consumers money rather than continuing the uncertainty of running a power system without a schedule for getting the job done and the uncertainty and expense of litigation. There is nothing more important to the consumers of TVA electricity today than for us to keep our costs under control. We are dutybound to do so. As a new management team we are working vigorously to meet our responsibilities. We will be discussing that more fully in a moment. I can't agree with you more.

Senator RANDOLPH. Just one further point to make the record complete. We have a copy, Chairman Freeman, of the letter from the Director, Mr. Bosworth. I will place that in the record, without objection.

[A letter from TVA relative to the Shawnee plant and the letter from Mr. Bosworth follows:]

February 26, 1979

The Honorable Jennings Randolph
Chairman, Senate Committee on
Environment and Public Works
Senate Office Building
Washington, DC 20510

Dear Senator Randolph:

At the specific request of Senator Domenici, I am providing the committee with information regarding the use of eastern low-sulfur coal at TVA's Shawnee Steam Plant.

TVA's electric generating facilities include 12 coal-fired steam plants which now consume about 40 million tons each year. The coal supplies for these facilities historically have come almost exclusively from the eastern states; indeed, the only coal ever purchased and received by TVA from western states involved relatively small amounts for the purpose of evaluating its economics and adaptability for use in TVA facilities. TVA found that the relatively lower cost of western coal was largely offset by tremendously high transportation costs, decreased generating capability (about 20 percent less than available from traditional eastern coal because TVA's plants are not designed to burn the lower Btu western coal), and the lack of assured transportation for western coal. TVA simply was not in a position to risk the loss of generation at a time when our power margins were already requiring the purchase of high-price power from other systems to meet our loads. In addition, the use of costly and scarce petroleum fuel to transport coal hundreds of miles for use in the heart of the great eastern coal fields was a serious concern.

TVA Board policy to use eastern coal was even adhered to for a period of time during the coal strike in January 1978. During this emergency period the Board initially rejected western coal, and then when it finally became important to make some purchases to maintain power supplies, each of TVA's three Board members made public statements indicating this did not reflect a change in the Board's policy on not purchasing western coal, but rather the action was being taken because coal supplies at the generating plants had reached critical levels.

The consent decree which settled the lawsuit was finalized with the plaintiffs during March 1978 and subsequently approved by the TVA Board on December 14, 1978. A copy is attached. It includes two provisions

The Honorable Jennings Randolph

February 26, 1979

which had a bearing on the use of eastern coal. First, on page 2 of the consent decree the fifth Whereas clause provides that, "the parties agree that, except in emergency situations, the requirements of this consent decree shall be complied with using coal mined in the eastern United States." Second, on page 16 of the consent decree TVA was required to award sufficient complying coal contracts to provide for 80 percent of the Shawnee plant coal requirements after the final compliance date of October 1981. Thus, sufficient contracts were needed to supply the plant's requirements through October 1984. However, following the October 1984 date, TVA has no requirements under the consent decree to continue to limit low-sulfur coal purchases for Shawnee to eastern suppliers.

The two present members of the TVA Board each expressed their agreement with the TVA policy of using eastern coal at their respective confirmation hearings before this committee. Hearings on Nomination of S. David Freeman Before the Senate Comm. on Environment and Pub. Works, 95th Cong., 1st Sess. 27 (1977); Hearings on Nomination of Richard M. Freeman Before the Senate Comm. on Environment and Pub. Works, 95th Cong., 2d Sess. 40-42 (1978)).

Sincerely,

S. David Freeman
Chairman

JPD:BBW:HSS:SDF:JAR

OCT 17 1978

Mr. Richard M. Freeman
Director
Tennessee Valley Authority
400 Commerce Avenue
Knoxville, Tennessee 37902

Dear Mr. Freeman:

In July, the Tennessee Valley Authority signed long-term contracts for the delivery of low-sulfur eastern coal to its Shawnee plant at a price that was well above the price available from alternative sources. Although TVA has now exercised its option under one of the contracts (with Pittston) to obtain up to half of the contracted coal from alternative eastern suppliers, the cost incurred under these contracts remains well above our estimate of the cost of using low-sulfur western coal. Furthermore, the pattern setting nature of this transaction poses a serious inflationary problem throughout the coal-using regions east of the Mississippi River.

In examining the potential cost impact of this transaction, it has come to our attention that the Shawnee contracts represent a part of a broader strategy for bringing TVA's coal-fired plants into compliance with air pollution standards. Once approved by the TVA Board, this control strategy -- as outlined in an out-of-court settlement negotiated earlier this year -- would govern TVA's course in complying with air pollution standards.

We have several major concerns with the settlement, as drafted. First, the settlement specifies the exclusive use of eastern coals. There is surely little merit in constraining TVA access to low-cost sources of fuel. Second, the 1977 Amendments to the Clean Air Act would permit -- with the approval of Federal and State authorities -- an adjustment in emission limits (to higher levels) for two of the plants covered by this settlement. The settlement specifies a more stringent emission limit for these plants than might otherwise be allowed under the 1977 Amendments. Third, the settlement stipulated methods of compliance for individual plants -- for example, the application of scrubbers -- which appear to be more costly than available alternatives.

- 2 -

The TVA Board recently moderated a proposed increase in electricity rates in recognition of the leading role which Federal agencies must play in the effort to control inflation. However, the failure to minimize the cost of inputs inevitably invites further rate increases. The abandonment of cost minimization as a principle of public utility management places unnecessary burdens on consumers. We recognize that TVA is charged with promoting a broad range of regional objectives, but also believe that these objectives can be jeopardized by the failure to minimize costs. The sharp increase in the rates charged TVA's industrial customers in recent years have reduced the region's historical advantage in providing low-cost electric power. Additional increases in electricity rates may rebound unfavorably on the region served by TVA through reductions in employment opportunities relative to other areas of the country. For these reasons, we urge the Board to weigh carefully the inflationary consequences of its actions.

In particular, in light of the substantial costs involved, we urge that the TVA Board weigh carefully the cost impact of this settlement. While we recognize the complexity inherent in the negotiation of this issue and the fact that contracts already let may reduce TVA's flexibility in the near future, we believe that some reduction in cost could be realized by

- a) eliminating the prohibition on the use of western coals,
- b) obtaining full credit as allowed under the 1977 Amendments in the readjustments of emission limits for the Kingston and Johnsonville steam plants, and
- c) reexamining the use of scrubber retrofit, especially in those cases in which partial scrubbing will be used in combination with washed coals.

We would greatly appreciate it if you would give these considerations some attention.

Sincerely,

Billy Donworth
Director

SAME LETTER SENT TO:

cc:
Official file
Chron
OWPM:AFRAAS:blm-10/16/78

Mr. David Freeman
Chairman
Tennessee Valley Authority
400 Commerce Avenue
Knoxville, Tennessee 37902

Mr. FREEMAN. I would also like to point out that in the course of the settlement, TVA took advantage of the Baker amendment to the air quality legislation in 1977 and was able to negotiate relaxed standards at the Kingston and Johnsonville steamplant. I think it is relevant to the discussion for us to say that we bargained very hard for our customers, and, in a sense, cashed in on the help provided by this committee and the legislative process.

Senator BAKER. Mr. Chairman, I am sure that Senator Domenici won't be offended when I repeat a private conversation up here. He looked down at Dave Freeman and said, "He looks older than I remember him." I said, "This sort of thing will age you in a hurry."

Senator DOMENICI. I remember you wanted the job and you looked very enthusiastic.

Mr. FREEMAN. The Senator might have added a year or two to my age just now.

Senator RANDOLPH. I remember when Secretary Marshall, the Secretary of Labor-designate, was before our Labor and Public Welfare Committee. I checked on his age. I said, "Mr. Marshall, you are a very young man." He said, well, he didn't know about that. I said to him, "I can assure you you are going to age in the job you are undertaking." The mortality rate is very high in the change from one Secretary of Labor to another. I don't know how long he has been there. If you look back at the changes, they are very precipitous.

Senator DOMENICI. If he went to those fraud and abuse hearings on CETA, he aged a few years just the other day, Mr. Chairman.

Senator BAKER. My father told me years ago when he looked at me after a hard day at work, he said, "Son, you used to be a young man, but I see you have recovered from it."

Senator RANDOLPH. Continuing this line which I relish to much, I was at a dinner years and years ago in Chicago and the speaker of the evening was Eddie Cantor. He was receiving a very excellent fee. The dinner ran on and on. He was finally introduced at 5 minutes past 11. He stood before the podium and looked over the audience and he said, "Mr. Chairman, ladies and gentlemen, when I came in this evening I was a young man. You now look at me and see I am very much older. I am so much older that it is necessary for me to retire. I leave you with my best wishes." They contested the payment of the fee to him. But he showed them that all he was to do was to make remarks.

Senator DOMENICI. They paid him?

Senator RANDOLPH. They paid him, that is right.

The closing sentence of Mr. Bosworth's letter is as follows: "We would greatly appreciate it if you would give these considerations some attention." I presume you gave it not "some" but very careful attention. Is that right?

Mr. FREEMAN. We certainly did. We would be glad to have the opportunity to supply for the record our analysis of the points that he made which we feel have no merit.

Senator RANDOLPH. Thank you, Mr. Chairman.

[The material referred to follows:]

TENNESSEE VALLEY AUTHORITY
KNOXVILLE, TENNESSEE 37902

OFFICE OF THE BOARD OF DIRECTORS

March 7, 1979

The Honorable Jennings Randolph, Chairman
Committee on Environment and
Public Works
The United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

The Director of the Council on Wage and Price Stability, Mr. Barry P. Bosworth, has expressed three concerns about the proposed settlement in the air compliance litigation involving emissions from 10 TVA coal-fired steam plants. During the February 23rd hearing of the Subcommittee on Regional and Community Development on S. 436, reference was made to those concerns. We appreciate the opportunity to provide our response for the hearing record.

Director Bosworth's first concern, that TVA is incurring greater costs by specifying the exclusive use of eastern coal at our Shawnee Steam Plant, is not justified.

Coal supplies for all the TVA facilities historically have come almost exclusively from the eastern states; indeed, the only coal ever purchased and received by TVA from western states involved relatively small amounts for the purpose of evaluating its economics and adaptability for use in TVA facilities.

TVA found that the lower purchase price of western coal was largely offset by tremendously high transportation costs, and the lack of assured transportation for western coal. However, the crucial factor which makes western coal uneconomical for TVA during the period of the consent decree is the decreased generating capability, about 20 percent less than that derived from traditionally used eastern coal, because TVA's plants are not designed to burn the lower Btu western coal.

TVA simply was not in a position to lose 300 MW of generation at the Shawnee Power Plant (20 percent of its capacity) at a time when our power margins were already requiring the purchase of high-priced power from other systems to meet our loads.

The CWPS staff analysis thus omitted the most important responsibility of TVA - namely its utility responsibility to meet the loads of its customers. Furthermore, that analysis ignored the need to conserve

The Honorable Jennings Randolph

March 7, 1979

costly and scarce petroleum fuel (rather than waste it to transport coal hundreds of miles for use in the heart of the great eastern coal fields), President Carter's National Energy Policy encouraging coal consumers in the East to use eastern coal so as to avoid the inflationary costs to the Nation of building the new communities required for additional development of western coal, and the unemployment that would result in Appalachia from substitution of western coal.

The proposed consent decrees in the pending litigation provide that TVA will use eastern coal at Shawnee for a three-year period from the date of beginning compliance. This merely reflects the terms of the contracts which already had been awarded in 1978, prior to approval of the settlement by the TVA Board, to assure the availability of the coal needed there. TVA's term coal contracts range from 6 months to about 15 years.

Thus, that provision in the proposed decrees relating to eastern coal only reflects TVA's past coal purchasing history and in the Board's and staff's best judgment represents the most economical method for TVA's system meeting SO₂ emission requirements at Shawnee.

The second concern expressed by Mr. Bosworth is that TVA has not fully availed itself of the provisions of the Clean Air Act Amendment that would permit a relaxation of the sulfur dioxide emission limitations at the Kingston and Johnsonville Plants and that TVA has agreed to an emission limitation more stringent than is required at the Cumberland Plant. This concern is misplaced because the proposed settlement agreement essentially meets those objectives: it provides that standards at the two plants would be relaxed and specifies standards at the other plants that are no more stringent than TVA's own studies demonstrate are required under the Clean Air Act.

Absent the consent decrees, administrative relaxation of standards for the two plants in question can take place under present law only after notice, public hearing, action by the Tennessee Air Pollution Control Board, and approval by the Environmental Protection Agency. An attempt to relax the standards through litigation would involve lengthy proceedings, and the final outcome would be questionable. In contrast, the proposed settlement embodies relaxed standards for the two plants. The Kingston and Johnsonville Steam Plants' sulfur dioxide emission limitations are 1.2 lbs/10⁶ Btu; the proposed settlement agreement specifies a 2.8 lb/10⁶ Btu limit at Kingston and a 3.4 lb/10⁶ Btu limit at Johnsonville. The proposed settlement bars any party to the litigation from objecting to these relaxed standards in the regulatory proceedings to revise them formally.

The Honorable Jennings Randolph

March 7, 1979

The emission limitation specified in the proposed settlement agreement for Cumberland Steam Plant is more stringent than the current standard. However, we know from air quality studies that the current standard will have to be tightened. By agreeing now to meet the revised standard we are avoiding the waste of possible retrofit solutions if we had to meet a more stringent standard after the current compliance program is completed.

Moreover, as a part of the total settlement agreement, we are being relieved of claims for substantial civil penalties.

Director Bosworth's third concern is that the use of scrubbers selected by TVA as the compliance method at four plants is not the most economical method of meeting emission requirements. TVA carefully evaluated the various methods for meeting emission limitations at each of the 10 plants. Scrubbers were selected only at the four plants where they were demonstrated to be the most cost effective method for reducing emissions at a particular plant. We are installing the equipment that our engineers believe is most cost-effective.

TVA certainly recognizes that the cost involved in this program is huge. Nevertheless, we have no choice but to obey the law. And there are no outstanding issues to litigate.

The settlement agreement enables us to comply with the obligations to which TVA is subject under state and Federal clean air statutes and regulations at a lower cost than continuing to litigate issues that have already been resolved against TVA by the Courts.

We have been authorized to state that the settlement is consistent with the Administration's policy.

Sincerely,

S. David Freeman
Chairman

Senator BAKER. I am trying hard, but I find it irresistible, Mr. Chairman. I have to have the last word. I read in the newspaper accounts this morning of Jody Powell's remarks on the EPA protest about White House interference, and I was reminded by Powell's remarks in the story about the chairman of the board of a corporation who owned all the stock but had outside directors. He put a motion, he said, "All of those in favor of the motion say aye. All those opposed say I resign."

Senator RANDOLPH. Mr. Chairman, speaking of a board of directors, the board of directors of a certain firm decided to send a telegram; the chairman of the board was in the hospital. They said, "We wish for you a speedy and complete recovery. The vote was 11 to 9." I am sure we have stretched this out beyond good taste.

Senator BAKER. I am sure we have.

Senator RANDOLPH. John, you haven't said a word.

Senator CHAFEE. I didn't come prepared for the witticisms of the day. Would you mind if we strayed back to some TVA matters?

Senator RANDOLPH. Yes. I would want you to.

First of all, I want to say what a treat it is to see Mr. Freeman again, and Mr. Richard Freeman. I understand that Mr. Clement's nomination is coming up, when?

Senator BAKER. Soon.

Senator CHAFEE. Has it been formally made?

Senator RANDOLPH. No, it has not. We, frankly, have urged that it come because we feel it is important to the mission of the Tennessee Valley Authority.

Senator CHAFEE. Has the President made a nomination? Are we nominating him here, or what?

Senator BAKER. The President has announced the appointment, but he has not yet made the appointment. If he doesn't make the appointment, it is going to be an awful surprise to Bob Clement.

Senator CHAFEE. I can remember him standing next to his father when he gave the keynote address at one of the conventions, when was it?

Senator BAKER. 1956.

Senator CHAFEE. I would just like to ask a couple questions, if I could. Am I in order here, Mr. Chairman?

Senator RANDOLPH. Certainly. Howard is the chairman today. But I certainly would endorse that.

Senator CHAFEE. He supports TVA; is that correct?

Senator BAKER. He generally supports John Chafee, whom I trust won't create any conflict.

Senator CHAFEE. We see him here all the time. Now let's not let any secrets out.

Mr. Freeman, if I might, I was looking over the rate of increases in the bond ceiling the last three times you have been up here. It started at one point in 1966, it was \$1.75 million. Then it went up 4 years later to \$5 billion; then 5 years later to \$15 billion; and now in 1980 you are seeking \$30 billion. Is that correct?

Mr. FREEMAN. Yes, sir; in 1979.

Senator CHAFEE. Can you give any projection for the future? Are these types of increases—I suppose it is all tied into inflation. What do you think the next time you come up here it will be? Do you have any estimate of what that will be?

Mr. FREEMAN. Senator, I think you have in a sense answered your own question. The amount of the increase we will need 5 years from now is crucially dependent on our ability to control inflation. In terms of purchasing power, the \$15 billion increase that we are seeking is approximately the same as the \$10 billion increase that we asked for in 1975. Very roughly and prudently, what the graph of our increases tracks, is the inflationary spiral that this Nation is caught up in.

Senator CHAFEE. As I understand it, these sums are cumulative sums. In other words, it lets you go up to \$30 billion obligations outstanding. Is that correct?

Mr. FREEMAN. Yes, sir.

Senator CHAFEE. How long are these bonds issued for? I mean you are paying some off.

Mr. FREEMAN. Actually, the financing in the utility industry generally follows the same pattern.

Senator CHAFEE. Pretty long term, isn't it?

Mr. FREEMAN. The financing of almost all utility organizations pretty much follows a pattern of putting funds into plant and equipment rather than retiring debt. Most of this debt is long term, about 20 years. The ceiling is on the amount which can be outstanding at any one time.

Senator CHAFEE. But you must be paying some of the early ones off as you issue the new ones?

Mr. FREEMAN. Sure. We refund issues.

Senator CHAFEE. But in addition to refunding, you must be retiring some.

Mr. RICHARD FREEMAN. We have retired five issues.

Senator CHAFEE. Mr. Chairman, Senator Baker, Mr. Freeman was good enough to come by and see me not too long ago. I am in favor of this legislation to increasing the bond authority. I would go along with whatever motion you intend to make at whatever time, whenever that is. Are we intending to meet later or do we have a quorum or what is the situation?

Senator BAKER. I think, Senator Chafee, that the chairman would plan to have a markup session on this subject shortly after we finish. I haven't talked with the Chairman.

Senator RANDOLPH. I think that is appropriate.

Senator BAKER. I appreciate your remarks. Thank you very much.

Senator CHAFEE. One other thing. When Dave Freeman came in, he was kind enough to suggest that perhaps, or maybe I suggested to him, at any event we worked it out that perhaps I could go down there for a visit, and I would like to do that.

Senator BAKER. We would like to have you do that.

Senator RANDOLPH. That is good, John.

Mr. DAVID FREEMAN. We would be most honored if you would come. We think we have much to show off.

Senator CHAFEE. I am sure I will come back with a lot more knowledge than I currently have of the TVA.

Senator BAKER. We will certainly see to it. I will make sure Chairman Freeman and I have a chance to confer on your convenience in that respect, Senator Chafee.

Senator CHAFEE. Thank you.

Senator BAKER. Thank you, sir.

Senator DOMENICI. Mr. Chairman, could I just ask a couple questions?

Senator BAKER. Yes.

Senator DOMENICI. As I indicated, I came down kind of as an interloper, not for the legislation but rather to ask a little background on the settlement and what I see as a growing discussion and debate as to executive power here or abuse of it.

Let me ask you in terms of this settlement which is reported in this morning's Post as a billion dollar settlement, just by way of quick background, how did such a settlement come about?

Mr. FREEMAN. The Clean Air Act prescribed standards for all our powerplants that burn coal including the 10 plants involved in the settlement. In the early 1970's TVA took the position that tall stacks could satisfy the act. EPA rejected that theory; TVA took EPA's decision to court and the Court of Appeals ruled against TVA and the Supreme Court denied certiorari in 1976. TVA was then left with specific standards that were judicially approved. There was really nothing left to litigate, Senator, except as to the timetables and the options we had to negotiate for some relaxation at two of our steamplants. These options came about from the Baker amendment and the good engineering practice in the 1977 Clean Air Act law. We sat down with EPA and worked out a settlement that in the opinion of our people gave us a reasonable timetable. It also forgave fines that might otherwise be imposed for being out of compliance during all of these years, and gave us relaxed standards at these plants. These 10 plants involved the use of eastern coal. We used scrubbers at some plants, which was the lowest cost option, but we use natural medium sulfur and low sulfur coal in most of our plants. The settlement was scrutinized and finally agreed to. The point of it is—and counsel is here; you can ask him—but there was nothing to litigate anymore.

Senator DOMENICI. What I don't understand is how did where you are going to buy coal and how did whether or not you are going to use scrubbers end up in the settlement?

Mr. FREEMAN. Mr. Bosworth raised the point that he thought we might have been able to save some money at one plant, or perhaps he thought—this was the only plant that went that way—

Senator DOMENICI. No. How did it get in the settlement that you were agreeing to buy coal from a certain part of the country?

Mr. FREEMAN. Two of the primary plaintiffs in the suit were the State of Kentucky and the State of Alabama. There were also some local citizens groups. EPA simply intervened. We were violating laws, the air quality laws of the State. They insisted as part of the settlement that we agree to an eastern coal strategy. Since this had been the practice of the TVA Board in any event, we, quite frankly, didn't think we were giving anything away to agree to that. But we did incorporate that in the settlement agreement at the insistence of the State of Kentucky who was a plaintiff in the lawsuit. It is also in accord with the policy of the administration.

Senator DOMENICI. What was their major complaint, if they were plaintiffs in the lawsuit? Was it with reference to your not buying their coal?

Mr. FREEMAN. No. Their complaint was we were violating the Clean Air Act. It was simply in the course of the settlement—the only thing we had to debate in the settlement was how we were going to go about complying and when. We worked this all out with the least cost to our consumers as an objective which we think we have met.

Senator DOMENICI. Didn't that then end up to some extent, as Senator Baker and I were discussing it up here, evolving out as to whether or not you were going to use western coal with not so many scrubbers or maybe eastern coal with scrubbers?

Mr. FREEMAN. The economics of the situation left us only one powerplant where western coal was even in the ballpark at all, the Shawnee steam plant. On all the other plants we had an eastern coal strategy that was clearly cheaper than western coal. Then on the Shawnee plant we looked at the factors. We would have to derate the plant 20 percent at a time we are short of electricity. We would be gambling on the rate of inflation in rail rates and the prices we would be getting for western coal in the future. And the Rogers-Metzenbaum amendment of the Clean Air Act provided a congressional direction in a sense to use eastern coal. We felt that the policy of the administration, the policy of the Congress, and the economics of the situation supported the purchase of eastern coal for the Shawnee plant. That was the dispute.

Senator DOMENICI. Now let me just ask two more questions. The thing that bothers me about any public body and about the Metzenbaum amendment—

Senator RANDOLPH. It wasn't the Metzenbaum amendment.

Senator DOMENICI. Wait a minute. The Metzenbaum amendment was part of your reasoning. I think it ended up getting deleted from the National Energy Act. Am I correct that it was deleted during the conference on the National Energy Act?

Mr. FREEMAN. It was amended, as I recall, and revised in language. But I believe it is still in the act in one form or another.

Senator DOMENICI. It is not nearly the same way it was on the floor.

Mr. FREEMAN. That is correct. It was amended.

Senator DOMENICI. We fought that issue four times on the Senate floor, four different votes, as I recall. Let me just tell you what bothers me. I don't like courts and I don't like Congress telling any public or private utility company where they ought to buy coal in these United States in the fragile economic times we have. I may be on the opposite side here of some others sitting up here whom I dearly respect and admire, but I think that kind of situation is very dangerous. It leads to volcanization. It leads to putting companies on the line, 10, 15, 20 years down the line when we can't predict what is going to happen.

That is why I don't understand why you had to agree in the settlement of the clean air suit as to where you would buy coal for the TVA.

Mr. FREEMAN. Well, I think my answer is that we already had a preexisting practice, which all of the members of the Board agreed to, to buy coal in the East. In the course of the settlement, this was a matter of great importance to the plaintiffs. Just for tactical purposes, we included it as a requirement. But it had been a long-

term practice and was based upon our decisions as to what methods constituted the best economics of our power system. I tend to agree with you. I would hope that the TVA Board has the independence to follow our lowest feasible cost mandate and would not be required to take direction from any group of people outside the agency who do not have the responsibility to meet this lowest feasible cost standard.

Senator DOMENICI. Right. The problem with the Metzenbaum amendment, as it went through the floor of the Senate, was that there was no consumer protection in it. There wasn't even any requirement that it be cheap or cheaper than. You probably concluded you have done that in your settlement. Would you furnish me with a copy of the settlement as it pertains to the buying of coal and the mandate on you and a copy of the policy that existed prior to it which you say indicated in any event we were going to buy in that area? May I have those?

Mr. FREEMAN. Yes, sir.

Senator DOMENICI. I will go elsewhere then.

Senator CHAFEE. Mr. Chairman, could I ask a couple of questions along the same line? I agree with Senator Domenici. I just don't think Congress or the courts should be trying to upset the pattern of flow of goods or raw materials in the Nation. But do I understand that this decree of the court, or that you have entered in the settlement, requires you to buy coal from such and such a place, or that because you seek low sulfur coal, therefore, you do buy from such and such a place?

Mr. FREEMAN. We are going to furnish the papers that Senator Domenici requested. [See p. 19.] My best recollection is that there is a paragraph in the consent decree that states that in carrying out the requirements of the Clean Air Act, in obtaining the low sulfur coal that is needed to meet the Clean Air Act requirements, that the TVA agrees that it will purchase the coal from the resources in the broad region in the East where we serve.

Now that was a practice and a decision that was independent of the settlement. But the settlement agreement, I believe, does lay that requirement, quite frankly, on us as a means of compliance. It also specifies places where we have scrubbers. It was all part of the agreement we worked out. In a sense, it incorporates the decisions that were made. But I don't remember the precise language so I am hesitant to answer your question. It may very well be worded in a way that it makes that requirement on us. I think it probably does.

Senator CHAFEE. Would your counsel know?

Mr. SANGER. Yes. It is limited to a 3-year supply.

Senator CHAFEE. I see. So that in other words, if TVA wanted to move to a cheaper source of supply, which indeed was low sulfur coal, within 3 years, you could purchase elsewhere?

Mr. SANGER. Under the settlement agreement we have to have at least 3 years' supply of eastern low-sulfur coal under contract. However, at the end of these original contracts and 3 years after each plant is brought into compliance we are free to obtain replacement coal from anywhere.

Mr. RICHARD FREEMAN. The answer is yes.

Senator DOMENICI. You are not bound?

Mr. DAVID FREEMAN. No.

Senator DOMENICI. The other question deals with your scrubber situation. What is your experience with disposing of the sludge that results from the scrubbers? What do you do with that?

Mr. FREEMAN. It does provide us with a rather large solid waste problem.

Senator DOMENICI. You must be talking of substantial tonnage, aren't you?

Mr. FREEMAN. Certainly. We are working very hard on a scrubber that will provide us with a marketable product that we can sell. We are using magnesium oxide scrubbers at one of the plants which we expect will end up with gypsum, as I recall. It will be a product that we can market. But you are correct in identifying that the scrubber process as the technology exists today controls the effluent and can solve the air quality problem, but it creates a solid waste problem of rather large proportions. Of course, we do have ash disposal problems at our plant in any event. But it does add a very large volume. Perhaps our manager of power might want to elaborate on that, if that is appropriate.

Mr. PARRIS. We do have very large volumes of the sludge that come from scrubbers. We are, as Mr. Freeman indicated, looking at the best scrubbers. We are also looking at and doing a considerable amount of research in trying to stabilize the sludge so it can be stored in a dry condition. We are spending a considerable amount of money at our Widow's Creek 8 facility to learn how to solidify and take care of the sludge problem. But it is a big problem.

Senator DOMENICI. Do you have any rule of thumb that the costs to operate the scrubbers occur outward of electricity? Is there any formula that you have? I take it that the operation of the scrubbers themselves is a very high consumer of energy. Is that not so?

Mr. PARRIS. It does consume significant amounts of energy, in the order of five percent of the plant's output.

Senator DOMENICI. Five percent?

Mr. PARRIS. Yes, sir.

Senator DOMENICI. Thank you very much, Mr. Chairman.

Senator RANDOLPH. Senator Chafee, I am not an expert, but I am a student of energy problems, and have been for a long time. If you have a problem with sludge on the one hand, what would be the problem with high ash on the other?

Mr. PARRIS. With high ash?

Senator RANDOLPH. Yes, sir.

Mr. PARRIS. You would have, of course, a higher waste volume. You would have to store this. Generally ash per se can be stored easier and less expensively than sludge from scrubbers. But you still have a solid waste problem.

Senator RANDOLPH. Which is the most economical?

Mr. PARRIS. It is more expensive on a per-ton basis to deal with the sludge problem than it is just the high ash problem because of the ash you can put into well designed ponds that will settle out and eventually you can fill over. The sludge that comes out of scrubbers today is not stable. In other words, it has no structure stability at all. So it is much more difficult to deal with that, and more expensive.

Mr. FREEMAN. If I could just add this point: We carefully look at the control technology, fuel option at each of our plants, looking at all of the costs. We are using scrubbers at the four plants where, taking into account the total cost of compliance, scrubbers are the least cost option. This is looked into quite carefully.

Senator RANDOLPH. That is a further question I was going to ask. You are looking at the top line rather than the bottom line, whatever it is; isn't that right?

Mr. PARRIS. That is absolutely correct. We refer to that as the bottom line.

Senator RANDOLPH. What I am trying to say, is that economics is a prime consideration. Is that right?

Mr. FREEMAN. That is correct. As it turned out, in the 10 plants we have under compliance programs, we went to a scrubber solution at only 4 of the 10. At the other plants we use either washed coal or coal in its natural state, either low sulfur or medium sulfur, depending on the standard we have to meet. So we have been I think meticulous in scrutinizing the bottom line and coming up with a solution that would provide the lowest cost solution to our customers.

Senator RANDOLPH. Thank you very much.

Senator BAKER. Mr. Chairman, could I say just a word? It is 11:30. I am sorry to say so, but I have an irreconcilable conflict at 11:45.

Senator RANDOLPH. Mr. Chairman, I think the questioning has been detailed.

Senator BAKER. All right. We have another witness here who is not a TVA witness. I wondered if you would be agreeable to calling Mr. Feather at this time, if Mr. Richard Freeman wouldn't mind.

Mr. RICHARD FREEMAN. Mr. Chairman, in fact, I would be perfectly satisfied to have my statement treated in the record.

Senator BAKER. Mr. Chairman, I would like to do that just as a fail-safe measure. That is, in case we run out of time, Mr. Richard Freeman's statement will appear in the record. [See p. 47.]

Senator RANDOLPH. I think that is satisfactory. Is that satisfactory to you, John?

Senator CHAFEE. Certainly.

Senator BAKER. Could I invite Mr. Feather in then, Mr. Chairman, to take the stand at this time?

Senator RANDOLPH. Certainly.

STATEMENT OF DAN FEATHER, TENNESSEE VALLEY ENERGY COALITION, ACCOMPANIED BY LOUISE GORENFLO

Mr. FEATHER. I would like to also introduce to my right Miss Louise Gorenflo who also represents the Tennessee Valley Energy Coalition.

Senator BAKER. We are happy to have you both here. I have been delivered a copy of the statement which you may read, Mr. Feather, or summarize, as you prefer.

Mr. FEATHER. I think I can read it quickly, sir.

We thank you Senators for the opportunity to present to you our views on the issue of the proposed increase of TVA bonding authority. I am speaking on behalf of the Tennessee Valley Energy Coalition, with membership representing senior citizens, rural people,

Appalachians, environmentalists, church and community organizations.

The Tennessee Valley Energy Coalition has formed to help fill the void in ratepayer advocacy in the valley. As you know, TVA is a self-regulating agency, and no public service commission represents ratepayers' interests in oversight of the utility. Ratepayers have no guaranteed access to TVA procedures.

The most recent evidence of this reality is the failure of TVA to solicit public opinion on this matter of the debt ceiling increase. No public hearing or forum was held by TVA in the valley. Even the hearings Senator Sasser held last week in Knoxville were originally closed both to the public and the media. It was only after the persistence of our coalition that citizens were admitted access to these hearings to present their position on TVA's proposed debt limit increase and power planning.

At this time I would like to submit for the record copies of the testimony presented during the Sasser Knoxville hearings last week by the Tennessee Valley Energy Coalition, East Tennessee Energy Group and the Tennessee Chapter of the Sierra Club.

Senator BAKER. I would be happy to receive those. [See p. 105-116.]

Mr. FEATHER. The need for the proposed debt ceiling increase is questionable. The testimony presented by J. Dexter Peach on behalf of the General Accounting Office clearly details other options available to TVA—conservation, load management, solar energy and federally funded energy experiments.

The GAO study, which was published November 29, 1978, concludes that TVA will not require additional generating capacity until the end of the century; a claim which, even though TVA has disputed it, it has not adequately disproven. At this time I would like to submit the testimony of J. Dexter Peach for the record.

Senator BAKER. We would be happy to receive that as well. I take it that testimony isn't so long and voluminous that it will burden the record.

Mr. FEATHER. No.

Senator BAKER. We would be happy to have it. Thank you, sir. [See p. 117.]

Mr. FEATHER. The TVA's most recent projections presented last week demonstrate a need for additional capacity beyond that already under construction. However, these projections are incomplete. Such options as rate restructuring and load management are not reflected in these projections.

TVA is considering various rate structuring reforms this year, and it is certain that rate structure has a significant effect on the use of electricity. Load management techniques are useful in decreasing the need for peak capacity.

The recent report from the Solar Energy Domestic Review advocates solar energy meeting 20 percent of the national energy needs by the end of the century. However, TVA projects that by 1990 solar will meet less than 1 percent of the valley needs.

This meager projection has been included despite a vigorous TVA solar program, which, even though a TVA sideshow, promises to meet the 20-percent goal. TVA has also initiated a sound conserva-

tion program which we feel should receive even greater emphasis to promote removal of waste from the system.

These and other factors need to be analyzed and figured into power projections for the valley. The projections as they influence both the future development of the valley and the ratepayers' pocketbooks need to be fully reviewed and discussed in the valley so that a consensus exists not only within TVA but among State leaders, citizens and planning agencies. We must agree upon where we want to go. The GAO's recommendation for a long term plan with specific short term goals is important. These plans should be updated and reviewed annually by the region and Congress. GAO's report also points out that the agency has failed to develop an overall strategic plan which takes into account different long term scenarios of energy supply and demand.

TVA is a national agency with a national responsibility to serve as a model, a yardstick, for other regions and utilities. In this period of energy uncertainty, it is questionable whether it is the wisest course for a nation to pursue a pattern of ever-increasing electrical consumption. The Coalition members consider TVA will have more than adequate capacity within a few years to meet the electrical needs of the valley for the century. The region is already the most highly electrified in the Nation, and thus the world.

We urge TVA to lead the country in demonstrating the crucial practices of conservation, load management, rate structure reform, solar energy and other alternatives to construction of new electrical capacity. It is no longer necessarily true that a growing economy matches a growing energy base. The GNP has been decoupled from energy growth elsewhere in the Nation, and that can occur in the valley.

Ratepayers are the individuals who are ultimately responsible for the decision to increase the debt, as it will be the rate-payers who pay the interest charges and retire the debt through their bills. Right now 22 percent of utility bills go toward payment of interest charges. By 1981 ratepayers will be paying about \$1 billion in interest charges.

If the debt is increased from that already established, ratepayers will be faced with even higher rates. Rate payers are bearing an enormous responsibility. Because of this responsibility, ratepayers must have a voice in the assumption of this responsibility.

We fully support the GAO recommendations that TVA receive closer congressional oversight of its operations. We cannot stress enough the importance of the GAO suggestion that TVA plans be reviewed and commented on by as wide a spectrum of regional citizens and institutions as practicable and by the Department of Energy to assure consistency with national priorities.

We are pleased to be given the opportunity to speak before you today. We urge you to consider our recommendation that this matter be turned back to the ratepayers of the valley before Congress acts upon it so that our voices in the valley can become part of the decision that is made. We have great hope that TVA can fulfill its goal as a regional resource and meet our energy needs. Yet this goal cannot be met without citizens and their representatives guiding it.

We thank you.

Senator BAKER. Mr. Feather, thank you very much. We appreciate your statement. Does your colleague have a statement that she wishes to make?

Ms. GORENFLO. No, sir.

Senator BAKER. Thank you both very much.

Senator Chafee, do you have questions?

Senator CHAFEE. No, I don't. First, I would just like to express our appreciation for your coming here and giving your testimony. I suppose that you traveled here at your own expense and all of that. So it does represent some sacrifice for you to come up here. It is helpful for us in the committee to hear views of citizens such as yourselves.

Mr. Chairman, I think what my intention would be is to discuss this, when we have an opportunity, with Mr. Freeman and his associates. Obviously, like everything, there are views on both sides.

Let me just ask a question. How do they work it down there as far as setting the rates? You indicated, Mr. Feather, in your testimony that there is no utility commission or any rate-setting body that citizens can appear before and have their views known. Is that an accurate description of the situation?

Ms. GORENFLO. Right. There is no public service commission or independent agency that acts the citizen ratepayer advocate. Currently TVA proposes, and since Mr. Freeman became chairman of TVA, he has initiated a policy of public hearings. However, at this last public hearing, last Friday, a week ago yesterday, the board proposed an increase of 6.5 percent, and then 5 days later public hearings were held.

I guess on Monday they are going to make a decision. So the citizens are given a 5-day period to review information. They have to go to TVA and try to find it themselves. So it is a monumental task for an individual citizen to review the complete financial status of the utility.

We don't have those resources. They are not provided by TVA. We are bereft of any form of intervention of that form. We feel a great need for that, since many of the representatives of the Coalition are people who are on fixed and low incomes and who are becoming increasingly desperate.

Without any other body to appeal to other than the Congress for intervention, it becomes a rather insulated process in which TVA does make decisions that affect the ratepayer.

Senator CHAFEE. Thank you very much.

Senator BAKER. Senator Chafee, I thank you.

It is a matter of some interest to me, since I have lived through a part of TVA's history, to track the development of these issues. Let me say first of all that the concerns that are expressed by Mr. Feather and his colleague are widely shared concerns in the Tennessee Valley area. But as one who has lived in the area literally since the inception of TVA, and I have watched the evolution of the concern that private utility companies were not responsive, that public service commissions did not adequately safeguard the interests of the public, that a nonprofit corporation such as TVA, and electric coops, would do a better job, that they should be governed by their members and not by regulatory authority. So the

wheel has come full turn around now, and there is a real concern about whether there should be some review authority for TVA's ratemaking facility.

Ms. GORENFLO. We are not sure the utilities commission is the best.

Senator BAKER. I am not sure either. I am sort of thinking of the historical perspective.

There is one point that Mr. Feather makes in his statement that I think is very important. I entirely agree that the Congress has not been diligent in its oversight of TVA. It is in the last few years, I think in the last 3 or 4 years, that Congress has begun to have regular oversight hearings, not tied to a debt ceiling increase, the appointment of a director, or something of that type. I think that may at least for the moment serve as a forum for the public to express their views and their dissent.

Ms. GORENFLO. May I make a suggestion? Some of those hearings should be held down in the valley.

Senator BAKER. I think that is a good suggestion. I am prepared to recommend to the chairman that at least a portion of this year's oversight hearings should be held in the valley region and maybe someplace else other than just in Knoxville.

Ms. GORENFLO. Right.

Senator BAKER. That point is very well taken. While I am not sure it is the long term and final answer for citizen involvement in the self governing processes of TVA, I think it is a good next step. So I will suggest that to the chairman. I rather suspect he may be sympathetic to this.

Ms. GORENFLO. I just really feel that on the issue of the debt ceiling that there has been an inadequate public participation in this in the valley. There has been no public hearing, no public forum. We are going to be the ones who are stuck with the bill.

Senator BAKER. Yes, we are.

Ms. GORENFLO. And it is not fair. It is not democratic.

Senator BAKER. I might say parenthetically that one of the things we have to do in addition to TVA's rash of problems, something has to be found not only to control inflation but to get interest rates down, because they are becoming a depressing burden on ratepayers and the general consuming public in the United States. I frankly don't have a good answer for that right now, but I don't think the free enterprise system can endure permanently if it is going to have 12 and 15 percent prime rates. I think we have got to find a way to get away from that.

This is no criticism of TVA. It is just a general commentary on the nature and state of our economy.

I said earlier I had an irreconcilable appointment at 11:45, and I do, and I apologize. It is a commitment of some importance, even in relation to the importance of this hearing. I have to leave.

I would like to leave the hearing record open. We would be happy to have any additional statements that you wish to make.

Ms. GORENFLO. May other citizens from the valley submit statements?

Senator BAKER. Yes, they may.

Ms. GORENFLO. What is the period?

Senator BAKER. Why don't we leave the record open for two weeks. If you would contact the staff of the committee, I would ask restraint in the length of the statements or the volume of documents you might ask to be associated with the record because we have our own internal problems of how we publish them.

The record will stay open for two weeks. We would be happy to have any additional material you care to submit to the record.

I again express my apologies to Richard Freeman who has not had a chance to testify on his maiden voyage here.

Mr. RICHARD FREEMAN. Mr. Chairman, that is perfectly satisfactory.

Senator CHAFEE. We can arrange plenty of other opportunities.

Mr. BAKER. I thank all of the witnesses here for their cooperation. I reiterate I will discuss with Chairman Randolph the possibility of having at least part of our oversight hearings in the Tennessee Valley this year. I think that is a good point.

With that, the hearing is adjourned. Thank you very much.
[Whereupon, at 11:50 a.m., the subcommittee was recessed, to reconvene subject to the call of the Chair.]

[The bill, S. 436, statements submitted for the record, and responses from TVA to written questions follow:]

96TH CONGRESS
1ST SESSION

S. 436

To amend section 15(d) of the Tennessee Valley Authority Act of 1933 to increase the amount of debt which may be incurred by the Tennessee Valley Authority.

IN THE SENATE OF THE UNITED STATES

FEBRUARY 21 (legislative day, JANUARY 15), 1979

Mr. BAKER (for himself and Mr. RANDOLPH) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

A BILL

To amend section 15(d) of the Tennessee Valley Authority Act of 1933 to increase the amount of debt which may be incurred by the Tennessee Valley Authority.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That the first sentence of subsection (a) of section 15(d) of the
4 Tennessee Valley Authority Act of 1933, as amended (16
5 U.S.C. 831n-4), is amended by striking out
6 "\$15,000,000,000" and inserting in lieu thereof
7 "\$30,000,000,000".

TESTIMONY OF
S. DAVID FREEMAN
CHAIRMAN, TENNESSEE VALLEY AUTHORITY
BEFORE THE SUBCOMMITTEE ON
REGIONAL AND COMMUNITY DEVELOPMENT
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

We are pleased to be here today to discuss with you the legislation which would provide a \$15 billion increase in the statutory ceiling. The President has given his support to this legislation.

The central fact in our presentation is that the TVA power system is self-sufficient. In fact, 1979 marks the 20th anniversary of the self-financing legislation, which this Committee originated, that authorized TVA to use revenue bonds in place of congressional appropriations for its power system capital needs.

We are not here to ask the Federal Government for money. We are simply asking that the ceiling be raised so TVA may continue to use its own credit to borrow money needed to fulfill our responsibility to the six million people that are dependent on TVA for their power supply.

I think it's worth a moment to look at the history of that 1959 self-financing legislation. It had two basic results. For the rest of the Nation, it meant that taxpayers no longer provided the capital funds for TVA's power system. For the people and the economy of our own region, it meant assurance that TVA could plan and finance the facilities necessary to serve regional economic growth without the uncertainty of the annual appropriation process. The legislation also limited TVA's service to the area we served 20 years ago and ended lingering concerns about TVA expansion into territory served by the private power companies.

TVA bonds are not financial obligations of the United States. They are backed only by the credit of TVA and its customers and income to the bondholders is subject to Federal income tax. The TVA yardstick is 36 inches long. The 1959 self-financing legislation thus ended the TVA power program's dependence on the American taxpayer, but it subjected the TVA power program to continuing oversight by the Congress as well as the critical judgment of the financial marketplace. TVA reports to the Congress on its power operations each year. More to the point of this hearing, Congress placed a ceiling on our authority to borrow. This means that at about five-year intervals, we must in a sense renew our charter from the Congress by obtaining legislation to permit us to continue to carry out our electric utility responsibility.

The TVA power program today is not the same program it was in 1959. It has tripled in size. But just as important, then it had a "Division of Power Marketing;" today it has a "Division of Energy Conservation." Both the national energy problem and the realities of today's power supply costs dictate that we put the greatest possible emphasis on effective programs to encourage power conservation and the use of alternative energy sources. TVA has those programs under way, and this Agency intends to be the leader in this national effort.

At the same time, TVA still has the same responsibility as any other power supplier to meet the demands of its customers--to keep the lights and the heat on and to keep the equipment functioning that provides the region's jobs in business and industry. That job requires large amounts of capital to build new facilities, and it requires that we plan future facilities with the assurance that funding will be available over the very long lead times some of these projects require. That responsibility to meet future demands for electric energy is particularly acute in the Tennessee Valley, an area largely dependent upon electricity from domestic coal and uranium for energy supply rather than gas or oil. Sixty-eight percent of all energy generated by TVA is consumed in the commercial and industrial sector. In a sense TVA is the lifeline of the region's economy.

The TVA power system has turned out to be a very good investment for the Nation. I don't hear anyone suggesting that TVA be sold these days. That may be because the market value or replacement cost of our assets is estimated to be some \$30 billion. The book value alone is some \$10 billion and if our debt is subtracted, TVA has a "net worth" of \$2.2 billion. By contrast TVA's total power assets in 1959 were \$1.7 billion.

Last year TVA sent the Treasury a check for \$82 million, and our power program received no funding from the Congress. To date TVA has repaid \$1.255 billion to the Treasury since 1961; \$290 million was applied toward the \$1 billion appropriations investment repayment. Interest payments on the appropriations

investment have totaled \$965 million through September 30, 1978. I might add that TVA also pays 5 percent of its gross revenues to State and local governments as prescribed in the TVA Act. Last year these payments amounted to about \$80 million.

This year makes TVA's fourth request for an increase in our debt ceiling. The \$750 million ceiling established by the 1959 amendment was increased in 1966 by \$1 billion. In 1970 the ceiling was raised to \$5 billion and in 1975 to the current \$15 billion ceiling. This sequence roughly parallels the legislative intent of the 1959 amendment, that the debt ceiling be reviewed at approximately five-year intervals.

The bill now under consideration would raise the current debt ceiling from \$15 billion to \$30 billion. While this increase appears to represent a tremendous jump in borrowing authority, in reality it represents no more than another five-year increment to meet our best judgment of what our expansion needs might be. If you remove the effects of inflation and examine the buying power of the \$15 billion, it is equivalent to approximately \$10.2 billion in 1975 dollars (the size of the last increase), or to roughly \$7 billion in 1970 dollars.

The proposed increase would provide the capital needed to complete the power plants under construction and would provide full funding for about 7,200 MW of additional generating capacity at an average cost of about \$1,500 per kW, a figure which represents the inflated costs at the time this equipment may be purchased. The nature of these plants cannot be identified at this time, but they could be conventional coal-fired or nuclear generating stations, or could include other types--fluidized-bed combustion plants, cogeneration facilities, fuel cells, or solar and other alternative sources. The actual types of plants will, of course, be determined later in the planning period as our knowledge of needs and the costs of various options becomes more specific. We also will need capital for conservation and alternative energy investments, additional environmental protection facilities and plant improvements, and the continued development of fuel resources for both coal-fired and nuclear generating plants.

The type of generation is not the issue. What is at issue is the ability to add capacity at the time it is needed. Approximately 10 to 12 years is presently needed to plan and build power supply facilities. This long lead time requires that TVA be ready now to begin making commitments for power needs in the 1990's.

Admittedly, there is some uncertainty about the exact rate of growth in electric power demand which will occur. Even so, we must have the financial capacity to meet what we consider to be a reasonably probable pattern of growth. TVA has the utility responsibility to be able to serve whatever loads might develop, and we must have the authority and the plans to meet any foreseeable contingency. This is not to say that we will make commitments to borrow and spend money simply because we have the authority. Future capacity will be ordered only when we are confident that it is needed and we will use the \$15 billion only as it is needed. But there can be no doubt that the legislation before you is urgently needed now.

Mr. Chairman, the harsh truth is that inflation has eroded the purchasing power of the dollar to the point that we need additional borrowing authority to complete the power plants we currently have under construction. Those plants are vital to our needs. TVA also must be in a position to order new capacity as it is projected to be needed in the decade of the 1990's.

Like others in the business of building new electric generating capacity, TVA has experienced perhaps the most frustrating period in the history of heavy construction. Inflation, unexpected difficulties with new technologies, and changing regulations for the protection of man and his environment have delayed completion of units now under construction. These factors have led to increased costs beyond our earlier estimates. TVA has, we believe, responded to these changes in a positive manner. Our costs for new generating facilities have been and remain the lowest or among the lowest in the industry. But there is room for improvement and the new management at TVA is taking vigorous action to cut costs in every possible way. Director Richard Freeman will elaborate on that point in just a moment.

Inflation and rising costs have taken their toll on power rates as well as construction costs. TVA will continue to make every effort to hold down the cost of electric energy. Our goal is to hold power rate increases to no more than the rate of inflation. To accomplish this it will be necessary to use existing generating facilities as efficiently as possible, encourage as much energy conservation as we possibly can, avoid commitments to facilities which we do not absolutely need, hold down the increase in fuel prices to the extent that we can, and in every other way possible conduct our activities with a deep regard for what cost increases mean to the power consumer.

We have launched an energy conservation program which we consider to be the most aggressive and comprehensive in the Nation. We anticipate electricity savings from this program in the 15 to 20 million kilowatt range by 1990, reducing power supply costs and offsetting the need for costly generating facilities. Such a program is not without cost. We estimate that up to \$1 billion of capital could be needed to support our conservation program over the next five years, but in the long run this would offset larger investments in generating capacity. Mr. Chairman, with your permission I would like to submit for the record a description of TVA's conservation and renewable resources programs prepared by Robert Hemphill, who directs that effort for TVA.

TVA's current forecasts provide a thoughtful and, I believe, realistic basis for projecting the region's needs. They take into consideration three different levels of regional economic growth, three different sets of energy prices, three different levels of electricity substitution for natural gas, and two different levels of effectiveness for our energy conservation programs. All together we have generated some 54 different forecasts from these fairly basic sets of assumptions. These are explained in some detail in an analysis by Dr. Lynn C. Maxwell of the TVA staff which, with your permission, I would also like to submit for the record.

In examining the future power needs of the region, TVA is looking at a range of alternatives. From this analysis we derive a reasonable basis for proceeding with planning for additional generating facilities subject to changes in the plan as economic and other conditions develop. A "reasonable basis" means that

we must plan for any contingency that appears likely to happen. In projecting future power needs over the next 20 years, we selected the forecast which projected annual growth rates in electricity consumption of 4.6 percent between 1978 and 1990 and 3.8 percent from 1990 to the year 2000. It assumes a high level of economic growth as represented by employment within the TVA region, a moderate amount of substitution of electricity for natural gas, electricity prices increasing no faster than inflation, and TVA's implementing aggressive conservation programs in its service area.

In summary, the proposed \$15 billion increase in our ceiling will be used primarily to provide additional capacity costing an estimated \$11.3 billion. An estimated \$2 billion will be used to complete projects now under construction. Quite frankly, with inflation continuing unabated, that figure could well increase. The balance would be used to finance conservation investments, environmental protection facilities, and development of fuel resources as described earlier.

Let me also emphasize that we have financial obligations that must be met even if we build no additional plants in the immediate future. These involve the completion of plants currently under construction, improvements and additions needed in existing plants, and the funding of conservation and demonstration programs. Even if we were to assume that there will be no need for additional capacity in the decade of the 1990's, we must have additional borrowing authority.

I reiterate, TVA is not asking the Federal Government for money. We are asking for the authority to move forward with plans for the future and the ability to borrow money to carry out those plans. The timing of this planning and the capability to act in a timely manner is crucial. Decisions must be made today which will determine the region's power supply for 10 to 12 years hence. We are not here simply representing TVA. In a sense we represent some six million people of the Tennessee Valley region who depend on TVA for the electricity that supplies their homes and directly or indirectly makes possible most of their jobs.

We believe that TVA has demonstrated the wisdom of the self-financing amendment of 1959, both to relieve the taxpayers of their burden and to assure the Valley of a reliable source of power supply. As a consequence, TVA has become the Nation's largest purchaser of coal and has the largest amount of nuclear power in the Nation under construction. The Nation faces a petroleum crisis, and the Tennessee Valley is leading the way toward self-sufficiency through conservation and the use of domestic resources. We obtain a much smaller share of our total energy from petroleum than the Nation, generally. We want to enlarge our energy supply from domestic sources and continue our record of adequate supply at the lowest feasible rate. All we ask is the authority to borrow the money and take the risk with our own credit.

The White House advises us that the enactment of this legislation would be in accord with the President's program and has the Administration's full support. Mr. Chairman, we respectfully urge prompt and favorable action.

TESTIMONY OF
RICHARD M. FREEMAN
DIRECTOR, TENNESSEE VALLEY AUTHORITY
BEFORE THE SUBCOMMITTEE ON
REGIONAL AND COMMUNITY DEVELOPMENT
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

Although I have been back with TVA for little more than four months, I would like to express, from my rather different business background and perspective, the sense of urgency I feel about the need to increase TVA's debt ceiling. These brief remarks will be addressed to my duty as a Board member to see that TVA discharges its utility responsibility to meet the electric power needs of the region it serves.

First, the Board must assure that the six plants under construction are completed as expeditiously as possible and at least cost. I am reassured that TVA is making substantial progress toward those ends. Last June the Chairman and TVA's staff commissioned a thorough study of TVA's construction activities by the highly respected Theodore Barry & Associates organization. TVA received the results of that study in December. I was struck by two themes which ran through the report. First, that TVA's construction efficiency, no matter how measured, was somewhat above the average in the utility industry. Second, and more important, that there are large opportunities to improve the efficiency of our construction activities. The report detailed some 115 recommendations. We are well on our way toward implementing almost all of them. This is in TVA's tradition of not being satisfied to be only somewhat above average. Historically, TVA's goal has been to set the standards. In short, I am satisfied that we will be on our way toward completing the six plants as effectively as possible.

Second, the Board must look ahead to the needs of the region it serves to determine if and when additional capacity must be in place. That is a difficult exercise, because of the long lead times for meeting energy needs, no matter what the technology--whether that capacity is supplied by nuclear plants, coal plants, cogeneration, solar, or others. The Chairman has explained the steps we have taken to evaluate the short- and long-term effects of our most ambitious conservation program; and how we have analyzed the economic data in an attempt to forecast the future energy needs under varying assumptions. Suffice to say, I am satisfied that, given the long lead times for meeting our possible, indeed probable, energy demand under the best of conservation programs, the TVA region will need additional capacity in the 1990's.

Third, the Board must be satisfied that it has both the legal authority and the financial capability to provide the fully funded capability to build the needed plant capacity. No self-respecting board of directors in the private sector would authorize a construction project before being assured by the chief financial officer that the financing was comfortably available. Certainly, I cannot agree to authorize any new energy construction until I know that TVA has the authority and capacity to finance it.

It is my purpose as a member of the Board to see that we maintain our financial integrity so that we at all times have credibility in the public bond market. That is the surest way, in the long term, of minimizing financing costs, and thus meeting the TVA statutory test of keeping rates at the lowest feasible level.

CONSERVATION AND RENEWABLE RESOURCES PROGRAMS

Robert F. Hemphill, Jr.
Director of Energy Conservation

As indicated in the report to the Congress prepared by the General Accounting Office, conservation and renewable resources are key components in solving the Nation's energy problems. TVA has recognized the role conservation should play and has placed increased emphasis on expanding its conservation efforts to the extent that we now have the most aggressive and comprehensive program in the Nation.

Our conservation efforts will play an important role in reducing energy consumption in the Valley area, thus reducing power supply costs and offsetting the need for costly generating facilities. However, these benefits are not received without associated costs. Present estimates indicate that up to \$1 billion of capital could potentially be used to support an ambitious long-term conservation program.

TVA's conservation programs are expected to result in electricity savings in 1990 of 15 to 20 billion kWh. Admittedly, these projections are ambitious. Many factors such as consumer acceptance and participation, and unforeseen technical, institutional, and environmental problems could well affect the attainment of program goals.

We are presently studying various rate reform and load management programs. These programs have not been incorporated in our load forecasts and will most likely be required to attain the projected energy and capacity savings already attributed to our conservation efforts. They should also produce additional capacity and energy savings which we have not quantified.

TVA has several major programs which are well underway as well as others still in the planning phases. To provide better insight into the nature of our programs, brief summaries of various programs are provided.

Home Insulation Program

The TVA Home Insulation Program is designed to promote energy conservation and the more efficient utilization of electricity by encouraging all residential consumers to have adequate insulation and other weatherization measures. The program provides onsite energy surveys and recommendations for all interested residential consumers and subsidized financing to cover the cost of insulation and other weatherization measures in dwelling units that are either heated or cooled electrically.

Consumers who request a survey, whether they have electric heat or electric air-conditioning, are provided with complete recommendations on how they can have a more energy-efficient dwelling unit. The energy advisor will consult with the consumer to help find sources of funds that can be utilized for weatherization measures if the consumer is not eligible for a subsidized loan. There are many conservation measures recommended by the energy advisor that can be performed by the consumer himself, thereby providing him direct benefits from the survey and recommendations prepared by the energy advisor.

Through 1978, 87,726 surveys have been completed and 30,348 consumers have used the program to install weatherization materials.

The reduction in electric use by participants in this program will permit savings in capacity and fuel costs, thereby benefiting all consumers of TVA power through lower rates than would otherwise be

required. TVA will seek to achieve an estimated reduction in peak demand of 1,099 megawatts after an 8-year period, which would result in lower capacity requirements and lower generation and purchased power cost for peaking. It is estimated that this program, which is more comprehensive than that required by the National Energy Act, can result in an annual energy reduction of 2.7 billion kWh after an 8-year period.

Heat Pump Financing Plan

This program is designed to expand the Home Insulation Program by making available a loan for consumers who install a heat pump in an existing dwelling and meet certain installation requirements. Loans for heat pump installations would be repaid over a 10-year period and would include interest at 8.5 percent per annum. Based on an average loan of \$2,000 for a heat pump retrofit installation, a total of \$47.25 million will be outstanding in 1985. Total estimated operating cost over the program's 8-year life is \$5.9 million.

Program goals call for 5,000 retrofit heat pump installations per year. Based on 4,270 kWh savings per year and 0.7 kW savings per heat pump installation, 1985 system savings are approximately 150 million kWh and 21 megawatts of capacity. Over the program's 8-year life, total savings equate to approximately \$12 million.

Super Saver Home Program

A house built to Super Saver standards will yield an annual reduction in heating and cooling energy of approximately 50 percent compared to conventional construction. Super Saver homes are currently being built in the Tennessee Valley area, but of the 60,000 new homes built in the past two years, only 1,000 were built to Super Saver specifications.

It is apparent that the current low-key voluntary program should be expanded and emphasized to encourage many new homes to meet Super Saver type standards. Beginning February 27, 1979, TVA will hold public hearings on service practices. One practice to be considered is that new buildings, including homes, must meet energy conservation weatherization standards developed by TVA as a requirement for electric service.

Program goals call for approximately 140,000 Super Saver homes to be built in 1985. Based on 8,750 kWh savings per year and 1.64 kW savings per Super Saver home, 1985 system savings are approximately 1,203 million kWh.

Commercial and Industrial (C&I) Conservation Program

Sixty-eight percent of all energy generated by TVA is consumed in the commercial and industrial sector. In 1977 this represented 80 billion kWh which were consumed by approximately 50 directly served TVA customers and 285,000 distributor-served customers.

TVA is implementing an in-depth audit program for commercial and industrial consumers for all forms of energy and will include estimated economic payback periods for each recommended energy conservation opportunity (ECO). The audits will be free to all nonprofit C&I customers. Profit making customers will be charged for the audits and rebated \$1 of the audit charge for every \$2 invested in electrical ECO's. Our goal is 5,000 C&I audits per year when the program is fully operational. Private consultants will be utilized in addition to TVA's field engineers. We will also be working closely with architects and consulting engineers to improve the energy efficiency of new structures.

To help ensure the implementation of the ECO's identified in the audits, TVA will make available loans to the C&I customers. These loans will be available for a maximum of 10 years with a maximum amount of \$100,000 per site and will bear an interest rate equal to TVA's current debt interest rate plus 1 percent. It is estimated that the maximum outstanding loan balance will be approximately \$280 million which will occur in 1985.

Energy conservation forecasts for the year 1990 indicate savings of 6.3 billion kWh in energy usage and 1,120 MW in demand. We estimate the audit potential of the existing customers to be a maximum of 150,000. Of these audits, approximately 35,000-40,000 will be for nonprofit organizations, including educational facilities, hospitals, governmental buildings, churches, and clubs. Approximately 225 specific type conservation workshops will be presented during the first few years of the program.

Solar Water Heating Program

TVA has begun a demonstration program in Memphis to finance solar water heating systems with no downpayment and a 3.4 percent 20-year loan. Several of the 1,000 systems have already been installed. Each system is expected to provide 75 percent of the hot water for a typical 4-member family. The South Memphis Community Development Corporation, a nonprofit community development corporation, trained the workers who are installing the systems. Each system will save approximately \$600 (present worth) in reduced energy and electric generating costs over the 20-year term of the loan. This savings is used to finance the loan program. A sample of the water heaters will be instrumented to evaluate their performance. If this program proves successful, we will consider expanding it throughout the Valley.

Wood Heating Program

TVA has begun a demonstration program to finance the installation of modern, efficient wood heaters with no downpayment, interest-subsidized 3- to 5-year loans. The first of 1,000 heaters is now being installed in North Georgia. Each homeowner who installs a heater is expected to save about \$66 per year in electricity costs. A sample of the heater installations will be instrumented to determine efficiency and environmental impact. The heaters are expected to save TVA an estimated 6,112,000 kWh of electricity annually and 6 megawatts of peaking capacity. If the program proves successful, we will consider expanding it throughout the Valley. There may be some areas where the ambient air quality standards of the Clean Air Act will preclude such a program, however.

Cogeneration

TVA has recently completed a preliminary assessment of the potential for cogeneration in the TVA service area over the next 20 years. Work is in progress to achieve completion of a final draft and this assessment should be published during the first half of 1979.

A Cogeneration Task Force is working on program plans for the development of the cogeneration potential. Current options under consideration may include TVA technical and financial assistance and maintaining favorable standby power rates and other assistance where needed. Program efforts under this option are estimated to transfer loads that would otherwise be served from the TVA grid of about 285 MW and annual energy production of about 2.2 billion kWh to industry-owned inplant generation facilities by 1990.

If it is possible to develop more attractive methods of TVA financial assistance and with favorable economic conditions in industry, it may be possible to achieve a higher level of cogeneration development in the industrial plants and energy park complexes. With this more intense effort it may be possible to achieve the installation of about 625 MW in industrial plants and energy park complexes by 1990. These facilities could have an estimated annual energy production of about 4.6 million kWh for loads that would otherwise be served by TVA-owned facilities.

Summary

The preceding summaries represent some of the programs which we have taken into account in developing our recent load forecasts. Our alternative load forecasts also include anticipated savings from other programs under development. Examples of such programs include: extended efforts in the home insulation and heat pump programs, Valley-wide solar space heating and water heating programs, residential biomass program, and commercial and industrial biomass program. Potential savings are provided on the attached table.

As indicated earlier, TVA hopes to achieve an electricity savings in 1990 of 15 to 20 billion kWh through successful implementation of these programs. Expressed in terms of capacity savings rather than energy savings, accomplishment of program goals would be equivalent to offsetting the addition of three or four large generating units.

The achievement of these projected energy and capacity savings requires a significant amount of capital. Of the \$15 billion in borrowing

authority we may want to use up to \$1 billion in cost effective facilities that will be candidates for future investment to achieve an energy saving of up to 20 billion kWh. It is important that TVA be provided this additional borrowing authority in order to carry out its conservation objectives.

EXISTING AND POTENTIAL TVA CONSERVATION PROGRAMS

RESIDENTIAL

Program	Description	1990 Energy Savings Millions of kWh	1990 Capacity Savings (Winter Peak) MW	1979-1985 Estimated Capital Requirements, Millions of Dollars ^{2/}
Home Insulation Program	Approximately 43,200 loans per year	3,100	1,412	187.8
Super Saver Home Program	36,000 homes per year built to energy efficient Super Saver standards	2,100 ^{1/}	754 ^{1/}	52.1
Residential Heating Equipment				
Heat Pumps--low	Low-interest loans (8%) provided; 5,000 per year from Heat Pump Financing Plan; approximately 15,000 per year through Super Saver efforts	800 ^{2/}	372 ^{2/}	52.8
	Low-interest loans provided; 2,200 ^{2/} intensified effort; 19,000 per year from Heat Pump Financing Plan; approximately 36,000 per year through Super Saver efforts	1,052 ^{2/}	211.9	
Biomass--low	Expanded wood heater loan or incentive program; estimated 31,000 homes in 1990	166	6.2	
	Expanded wood heater loan or incentive program; estimated 94,000 homes in 1990	500	18.6	

1/ Energy and capacity savings represent insulation savings only.

2/ Energy and capacity savings for heat pumps installed in Super Saver program are included along with heat pumps installed through Heat Pump Financing Plan.

3/ These include existing programs that will be candidates for expansion and new programs that will be candidates for future investment. The actual investment made could vary somewhat from the estimated capital investment requirements shown here. As more experience is gained some shifts in capital requirements could occur to ensure the most cost effective investments are funded.

EXISTING AND POTENTIAL TVA CONSERVATION PROGRAMS

RESIDENTIAL (Continued)

Program	Description	1990 Energy Savings Millions of Kwh	1990 Capacity Savings (Winter Peak) MW	1979-1985 Estimated Capital Requirements Millions of Dollars
Residential Heating Equipment (Continued)				
Solar Active System-- Retrofit--low	Solar active heating systems developed as "add-on" packages for retrofit; 2,800 units in 1990	20	18	9.0
--high	More intensified effort; 28,400 units in 1990	180	186	90.8
Solar water heating--low	Expanded solar water heating program with loan or incentive plan; 53,000 units in 1990	69	67.7	
--high	Intensified effort; 163,000 units in 1990	500	211	208.4
Passive solar homes (new homes)--low	11,600 units in 1990	70	45	21.5
--high	27,200 units in 1990	140	90	43.1
Electrified transportation	200,000 vehicles in 1990	-1,400	-209	14.0
Total residential		5,000 - 7,300	2,625 - 3,995	410 - 825

EXISTING AND POTENTIAL TVA CONSERVATION PROGRAMS

COMMERCIAL AND INDUSTRIAL (C&I)

Program	Description	1990	1990	1979-1985
		Energy Savings Millions of kWh	Capacity Savings (Winter Peak) MW	Estimated Capital Requirements Millions of Dollars
Commercial and Industrial (C&I)				
Solar--low	Encourage active and passive solar thermal systems for space and process heat; 10-percent penetration by 1990	400	100	20.7
--high	20-percent penetration by 1990	1,200	217	81.6
Biomass--low	Encourage the use of industrial biomass systems for industrial space and process heating applications; 2-percent penetration by 1990	400	79	41.2
--high	3-percent penetration by 1990	118	61.1	
C&I Conservation Program	Low-interest loans up to \$100,000 to carry out ECO's.	6,300	1,120	281.0
Cogeneration--low	Moderate financial assistance program; favorable standby power rates	2,200	285	20.5
--high	Intensified effort; more attractive financial assistance program	4,600	625	34.0
Total commercial and industrial		9,500 - 12,700	1,585 - 2,080	365 - 460
Total residential and commercial and industrial		14,500 - 20,000	4,210 - 6,075	775 - 1,285

LOAD FORECASTS

Lynn C. Maxwell
Assistant Chief, Analysis Branch

Introduction

Load forecasting in today's environment has increased in complexity due to rapid changes in the factors that influence electricity consumption.

The underlying factors which affect future electricity consumption are growing in number and changing rapidly over time.¹

Historically, the TVA area has experienced rapid economic growth compared to the Nation. Prior to the 1975 recession, gross regional product in the TVA area grew approximately one and a half times as fast as gross national product. Likewise, total employment in the Valley increased much faster than total employment in the U.S. with much of this growth occurring in manufacturing industries within the Valley.

The rapid historical growth of the TVA area economy has helped close the gap between incomes in the TVA area and the Nation. In 1977 TVA area income per capita reached 80 percent of U.S. income per capita.

Although the Valley has come a long way, we expect that the regional economy will continue to outpace the national economy even though at a somewhat slower

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1. These factors include changes in the level of economic activity, the effect of higher electricity rates, conservation associated with Federal and State legislation, the substitution of electricity for scarce fossil fuels, and the aggressive development of TVA conservation programs and alternative energy sources such as solar space and water heating.

pace compared to historical evidence. In the future we expect that much of this growth will occur in the service or commercial industries which reflects underlying structural changes in the regional economy which occurred in the late 1960's and early 1970's.

Although TVA expects the regional economy to grow faster than the national economy, we must realize that there is some uncertainty in forecasting economic growth and other determinants of electricity consumption. In order to proceed on a prudent planning basis, TVA prepares several long-run forecasts to the year 2000.

Forecasts of Economic Determinants
of Electricity Consumption

The basic premise on which TVA load forecasting methodology and procedures are founded is that the demand for electricity is a derived demand determined by the level of economic activity, the price of electricity, the prices and availability of alternative fuels, and conservation and new end-use technology programs designed to increase the efficiency by which electricity is used.

There is a wide variety of determinants of load growth which TVA forecasts in order to prepare alternative load forecasts. Rather than presenting all of the determinants of load growth, the key economic factors which influence loads are presented in Exhibit 1. Since there is uncertainty in forecasting any economic factors, a range of forecasts is provided for the key determinants of load growth.

One of the major determinants is economic activity. Three forecasts of total TVA area employment are indicated in the top part of Exhibit 1, with the high forecast indicating a growth of approximately 2.3 percent per year from 1980-2000

and the low economic growth forecast indicating a growth rate of 1.6 percent per year. By the year 2000 there is a 12 percent difference between the high and low forecasts of regional employment.

Past and future increases in the price of electricity are also important determinants of the increased efficiency in the use of electricity. TVA forecasts the real price of electricity or the price of electricity adjusted to exclude the rate of inflation. The forecast range for the price of electricity varies from a 0 percent change in real price (the price of electricity increasing at the same rate as the inflation rate) to a very high forecast of 4 percent per year. Although a high forecast of electricity prices was prepared, TVA analyses of future revenue requirements indicate that the real price of electricity will increase between 0 and 2 percent per year. TVA's goal is to maintain electricity prices as low as possible although we will encourage conservation through appropriate rate design.

As indicated in Exhibit 1 fossil fuel prices as represented by the real price of natural gas are expected to increase faster than the price of electricity. The rising real price of natural gas will tend to cause a substitution of electricity for scarce fossil fuels. A more complete discussion of the forecast of factors which determine load growth is presented in Appendix A.

TVA Conservation Programs

Not only do economic factors influence load growth, but conservation programs play a major role in promoting the efficient use of electricity.

As Bob Hemphill has discussed, all of the TVA conservation programs are expected to reduce electricity consumption by 15 to 20 billion kWh by 1990 or the equivalent of three to four large generating units.

Load Forecasts

For each of the major factors determining load growth, a low, medium, and high forecast was prepared; and for TVA conservation programs, a low and high projection are provided. Although a limited number of variations in determinants of load is provided, all possible combinations of these variations in determinants would produce 54 alternative load forecasts.

The alternative load forecasts can be organized with a tree diagram as shown in Exhibit 2. There are four types of branches in the tree--one each for the four major determinants of load: economic activity, price of natural gas, price of electricity, and TVA conservation programs. For each of the first three factors, there are three alternative levels of activity; and for TVA programs, there are two levels of activity.

Combinations of various levels of the determinants of electricity consumption produce 54 alternative forecasts. For example, high economic activity, high price of natural gas or substitution, low price of electricity (0 percent per year), and low TVA program levels would produce the highest forecast and results in a growth rate of electricity consumption of 5.1 percent per year from 1978-1990. The bottom branches of the tree would produce the lowest forecast and would result in a growth rate of electricity consumption of 2.2 percent per year from 1978-1990. There are, of course, a large number of forecasts between the extremes.

Not all of the alternative forecasts are equally likely to occur. It is expected that the mid-range forecasts between the extreme high and low forecasts have a higher possibility of occurrence.

The forecasts of electricity consumption (kilowatthours) for 1990 and 2000 for selected forecasts which may be likely to occur are presented in Exhibit 3. These alternative forecasts represent a range of forecasts which deals with the uncertainty in load forecasting. In light of this uncertainty, the range of forecasts provides a prudent planning basis.

The first forecast presented in Exhibit 4 is based on the forecasts of the high level of economic activity, the medium outlook for the price of natural gas (medium substitution), the price of electricity increasing no faster than the rate of inflation (0 percent per year), and the high estimate of the effect of TVA conservation programs. This forecast results in a growth of electricity consumption of 4.6 percent per year from 1978 to 1990 and 3.8 percent per year from 1990 to 2000.

Since the assumptions underlying this forecast closely approximate several of TVA's goals, alternative forecasts may seem unnecessary. However, other forecasts must be considered in light of forecasting uncertainty and the need to proceed on a prudent planning basis, recognizing that goals may or may not be achieved.

The fourth forecast in Exhibit 3 represents the same assumptions as the first but with total employment being 8 percent lower in 1990 and 12 percent lower in the year 2000 and the effect of TVA conservation programs being slightly less. The growth rate of electricity consumption in the forecast is expected to be 3.7 percent per year from 1978-1990 and 2.8 percent per year from 1990-2000.

The second and fifth forecasts are the same as the first and fourth forecasts except that the real price of electricity increases at 2 percent per year rather than 0 percent during the forecast period. Generally, higher prices of electricity reduce the growth rate of electricity consumption 0.5 to 0.8 of a percentage point per year. In 1990 electricity consumption would decrease by approximately 6 percent. A more complete discussion of the alternative load forecasts is presented in Appendix B.

Exhibit 1

FORECASTS OF DETERMINANTS OF LOAD GROWTH

	Total Regional Employment (Thousands)		
	<u>Low</u>	<u>Medium</u>	<u>High</u>
1978	2,588	2,588	2,588
1980	2,708	2,708	2,708
1990	3,214	3,311	3,477
2000	3,730	3,972	4,261

Growth rate:			
1980-2000	1.6%	1.9%	2.3%

	Price of Electricity (Mills per kWh in Constant 1972\$)		
	<u>Low</u>	<u>Medium</u>	<u>High</u>
1978	13.8	13.8	13.8
1980	14.9	15.2	15.2
1990	14.9	18.2	22.5
2000	14.9	21.8	33.3

Growth rate:			
1980-2000	0%	1.8%	4.0%

	Residential Price of Natural Gas (1972\$ per Thousand Cubic Feet)		
	<u>Low</u>	<u>Medium</u>	<u>High</u>
1978	1.21	1.21	1.21
1980	1.49	1.49	1.49
1990	1.78	2.16	2.62
2000	2.17	3.17	4.69

Growth rate:			
1980-2000	1.9%	3.9%	5.9%

Source: Projections of price of gas through 1990 are based on Data Resources Incorporated Autumn 1978 Energy Review.

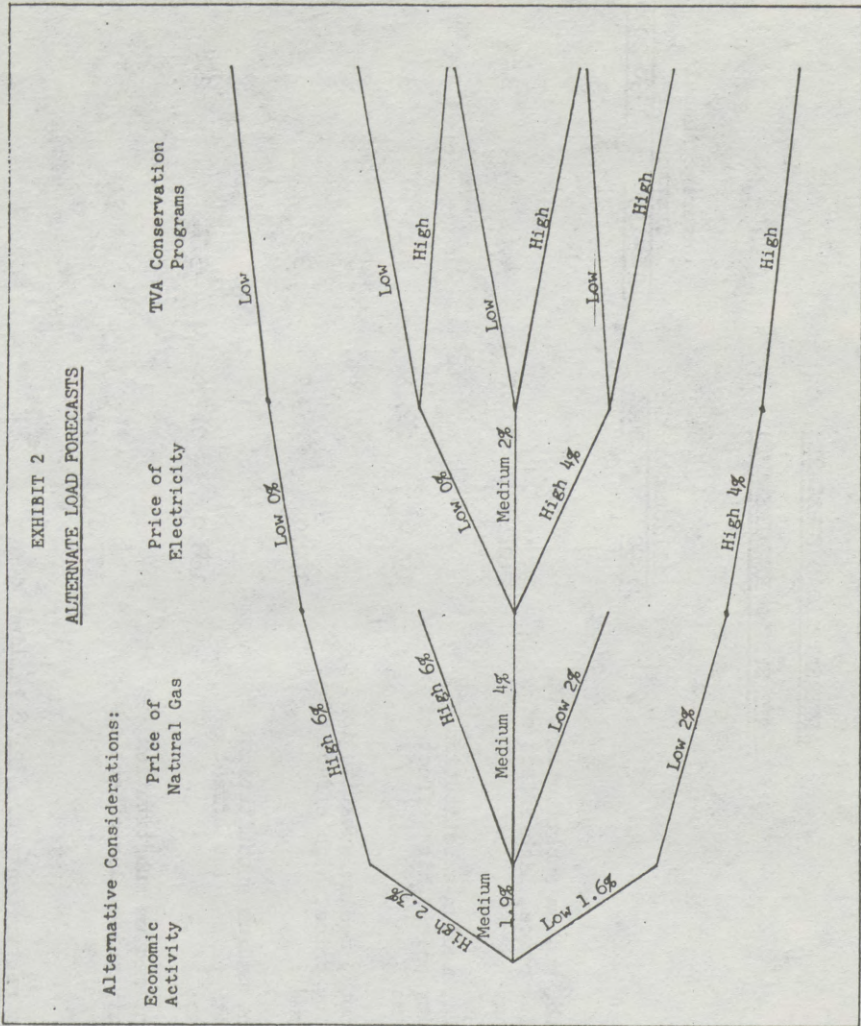


EXHIBIT 3

ALTERNATE LOAD FORECASTS

NET SYSTEM REQUIREMENTS

	<u>Billions of kWh</u>		<u>Average Annual Growth Rate*</u>	
	<u>1990</u>	<u>2000</u>	<u>1978-1990</u>	<u>1990-2000</u>
1. High economic growth, medium substitution, 0% change in electricity price, high effect of conservation programs	210.1	306.0	4.6%	3.8%
2. High economic growth, medium substitution, 2% change in electricity price, high effect of conservation programs	197.4	265.3	4.1	3.0
3. Medium economic growth, medium substitution, 0% change in electricity price, high effect of conservation programs	192.0	263.7	3.9	3.2
4. Low economic growth, medium substitution, 0% change in electricity price, low effect of conservation programs	188.0	247.6	3.7	2.8
5. Low economic growth, medium substitution, 2% change in electricity price, low effect of conservation programs	177.1	216.7	3.2	2.0

*Fiscal 1978 net system requirements are 121.8 billion kWh.

Appendix A

FORECASTS OF MAJOR DETERMINANTS OF ELECTRICITY CONSUMPTIONShort-Term Economic OutlookNational Economy

The growth of the national economy is expected to slow in the next two years as rising prices and interest rates dampen expenditures by businesses and households. Consumer expenditures are expected to increase moderately, whereas investment expenditures are expected to decrease due to a recession in the housing industry.

Our current short-term outlook for gross national product (GNP), the major components of expenditures on goods and services, and total employment in the U.S. are presented in Table 1. Under this forecast, GNP is expected to increase 2.6 percent in 1979 and 1.4 percent in 1980. This implies a slowdown in the rate of economic expansion in 1979 and 1980.

While growth will be quite slow with some sectors declining, the overall economy is not expected to experience a recession, although such a possibility exists. In our view, any recession which may develop will be mild and of short duration.

Total employment in the U.S. is expected to increase 2.5 percent in 1979 and 1.7 percent in 1980 compared to total employment growth of 4.1 percent in 1978. It should be noted that total employment is expected to increase at about the same rate as GNP which follows recent short-term trends of very sluggish growth in labor productivity.

Table 1
SHORT-TERM U.S. ECONOMIC OUTLOOK

Year	Gross National Product and Components (Billions of 1972\$)								Total Employment (Millions) Percent Change	
	Gross National Product	Consumer Expenditures		Investment Expenditures		Government Expenditures				
		Percent Change	Percent Change	Percent Change	Percent Change	Percent Change	Percent Change			
1977	1,332.6		857.7		196.3		269.2		90.55	
1978	1,384.2	3.9	888.3	3.6	210.2	7.1	275.3	2.2	94.27	4.1
1979	1,420.6	2.6	913.7	2.9	199.8	-5.0	283.8	3.1	96.59	2.5
1980	1,440.4	1.4	930.6	1.8	188.8	-5.5	291.4	2.7	98.19	1.7

Source: Wharton Econometric Forecasting Associates, Short-Term Forecast, November 1978.

Regional Economy

The short-term outlook for the regional economy largely reflects the outlook for the U.S. economy as indicated in Table 2. Total employment is expected to increase 2.4 percent in 1979 and 2.2 percent in 1980 compared to 3.5 percent in 1978. In the regional economy, nonmanufacturing employment is expected to increase faster than manufacturing employment reflecting recent historical trends.

Alternative Short-Term Outlook

An alternative to a GNP growth deceleration in both 1979 and 1980 is that a mild recession could occur in 1979 with recovery occurring quickly in 1980. Two or three quarters of negative growth of real GNP implied in this alternative outlook would represent a mild recession with overall growth of GNP being 1 percent in 1979 and a mild recovery of 3 percent in 1980. A recession in 1979 would change the national and regional outlook as outlined in Table 3.

In the U.S. the percent change in real GNP and total employment would be approximately the same indicating little change in overall labor productivity. In the region, total employment would change in a pattern similar to the Nation. Manufacturing employment would decline in 1979 with recovery in the following year. Nonmanufacturing employment would show little change.

Table 2

TVA REGIONAL EMPLOYMENT OUTLOOK(Thousands)

<u>Year</u>	<u>Total Employment</u>		<u>Manufacturing Employment</u>		<u>Commercial and Other Employment</u>	
		<u>Percent Change</u>		<u>Percent Change</u>		<u>Percent Change</u>
1977	2,499.8		756.7		1,743.1	
1978 ^a	2,588.0	3.5	775.0	2.4	1,813.0	4.0
1979 ^b	2,649.4	2.4	791.3	2.1	1,858.1	2.5
1980 ^b	2,707.6	2.2	803.9	1.6	1,903.7	2.4

a. Estimated employment in 1978.

b. Forecast employment based on Division of Navigation Development and Regional Studies forecast of November 22, 1978.

Table 3

NATIONAL AND REGIONAL ECONOMIC OUTLOOK

WITH A RECESSION IN 1979

<u>Year</u>	<u>National Outlook</u>		<u>Regional Outlook</u>		
	<u>Growth Rates of:</u>		<u>Growth Rates of:</u>		
	<u>Real</u>	<u>Total</u>	<u>Total</u>	<u>Manufacturing</u>	<u>Nonmanufacturing</u>
	<u>GNP</u>	<u>Employment</u>	<u>Employment</u>	<u>Employment</u>	<u>Employment</u>
1978	3.9	4.1	3.5	2.4	4.0
1979	1.0	1.0	0.9	-2.6	2.4
1980	3.0	3.0	3.7	6.4	2.6

Long-Term Economic OutlookNational Economy

As in last year's forecast, the long-term outlook continues to reflect several factors affecting employment, productivity, and output growth. The decline in the growth rates of population continues to decrease the growth in the labor force, although this is partially offset by increased participation of women in the labor force. The current dampening of overall productivity growth is partially due to the substantial number of new entrants to the labor force in the 16- to 24-year age group. Traditionally, this age group exhibits lower average productivity than the older, more experienced workers. As this large bulk of younger workers gains employment experience, improvements in productivity are expected to occur in the mid to later 1980's.

The long-term forecast also indicates that employment in service-oriented industries will increase faster than in manufacturing industries.

The long-term outlook for GNP, employment, and real per capita income is presented in Table 4.

The average annual growth rate of GNP from 1980 to 2000 is approximately 3.0 percent. Growth in total employment declines from 1.4 percent per year from 1980 to 1990 to 1.1 percent from 1990 to 2000, reflecting the slower growth of the labor force. Nonmanufacturing employment increases at a faster rate than manufacturing employment, where nonmanufacturing employment as a percent of total employment increases from 79 percent in 1980 to 82 percent in 2000. Growth of real per capita income reflects a pattern similar to the growth of real GNP.

Table 4

LONG-TERM U.S. ECONOMIC OUTLOOKSELECTED YEARS

Year	Gross National Product (Billions of Constant Dollars)		Employment (Millions)				Real Per Capita Personal Income	
	Percent Change ^a	Total	Manufacturing		Nonmanufacturing		Percent Change ^a	Percent Change ^a
			Percent Change ^a	Percent Change ^a	Percent Change ^a	Percent Change ^a		
1980		1,440	98.2		20.8	77.4	4,033	
1985 ^b		1,683	106.2	1.6	21.5	0.7	84.7	1.8
1990 ^c		1,921	112.6	1.2	21.6	0.1	91.0	1.5
2000 ^c		2,574	125.0	1.1	22.3	0.3	102.7	1.2
								2.2

a. Average annual percent change for periods indicated.

b. Forecast based on Wharton Econometric Forecasting Associates long-term forecast of September 1978.

c. Forecast based on Wharton Econometric Forecasting Associates long-term forecast extended to 2000 of July 1978.

Regional Economy

The growth history of the regional economy indicates a strong growth potential in total employment. In our current forecast, total employment as shown in Table 5 will increase 2 percent per year from 1980 to 2000 compared to 1.2 percent in the Nation. Faster regional economic growth compared to the Nation reflects historical trends in the growth of total employment. From 1955 to 1977, U.S. total nonagricultural employment increased 2.1 percent per year compared to a 3.2-percent-per-year increase in TVA area total nonagricultural employment.

The major difference in this year's regional economic outlook and last year's outlook is in the composition of employment growth between manufacturing and nonmanufacturing sectors. Last year's regional economic outlook indicated that manufacturing employment as a percent of total employment would remain fairly stable although an alternative regional outlook examined the potential for a decline in manufacturing employment as a percent of total employment.

In the development of this year's regional economic outlook, an extensive examination was undertaken of the factors which are likely to determine the growth of the manufacturing sector of the regional economy compared to the Nation. From this examination, it was determined that relative wages and relative power costs for the region compared to the Nation were the important determinants of industrial location. In the regional forecast, wage rates in the region as a percent of U.S. wage rates increase from 79 percent in 1980 to 90 percent in 2000. Power costs in the region as a percent of national power costs increase from approximately 75 percent in 1980 to 90 percent in 2000. The increases in relative wage rates and

Table 5
LONG-TERM REGIONAL ECONOMIC OUTLOOK*

Year	Employment (Thousands)				Real Per Capita Income	
	Total	Manufacturing	Nonmanufacturing		Percent	Change
	Change	Change	Change			
1980	2,708	804	1,904	3,307		
1985	3,013	862	2,151	3,817	2.9	
1990	3,311	901	2,410	4,283	2.3	
2000	3,972	1,005	2,967	5,618	2.8	

*Forecast based on Division of Navigation Development and Regional Studies forecast of November 22, 1978.

power costs tend to decrease the growth potential for manufacturing in the region.

In addition to the examination of the manufacturing sector, the long-term trends in the growth of nonmanufacturing employment as a percent of total employment were reviewed. Prior to 1967, manufacturing employment as a percent of total employment increased. From 1967 to 1977, manufacturing employment as a percent of total employment declined from approximately 35 percent to 30 percent. As indicated in Table 5, nonmanufacturing employment increases at a faster rate than manufacturing employment. From 1980 to 2000, manufacturing employment as a percent of total employment is projected to decrease from 30 percent to 25 percent. Throughout the forecast period, the regional composition of employment approaches that of the Nation.

The growth of real income per capita reflects the increase in relative wages and historical trends of regional per capita income. TVA area per capita income as a percent of U.S. per capita income is 82 percent in 1980 and 92 percent in the year 2000.

Alternative Regional Outlook

In addition to the regional forecast described above, two alternative regional forecasts were prepared for use in planning studies. The first of these continues the historical pattern of expansion by assuming that relative wages remain constant throughout the planning period. This results in manufacturing employment levels that are 17 percent higher by the year 2000 and somewhat smaller increases in total employment and population. A second alternative considers the implications of lower employment growth in the region. The lower forecast would result

if regional wages and power costs were the same as the Nation in the year 2000. A comparison of the expected total employment in all three alternative regional economic forecasts is presented in Table 6.

Table 6

ALTERNATIVE REGIONAL ECONOMIC FORECASTSTOTAL EMPLOYMENT (THOUSANDS)

<u>Year</u>	<u>Medium Economic Growth</u>	<u>Percent Change</u>	<u>Low Economic Growth</u>	<u>Percent Change</u>	<u>High Economic Growth</u>	<u>Percent Change</u>
1980	2,708		2,708		2,708	
1990	3,311	2.0	3,214	1.7	3,477	2.5
2000	3,972	1.8	3,730	1.5	4,261	2.1

Outlook for the Price of Electricity

The most important change in assumptions from the July 1978 load forecasts is in the outlook for the price of electricity.

In the July 1978 load forecasts, the real price of electricity was unchanged in real terms from 1978 to 1990 as indicated in Table 7. In the July 1978 load forecasts, the real price of electricity increased slightly in 1978 and 1979 and then declined in real terms through 1986-1987 and then increased slightly in real terms from 1987 to 1990.

The revised outlook for prices is shown for three alternatives--low, medium, and high--in Table 7. All three alternative forecasts are substantially higher than the July 1978 forecast in the short run. In the long run, the low forecast indicates no change in the real price of electricity from 1980 through 2000. The medium forecast indicates a 2-percent-per-year increase in the real price of electricity; whereas, the high forecast indicates a 4-percent-per-year increase in the price of electricity.

After an examination of the assumptions which underlie the electricity price forecast, it is believed that the low to medium price forecast is more likely than the high forecast.

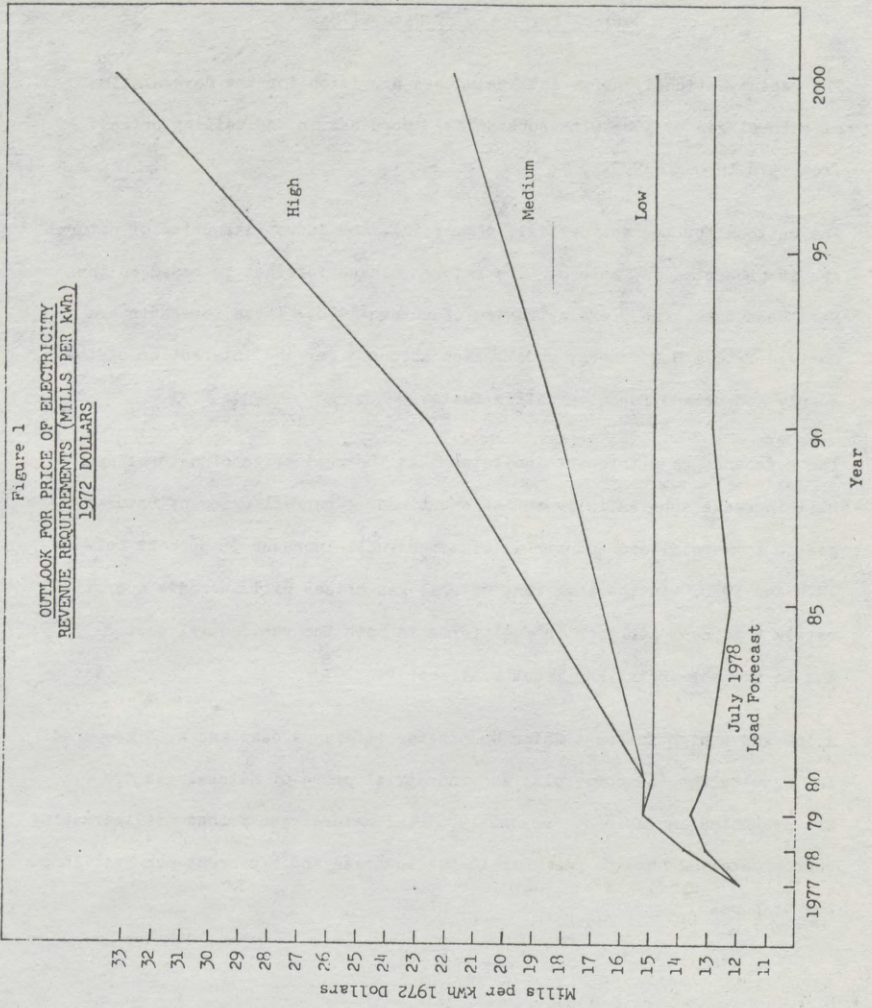
A comparison of the price of electricity outlook used in the July 1978 forecasts and the current alternative price forecasts is presented in Figure 1.

Table 7

OUTLOOK FOR PRICE OF ELECTRICITY
REVENUE REQUIREMENTS (MILLS PER kWh)
1972 Dollars

Year	July 1978 Load Forecast	Percent Change*	Revised Forecast			Percent Change*	High	Percent Change*
			Low	Medium	High			
1977	11.9		11.9	11.9	11.9			
1978	13.1	10.1	13.8	13.8	13.8	16.0	13.8	16.0
1979	13.6	3.8	15.2	15.2	15.2	10.0	15.2	10.0
1980	13.1	-3.7	14.9	15.2	15.2	0.0	15.2	0.0
1990	12.9	-0.2	14.9	18.2	18.2	1.8	22.5	4.0
2000	12.9	0.0	14.9	21.8	21.8	1.8	33.3	4.0

*Average annual percent change for period indicated.



Outlook for Price of Natural Gas

The recent National Energy Act includes a provision for the deregulation of natural gas by 1985 with substantial increases in the ceiling price from 1978 through 1980.

The outlook for the residential, commercial, and industrial price of natural gas is presented in Table 8. The reference case forecast is based on the Data Resources, Inc., energy review of autumn 1978. These forecasts are derived from a U.S. energy model which accounts for the interaction of the supply and demand for alternative fuels.

The reference case forecast indicates that the real price of natural gas will increase substantially in the short run. The real price of natural gas to commercial and industrial customers will increase 35 percent between 1978 and 1980. In the long run, natural gas prices will increase approximately 4 percent per year in real terms in both the residential sector and in the commercial and industrial sector.

A low and a high forecast which bounds the reference case was also prepared. The results for the commercial and industrial price of natural gas are presented in Table 8. Beyond 1980 real natural gas prices are increasing approximately 2 percent per year in the low case and 6 percent per year in the high case.

Table 8
OUTLOOK FOR PRICE OF NATURAL GAS
1972 DOLLARS PER THOUSAND CUBIC FEET

Year	Reference Case ¹			Low		High	
	Residential	Percent Change ²	Commercial and Industrial	Percent Change ²	Commercial and Industrial	Percent Change ²	Commercial and Industrial
1978	1.21		1.09		1.09		1.09
1979	1.39	14.5	1.33	22.0	1.33	22.0	22.0
1980	1.49	7.5	1.47	10.5	1.47	10.5	10.5
1990	2.16	4.2	2.10	3.6	1.73	1.6	5.6
2000	3.17	4.0	3.12	4.0	2.12	2.0	6.3

1. Source: Data Resources, Inc., Autumn 1978 Energy Review, East South Central I, Kentucky and Tennessee.

2. Average annual percent change for period shown.

TVA Conservation Programs

There is a wide variety of TVA programs currently underway or soon to be underway which will achieve a substantial amount of conservation.

Since the July 1978 load forecasts were completed, a substantial effort has been put forth in obtaining estimates of the potential for TVA energy programs. The programs, the assumed penetration, and the resulting energy saving in 1990 are presented in Table 9. The conservation programs are expected to result in an electricity saving in 1990 of 14.5 to 20.0 billion kWh.

Table 9

TVA CONSERVATION PROGRAMS

	<u>Assumed Penetration</u>	<u>1990 Energy Savings Millions of kWh</u>
A. Residential		
1. Retrofit programs--Home Insulation Program	43,000 homes per year--8 years	3,100
2. New home programs--\$uper \$aver home program	36,000 homes per year	2,100
3. Residential heating equipment		
a. Heat pumps		
(1) Low estimate	20,000 per year or 222,000 in 1990	800
(2) High estimate	55,000 per year or 628,000 in 1990	2,200
b. Biomass		
(1) Low estimate	31,000 homes in 1990	170
(2) High estimate	94,000 homes in 1990	500
c. Solar active system--retrofit		
(1) Low estimate	2,800 units in 1990	20
(2) High estimate	28,400 units in 1990	180
4. Solar water heating		
Low estimate	53,000 units in 1990	150
High estimate	163,000 units in 1990	500
5. Passive solar homes--new homes		
Low estimate	11,600 units in 1990	70
High estimate	23,200 units in 1990	140
6. Electrified transportation	200,000 vehicles in 1990	-1,400
Total residential energy savings		5,000-7,300
B. Commercial and industrial		
1. Solar		
Low estimate	10-percent penetration	600
High estimate	20-percent penetration	1,200
2. Biomass		
Low estimate	2-percent penetration	400
High estimate	3-percent penetration	600
3. Commercial and industrial energy audit program		6,300
4. Cogeneration		
Low estimate	Moderate national and TVA financing incentives	2,200
High estimate	30-percent tax credit TVA loans	4,600
Total commercial and industrial energy savings		9,500-12,700
Total energy savings		14,500-20,000

Appendix B

LOAD FORECASTS

The July 1978 load forecasts explored the impact on electricity consumption of TVA conservation programs and the development of new end-use technologies. Revisions to the July 1978 forecasts have included several changes: (1) an improved regional economic outlook, (2) changes in the outlook for electricity prices, (3) changes in the estimates of TVA conservation and new technology programs based on estimates of the potential effect provided by those responsible for the programs, (4) an examination of a wider variety of changes in load due to economic and noneconomic factors, and (5) changes in the peak and hourly load forecast based on an analysis of individual residential conservation programs.

Comparison of February 1979
And July 1978 Load Forecasts

A comparison of the July 1978 and February 1979 forecasts is presented in Tables 1 and 2. In Table 1, a comparison of forecasts of net system requirements is presented based on the Medium Economic Growth--Expanded Conservation forecast for 1990. The top line indicates the net system requirements based solely on economic and demographic factors. The February 1979 forecast is based on the medium regional economic forecast excluding the shift to services industries.

The February 1979 forecast, based solely on economic and demographic factors, is approximately 6 billion kWh or 2.4 percent lower than the July 1978 forecast due to: a downward revision in the outlook for directly served

Table 1

COMPARISON OF FORECASTS 1990

MEDIUM ECONOMIC GROWTH--EXPANDED CONSERVATION

Factors Influencing Change		July 1978* Forecast (Billions of kWh)	Revised Forecast February 1979 (Billions of kWh)
Economic growth and demographic factors		250.3	244.2
Conservation			
Price		-17.5	-43.6
National programs		-5.2	-2.0
TVA programs			
Home insulation programs		-2.0	-3.4
Super Saver home program		(-3.2)	-2.3
Heat pump			-2.4
C&I energy audits		-5.9	-5.9
Low-interest loans--heat pump		0.0	+0.3
Substitution		+14.4	+14.7
Medium economic growth--expanded conservation		230.9	199.6

*For a further discussion of the July 1978 load forecasts, see "July 1978 Load Forecasts," Analysis Branch, Tennessee Valley Authority, 1978.

Table 2
COMPARISON OF FORECASTS 1990
MEDIUM ECONOMIC GROWTH--NEW END-USE TECHNOLOGIES

<u>Factors Influencing Change</u>	<u>July 1978* Forecast (Billions of kwh)</u>	<u>Revised Forecast February 1979 (Billions of kwh)</u>
Medium economic growth-- expanded conservation	230.9	199.6
Shift to services	-8.8	-3.3
New end-use technologies		
Solar	-4.7	-2.2
Cogeneration	-4.0	-5.0
Monetary incentives	-7.1	-3.9
Appliance efficiency	-3.0	0.0
Biomass	0.0	-1.2
Electric car	+1.4	+1.5
Substitution	+11.1	+3.3
Medium economic growth-- new end-use technologies	215.8	183.8

*Source: See "July 1978 Load Forecasts," Analysis Branch, Tennessee Valley Authority, 1978.

industry, a lower economic outlook in the short run, and a revision in the projection of residential customers.

The largest change in the forecast is due to the outlook for the price of electricity. The outlook for prices in the July 1978 forecast indicated a constant real price from 1977 through 2000. The outlook for electricity prices which is included in Table 1 for the February 1979 load review indicates substantial increases in the real price of electricity for 1979 and approximately a 2-percent-per-year increase from 1980 to 2000. The increases in price reduced the forecast for 1990 by 26 billion kWh.

There are some revisions in the 1979 estimates of TVA conservation programs reflecting expansion of the home insulation program and acceleration of the Super Saver home and heat pump programs.

The overall decrease in net system requirements is approximately 31 billion kWh of which increases in the price of electricity account for 85 percent of the change in electricity consumption.

In Table 2 a comparison of the forecasts on the basis of the Medium Economic Growth--New End-Use Technologies forecast is presented. Overall, there have been some downward revisions in the effect of some TVA programs and a reduction in the substitution of electricity for scarce fossil fuels since a lower forecast of natural gas prices was utilized as an alternative in the February 1979 forecast.

The difference in net system requirements is approximately 32 billion kWh, again largely reflecting increases in the price of electricity.

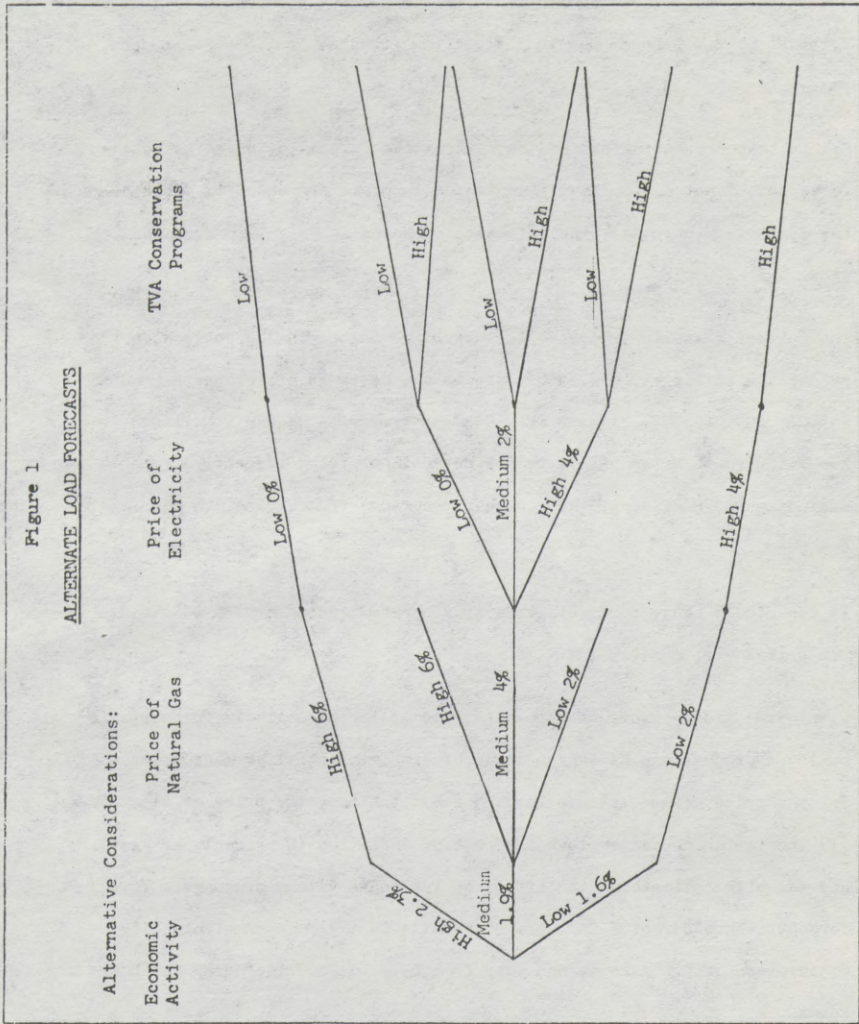
Revised Load Forecasts

Electric Energy Forecasts--A range of alternative forecasts of factors such as economic activity, the price of electricity, the price of natural gas, and TVA conservation programs provides the basis for determining a range of electricity forecasts.

For each of the major factors determining load growth, a low, medium or reference, and high forecast were prepared; and for the TVA conservation programs, a low and high projection are provided. Although a limited number of variations in determinants of load is provided, all possible combinations of these variations in determinants would produce a large number of alternative load forecasts.

The alternative load forecasts can be organized with a tree diagram as shown in Figure 1. There are four alternative types of branches in the tree--one each for the four determinants of load: economic activity, price of natural gas, price of electricity, and TVA programs. For each of the first three factors, there are three alternative levels of activity; and for TVA programs, there are two levels of activity.

Combinations of various levels of the determinants of electricity consumption produce alternative forecasts. For example, high economic activity, high price of natural gas or substitution, low price of electricity (0 percent per year), and low TVA program levels would produce the highest forecast; whereas, the bottom branches of the tree would produce the lowest forecast. The percentages on the top of each branch of the tree represent the average annual growth rate from 1980 to 2000 of the determinants of electricity consumption. For example, the reference case growth rate for economic



activity (total regional employment) is 1.9 percent per year with a high forecast of 2.3 percent per year and a low forecast of 1.6 percent per year.

Rather than presenting all of the alternative forecasts, seven selected forecasts of net system requirements for 1990 are presented in Table 3. For comparison purposes, the forecasts prepared in July 1978 are also shown.

The forecasts are lower due to the upward revisions in the outlook for price of electricity. In 1990 there is a wide range of forecasts from an extreme low of 158.7 billion kWh to an extreme high of 219.9 billion kWh with growth rates of 2.2 to 5.1 percent per year, respectively. Excluding the DOE loads, the growth rates range from 1.0 to 4.5 percent per year.

In the middle range forecasts, the growth rates including the DOE loads range from 3.2 to 4.6 percent.

Within the middle range of forecasts, one of the more likely forecasts is based on projections of a high level of economic activity, medium outlook for the price of natural gas (medium substitution), the price of electricity increasing no faster than the rate of inflation (0 percent per year), and the high estimate of the effect of TVA conservation programs. This forecast (labeled No. 2 in Table 3) results in a growth of electricity consumption of 4.6 percent per year from 1978 to 2000 including the DOE loads.

Table 3

ALTERNATIVE LOAD FORECASTSNET SYSTEM REQUIREMENTS 1990

		Average Annual Growth Rate* 1978-1990	
	Billions of kWh	Includes DOE	Excludes DOE
<u>High forecast</u>			
1. High economic growth, high substitution, 0% change in electricity price, low TVA programs	219.9	5.1%	4.5%
<u>Middle range forecasts</u>			
2. High economic growth, medium substitution, 0% change in electricity price, high TVA programs	210.1	4.6	4.1
3. High economic growth, medium substitution, 2% change in electricity price, high TVA programs	197.4	4.1	3.4
4. Medium economic growth, medium substitution, 0% change in electricity price, high TVA programs	192.0	3.9	3.1
5. Low economic growth, medium substitution, 0% change in electricity price, low TVA programs	188.0	3.7	2.9
6. Low economic growth, medium substitution, 2% change in electricity price, low TVA programs	177.1	3.2	2.2
<u>Low forecast</u>			
7. Low economic growth, low substitution, 4% change in electricity price, high TVA programs	158.7	2.2	1.0
<u>July 1978 forecasts</u>			
Medium economic growth--expanded conservation	230.6	5.5	5.0
Medium economic growth--new end-use technologies	215.4	4.9	4.3

*Fiscal 1978 net system requirements are 121.8 billion kWh. DOE requirements are 15.6 billion kWh.

The fifth forecast in Table 3 represents the same assumptions as the first but with total employment being 8 percent lower in 1990 and 12 percent lower in the year 2000 and the effect of TVA conservation programs being slightly less. The growth rate of electricity consumption in the forecast is expected to be 3.7 percent per year from 1978-1990.

The third and sixth forecasts are the same as the second and fifth forecasts except that the real price of electricity increases at 2 percent per year rather than zero percent during the forecast period. Generally, higher prices of electricity reduce the growth rate of electricity consumption 0.5 to 0.8 of a percentage point per year. In 1990, electricity consumption would decrease by approximately 6 percent.

The forecast of net system requirements for the year 2000 is presented in Table 4. These forecasts indicate a range of growth rates from 1990 to 2000 of 0.6 to 4.1 percent per year. Excluding the DOE loads, the growth rates range from 0.8 to 4.8 percent per year. For the middle range forecasts, the growth rates range from 2.0 percent to 3.8 percent.

All of the growth rates from 1990 to 2000 are lower compared to 1978 to 1990 largely due to the zero growth of the Department of Energy uranium enrichment loads from 1985 to 2000. Excluding the DOE loads, the growth rates from 1978 to 1990 are lower than the growth rates from 1990 to 2000 due to the rapid buildup of TVA conservation programs in the early years of the forecast period.

Table 4

ALTERNATIVE LOAD FORECASTSNET SYSTEM REQUIREMENTS 2000

		Average Annual Growth Rate 1990-2000	
	Billions of kWh	Includes DOE	Excludes DOE
<u>High forecast</u>			
1. High economic growth, high substitution, 0% change in electricity price, low TVA programs	328.8	4.1%	4.8%
<u>Middle range forecasts</u>			
2. High economic growth, medium substitution, 0% change in electricity price, high TVA programs	306.0	3.8	4.5
3. High economic growth, medium substitution, 2% change in electricity price, high TVA programs	265.3	3.0	3.6
4. Medium economic growth, medium substitution, 0% change in electricity price, high TVA programs	263.7	3.2	3.9
5. Low economic growth, medium substitution, 0% change in electricity price, low TVA programs	247.6	2.8	3.4
6. Low economic growth, medium substitution, 2% change in electricity price, low TVA programs	216.7	2.0	2.6
<u>Low forecast</u>			
7. Low economic growth, low substitution, 4% change in electricity price, high TVA programs	169.2	0.6	0.8
<u>July 1978 forecasts</u>			
Medium economic growth--expanded conservation	311.9	3.1	3.6
Medium economic growth--new end-use technologies	277.5	2.6	3.1

A graph of several alternative load forecasts compared to the July 1978 Medium Economic Growth--New End-Use Technologies forecast (forecast 6) is presented in Figure 2. Forecast 1 represents the extremely high forecast, and forecast 5 represents the extremely low forecast. Forecasts 2, 3, and 4 represent the middle range forecasts, with forecast 2 representing high economic growth, medium substitution, 0-percent change in electricity prices, and the high estimate of TVA programs. From 1980 to 1986, all of the forecasts are below the July 1978 forecast. This is due to the lower short-term economic outlook, increased prices of electricity, and the rapid buildup of TVA conservation programs, especially the home weatherization program and the commercial and industrial program.

Beyond 1986, the July 1978 forecast is in the upper range of the revised alternative forecasts.

Winter Peak Requirements Forecast

The forecasts of winter peak requirements for 1990 are shown in Table 5.

In the July 1978 new end-use technologies forecast, the 1990 winter requirements were 38,100 MW. The revised forecasts indicate a range of winter peak requirements of 24,700 MW to 36,200 MW. Comparing the July 1978 new end-use technologies forecast of 38,100 MW with the high economic growth, medium substitution, 0-percent change in price, high TVA programs forecast of 33,900 MW indicates a decrease of 4,000 MW. The increased growth of prices from zero percent per year to 2 percent per year accounts for a decrease in winter peak load of approximately 2,000 MW.

Figure 2

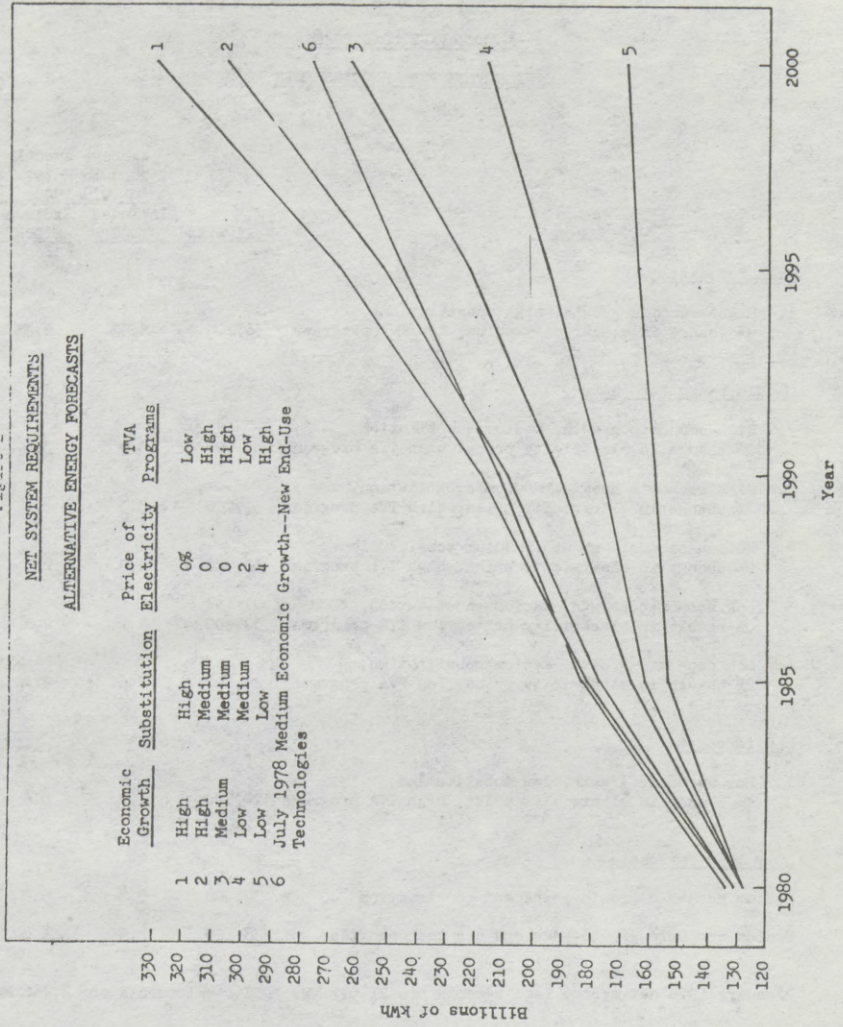


Table 5

ALTERNATIVE LOAD FORECASTS
NET SYSTEM PEAK REQUIREMENTS 1990

		Average Annual Growth Rate* 1978-1990	
		Includes	Excludes
		DOE	DOE
		Megawatts	
<u>High forecast</u>			
1. High economic growth, high substitution, 0% change in electricity price, low TVA programs	36,200	4.4%	4.3%
<u>Middle range forecasts</u>			
2. High economic growth, medium substitution, 0% change in electricity price, high TVA programs	33,900	3.9	3.6
3. High economic growth, medium substitution, 2% change in electricity price, high TVA programs	31,700	3.3	3.0
4. Medium economic growth, medium substitution, 0% change in electricity price, high TVA programs	30,800	3.0	2.7
5. Low economic growth, medium substitution, 0% change in electricity price, low TVA programs	30,900	3.1	2.7
6. Low economic growth, medium substitution, 2% change in electricity price, low TVA programs	29,050	2.5	2.1
<u>Low forecast</u>			
7. Low economic growth, low substitution, 4% change in electricity price, high TVA programs	24,700	1.2	0.4
<u>July 1978 forecasts</u>			
Medium economic growth--expanded conservation	39,900	5.3	5.3
Medium economic growth--new end-use technologies	38,100	4.9	4.8

*January 1978 net system requirements are 21,517 MW. DOE requirements are 2,346 MW.

The forecast winter peak loads in the year 2000 are presented in Table 6. The revised forecast winter peak loads range from 26,700 MW to 56,100 MW.

A comparison of the growth rates of winter peak load (Table 5) and the net system energy requirements (Table 3) for 1978 to 1990 indicates lower rates of growth for peak loads than for energy. The difference in growth rates ranges from 0.5 to 1.0 percent per year and increases the lower the load forecast. The slower growth rates of peaks than energy are due to the rapid increase in TVA conservation programs in the early years of the forecast. From 1990 to 2000 the peak loads are increasing at approximately the same rate as energy. This is due to a leveling off of the growth of the TVA conservation programs and the constant level of DOE loads which causes a slight decline in the overall system load factor.

Table 6

ALTERNATIVE LOAD FORECASTS
NET SYSTEM PEAK REQUIREMENTS 2000

		Average Annual Growth Rate 1990-2000	
		Includes DOE	Excludes DOE
	Megawatts		
<u>High forecast</u>			
1. High economic growth, high substitution, 0% change in electricity price, low TVA programs	56,100	4.5%	5.0%
<u>Middle range forecasts</u>			
2. High economic growth, medium substitution, 0% change in electricity price, high TVA programs	50,650	4.1	4.6
3. High economic growth, medium substitution, 2% change in electricity price, high TVA programs	43,400	3.2	3.6
4. Medium economic growth, medium substitution, 0% change in electricity price, high TVA programs	43,150	3.4	3.9
5. Low economic growth, medium substitution, 0% change in electricity price, low TVA programs	41,850	3.1	3.5
6. Low economic growth, medium substitution, 2% change in electricity price, low TVA programs	36,350	2.3	2.6
<u>Low forecast</u>			
7. Low economic growth, low substitution, 4% change in electricity price, high TVA programs	26,700	0.8	0.9
<u>July 1978 forecasts</u>			
Medium economic growth--expanded conservation	54,000	3.1	3.4
Medium economic growth--new end-use technologies	51,000	3.0	3.3

RESPONSES TO WRITTEN QUESTIONS

Question. Chairman Freeman, can you please tell the committee members about the number of facilities which will be constructed with the borrowed funds and will any of the monies be used to rehabilitate existing generating capacity?

Answer. The \$15 billion increase would provide the necessary authority for the financing of the power program needs between now and 1985. During that time period, the increase in borrowing authority would permit the commitments to be made for a 7,200-MW increase in generating capacity. The size, number, and type of generating facilities has not been determined at this time.

Approximately \$11.4 billion of the \$15 billion increase is estimated to be for new generating facilities, and the remaining \$3.6 billion is to finance on-going programs, including completion of generating facilities now under construction; transmission facilities; improvements including pollution control equipment on existing plants; nuclear fuel investments; and financing for TVA's conservation programs.

Included in the \$3.6 billion are funds for additions and improvements to power facilities. This includes pollution control equipment and rehabilitation of some of TVA's older power facilities. Specifically, the estimate includes funds to rehabilitate the Ocoee No. 2 flume line, an increase in spillway capacity at Blue Ridge, and conversion of the Colbert unit 5 to balanced draft operation. Major rehabilitation work which may be required in the future but which has not been specifically identified at this time has not been included in the estimate.

Question. What are your plans for disposal of nuclear waste from these plants, and are any of the funds to be provided by this ceiling increase to be used for this activity?

Answer. TVA is providing interim storage of spent fuel at Browns Ferry Nuclear Plant and will provide such storage at those plants still under construction. We do not expect to need additional storage capacity until about 1989 or 1990. Storage needs beyond 1990 and alternatives to meet these needs are presently being studied. Disposal of low level waste is also under study at this time.

Because of the uncertainties, specific funding was not included in our request for new borrowing authority.

Question. How many power plants does TVA have in operation which are nuclear?

Answer. The Browns Ferry Nuclear Plant is the only nuclear plant TVA has in operation at the present time. The plant consists of three boiling water reactor units, each having a generating capacity of 1,065 megawatts.

Question. What does TVA believe will be the impact on consumers of the settlement which I just referred to?

Answer. The estimated increase in the annual cost of producing power on the TVA system resulting from the air quality settlement is \$447 million in 1982 dollars. Based on earlier estimates, this increase in annual costs results in about a 9 percent increase to the residential consumers at its maximum, going down to around 4 percent by the end of the 1980's. The offsetting impact to the consumer is that approximately one million tons of pollutants each year will be controlled and not emitted to the atmosphere, thus bringing air quality in the areas around our power plants within the standards prescribed by law.

Question. What portion of these funds will be used to implement the TVA/EPA air quality settlement?

Answer. To implement the TVA/EPA air quality settlement, approximately \$1 billion of capital investment will be required. About 30 percent of that amount has already been obligated. These obligations and most of the remaining investment will come from our existing borrowing authority and not from current revenues. Because we need additional borrowing authority just to complete the nuclear construction program now underway, the investment in these pollution control facilities does affect the total amount of additional funds needed.

Question. I understand this borrowing authority will allow you to make commitments for new generating plants for about five years. For how many years will these plants meet your estimated demand?

Answer. The increase in borrowing authority will provide for those commitments on new generating facilities made prior to 1985. This would increase TVA's generating capacity by about 7,200 megawatts which should adequately meet the region's needs until the 1994-95 time period.

Question. As you develop your power program over the remainder of this century, how do you view the relationship of coal- and nuclear-fired capacity? Do you both still believe in coal as you so stated when confirmed by this committee?

Answer. Yes. Even with aggressive conservation programs, coal and nuclear capacity will remain the most important elements of meeting the region's energy supply for the remainder of this century. The development of new generating technologies such as fluidized-bed combustion and fuel cells should enhance the role that coal-fired generation will play in meeting future energy needs.

Testimony before the U.S. Senate Subcommittee
on Inter-Governmental Relations

February 14, 1979

Knoxville, Tennessee

Presented by the Tennessee Valley Energy Coalition

My name is Charles Wilson, and I am here today representing the Tennessee Valley Energy Coalition and the National Council of Senior Citizens which is a member of the Coalition. The Tennessee Valley Energy Coalition is a newly formed organization comprised of the many various constituencies of the Valley: senior citizens, church, women, Appalachians, environmentalists, people on low and fixed incomes, rural and community groups. All of these interests have gathered together to respond in unison to the many rate issues which affect our security and well being.

The ratepayers of the Tennessee Valley will bear the brunt of any decision made about TVA's debt ceiling and thus have every legitimate right to be heard during discussion of that decision. We thank you, Senator Sasser, and the other committee members for recognizing that reality and permitting citizen testimony during these hearings.

In 1975 TVA went to Congress to increase its debt from \$5 to \$15 billion. Today 22% of our electric bills pays for the \$650 million interest payment TVA already must pay on the \$7 billion it has already spent for its nuclear power construction program. Already a great number of people on fixed and low incomes spend two-thirds of their monthly income on the electric bill. For most retired people, utility bills range from 10 to 70% of their income.

By 1981 the ratepayers will be paying over ^{billion}\$1 to meet the interest costs on
^

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the \$15 billion TVA will have spent on its power construction program. These interest payments do not even touch the costs of the debt retirement. This \$1 billion interest charge is roughly two-thirds of the original cost of all the dams and reservoirs built by the agency since 1933. TVA's financial condition is deteriorating quickly as the utility plunges ever deeper into debt.

Now TVA is urging Congress to raise its debt ceiling to \$30 billion dollars. It claims it needs the funds to complete the fourteen nuclear power units currently under construction, plants which have already incurred 100 to 200% cost overruns. TVA claims it needs the additional capacity even though the recent GAO report concludes that TVA will not need additional capacity through the end of the century.

The Tennessee Valley is already the most highly electrified region in the United States, and thus the world. Increased electrification means automation and loss of jobs, a fact many unions are beginning to recognize. TVA has a moral responsibility to the citizens of the Valley to reverse this trend towards increased electrification; however, TVA pretends that the situation is out of its control and that it can only meet the demand.

By building ever more capacity is TVA supplying demand or is it creating it? How does TVA fit into the plans for a national grid? Will TVA be the supplier of power that is cheaper because of its ability to get low interest federal loans? More and more ratepayers are coming to the realization that the Tennessee Valley is being turned into an energy colony for the benefit of other utilities, while we, the ratepayers, must pay for the costs of construction and interest and bear the environmental burdens associated with coal and

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nuclear generation. TVA ratepayers are being forced by TVA to subsidize other utilities when TVA becomes an exporter of power. Already, both Freemans have admitted that when all the nuclear plants are on line, TVA will have such an excess of generating capacity that it will be able to sell power to other utilities.

Ratepayers have not been privy to any of these TVA decisions and so our opinion on this matter has not been heard by TVA, nor will TVA probably ever ask for it. Let us state right now for the record that TVA was established as a regional entity to develop the resources of the Tennessee Valley. TVA must be encouraged to remember its historic commitment to the welfare of the Valley citizens. We oppose its recent trend towards considering itself an agency with primarily a national responsibility. Such an orientation is new to TVA and very dangerous and expensive for its ratepayers.

Conservation, solar energy, load management and rate restructuring are all options that TVA can utilize to decrease current needs for power consumption. Indeed, if TVA is sincerely interested in the interests of the Valley and in demonstrating to the nation that society can free itself from ever larger energy fixes, such option will become central to TVA planning. The power needs of the Valley could be met through alternative means which might even make unnecessary completion of Yellow Creek, Phipps Bend and perhaps even Hartsville. The Tellico sage taught us all a lesson: we don't have to complete an idea that was not well thought out to begin with. Such a course of action would save the ratepayers billions of dollars and end the necessity of raising TVA's debt ceiling.

However, such are not TVA's current goals, whatever they are. That, by the

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way, is a great problem for citizens. TVA says it always has these plans and studies, but these documents are never released to the public to permit our study and educated response until just before they are implemented. TVA seems afraid to involve citizens in such vital decisions as power construction plans. It announces its plans and expects the ratepayers to pay. The Coalition urges Congress to encourage TVA to open itself to citizen participation in its planning processes so that the people it so drastically affects have the guaranteed opportunity to have our opinions heard and considered before decisions are made. We don't need to remind this committee that TVA is a self-regulating agency with no other watchdog agency other than Congress itself. It is perhaps time to extend democracy to the Tennessee Valley and change that cumbersome and underrepresentative mechanism.

The TVA was established as a yardstick so that other regions of the country and other utilities could learn from the TVA model. Are we to gather from these events that the model being proposed for the country is that ever increasing debt is the way to go? TVA has not been fiscally responsible. Now it wants the debt ceiling raised to THIRTY BILLION DOLLARS. Such deficit spending breeds inflation. Moreover, the increase of the debt ceiling will bring TVA that much closer to default, a circumstance that will place the entire debt into the hands of the federal government.

TVA has already admitted that with the completion of all its nuclear units it will have more power than it needs. The GAO report contends that TVA won't need additional capacity until the end of the century. TVA has only begun to experiment with conservation, solar energy and load management which will decrease demand on existing capacity.

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We urge this committee to decide that the TVA debt ceiling not be raised any further and that it suggest to TVA that it consider delay of the Yellow Creek, Phipps Bend and Hartsville units to better manage its fiscal resources. Further, we urge this committee to encourage TVA to integrate conservation, a realistic solar energy program, load management and rate restructuring into its power projections and to demonstrate to the nation in its role as a yardstick how these options can reduce the need for electricity. Finally, TVA's regional nature must be reaffirmed to discourage current trends toward satisfying national energy needs. We here in the Valley consider TVA as a great potential asset once it has become responsive to the needs of the Valley rather than its own internal whims or grandiose aspirations.

We need TVA to meet our needs here in the Valley. TVA has a moral responsibility to respond to our needs. We need your help to remind TVA of that. We urge you to listen to us. Thank you.

(Members of the Coalition: National Council of Senior Citizens (Knoxville), East Tennessee Energy Group, Citizen/Labor Energy Coalition, Save Our Cumberland Mountains, Southerners for Economic Justice, Southern Appalachian Ministry, Volunteers for Clean Energy, Cumberland Clean Energy, Carter Community Senior Citizens, FOLK, Concerned Citizens of Tennessee)

Testimony of the East Tennessee Energy Group before the Senate Budget
Committee., Knoxville, Tennessee, February 15, 1979

I am John Z. C. Thomas from the East Tennessee Energy Group. We thank you for opening up this hearing to citizen participation and for this opportunity to testify before the subcommittee. The voice of citizens is too frequently ignored in the Tennessee Valley Authority's decision making process. The so-called public meetings on the fuel adjustment clause or the rate reviews are merely comment periods on decisions already taken and thus because they are so meaningless they are poorly attended. At the moment there is no mechanism for broad citizen input to be incorporated in the decision on whether to increase TVA's debt limit ceiling. This hearing is the only chance citizens will have to have input on that decision. We appreciate this opportunity but it is not enough. That, however, is not your fault.

You have listened today to much testimony on TVA's growth projections. Unfortunately such projections are an inexact science, to say the least, and generally can be made to prove whatever you want to prove. Although such projections are important in deciding whether to raise TVA's debt limit ceiling, there are other considerations that need to be taken into account.

In 1975, TVA approached the U.S. Congress and had its debt limit ceiling raised from five billion to fifteen billion dollars. In less than four years they have contracted to spend that money and they are now asking you to further increase their borrowing power from fifteen to thirty billion dollars. To what end? That is a most important question since TVA has indicated no specific uses for the money except for a couple of billion dollars necessary to finish their current construction commitments. There have been hints that another nuclear facility is on the books and the General Accounting Office Report (EMD-78-91) mentions the possibility of at least one more pump storage facility. The nuclear plant was in the budget for fiscal

year 1978 but was omitted from the 1979 budget. Thus we are left with over ten billion dollars for which there is no explanation other than TVA's projected growth projections. This is irresponsible financing especially since TVA undoubtedly has some idea of what type of future capacity they are planning. If they do not have such plans they are even more irresponsible.

TVA's last increase was to fulfill its commitment to nuclear power and we are fearful that, that is what the current request for additional borrowing authority will be used for. In this region, in this day and age, such a commitment goes against the best interest of the people of the region for two reasons. This is coal country and to embrace a technology that has as its end result the retiring of coal-fired plants is not in the best interests of Appalachia's economy. By going nuclear and ignoring coal supplies TVA is doing incredible damage to the future job market in this area. That and that alone is sufficient grounds to reconsider financing TVA's expensive nuclear option.

Equally as important is the interest costs for TVA's nuclear commitment. This increasingly is going to become a greater and greater burden on the Valley's citizens, especially those on low or fixed incomes. In the rate review coming up interest expense for fiscal year 1979 is projected to be 655 million dollars as compared to approximately 437 million dollars in 1978 and 384 million dollars in fiscal year 1977. The projected interest expense for fiscal year 1979 is only slightly less than half of TVA's projected fuel expense. One would almost think they are literally burning money. Almost all of this increase can be attributed to TVA's nuclear construction program. By 1981 when TVA, at the most will have on line three nuclear plants, the interest expense is expected to reach more than one billion dollars annually. Before subjecting the Valley's ratepayers to this burden careful consideration should be given to the need for increasing the debt limit ceiling.

There are persistent rumors that part of TVA's excess capacity, some of which will be built with an increased debt limit ceiling, will go for the export of electricity. We have been exporting energy for the last twenty years in the guise of enriched uranium and we are tired of being an energy colony. Regardless of how you look at it, it costs us more than we get in return. It costs our environment, our jobs, and our lifestyle. Certainly any increase in the debt limit ceiling should be tied to a requirement that energy produced in the Valley will stay in the Valley.

Before raising TVA's debt limit ceiling you should carefully review TVA's past practices, especially those for its nuclear program. In the light of the debate over TVA's current growth projections you should consider the ones used to justify TVA's last three nuclear plants—given that those projections were a lot less sophisticated than the current ones under review.

Furthermore the cost-benefit analysis for the nuclear plants should be reviewed to see if they are still viable. TVA is notorious for doing a poor job of projecting costs. This is amply demonstrated in the cost overruns for TVA's nuclear facilities. For the Sequotah plant it is now 227%, for Watts Bar it is 115%, for Bellefonte it is 100%, for Hartsville it is 122%, and for Browns Ferry, the only plant operating, it is 135%. TVA's last two plants have a current cost overrun of 13% each but then construction has barely started on Phipps Bend and Yellow Creek. Although a lot of this increase is due to inflation that is no excuse since TVA has always claimed to have taken that into consideration in its cost-benefit analysis.

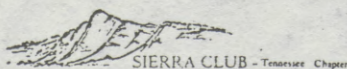
As an aside let me say that a lot of the above mentioned problems might not loom so large in the future since TVA is now under new leadership. Regardless of future plans to correct the inequalities of the past, such previous mistakes should not be allowed to survive merely because the projects have already been started. By getting the projections and cost-benefit analysis to come out as they wished the old TVA

was able to get questionable projects authorized.

My final point deals with public participation in TVA's decision making process—effective public participation. Before TVA's debt limit ceiling is raised there must be public education and public hearings. TVA said in January that none were planned, that none were needed because they did not have any other option except to ask for the increase. There are other options, some of which have been pointed out today. And certainly before the debt is increased those of us that are going to have to pay for it ought to know how much it is going to cost and what it is going to be used for. And this time we want understandable figures and information that reflect what is going happen, not what TVA wants to happen. After all, in the end we are the ones that are going to have to live with whatever results. This is our home and we cannot move away or retire and leave the mess for someone else to clean up.

If TVA is as serious about its public participation program as their press releases say, then this is a good opportunity to educate the people of the Valley as to TVA's plans and problems. Then they could have meaningful public participation and a decision could be made by all the people of the Valley not just a few. Maybe the increase is necessary but we have no evidence that it is except to be told so. That is not good enough. If TVA is not serious about Citizen Action then the whole new character of the agency is a sham. In fact, the new TVA is beginning to look like the old TVA in different clothes.

John Z. C. Thomas
East Tennessee Energy Group
1538 Highland Avenue
Knoxville, Tennessee 37916



TESTIMONY OF WILL SKELTON FOR THE TENNESSEE CHAPTER, SIERRA CLUB,
BEFORE THE HONORABLE JAMES SASSER ON FEBRUARY 15, 1979

My name is Will Skelton and I would like to make several comments on behalf of the Tennessee Chapter of the Sierra Club in connection with the proposed increase in the debt ceiling of the Tennessee Valley Authority. TVA has long been recognized as a yardstick utility for low electric rates, thanks principally to abundant natural resources. That reputation was, in TVA's early days, due to abundant hydro generation capacity, similar to that found on the Columbia River in Washington. When the prime hydro sites proved insufficient, TVA turned to coal generation of electricity and benefited from the Valley's proximity to massive reserves of coal. TVA is now, unfortunately, turning to a third primary source of generating capacity--nuclear.

TVA is currently constructing and/or plans to construct 6 nuclear power plants, plus Brown's Ferry which is already operational. Their construction is the primary reason for our being here, and the need for TVA to borrow up to 30 billion dollars. We feel TVA is overemphasizing the nuclear alternative to the exclusion of other viable alternatives and, as a result, is sowing the seeds that will make TVA a yardstick utility in the future--but on the high side of the scale this time. Why do we feel this way?

1. Coal continues to be a viable option for the short and middle term future. Coal reserves in the Southern Appalachians are still massive--200 years or so worth. The Surface Mining Act and TVA's finally agreeing that the Clear Air Act applies to TVA reduce significantly the environmental problems of coal. The Mine Safety Act can make deep mining safe, if enforced. New techniques can and will make coal more efficient, safer and cleaner.
2. Conservation can make a difference. Congress' own investigative arm, the GAO, has confirmed TVA's overemphasis on future demand and underemphasis on conservation.
3. Finally, and very important, the nuclear option is economically becoming a disaster area. The Sierra Club is, of course, principally concerned with the environmental hazards of nuclear power. However, environmental objections have stopped or slowed the construction of very few nuclear plants, with a few well publicized exceptions. Instead, straight economics is killing nuclear power. William Mooz of the Rand Corporation says regarding price escalation of nuclear power: "You have to wonder if nuclear can be competitive." He is talking principally of construction costs; if you calculate also the increased costs of security at nuclear plants, the skyrocketing cost of nuclear fuel, the cost of decommissioning the plants after 35 years or so,

"Not blind opposition to progress, but opposition to blind progress."

and the cost of maintaining the site and waste material forever, then nuclear power is certainly no bargain. Private utility companies are realizing the uncertain economics and, as a result, only two nuclear reactors were ordered in 1978, while twelve were cancelled. For both economic and environmental reasons, numerous states and other countries have severely regulated or banned nuclear power plants. And yet, in the midst of what is certainly a huge question mark over the future of nuclear power, TVA blissfully proceeds toward placing a greater and greater reliance on nuclear power; more than any other large American utility. TVA wants the biggest nuclear power plant, and they want the most nuclear power plants. And, the pricetag for this extremely expensive technology will be paid by the consumer, who's had little opportunity to support or oppose the decisions being made by TVA.

We urge you to vote against and work against any increase in TVA's current debt ceiling of 15 billion dollars, which is probably already too high. TVA's debt is already proportionately higher than most other utilities, which should raise some rather serious questions for Congress. For example, for each megawatt of generating capacity, Duke Power has \$177,109.11 of debt. The Southern Company has \$198,988.65 of debt, and TVA, in sharp contrast, has \$266,360.85 of debt. The comparison will worsen as TVA's nuclear program continues, especially if the debt is raised. In 1979, for example, TVA will have \$366,638.06 of debt per megawatt of generating capacity.

If the result of no increase in TVA's debt ceiling is the cancellation of one or more nuclear power plants, so much the better, for the reasons discussed before. Instead, let TVA economize for a change (their overstaffing and inefficiencies are widely discussed and known); let them encourage and even require conservation of energy; and let them continue using our local supplies of coal rather than going to North Dakota or New Mexico for uranium. Otherwise, a 30 billion debt will mean an oppressive burden on the rate payer, and even the 30 billion may not be enough (they told us only a short time ago that 15 billion would be enough). The interest alone on 30 billion dollars at 8% per annum would be 2.4 billion dollars a year, or \$1,000.00 per year for every TVA residential customer. Of course, TVA may not borrow the full 30 billion (but they're requesting authority to) and the full interest charge would not be passed on solely to residential customers; however, the magnitude of the rate payer's potential liability is clear.

TVA will apparently not economize itself; their only solution to an obvious problem is to throw more money, our money, at it. Hopefully, Congress will act to restrain TVA's spending habit. We support a proposition 13 for TVA in the form of a refusal to increase their current debt ceiling.

Thank you.

Additional Information:

<u>Company</u>	<u>Total Generating Capacity*</u>	<u>Total Debt*</u>
Duke Power	12,446 MW	2,204,300,000
Southern Co.	23,632 MW	4,702,500,000
TVA	27,031 MW#	7,200,000,000**

*Late 1978

TVA, System Capacity publication dated November 9, 1978

**Knoxville Journal, January 29, 1979

TVA residential customers: 2,400,000

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C.

FOR RELEASE ON DELIVERY
EXPECTED AT 10:00 A.M. EST
FEBRUARY 15, 1979

STATEMENT OF
J. DEXTER PEACH
DIRECTOR, ENERGY AND MINERALS DIVISION
BEFORE THE
COMMITTEE ON BUDGET
U.S. SENATE

Senator Sasser:

We appreciate your invitation to discuss our recent report entitled "Electric Energy Options Hold Great Promise For the Tennessee Valley Authority." My statement will focus on two areas in which you expressed special interest.

--The conclusion in our report that TVA could meet power needs through the year 2000 without constructing any more central station power plants beyond those under construction or licensed by emphasizing instead: energy conservation, improved power management, and the use of renewable resources.

--The implication of our report on TVA's request to increase its borrowing authority above the existing \$15 billion.

NEED FOR BETTER
LONG RANGE PLANS

TVA has important responsibilities not only as a supplier of electricity, but also as an energy leader. Our work showed a need for different programs and priorities if TVA is to reflect national energy goals and to continue its role, since its creation in 1933, as a national yardstick.

When we started our work, TVA's future planning was based on a July 1977 single load forecast which projected an average annual electricity growth rate of 4.5 percent for a 15 year period. We believe the use of a single estimate for electricity growth implies that the amount of growth required is predetermined when, in fact, considerable influence can be exercised. It is for this reason that we developed two alternative projections designed to evaluate the effects of various conservation and other programs consistent with emerging national energy goals. Our high projection indicated an average annual growth rate to the year 2000 of 4 percent and our low projection an average annual growth rate of 2.7 percent.

Of course, we cannot state with certainty that either of our projections will precisely represent the future. I believe they do show, however, that increased emphasis on conservation and demand management could reduce substantially the electricity which will be required if such measures are not taken.

We believe TVA has the opportunity to demonstrate the benefits of pursuing various demand options in residential applications, power management, and solar alternatives. By exercising various options, TVA could (1) reduce the growth rate of energy demand, (2) make the existing power system more efficient, and (3) defer new generating systems. For example, TVA could save electricity and reduce energy-related costs in area households by implementing the three residential programs in the National Energy Plan. These include appliance efficiency standards, thermal standards for new construction, and several measures to encourage insulating existing residences.

Many options also exist for meeting the TVA region's power needs other than through its traditional focus on large central station nuclear construction. Our analysis showed that completion of plants presently under construction or licensed could, when coupled with a new efficiency in consumption, meet demand through the early 1990's. With expanded conservation, improved power management, and the use of renewable resources, our analysis showed the region could meet its power needs through 2000 without thermal plant construction beyond that now in the licensing process. This would allow time for evaluation, development, and testing of alternative options before making additional commitments to large central station units.

To take advantage of this opportunity, we recommended that TVA abandon its practice of issuing a single forecast based largely on extrapolation of historic trends. Instead,

TVA should develop a long-range comprehensive plan and several demand forecasts which could better reflect changing national goals. Such a plan could assess optional courses of action both from a cost-effectiveness viewpoint and in terms of TVA's yardstick function. TVA and the public could then evaluate the benefits and costs of alternative electricity futures and, as our projections suggest, consider initiatives which could influence future trends in electricity use.

While doing our work, we maintained an open dialogue with TVA regarding our tentative findings and conclusions including a briefing of the now Chairman of the TVA Board, after his appointment as a board member was announced. We believe TVA's overall response has been positive, particularly its efforts to improve in its planning and forecasting system. In July 1978, TVA developed several forecasts and extended its forecasts further into the future. In addition, TVA expanded its conservation-related programs.

TVA's most recent projections include four forecasts, the lowest of which is close to our high projection. We believe this approach is a step in the right direction and will offer TVA management some new opportunities for considering various options for the future.

As part of TVA's long-range comprehensive plan, we recommended that it undertake the following demand options.

- Increase efforts to implement national energy goals.
- Actively encourage installation of heat pumps in all new construction, in conjunction with the education and certification of heat pump installation and maintenance.
- Study and implement seasonal and time-of-day rates.
- Expand the use of interruptible contracts, but offer them on a regular interruption basis rather than an emergency.
- Initiate a program to switch off hot water heaters and larger air conditioners during peak hours.
- Evaluate and pursue opportunities for matching variable loads in the region.

To further decrease electricity demand, TVA should:

- Promote the use of solar passive building design with incentives such as design awards for builders, similar to the heat pump and Super Saver home programs.
- Design a strategy similar to the above promotion for solar water heating. In addition, TVA should provide alternatives for making these systems economically competitive for the consumer (such as reduced rates) since they are less costly to the power system than adding new generation capacity.
- Participate with the Department of Energy in the research and development of solar space heating and cooling for applications in the region.

--If the above options and other TVA initiatives do not adequately reduce demand, TVA should consider applying a power rate surcharge or issue bonds to provide money that could be used as an incentive to further conservation and the use of renewable resources.

Concerning energy supply alternatives, TVA should undertake an application/demonstration of cogeneration technologies, flue gas desulfurization technologies in its coal-fired plants, and construct commercial scale atmospheric fluidized bed combustion. Federal funding should be requested for that portion of the costs of these projects that exceed TVA's incremental cost per kilowatt. This would prevent TVA's customers from bearing the additional cost of a demonstration that benefits the Nation as a whole.

If TVA carries out the recommended programs, it can regain its position as an energy leader and as a model for the utility industry. Not only the Tennessee Valley, but the entire Nation, stands to benefit. To assure this outcome, we believe the Congress should revise TVA's legislative charter to better reflect current national energy priorities. TVA should be charged with:

- leading in the development of electricity management plans and programs,
- encouraging energy conservation and the most efficient production and use of energy,

- encouraging the use of renewable resources, and
- assuring adequate public involvement in energy planning and policymaking.

TVA BORROWING AUTHORITY

In regards to TVA borrowing authority, the Congress authorized TVA to incur a total indebtedness of up to \$15 billion to finance its power program. As of September 30, 1978, TVA had \$7.2 billion indebtedness outstanding and projected an outstanding level of \$9.1 billion by September 30, 1979.

Although our TVA study did not directly address the need for additional borrowing authority at this time, GAO has also conducted a recent review of cost overruns on three TVA nuclear plants under construction. That review indicates that additional borrowing of \$11.8 billion will be needed to finish the construction of those three plants and all other nuclear plants now under construction which are scheduled for completion by 1986. An internal TVA study, which we did not verify, shows that the \$15 billion borrowing authority could be exceeded by 1983 and indebtedness could reach \$28 billion by 1988. In addition, some funding would be needed to carry out the type of programs we have recommended in our report.

It seems clear that at a minimum TVA will need an increase in its borrowing authority to about \$20 billion just to finish the nuclear plants under construction.

Beyond that, the additional amount needed and timeframe for when it will be required could vary significantly. As our alternative projections have indicated, the need for adding additional capacity is based on many assumptions and uncertainties and there are various options available for decreasing or meeting demand that could have significant impacts on TVA's borrowing needs.

This is the key reason we suggested in our report closer congressional oversight of TVA operations. We recommended that TVA's plans should be reviewed and commented on by as wide a spectrum of regional citizens and institutions as practicable and by the Department of Energy, to assure consistency with national priorities. TVA, when its final plan is finished, should submit it to the Congress. The Congress should then evaluate and monitor the implementation of the plans. We of course would stand ready to assist the Congress in this regard.

This concludes my prepared statement. I will be happy to address any questions you may have.

Statement by Alex Radin, executive director
American Public Power Association, Washington, D. C.
for hearing before Senate Environment and Public Works
Committee re S. 436, to increase TVA borrowing authority,
February 23, 1979

I am Alex Radin, executive director of the American Public Power Association, a national association representing more than 1,400 local public power systems, mainly municipally-owned utilities, in 47 States, American Samoa, Guam, Puerto Rico and the Virgin Islands.

In the Tennessee Valley, there are 110 municipal electric systems that purchase their entire wholesale power supply from the Tennessee Valley Authority (TVA). These municipal power systems include major cities including Chattanooga, Knoxville, Memphis, and Nashville, Tennessee, Huntsville, Alabama, and others.

These city-owned electric power systems--in parts of Alabama, Kentucky, Mississippi, North Carolina, Tennessee and Virginia--are major purchasers of TVA electric power. They look to TVA as their sole supplier of electricity to serve their growing communities.

We strongly support an increase in TVA's borrowing authority, from the present level of \$15 billion to at least the \$30 billion ceiling as proposed in S. 436 and as recommended by the Administration. This authority has been increased several times in the past by Congress, since enactment of the 1959 self-financing amendments to the Tennessee Valley Authority Act of 1933.

TVA has acted responsibly in using the borrowing authority given to it by the Congress. We urge the committee to approve promptly an increase in TVA's borrowing authority.

TVA must make decisions this year that will determine the Tennessee Valley's power supply 10 to 12 years from now. It is our understanding that the additional borrowing authority under S. 436 will take care of the needs for the next five years. TVA needs added borrowing authority to complete the power plants now under construction; and to begin to place orders for new generating capacity. TVA estimates that it must, within the next five years, make commitments for about 7,200 megawatts of additional generating capacity to meet estimated load growth.

A major part of that load growth will be by the electric consumers served at retail by the municipal electric systems in the Tennessee Valley area. We urge, therefore, that the committee promptly approve S. 436 in order to assure adequate future power supply for the electric consumers of the Tennessee Valley.

Attached is a resolution adopted on January 24, 1979 by the Legislative and Resolutions Committee of the American Public Power Association.

The resolution places the Association in favor of removal of the ceiling on TVA's borrowing authority, since TVA would not issue bonds or notes to finance additional electrical generation and transmission facilities unless there was a need for those facilities. However, if the Congress chooses not to remove the ceiling on TVA's borrowing authority, the Association "fully supports the proposed \$15 billion increase this year in TVA's borrowing authority."

American Public Power Association
RESOLUTION CONCERNING PROPOSED INCREASE IN TVA BORROWING AUTHORITY

WHEREAS, the Tennessee Valley Authority (TVA) for the past two decades has financed its electric power supply program through revenue bonds and notes backed up electric revenues from the sale of electric energy to consumers in the Tennessee Valley region, and

WHEREAS, the Administration has proposed that the present \$15 billion ceiling on TVA's borrowing authority be increased to \$30 billion, and

WHEREAS, this additional authority is essential if TVA is to continue to meet the growing electric needs of the Tennessee Valley's homes, farms, business and industry in an efficient and timely manner, and

WHEREAS, a lack of adequate electric power supply would slow the economic growth of the region, affect jobs of workers, and place a lid on the region's progress, and

WHEREAS, TVA's efforts to reduce the need for more power plants through energy conservation and increased power plant efficiency, though highly commendable, do not eliminate the need for additional power generating capacity, and

WHEREAS, lack of additional borrowing authority would force TVA to raise capital for new power plants through much higher electric rates, thus penalizing present rate payers, and

WHEREAS, TVA revenue bonds and notes are not guaranteed by the Federal Government, but are backed solely by power revenues from Tennessee Valley rate payers;

NOW, THEREFORE, BE IT RESOLVED: That the American Public Power Association supports removal of the ceiling on TVA's borrowing authority, to enable this Federal agency to continue to meet the power needs of the Tennessee Valley, including the 110 municipal power systems and 50 rural electric cooperatives that provide electricity at retail to more than six million people, as well as the Federal agencies and industrial customers of TVA; and

BE IT FURTHER RESOLVED: That the Association fully supports the proposed \$15 billion increase this year in TVA's borrowing authority, if the Congress chooses not to remove the ceiling on TVA's borrowing authority.

Adopted by American Public Power Association
Legislative and Resolutions Committee at a meeting
in Washington, D. C. on January 24, 1979

STATEMENT ON FUTURE ELECTRIC
ENERGY DEMAND IN THE
TENNESSEE VALLEY AUTHORITY
POWER SERVICE AREA

by

Robert A. Bohm
The University of Tennessee
Knoxville, Tennessee

February 15, 1979

STATEMENT ON FUTURE ELECTRIC ENERGY DEMAND IN THE TENNESSEE
VALLEY AUTHORITY POWER SERVICE AREA

prepared by

Robert A. Bohm
Professor of Finance
Associate Director, Environment Center
Knoxville, Tennessee

My name is Robert A. Bohm and I am currently Professor of Finance and Associate Director of the Environment Center at the University of Tennessee (UT). During the past eight years, I have been engaged in research on the topic of energy supply and demand as well as on the related topic of the environmental impact of energy production. During 1977-78, along with several of my colleagues at the University of Tennessee, I worked on the United States General Accounting Office's (GAO) evaluation of Tennessee Valley Authority (TVA) power programs.

The GAO report entitled Electric Energy Options Hold Great Promise for the Tennessee Valley Authority was issued on November 29, 1978. The involvement of the University of Tennessee faculty and staff was greatest in chapters four through seven of the report. These chapters contain the analysis of future energy demand in the TVA region and consideration of alternative supply strategies for meeting projected demand. Also included in these chapters are evaluations of several proposed energy demonstration programs that would affect both the demand and supply side of the energy equation.

In my remarks today, I would like to address several issues raised by the GAO study. First, I will review several alternative projections of

energy demand now available for the TVA region and discuss their meaning for future energy supply and the financing of TVA demonstration programs.

Second, I will comment briefly on the relationship of these demand projections to the possible necessity of raising TVA's borrowing authority from \$15 billion to \$30 billion. Finally, I will comment on my understanding of the rationale behind the GAO study of TVA power programs and the current relevance of the findings of the study. Let me emphasize that the statements that I will be making are my own opinions and do not represent the position of GAO or the University of Tennessee

Projections of Energy Demand and Supply

Two of the principal objectives of the GAO study were (1) to evaluate the feasibility of TVA undertaking several national demonstration projects for emerging energy technologies and (2) to establish grounds for financing these demonstrations out of power revenues or alternatively by means of appropriated funds. Until the summer of 1978, TVA provided only a single load forecast. The GAO demand projections were prepared to provide a context within which to consider alternative supply strategies and demonstration proposals. In this way, we were able to interject into our analysis the high degree of uncertainty that existed over the future course of electric energy demand. Proposed demonstrations of emerging technologies or conservation programs could then be more properly evaluated against scenarios of high and low energy demand.

Three projections of demand through the year 2000 were presented in the GAO report. The existing TVA forecast was taken as a representative high projection. Two lower "GAO" projections were prepared. Let me briefly review how these projections were made.

- (1) For federal demand, the projections provided by the Department of Energy to TVA were taken as given.
- (2) For residential demand, the Oak Ridge National Laboratory (ORNL) Residential Energy Model was adapted to the TVA region.
- (3) For commercial and industrial demand, an aggregate economic model was developed and estimated especially for the GAO study.

The two models were capable of projecting future energy demand based on assumed rates of change in energy prices and regional economic growth. In addition, the ORNL model contained so-called engineering variables that allowed direct estimation of National Energy Plan impacts on TVA residential power demand.

The GAO "high" demand projection was based on relatively rapid economic growth, no increase in the real price of electricity and ineffective conservation programs. The GAO "low" projection assumed lower economic growth, an increasing real price of electricity, and increased efficiency in the use of power. Table one contains data on the implicit compound growth rates of electric energy demand in the TVA region presented in the GAO study and compares these with the TVA January 1979 Load Forecast. These data illustrate two important points. First, all projections show a slowing down of demand growth over time. Thus, to compare any projection in the GAO report through the year 2000 with the current TVA load forecast is somewhat misleading because the TVA forecast concentrates on the period to 1990 and thereby excludes the slow growth 1990-2000 decade. The second point has to do with the vast array of alternative load forecasts now produced by TVA (one of the major recommendations of the GAO report was that TVA prepare multiple forecasts). A careful reading of Table one will reveal several of the 1979 TVA forecasts are lower than the GAO low projection.

Table 1
Implicit Compound Growth for Electric Energy Demand
in the TVA Region

	Without Federal Purchases	Percent	With Federal Purchases
A. GAO STUDY PROJECTIONS			
1. From 1975 to 2000			
TVA (1977)	4.8		4.5
GAO High	4.3		4.0
GAO Low	2.7		2.7
2. From 1975 to 1992			
TVA (1977)	4.5		4.7
GAO High	4.0		4.3
GAO Low	2.7		3.4
3. From 1992 to 2000			
TVA (1977)	3.4		2.9
GAO High	3.2		2.7
GAO Low	1.3		1.0
B. TVA JANUARY 1979 LOAD FORECAST			
1. From 1979 to 1990			
High	4.5		5.1
Mid Range	1.8-3.6		2.8-4.3
Low	1.0		2.2
2. From 1990 to 2000			
High	4.8		4.1
Mid Range	1.8-4.2		1.4-3.5
Low	0.8		0.6

Source: Electric Energy Options Hold Great Promise for the Tennessee Valley Authority. Report to the Congress by the Comptroller General, November 29, 1978, p. 4-5; and January 1979 Load Forecast, Tennessee Valley Authority.

Turning to the supply side, we adopted as a baseline objective the meeting of projected demands a minimum cost. Utilizing linear programming techniques, it was then quite simple to construct minimum cost supply scenarios for each demand projection. Largely because of the favorable TVA load configuration, our supply side analysis was largely confined to finding the least cost methods of meeting baseload requirements. It was concluded that nuclear systems would be the least expensive through the mid-1990's with coal-based fluidized bed systems cheaper thereafter.

It was from our supply side analysis that the conclusion was reached that if the low demand projection proved correct, then TVA might not need additional generating capacity before the year 2000 beyond those plants under construction or planned (i.e., beyond the Yellow Creek Plant). Perhaps this conclusion can best be put in proper perspective with a quote from the UT Environment Center's report to GAO entitled, "The reader should be kept aware constantly that none of the [demand] projections presented..... have any claim to superiority or likelihood. Each is based on a different set of plausible assumptions about what the future will bring. The authors have attempted to keep their analysis free of their own personal feelings and biases, for the implications of being wrong are enormous in either direction. If the TVA projections are accepted as the basis for planning capacity additions, and one of the lower projections proves closer to the mark, valuable and scarce resources could be wasted. On the other hand, if one of the lower projections is accepted and proves too low, crash efforts or critical shortages could result" (page 52).

With demand projections and minimum cost supply scenarios in hand, it was then possible to evaluate proposed energy demonstration programs and consider alternative methods of financing them. Proposed demonstrations that raised the cost to TVA rate payers above the minimum cost scenarios and also exceeded the direct benefits to residents of the region were clearly candidates for financing via the appropriations route. Demonstrations that yielded benefits to residents of the region or did not raise power costs might legitimately be funded out of power revenues. Clearly, a demonstration of an advanced energy supply technology must be evaluated differently under conditions of low and high projected energy demand. For example, with high demand a demonstration will yield needed power and merely replace some alternative production systems. Under such conditions a direct benefit accrues to the rate payers and hence it would seem appropriate to employ power revenue financing for part of the cost of the demonstration. In the case of low demand, additional generating capability would not be needed and hence from the point of the TVA system, the demonstration would create excess capacity. Obviously, in this latter case, heavier reliance on appropriated funds would be the desirable financing alternative.

Future Demand and TVA Borrowing Authority

Without careful analysis of the TVA's financial projections, it is impossible for me to state exactly how much borrowing authority I believe is needed in the future. However, even without being able to pinpoint an appropriate debt ceiling, several important issues raised by the request to increase the limit to \$30 billion can be addressed.

First, let us dispense with the notion that unused borrowing authority will somehow burn a hole in TVA's corporate pocket and lead to

construction of unneeded power plants. TVA borrows money to finance capital outlays on new capacity required to meet projected demand. This chain of causation cannot be reversed. Investors that purchase TVA power bonds expect to receive both interest and eventual repayment of principal. These cash flows to investors are derived from TVA power revenues. Idle capacity does not produce revenue and as a result TVA's ability to meet its interest and principal repayment obligations would be called into question. Only if TVA could raise rates at will and with complete disregard for the cost of production, would it perhaps be possible to market bonds to finance unneeded capacity. I doubt that the electricity consumers of the TVA region or the Congress would permit such irresponsible fiscal behavior to continue for very long. To summarize, therefore, even if TVA wished to construct unneeded power plants, great difficulty would be encountered financing them even in the presence of unused borrowing authority.

The TVA's actual need to issue debt must be tied to projections of the future demand for electricity and the expected future cost of capital equipment. Projections such as the GAO low demand projection imply little need for additional capacity beyond that already licensed or under construction. The first question that must be answered, therefore, is with low demand growth would TVA need additional borrowing authority?

Under conditions of low demand growth, TVA has two options: (1) complete already planned facilities on schedule and undertake little or no new construction in the 1990's; or (2) extend the construction schedule of already planned facilities into the 1990's. Since TVA is required to have bonding authority to cover its financial obligations, the second option could lead to higher debt requirements as obligations from earlier years

are extended and layered on top of those commencing in later years. Under either option, however, the key factor that might lead to a need for higher borrowing authority is inflation. The TVA must make its financial plans in terms of nominal dollars rather than real or deflated dollars. As a result, some assumption as to the future rate of inflation must be made. The higher the rate of inflation assumed by TVA, the more likely is a request for additional borrowing authority at an early date.

What about the case where demand is above the low levels indicated by projections such as the GAO low projection? The TVA would have to plan for additional new on-line capacity in the early 1990's and financial obligations would begin in the 1980's. It should also be mentioned that the various national demonstration programs TVA is proposing to undertake, to the extent they are funded out of power revenues, will draw upon TVA's borrowing authority to meet capital expenditures.

In conclusion, we can state that if TVA is at or near its current debt ceiling of \$15 billion, there are good reasons for believing that additional borrowing authority will be needed in the early 1980's. Two factors that would lower the pressure on TVA's debt ceiling are lower power demands and a low rate of inflation. A third possibility might revolve around heavier reliance on supply systems that have a relatively short construction period (as with industrial cogeneration)*. With conventional coal or nuclear baseload plants, decisions to build must be made 10-12 years before any power will actually come on line. As a hedge against the risk of

*This point was suggested to me by William U. Chandler of the UT Environment Center.

having too little productive or financial capacity, planners are likely to overstate the energy demand growth rate and the assumed inflation rate. If the construction lag could be cut to five years, projections would have a somewhat higher degree of certainty about them, and upward biases resulting from a long 10-12 year planning horizon might be reduced thereby cutting the projected need for borrowing authority.

Relevance of the GAO Study

It has always been my opinion that the rationale behind the GAO study was to present a case for establishing a role for TVA as the principal national demonstration agency in the energy field. It was felt at the onset of the study that this traditional TVA function had atrophied over the years almost to the point where it was difficult to distinguish TVA from a private power company.

The current validity of the findings and conclusions of the GAO report must be viewed within the time frame in which the study was conducted. The majority of the work performed at UT was completed prior to the end of 1977. The report itself was essentially finished by April 1978. The TVA had a complete draft in hand before the end of spring, 1978 and access to much of the analysis at earlier dates.

Also, it should be noted that during 1977-78, those of us working on the study were trying to take aim on at least two moving targets. The first was the energy market itself. Demand parameters and elasticities were changing rapidly and new information on price trends, costs of emerging technologies, etc. appeared almost daily. It was clear that with so much flux in the market, no 25 year demand forecast could stand the test of time. As a result, we eschewed competing with TVA in the area of load forecasting

and confined ourselves to preparing a set of projections within which energy supply and demand demonstration programs could be evaluated.

The second moving target we faced was the TVA itself. During the course of the GAO study, the complexion of the Board of Directors changed drastically, a new chairman was appointed and a new general manager named. The TVA energy policy shifted from a uni-dimensional emphasis on large nuclear plants to open consideration of numerous energy supply and demand options. Many of the programs that TVA initiated during 1978 are recommended in the GAO report. It is probably of little value to argue about which of TVA's new directions are due to GAO's efforts and which to TVA's new leadership. Rather what appears to be truly remarkable is the fact that much of the "vision" of TVA as a national energy demonstration agency found in the GAO report can be seen in practice in the operations of TVA today.

Conclusions

Several conclusions can be drawn from the preceeding discussion. First, since the GAO report contains no load forecasts other than those prepared by TVA, it is incorrect to imply that the GAO report says TVA has over-estimated future electric energy demand. Alternative projections on future demand appear in the GAO report for the purpose of providing a context within which to evaluate energy supply and demand demonstration options, and because TVA provided but a single forecast at that time.

One of the recommendations of the GAO study was that TVA prepare several alternative load forecasts. The January 1979 TVA load forecast contains seven alternatives. In addition to the TVA forecasts, there appear also to be several non-TVA forecasts and projections in print. With so many available, it would seem that our attention should now turn to evaluating

the validity of the assumptions underlying the various forecasts and projections and the sensitivity of power demand to changes in the values of key variables. Ultimately, probabilities and weights must be attached to different values of the key parameters. I would go so far as to recommend that TVA create a panel of experts on regional growth, energy prices and other important factors to assist in this evaluative process. Such a panel, consisting of both TVA and non-TVA personnel, could be made an integral part of the load forecasting process in the future.

Second, it would appear that uncertainty regarding future demand growth, inflation, and the lag involved in bringing new capacity on line leads to a conservative approach in forecasting loads and financial requirements. In other words, in its planning process TVA will minimize risk by leaning towards the higher growth load forecasts and assuming relatively high inflation rates. Such risk minimizing behavior may well be optimal under today's energy market conditions. It also implies, however, that TVA's request for increased borrowing authority may be justified. Personally, I see no danger in increasing this authority to \$30 billion.

Finally, the question arises, is the GAO report "out of date"? I don't think so. Of course, the two GAO projections can be called out of date in the sense that the energy market has moved on since 1977. But how out of date can these projections be when the current TVA load forecast presents energy demand growth rates both above and below the GAO projections? Certainly it cannot be argued that the GAO recommendations on energy supply and demand demonstration programs are out of date. Prior to the official publication date of the GAO report, TVA initiated work in many of the areas recommended by GAO. Implying that the GAO report is out of date therefore represents an indictment of many of TVA's newest and most exciting programs.

EDISON ELECTRIC INSTITUTE

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March 8, 1979

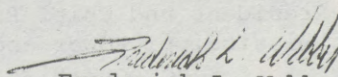
Honorable Quentin N. Burdick, Chairman
Subcommittee on Regional and
Community Development
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

It is requested that the enclosed statement dealing with S.436, which would increase TVA's bonding authority, be included in the Subcommittee's hearing record of February 23, 1979.

Thank you and best wishes.

Sincerely,


Frederick L. Webber
Executive Vice-President

Enclosure

JOINT STATEMENT BY

Mr. John W. Vaughan
Executive Vice President and
Chief Operating Officer
Appalachian Power Company
Roanoke, Virginia

Mr. Sherwood H. Smith, Jr.
President
Carolina Power and Light Company
Raleigh, North Carolina

Mr. R. E. Mathews
Executive Vice President and
Chief Operating Officer
Kentucky Power Company
Ashland, Kentucky

Mr. W. B. Bechanan
President and Chief Executive Officer
Kentucky Utilities Company, Inc.
Lexington, Kentucky

Mr. John E. Faust
Executive Vice President and
Chief Operating Officer
Kingsport Power Company
Kingsport, Tennessee

Mr. Donald C. Lutken
President and Chief Executive Officer
Mississippi Power and Light Company
Jackson, Mississippi

on behalf of the
Edison Electric Institute

before the

Senate Subcommittee on Regional and
Community Development

March 9, 1979

On S. 436 amending the Tennessee Valley Authority Act

Mr. Chairman and Members of the Subcommittee, on behalf of the Edison Electric Institute, the national association of investor-owned electric utility companies, we want to thank you for the opportunity to present this statement.

By way of background, TVA in the 1940's and 1950's, when it undertook to enlarge its electric system to meet the growing electricity demands within its service area, was required to seek and obtain Congressional approval and appropriations on an annual basis. To avoid the matter of annual Congressional review, bills were introduced in Congress in 1955, 1957 and 1959 to authorize TVA to issue revenue bonds for the purpose of obtaining capital funds with which to expand its electric system, including the construction of additional steam generating plants and transmission lines. Many Members of Congress at that time took exception to the prospect of such authority being conferred upon TVA unless some restrictions were placed on the area or territory in which TVA service would be made available.

During this period, a number of Congressional hearings were held on these bonding proposals. These deliberations culminated in the enactment of Public Law 86-137 (16 USC 831n-4) in 1959. This law authorized TVA to issue revenue bonds "to assist in financing its power program" but provided that TVA "shall make no contracts for the sale or delivery of power which

would have the effect of making the Corporation TVA or its distributors, directly or indirectly, a source of power supply outside the area for which the Corporation TVA or its distributors were the primary source of power supply on July 1, 1957 and such additional area extending not more than five miles around the periphery of such area as may be necessary to care for the growth of the Corporation TVA and its distributors within said area." Additionally, the 1959 law provided for limited and minimal extensions by TVA to take care of specified situations including certain named municipalities in Tennessee, Kentucky, Georgia and Mississippi as well as the Atomic Energy Commission and Department of Defense. It also reserved to TVA the right to make "exchange power arrangements with other power generating organizations with which the Corporation TVA had such arrangements on July 1, 1957."

It was generally recognized at the time that the revenue bond authority conferred upon TVA (which of course eliminated annual Congressional review of its power program) would not have taken place except for the territorial and power exchange limitations spelled out in the 1959 Act.

As you may recall, the issue of the possible expansion of TVA's service area surfaced again last year when Congress passed the Public Regulatory Policies Act of 1978 (PURPA).

Sections 202 and 203 of the Act authorize the Federal Energy Regulatory Commission to order TVA under certain conditions to interconnect with and wheel power for other utilities. Section 204 of PURPA also limits the possible role of the federal courts in finding that such an order violates the territorial restrictions in the 1959 Act. We are concerned that this provision poses a risk of undermining the TVA service area limitations that Congress saw fit to pass in 1959.

Mr. S. David Freeman, the Chairman of TVA, has stated publicly on several occasions that TVA has no plans to expand its service area or the situations in which it would undertake power supply responsibility outside the limits imposed in the legislation adopted by Congress in 1959 by which TVA was first authorized to issue revenue bonds. However, because of the magnitude of the requested increase in revenue bond financing now pending before this Subcommittee, and to make certain that TVA will not expand its power supply programs to other areas or situations without specific authorization from Congress, it is urged that the Subcommittee incorporate the following language in S.436: Add to Section 15d(a) of the Tennessee Valley Authority Act of 1933, as amended, the following literary paragraph:

"Notwithstanding any provision in the Public Utility Regulatory Policies Act of 1978, no order under section 210 or 211 of the Federal Power Act, as amended by the Public Utility Regulatory Policies Act of 1978, may require or permit the Corporation to take any action which would be contrary to the provisions of this subsection (a)."

I think you will agree, Mr. Chairman, that this suggested amendment would put an end to the concern that now exists with regard to the effects of Sections 202 through 204 of PURPA and would make certain that the market limitations embodied in the 1959 TVA Act are not eliminated.

Your favorable consideration of this proposed amendment will be greatly appreciated.

Statement by
John T. Butts, superintendent
Franklin, Ky. Electric Plant Board, and president
Tennessee Valley Public Power Association,
Chattanooga, Tennessee, at
Senate Committee on Environment and Public Works hearing
concerning increase in TVA's borrowing authority, February 23, 1979

My name is John T. Butts. I am superintendent of the Franklin, Ky. Electric Plant Board, a municipally-owned electric utility serving about 3,500 electric meters. In addition, I am president of the Tennessee Valley Public Power Association, a regional association of the 160 municipal and rural cooperative electric systems that purchase their entire wholesale power supply from the Tennessee Valley Authority (TVA).

This hearing relates primarily to the need for future electric power supply for the Tennessee Valley--and the need for an increase in TVA's borrowing authority. The consumer-owned electric distribution systems in the Tennessee Valley are deeply concerned about future electric power supply, and strongly in favor of an increase in TVA's borrowing authority to \$30 billion, to enable TVA to meet the growing needs of the region.

Background

Let me provide brief background information on the role of the 160 locally-owned electric power distribution systems represented by the Tennessee Valley Public Power Association.

In the Tennessee Valley, for more than four decades electric power has been the product of a partnership between the Tennessee Valley Authority (TVA)--a regional Federal corporation--and locally-owned, locally-managed electric distribution systems. Ever since TVA was created in 1933, there has been a "division of labor," with TVA responsible for generating and transmitting the electric power via a regional transmission network; and with the local delivery of that electricity to the ultimate consumer--the homes, farms, businesses and

industries--in the hands of consumer-owned electric utility systems: 110 municipal electric systems and 50 rural electric cooperatives.

Nowhere else in the Nation is there such a partnership of non-profit electric power systems--a Federal agency generating and transmitting the electricity, and non-profit municipal and rural cooperative electric systems distributing the power at retail to more than eight million users.

TVA acts under an Act of Congress passed in 1933, and several times amended. The local power systems--municipal and rural cooperative utilities--are authorized under State law, and have contracts with TVA for the purchase of electric power at wholesale.

These 160 municipal and rural cooperative electric systems represent sizeable operations, with combined annual revenues of more than \$1.5 billion, and assets of more than \$2 billion.

They are located in parts of seven States, including Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee and Virginia. They include major Tennessee cities such as Chattanooga, Knoxville, Memphis and Nashville.

The distributors' stake in adequate electric power supply

Here are reasons why TVA's future power supply is of overwhelming importance to the local electric power systems represented by the Tennessee Valley Public Power Association.

a. TVA is the sole wholesale supplier of electricity to those 160 municipal and rural cooperative electric systems, which provide electric power at retail to more than eight million people in parts of seven States. These locally-owned electric distribution systems, then, are at present totally dependent on TVA for their wholesale power service.

b. These 160 locally-owned power distribution systems last year paid TVA more than \$1-1/4 billion for electricity...or nearly two-thirds of TVA's total income from the sale of electricity. These local power systems are, by far, the largest purchaser of TVA electric power. These local utilities--and their retail customers, who pick up the bill ultimately--are directly affected by TVA's policy decisions.

The municipal and rural cooperative electric systems in the Tennessee Valley pay TVA nearly four times as much money for electricity as do TVA's Federal agency customers, and about 3-1/2 times as much as TVA's directly-served industrial customers.

c. The cost of wholesale power from TVA makes up about 80 percent of the total cost of supplying electric power at retail to the Valley's power users. To restate this fact, about 80 cents of every \$1.00 of expenses incurred by the Valley's 160 municipal and rural electric systems goes for buying power at wholesale from TVA.

These locally-owned power distribution systems are vitally affected by TVA policy decisions--especially those that impact on the cost of electric service, and on the adequacy of supply. Paying rising rates is highly undesirable; not having enough electrical energy to keep the lights on would be worse.

d. Because of the division of responsibility between TVA and the local power distribution systems, it is the 160 municipal and rural cooperative electric systems that deal directly with the electric consumers. When TVA modifies its wholesale rate schedules, it is the local distributors who must pass that rate change along to the retail consumers in their local communities. When TVA issues bonds or notes to expand its electric generation and transmission system, it is the power revenues from the local power distributors' retail customers

that represent the primary support of those bonds. If TVA does not have enough generating capacity to supply all of the region's power needs, it is the local distribution systems that must curtail electric service to consumers.

Thus, TVA policies concerning electric power must be implemented by the 160 municipal and rural cooperative electric systems.

To summarize, then;

These 160 locally-owned, non-profit electric distribution systems--operated in parts of seven States by municipalities and rural cooperative utilities--are totally dependent on TVA for their wholesale power supply; are by far the largest purchaser of TVA power, supplying nearly two-thirds of TVA's total income from the sale of electricity; spend on TVA power supply about 80 cents out of every \$1.00 of their total expenses in operating their locally-owned electric systems; and are the means by which TVA power policies are implemented, in day-to-day contact with retail electric consumers.

Adequate Electric Power Is Essential to the Region's Future

Our position concerning the adequacy of TVA's future power supply is simple and straightforward: we want the people of the Tennessee Valley to have enough electric power so the lights go on when they flip a switch. Our job--as consumer-owned electric utilities--is to keep the lights on, and to provide modern electric service to our communities. We have long-term contracts with TVA for the kilowatts of power to keep the lights on in our cities, towns and rural areas. We expect TVA to honor those contracts by having enough power, day after day, month after month, so we, the local distributors, can keep the lights on.

We favor prompt passage of legislation to increase TVA's borrowing authority from \$15 billion to \$30 billion, as requested by the Administration. We believe it is urgent to have enough power--so the lights and heat will stay on in homes; so businesses and industry can grow and expand, providing more jobs for the people of the region; so the Valley can meet the promise of an economy expanding at a faster rate than the national average.

In 1958--twenty-one years ago--the municipal and rural cooperative distributors of TVA power served 1.5 million customers, and distributed 17.5 billion kilowatt-hours of electricity. In the past year the distributors served about 2.6 million customers (meters)--an increase of well over 1 million meters. And total kilowatt-hour sales of the distributors amounted to more than 70 billion kilowatt-hours--more than four times as much electricity as used 21 years ago.

Another 21 years will take us to the year 2000. By that time this Valley will likely need the electricity to serve at least another one million homes, farms, businesses and industries. And the use of electricity will undoubtedly continue to grow in our complex, automated society.

The Electric Power Research Institute, in an important study last year, reached this conclusion about planning for future power supply:

"Specifically, the rate-paying consumer is better off if the utility guesses on too high an expansion rate than too low. This is mainly due to the customer outage costs."

Rene Males, a division director for the Electric Power Research Institute, said in a speech last year:

"The project clearly indicates that electric systems should have more reserve capacity than indicated by traditional system planning analyses. This stems from including demand

uncertainly and outage costs in the planning decision. At a time when utilities are having a difficult time licensing, building, and paying for new capacity, additional capacity requirements are hardly a blessing. However, the consumer is depending on us to provide an adequate and reliable supply of electric energy today, as well as a decade from now. Moreover, the rate-payer expects utilities to build a system that minimizes the customer's costs."

The message from this study by the respected Electric Power Research Institute is clear: the consumer--and the community--are "better off" if load estimates are too high than too low.

A related message is that while it costs money to build new power plants--especially in today's climate of rising costs and costly delays--there is a potentially greater cost to the consumer and to the society: running out of power. It costs more to run short of power than to have an abundance of power. Because if there isn't enough power, lifestyles change, jobs are cut back, standards of living reduced, society slowed.

The time to plan enough power for 1990 is today. If we wait longer, there will likely not be sufficient time to bring new, needed power generating facilities on the line. So now is the time to extend TVA's borrowing authority. The Tennessee Valley Public Power Association--whose member utilities provide electricity to more than 8 million people in parts of seven States--urges this committee and the Congress to pass legislation quickly to give the Valley the assurance of new jobs and a rising standard of living. We urge this committee for the action that will expedite additional borrowing authority to enable TVA to meet the Tennessee Valley's growing power needs.

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