

INTERVIEW: Bill Johnson

The Tennessee Valley Authority: A Key FDR Program Under Attack

On May 18, the Tennessee Valley Authority celebrated its 80th anniversary. The TVA was designed to develop the extremely poor southeastern region of the United States using the authority of the Federal government, but with the flexibility to choose the best path. Along with the package of measures, such as the reorganization of the banking system through the enactment of Glass-Steagall, and the regulation of critical infrastructure in laws such as the 1935 Public Utility Holding Company Act, the TVA has been a model of large-scale, integrated economic and resource development, for the rest of the country, and around the world.

Upon release of the Obama Administration's FY14 budget proposal on April 10, officials of the TVA, citizens of the Valley, and their elected Federal representatives learned that the Office of Management and Budget (OMB), under a chapter titled, "Creating a 21st Century Government," had included the following: "Given TVA's debt constraints and the impact to the federal deficit of its increasing capital expenditures, the administration intends to undertake a strategic review of options for addressing TVA's financial situation, including the possible divestiture of TVA, in part or as a whole." The budget document further notes that reducing or eliminating the Federal government's role in the TVA, which has achieved its objectives, could help put the country on a "sustainable" fiscal path.

The bipartisan and bicameral response from Capitol Hill was immediate, with many lawmakers assuring constituents that this proposal "isn't going anywhere." But it is astonishing that this proposal could even be made, to potentially wreck one of the most dramatically successful economic development projects of the New Deal, based on arguments that are patently untrue.

In January of this year, Bill Johnson became president and chief executive officer of the TVA. Before TVA, Johnson was chairman, president, and CEO of Progress Energy Inc., based in Raleigh, N.C., for five years, and has been a lawyer representing the utilities. He has served as vice chairman of the investor-owned utility industry's Edison Electric Institute, and was chair of the board of directors of the Nuclear Energy Institute.

21st Century Science & Technology Managing Editor Marsha Freeman spoke with Johnson at the Washington, D.C., office of the TVA, on June 26.



TVA

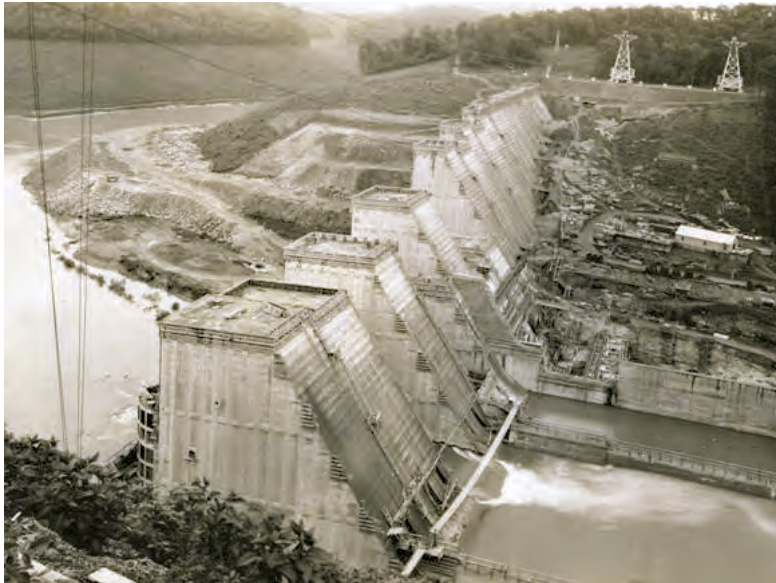
21st Century Science and Technology: Recently, two things of note have happened regarding the TVA. One was its 80th anniversary. Throughout its history, TVA has encountered opposition. It always seems that when people are making new proposals on how to change TVA, such as the recent one, they don't go back and read the old ones. And many of the arguments seem to repeat themselves. Now there is a proposal for a review to see if there is still a need for the TVA. Do you have any idea what that would mean?

Johnson: Not really. We've had several meetings with OMB about the proposal—introductory meetings, early, formative process meetings. What we hear is that the language means exactly what it says, which is that they think

they need to do a review, to see if TVA still needs to be a part of the Federal government, and whether its mission has been completed. That is the extent of our knowledge.

Do you know when this strategic review will take place?

We are still in the formative discussion stage. What they've made very clear is that they want this to be collaborative, they want us to be part of this, which we like. We see it as an opportunity to demonstrate that the model is good and works. They also understand the need for speed, because to our workforce, this is a distraction. And distraction doesn't help you, either in safety, or performance. So I'm hoping it will be thorough and quick.



Five months after President Franklin Roosevelt signed the legislation creating the TVA, construction was underway on Norris Dam, named for the intrepid Republican Senator from Nebraska who led the fight for a national project to develop the Tennessee Valley.

One immediate effect of this disruption, which people on Capitol Hill have pointed out, is that the uncertainty itself can affect your credit rating and selling of bonds.

Our bond spread widened half a billion dollars on the announcement. You sell a bond, and you buy it, but there's a secondary trading market, which doesn't have to do with the price of the bond, but with how much you are willing to pay above or below the price. It's in basis points. The higher the basis point is above the benchmark, the less value you have in your bond. The spread went up 17 points, which is about half a billion dollars. So the bondholders lost a half billion dollars in value the day of the announcement. It's come back, but it's still at about \$425 million. We have several billion dollars in refinancing to do this year. So our cost of money may change, just on this announcement. We have to wait and see. But we're on a fiscal year, so we have to be out there by the end of September.

Would such a divestiture apply just to the power assets of TVA?

It is not all clear. The document says to do a strategic review of all options, including partial or total divestiture, so it could mean everything.

One of the things that would be difficult in replacing TVA is that so many pieces of it are integrated. The whole idea is integrated resource management across state boundaries. If you break up that chain, you have all these cost centers that somebody else will have to deal with. Unless they have Federal authority, they will have to do things differently at the state boundaries.

The TVA's Debt

One rationale that has been used to promote this proposal is the idea that divesting some of TVA's assets could be used to reduce its debt, and that this would lower the Federal deficit. Would it do that?

To be clear: *We get no appropriations from the Federal government, and haven't, on the power side, since 1959.* We've actually made money for the government. In 1959, at our last power appropriation, we had gotten \$1 billion, cumulatively. We've paid back \$3.6 billion, so we are not leaning on the taxpayers. In fact, we're helping the taxpayers. So I don't think that's part of it.

Who knows what motivation there is in these things? If you think about the value proposition of TVA, if you are an elected official in the Valley, it's easy for you to be supportive of TVA, because you see the value every day. And if you have some institutional or historical memory, you know what has happened over the last 80 years, and the role of the TVA and the local power companies in improving the quality of life.

There is a theory that this is part of the government, and that the government shouldn't be in these businesses. Technically, we are in the budget. Every year, we submit all of our budgets and documents to the OMB and the Congressional Budget Office; so if you're in the budget, you're also included on the deficit side, you're on both sides of ledger. So we have \$24.5 billion in debt, and that shows up in the Federal deficit.

On paper.

On paper. But *that is all debt that is raised in the public markets, which the government does not stand by.* So technically, we're part of the deficit, but legally, the government isn't responsible for those debts.

Has there been any political activity locally in opposition to this divestiture possibility?

One of the prohibitions we have is that we do not lobby or advocate, because we are part of the Federal government, so we are not doing any of that. But the local public power association, TVPPA, which is the group of the 155 local power companies, has come out with a resolution opposing this. The American Public Power Association has come out with a resolution; there have been union letters to the White House. There is strong, and mostly uncoordinated support. You go to public meetings, you see people on the street—I met a woman the other day at a TV station who is 24, and she said, "I want to tell you how much I support TVA. My grandparents lived in the coun-



During its first decade, the TVA brought electricity to the poverty-stricken Valley, along with flood control, the eradication of disease, libraries, and modern agricultural technology. By the late 1930s, the TVA was circulating about 13,000 books a month. Spraying against mosquitoes (above) stopped the spread of malaria, and half a million people were inoculated against smallpox.

try. And I want you to know that people like me really support TVA.” The support at home is pretty strong. It would take Federal action to do something; they’ll have to pass a bill.

Would it have to amend the law that created the TVA?

Yes. We already have some ability to sell assets. There’s a process to do this. They usually have to be declared surplus assets. But we also have bond covenants that say if you sell any substantial portion, you immediately have to fund the outstanding bond indebtedness. There are a couple of other hurdles here that you’d have to work your way through.

The fight now to reinstate Glass-Steagall is a perfect example of what was necessary to create the TVA. There was tremendous opposition from the banks and the private utilities to the law that created the TVA in 1933. And how many lawsuits were there during the first few years of the TVA, to challenge the law?

It went all the way up to the Supreme Court twice, I think. Our goal is to make sure that there is a 160th anniversary of TVA!

‘Our Own Economic Development Company’

You have had a lot of experience in the investor-owned utilities, and seen both sides—public power and private. What do you think the impact might be if some of TVA’s electric-generating assets were sold?

Two impacts: One impact that we hope doesn’t happen but could, is that prices could go up. For example, we have the luxury of not having to pay dividends to share-

holders. Our dividend comes back to the customer in the form of a lower electric rate.

We have some advantages that would be hard for a shareholder organization to match. So I would think the price would be a real issue. How much would the rates be? I think it would be hard for someone to do it cheaper than we do it.

The other impact is the non-electric piece: river management, resource stewardship, campgrounds, boating. These are all things other people can do, but someone is going to have to get paid to do them. I just don’t see how, as an economic proposition, this would be done any better than it is today.

Because TVA pays for all of the non-electric programs out of its electricity sales?

Exactly right. And every utility, every power provider, does economic development. Mostly on the investor-owned utilities side; you do it to increase your sales. It’s good business. We do it for a different reason. We do it so we can bring jobs and vitality to the Valley. And we do it in a form and a fashion, and on a scale that nobody else does. We’re like our own economic development company. I’ve not seen anybody else who would approach it like this, especially if you have to invest some of your shareholder dollars.

The statistics for economic development in the Valley are very impressive.

Between about 2007 and 2012, 200,000 jobs created; \$24 billion in investment. If you look over a longer period, it’s millions of jobs.

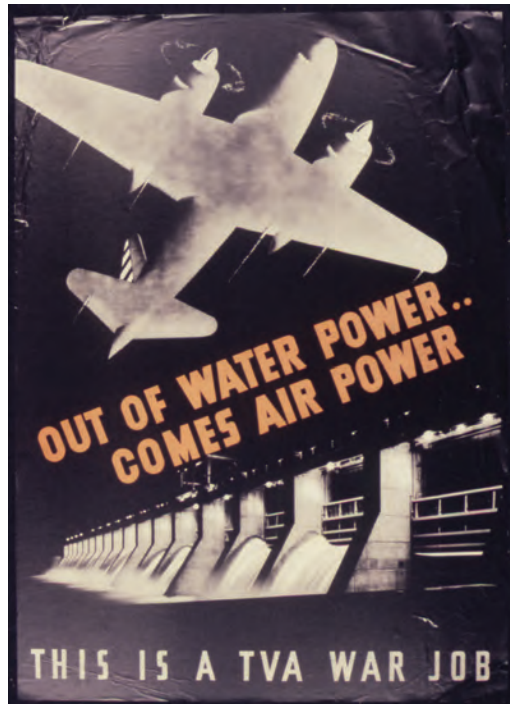
In mid-June, the Howard H. Baker Jr. Center for Public Policy at the University of Tennessee, Knoxville, released Policy Brief 2-13, "Should the Federal Government Sell TVA?" The data that is presented is quite dramatic.

One rationale for the Administration's strategic study is the claim that the TVA is in an untenable situation, because it has a Congressionally imposed debt cap of \$30 billion, and it has almost reached that ceiling. The Baker study reports, however, that the \$30 billion debt cap for TVA was set in 1979. If you adjust that figure for inflation, it would be about \$100 billion! They also report that there are investor-owned utilities that have more debt than the TVA does.

One of the charges that is made by the private utilities is that the implicit—which they admit is not explicit—government backing for TVA's debt gives TVA an unfair advantage, making its credit rating higher, so its interest rates are lower. But in the 1930s, the electric utilities were regulated through legislation such as the Public Utility Holding Company Act, because providing electricity was viewed not as a luxury, but as a necessity. Regulation ensured that the utilities would operate on a sound financial basis, with a guaranteed rate of return, if they met the requirements of the law. If universal access to electricity is a public good, perhaps the government should think about what the credit ratings, and credit availability should be, and not leave that up to the financial markets.

The question is, what is in the best interest of the people who get the service? Is it to have the lowest interest rate and highest credit rating you can, because you're providing a public good? That seems to make sense to me.

What really drives the credit rating is the TVA Board's authority to raise rates to cover costs. That's really the foundation of it. We actually have a really good self-regulating system. The TVA Board sets the rates to recover the costs. Customers see the impact of cost increases immediately in their rates. So our job is to keep rates low. That circle sort of works—we keep the rates low, and we do enjoy a low cost of capital because we have the au-



Without the TVA, the nation would not have been prepared to fight World War II, stated the Federal Power Commission after the war. Cheap and abundant hydro power made the TVA region a major supplier of aluminum for airplanes, along with processed metals, timber, chemicals, ship boilers, gas masks, and explosives. For the war effort, TVA built 10 dams; Douglas Dam was built in a record-breaking 12 months and 17 days.

this. These are the people who pay the entire cost, every day, of TVA. They are not only the value recipients, they are the payors. I think an interesting exercise would be to find out from the people who live there, who are served in some way by TVA, what they think. And I think that you'll find that the mission is not finished.

Just speaking personally, I'd say that the mission might be finished when everybody has a good-paying job, there is full employment, low power rates, and a good environment. Then, you'd be getting close.

Cleaner Power

Another event this week was President Obama's speech saying he would set new, stricter, environmental regulations for power plants through the Environmental Protection Agency, since the Congress has not done it. TVA has a number of older, more inefficient coal-burning plants, which it plans to retire.

It's 2,700 MW, 18 units, that are definitely going. There's a discussion about what to do with the rest of them.

thority to raise rates, but the Board doesn't want to raise rates. They want us to be more efficient, more effective. It is the essence of public power. You have a board appointed by the President, but you have a stakeholder group, the customers, and they're really influencing the Board.

Is the TVA's Work 'Finished'?

Another charge that's been made, is that the work of the TVA is really finished, so why do we need it? On the occasion of the 30th anniversary of the TVA, President Kennedy gave a speech at Muscle Shoals, Ala., where he responded to that charge, stating: "The work of the TVA will never be done until the work of our country is done."

I don't think that we at TVA are the people who should judge whether the mission is done or not. I think two groups should decide this: the people who own TVA, the people of the United States, through their elected or appointed officials, and more importantly, the people who receive the value, the mission recipients, should have a big say in

There are two possible pathways: to sink a lot of money into 40-year-old plants to have them meet new environmental regulations, or what TVA has done, deciding to complete some of its unfinished nuclear plants.

We have a vision to be a national leader in low-cost, cleaner energy by 2020. That's the path we're on. We're going to retire the old coal plants. The average age of our coal fleet is over 51 years. So I like to joke that I would like to close the ones that are older than me! We have added natural gas, and we are finishing the Watts Bar 2 nuclear plant. So you see a transition to a much cleaner portfolio. We have a big wind portfolio, by southern utility standards. So we are moving in that direction.

One of the things that is helping us is that we've had a significant decrease in demand, and, therefore, a significant decrease in revenue; that [second] part doesn't help. But the decrease in demand allows you to do some things in a window of five to seven years. Instead of thinking about, "What do I need to build?" you're thinking about, "How do I rationalize what I have?" Finish that big nuclear plant; retire some coal. Our emissions will be way down. The fuel mix will change. We will keep enough coal. If you're a producer, one of the things you want to do, is compete the fuels. You want enough coal to arbitrage against the coal price. But over time, the energy mix will have changed considerably. It will be cleaner and more environmentally friendly.

Innovation: the Nuclear Program

In nuclear technology, TVA has played a very important role in research and development, with the flexibility to move in to new areas. The most recent is to be the first utility to build and test a small modular nuclear reactor.

In the enabling statute we have, one of the things we're charged with doing is innovation in energy technology. People don't generally know this, but we do quite a bit of innovation. One of the key ones at the moment is small modular reactors (SMR), which we think has the potential



TVA's work "will never be done," stated President Kennedy at Muscle Shoals, on the 30th anniversary of the TVA. "Let us all resolve that we, too, in our time, 30 years later, will, ourselves, build a better nation for 'generations yet unborn.'"

to be a great technology. It lowers the capital risk. You're paying a fifth or a sixth of what you would pay for a big plant. The technology is pretty straightforward. It's similar to the reactors that have been used in aircraft carriers and submarines for the last 50 years. We just turn it up and put it in the ground.

It's a little more complicated than that, but I think there are three things: First, the capital risk is so much smaller, that it's easier to digest. One of things utilities have trouble with, is you build a big plant, but you probably don't need the whole big plant in the beginning. If you put plants in operation in thousand-megawatt chunks, that's a lot of plant. You put it in at 200 megawatts, or 180, it's easier to deal with.

Second, you can "drive" these nuclear plants—you can load-follow with them [adjusting the power output as demand fluctuates—ed.]. As a submarine goes faster and slower, you can do that with these reactors. For the big reactors, you want to put them on at 100% and leave them on until they run out of fuel, because when you maneuver them, the system changes; there are miles and miles of pipes, and everything is affected. So turn it on, and run it.

Third is the export [potential]. We have new [nuclear] entrants—Qatar, the UAE, Vietnam. It would be a good thing for them to start with a 180- instead of a 1,200-megawatt plant. So for those reasons, this is a very promising technology.

And TVA is looking at siting the first Small Modular Reactor?

We are in a partnership with Babcock & Wilcox and we got cost-sharing funding from the DOE. The partnership is called mPower, and we have a site at Clinch River, very close to Oak Ridge National Laboratory, that we have laid out. We're doing meteorological work there and soil testing, so we are doing a little preparatory work to be able to do this by 2020, 2021, depending on how long it takes to get through the Nuclear Regulatory Commission [licensing] process. The NRC has never licensed one of these. So that will tell us a lot about not just the commercial, but also the technical viability.

As nuclear energy takes off, many developing countries will want the smaller reactors. Do you think manufacturing facilities will be set up in the TVA region to produce these small reactors?

B&W builds the military reactors for submarines and aircraft carriers. The idea here is that you build this plant in a factory; it will fit on a rail car and you take it to the site. They have some capability, but not to do a lot of these. The military doesn't get that many over time, so you have to expand the capability. And we have all those great transportation routes and a skilled workforce. I would love to see that happen.

I read that work at the Bellefonte nuclear plant, which is being completed, is being slowed down, and people are being let go. What is the reason?

The demand picture, mostly. We used to project growth for ten years at 2 or 3% per year. We're now projecting 0.4%.

Bellefonte was approved to be completed two years ago, but the TVA Board also wanted a brand new estimate [of the cost of completion] given the history of the Watts Bar estimate.¹ We have been working on engineering and



Babcock & Wilcox

Conceptual drawing of an underground containment structure housing two Babcock & Wilcox mPower reactor modules. On the right is a single mPower reactor, showing the scale of the structure.

asset preservation, but in that two-year period, demand has gone down considerably, and we lost USEC, which was our biggest customer, a 1,000-MW customer. So the need for the plant has pushed back. We haven't changed the date or made a different decision, but we have figured out that we don't need it when we thought we would need it. And we have some short-term needs that we really need to focus on. We need to finish Watts Bar II by the fourth quarter of 2015, at \$4-4.5 billion. It's not so much the money as organizational capability and managerial mind-share.

One of the things you think about in a big organization is, what is our capability to be doing two [nuclear reactor construction projects] at once? You see Southern Company with two Vogtle units side by side on an existing site. Everyone would agree, I think, that the Southern Company is one of the better companies in the business, and they're having some trouble. I don't think we need to be building two units at the same time. Let's finish this one. Let's look at the fundamentals of demand and usage and see when we need that plant.

and schedule overruns led TVA to revise the schedule in 2011, with a projected current start-up date at the end of 2015, and a cost that is more than double the original, 2007 estimate of \$2.5 billion.

For an extensive history of the TVA, see "Roosevelt's TVA: The Development Program that Transformed a Region and Inspired the World," in the Summer 2011 issue of *21st Century Science & Technology*.

1. In 1985, TVA's Watts Bar Unit 2 nuclear power plant stopped construction, when it was 70% complete. In 2007, the TVA Board decided to complete the plant, with an initial projected 2012 start-up date. Cost

Economic Forecasting

The deregulation of the electric utility industry since the mid-1990s introduced a factor of instability to the entire nationwide industry. Utility long-term planning was made more difficult without government oversight. That is now combined with the current contraction of the economy, making forecasting what electric demand will be during the years it takes to build additional capacity even more difficult.

From World War II until 2007, we had growth. We averaged, sometimes, 3 or 4% [per year]. But then we dipped. We're in the fifth year of a decline in demand. As we now project our peak [demand], we will be back [up to the 2007 level] in 2023. So this is a fundamental change in the dynamics. What if you guess wrong, and demand comes back by 2018? What if it doesn't come back until 2030? It's sort of a conundrum. I think this is a time to husband your capital, preserve your options, and have enough flexibility, so if you're wrong in any direction, you can do something about it.

Our view is that what we need is a new economic policy. Your region may be a little less affected, because, due to TVA, you can be pro-active in attracting and keeping jobs; but if you look at Detroit and the industrial heartland, they are in bankruptcy. The government historically has had the responsibility to create the conditions for economic growth, which is what TVA was mandated to do. And that needs to be applied nationally.

I think you're on the right track here. Let us think about economic policy that encompasses industrial policy, energy policy. All of these things go together. That's the TVA model, a whole integrated plan for the region. You can't talk about energy policy in a vacuum—it's helpful to know what you're trying to achieve through that policy, not just have a policy.

One of the things that is so striking about the TVA, is how it became a model for development in other parts of the world, such as the Three Gorges Dam in China. Is there still interest from other countries in the TVA model of development?

We recently had some Japanese visitors, and I think we have some coming from Vietnam, so, yes, there's still a great deal of interest. The Chinese have come within the last six months. What they're interested in is integrated resource-management planning. How do you make all these things fit together? My own experience is that TVA is known much more thoroughly internationally than it is nationally. It's kind of amazing.

We are also a good example of thinking about the lessons of Fukushima, because our nuclear plants are all downstream of major dams. So the flooding aspect is

something for which we are a good model for the rest of the industry. There's probably not going to be a tsunami, but there are 49 dams on that [Tennessee] river, and there's a lot of water impounded on that river, so if you have a dam failure or two, then you have a flooding issue, and you have to be able to make sure you're cooling that [nuclear plant] core.

Had the TVA thought about that possibility before the Fukushima accident?

This is interesting. These plants were licensed as wet plants. In other words, licensed to be able to be flooded [and maintain safety]. But the projection of what a probable maximum flood is has changed, so we're having to do some work to move safety systems to higher elevations. They were built to be flooded, but the flood might be a little bigger, so we're moving things up.

Are other nuclear plants built that way?

There are a number of them around the country. The one in Nebraska, Fort Calhoun, which had big flooding, was licensed as a wet plant. A number of them are on hydro rivers.

Does that mean that the plant automatically shuts down, or does it keep operating?

If you have a flood of that proportion, you won't need the electricity, so you shut the plant down. In any kind of major flood, you would shut the plant down, but you would move clean water over the fuel and through the steam generators. You protect the asset, preserve the asset, but you wouldn't be generating power.

A recent news article reported that in your region, there was 60-year rainfall, and TVA flooded certain non-essential areas such as golf courses to cope with the water, but people's homes were not affected. The estimate was that \$800 million in damages was averted.

That was in January. If you look over the history, the number is some significant billions of dollars. Sometime when you come to Knoxville, you should see the River Operations Center. We had, during those rains, several of the dams dealing with record amounts of water. Think about that—80-, 90-, 100-year-old dams, with record amounts of water. The ability with which they can move that water with precision is unbelievable.

The people there say, "We've got to move this water. It's going to flood here, but it will be 100 feet from any structure." And they can do that with precision. It's so many millions of cubic feet they're spilling per second. If you go back in history and look at the flooding, and the ravaging nature of that, controlling that river has been one of the TVA's major accomplishments.

The other thing that impressed me was that because of the connections, this management of the Tennessee River also helps to manage the Ohio and Mississippi rivers.

The Tennessee River forms in Knoxville from the French Broad, the Little, and the Holston rivers. It goes down, doesn't touch Georgia—Georgia wants some of this water—Alabama, Mississippi, back up east of Memphis, all the way to Paducah, Kentucky, and runs in to the Ohio River. The Ohio runs in to the Mississippi, and that goes to Memphis. So the coordination with all those rivers, and the Army Corps, is all pretty important.

How do you interface with the Army Corps of Engineers? If the decision were made to break up the TVA, would the Army Corps have to pick up operation of the dams?

They would certainly be a likely candidate, but you'd find private enterprise to do that, too; private river-management companies. We interface very closely with the Corps because we control the river, we control the shoreline, so any appurtenances you'd want to build, boat docks, we control all of that. The Corps controls navigation. So we provide the water for navigation but they control the navigation, and they run the locks. There are a lot of locks.

You know, when TVA was formed in 1933, you could not travel the length of the Tennessee River. You would get down to the shoals, which is a big, muddy flat spot.

Today, there are a lot of locks, and we are in communication in real time with the Corps. How much water do you need in the Mississippi? How much do you want in Huntsville? That's a pretty daily occurrence. [Today, the Tennessee River] is a very heavily used transportation conduit, maybe the most heavily transported river, or second behind the Mississippi. The savings from using river transportation, versus other forms, is hundreds of millions [of dollars] every year, which also helps with economic development.

In the 1960s, at the same time that President Kennedy was at Muscle Shoals to celebrate the 30th anniversary of the TVA, there was a program put forward, and developed by the Ralph M. Parsons Company, called the North American Water and Power Alliance, or NAWAPA, which would have built on the TVA model, and moved it west. The Great American Desert, with such rich soil, but a serious lack of water, could have become a breadbasket for the country. But this was never built. We have resurrected and improved and expanded the NAWAPA program, as a great infrastructure project that must be built. The success of the TVA is an important precedent for taking on such a large-scale infrastructure project.

Thank you for taking the time to discuss the past and future of TVA.

It's been a pleasure.

SPACE

Curiosity Opens Many Windows To the Solar System

by Marsha Freeman

As we mark the one-year anniversary of the successful landing of NASA's Curiosity rover on Aug. 6, planetary scientists are reaping the early results of a set of scientific experiments never before carried out on Mars. The highly sophisticated, nuclear-powered rover will help both uncover the evolutionary history of the planet, and describe in detail where it is in that process today. But the success

of the mission is not only important based on what the Curiosity will find, but the precedent it sets for the missions of the future exploration of Mars.

The question of whether there was, or is, life on Mars has been the prime motivation for the series of missions in NASA's Mars exploration program. The question of whether life presents itself uniquely on Earth, or is a universal character-

istic of all of Creation, has occupied the greatest minds in science for generations. While Curiosity is not expected or designed to provide a definitive answer to that question, it will extend and enrich our understanding of crucial aspects of the pathway of development of the planet, through its geological, chemical, and hydrologic history, and provide more insight into whether that pathway has included life.