


Linking from this PDF

This PDF file has links for navigation and for accessing more information.

1. The table of contents is linked. Click on an entry to go to that page.
 2. The Stay Connected sections are linked to Web pages. Click on a bulleted item in a Stay Connected section to go to that Web page.
 3. The charts have links to the raw data for each chart. To view the raw data, **double-click** the blue icon next to the chart. 
- Close the pop-up window to hide the raw data.

toward environmental
EXCELLENCE



2001 ANNUAL ENVIRONMENTAL REPORT



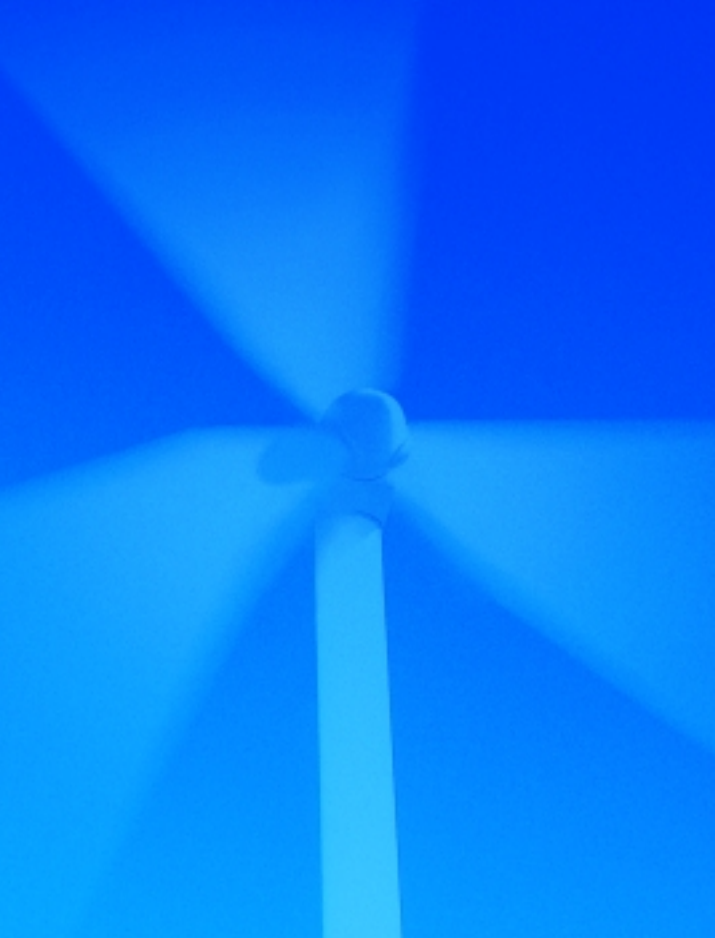


STAYCONNECTED

www.tva.com/environment

TVA's Environmental Policy and Principles
Boaters and Aquatic Plants
Biopower and the Renewable Energy Policy Project
Regenesys Flow-Battery Power Storage Facility
TVA and the WasteWise Program
Award-Winning Environmental Stewardship
and more





contents

Management Commitment

<i>Q&A With TVA's Board of Directors</i>	2
<i>Employee-Recognition Program</i>	3

Environmental Protection and Stewardship

<i>TVA Watershed Teams</i>	4
<i>Aquatic Biologist Award to Charlie Saylor</i>	5
<i>Native-Tree Seedling Donation</i>	6

Environmental Compliance

<i>Reportable Environmental Events</i>	8
----------------------------------------	---

Pollution Prevention

<i>Reducing Emissions From Fossil Plants</i>	12
<i>Energy Star®</i>	13
<i>TVA Recycling Effort: Old Computers</i>	15

Partnerships and Public Involvement

<i>Air-Quality Improvement Projects</i>	16
<i>Smokies Solar Water Heater</i>	17
<i>Mitchell-Nielson Elementary School Energy Conservation</i>	18

Innovation and Technology

<i>Public Power Institute Research and Development</i>	19
--------------------------------------------------------	----

A Look to the Future . . .

21

This report follows established Public Environmental Reporting Initiative guidelines for corporate environmental reporting. The report is printed on 100% post-consumer recycled paper and uses soy-based inks.

For additional copies of this report, call 865-632-4677. For alternative formats of this document, call 865-632-6824 and allow five working days for processing.

www.tva.com



Management Commitment

The members of TVA's Board of Directors answer questions about the agency's environmental-protection initiatives.

What is TVA's strategy for protecting the natural resources of the Tennessee Valley?

Glenn L. McCullough, Jr.: *The leadership standard TVA has set for itself as a public*



power agency is forthright and clear: TVA will achieve excellence. This means that TVA is committed to demonstrating excellence in both

business performance and public service in order to create value for the citizens of the Valley. We will provide leadership by being good stewards of the environment. One of our specific strategic objectives as a federal corporation is to improve life in the region through environmental stewardship and balanced, integrated management of the Tennessee River system. In keeping with this strategy, we also support the National Energy Policy announced by President Bush in May 2001, which encourages all federal agencies to use technological advances to better protect the environment. That includes focusing on energy efficiency, renewable sources of electricity, clean coal technology, and improvements in plant efficiency and reliable power delivery. This annual report gives stakeholders an update on some of the environmental-stewardship advances TVA

has made, as well as the steps we're taking to address emerging environmental issues.

Does the public have a say in the way TVA carries out its environmental strategies?

Skila Harris: *TVA recognizes that attention to the needs and preferences of our customers and stakeholders is critical to our success as a corporation. Stakeholders who are concerned that environmental factors play a role in operational and financial decisions are actively consulted through a variety of stakeholder organizations. One important group, the Regional Resource Stewardship Council, was created in 2000 to advise TVA on the management of natural resources in the Tennessee Valley. In 2001, the Council's Water Quality, Integrated River Management, Navigation Infrastructure, and Public Lands Subcommittees submitted recommendations covering such issues as the protection of water quality, stakeholder-relations policy, and aquatic-plant management on TVA reservoirs. The Board has accepted the majority of the Council's recommendations, including one proposing that TVA do an in-depth two-year analysis of its reservoir operations. The purpose of the study is to determine whether changes in TVA's reservoir-system operating policies would produce greater overall public value. As we conduct the study, we're committed to building on the stakeholder input already received from the Council.*

In 2000, TVA announced that it would enhance the Environmental Management System (EMS), its process-based method of managing environmental performance. How is this initiative going?

Skila Harris: *TVA's updated EMS focuses on maximizing efficiency and effectiveness through standardization and continuous improvement. It enables TVA to factor environmental considerations into every business decision and allows us to track our performance. We expect to see many benefits from implementation of the EMS, including increased conservation of materials and energy, better environmental-protection management, and an overall competitive advantage for TVA. EMS makes good business sense and is beneficial to the health of the environment. Frankly, though, our goal of implementing the EMS by the end of fiscal year 2001 was overly ambitious. We had to revise the date when it became clear that we needed more time to address nonstandardized systems and bring them into conformance with the International Standards Organization's 14001 standard. The revised target date for full implementation is May 2002, which is eight months later than we originally planned.*

How well did TVA meet its environmental objectives and targets for 2001?

Glenn L. McCullough, Jr.: *In 2000, TVA developed environmental objectives and set 15 specific targets for operations that had the*

greatest potential for improving our environmental-protection efforts. These objectives included the purchase of environmentally sensitive materials, reductions in low-level radioactive waste, and decreases in air emissions. All 15 targets are being incorporated into TVA's business plans, and progress will be monitored on an ongoing basis. The results for 2001 were mixed. For example, TVA's production of low-level radioactive waste was 1.5 percent less than the 2000 amount, and solid-waste production decreased by 5 percent. However, the number of Green Power Switch blocks sold during 2001 was slightly below TVA's target because of construction-related delays in landfill-gas generation, which created an imbalance in supply and demand.

Skila Harris: In terms of improving air quality, we continued to make systemwide reductions in both nitrogen oxide (NO_x) and sulfur dioxide (SO₂) emissions from our coal-fired plants. TVA announced this year that it will further reduce SO₂ emissions at four plants by installing emissions controls on 12 additional units, at a cost of \$1.5 billion. When complete, the controls will reduce SO₂ emissions by 181,400 metric tons (200,000 tons) each year. TVA is also in the midst of a \$1.2 billion program to reduce NO_x emissions at its plants by 70 to 75 percent during the summer ozone season. This involves the construction of 18 selective catalytic reduction systems (SCRs) on 25 of TVA's units, and is one of the most massive pollution-control programs in the nation. Two SCR systems are in



place at Paradise Fossil Plant, and the additional SCRs will be completed by 2005. The SO₂ and NO_x reduction initiatives will cost TVA a total of \$2.7 billion, an expenditure that affirms the agency's commitment to ongoing emissions reduction at its coal-fired plants. TVA continues to meet all EPA Clean Air Act regulatory requirements, and during

2001 it reduced SO₂ and NO_x emissions by 17 percent and 7 percent, respectively.

How does TVA support economic growth in the Valley while continuing to protect the environment?

Bill Baxter: As good environmental stewards, we have the job of balancing competing demands on TVA's integrated river and power system. So, as we take steps to sustain the Valley's economy and meet the need for power, we're using technology that balances the impact of our operations on the environment with our obligation to continue providing a reliable, low-cost supply of electricity. For instance, economic growth in the seven-state TVA region has increased the demand for electric power by almost 3 percent a year, well above earlier projections and the 1.5 percent rate of increase nationally. To meet this unprecedented growth in demand, we're evaluating several possibilities for adding new base-load generation. These options include gas-fired, combined-cycle generation in Tennessee and the restarting of Unit 1 at Browns Ferry Nuclear Plant in Alabama. By employing a diverse portfolio of power sources—hydro, coal, nuclear, natural gas, renewable energy—TVA is avoiding the risks associated with dependence on a single source and is ensuring that the Valley will continue to have sufficient reliable, affordable power.



place at Paradise Fossil Plant, and the additional SCRs will be completed by 2005. The SO₂ and NO_x reduction initiatives will cost TVA a total of \$2.7 billion, an expenditure that affirms the agency's commitment to ongoing emissions reduction at its coal-fired plants. TVA continues to meet all EPA Clean Air Act regulatory requirements, and during



STAYCONNECTED

At www.tva.com/environment

- See the environmental policy and principles that help guide TVA's work.
- Find a full list of the 2001 Environmental Excellence Award winners.

Employee-Recognition Program

By successfully developing a unique partnership of federal, state, and local agencies to promote environmentally responsible marina and boating practices throughout the Tennessee Valley, TVA's Clean Marina Initiative Implementation Team earned the 2001 Environmental Excellence of the Year Award.

TVA awards the honor to the person, team, site, facility, or organization that best exemplifies the agency's commitment to responsible environmental management and leadership. TVA also donates \$1,000 in the winners' names to the environmental project or charity of their choice.

The members of the award-winning team are Linda B. Harris, Project Coordinator; Lieutenant Art Schettini, Clean Marina Initiative Implementation Team and TVA Police; Debbie Heck, Clean Marina Initiative Implementation Team and Norris Reservoir Pilot Coordinator; and Tere McDonough, Project Initiator.

The Clean Marina Initiative was also the winner in the Environmental Protection and Stewardship category of TVA's Environmental Management System employee-recognition program. Awards went to those who turned in an exemplary performance in support of one of TVA's six environmental principles: management commitment, environmental protection and stewardship, environmental compliance, pollution prevention, partnerships and public involvement, and innovation and technology development.





Environmental Protection and Stewardship

TVA recognizes that its efforts to protect the environment are often most effective when carried out in partnership with others in the Valley's communities. We look for ways to work in tandem with community groups and other stakeholders in addressing environmental issues. The 12 multidisciplinary TVA Watershed Teams, which facilitate volunteer efforts at the grassroots level to help communities improve their water resources, are prime examples of TVA partnerships in action.

One aspect of responsible river stewardship is partnering with others to manage litter and natural debris, which floats downstream through the reservoir system and accumulates at dams. In 2001, volunteers working with the 12 TVA Watershed Teams removed 1,988 cubic meters (2,600 cubic yards) of this debris, enough to cover two football fields with a layer approximately 31 centimeters (one foot) thick. Hundreds of cleanups took place in conjunction with local groups.

TVA Watershed Teams supported the eighth annual National Public Lands Day in

September 2001. Each year National Public Lands Day brings together federal, state, and local volunteers to help clean up or improve the nation's public lands and to foster environmental awareness. TVA helped to coordinate the work of 1,427 volunteers, who contributed about 5,278 hours in labor to a



cleanup of public lands across the Valley. Watershed Teams cooperated with more than 50 federal, state, and local organizations to coordinate the effort, and 57 TVA employees participated in various events. The partnerships removed approximately 38.1 metric tons (42 tons) of trash and other debris from public lands.

In addition, TVA's Clean Marina Initiative (CMI) and Clean Boating events continue to heighten public awareness of the harmful effects of dumping waste into Valley waters. For instance, the Clinch-Powell Watershed Team's CMI work persuaded all 23 Norris Reservoir marinas to sign on in support of the proper disposal of boat waste. The result was an unprecedented 95 percent voluntary-compliance rate, which will prevent the dumping of more than 1.1 million liters

(300,000 gallons) of human waste into the reservoir each year. And on Chickamauga and Nickajack Reservoirs, the local Watershed Team developed a traveling classroom for boaters, in which the team visits marinas to provide information on spill cleanup, pollution prevention, and "green" boating products.

River stewardship also involves maintaining the shorelines along rivers. In 2001, TVA's Clinch-Powell Watershed Team collaborated with the Tennessee Wildlife Resources Agency, Trout Unlimited, the Natural Resource Conservation Service, and local businesses and landowners to complete the first project aimed at restoring the Clinch River's banks. Eroding riverbanks along the tailwater—the part of a river below a dam—threaten aquatic life and damage recreation areas. TVA helped stabilize a 1.2-kilometer (three-quarter-mile) stretch of the Clinch's banks by using bioengineering techniques such as cedar-tree revetments (a method of stabilizing shoreline by planting trees along it), erosion-control matting, root wads (tree stumps with exposed roots embedded in a bank to mitigate erosion), and 4,000 bare-root trees planted in and along buffer zones. The agency's partners furnished labor and donated equipment and supplies to match the project funding and help improve the quality of the water. A second project designed to stabilize and restore an additional 487 meters (1,600 feet) of shoreline along the Clinch River tailwater is being spearheaded by Trout Unlimited and the

“TVA is a good steward of the Tennessee River system. Its programs for monitoring, managing, and improving water quality in our lakes and streams have resulted in cleaner and safer water in Tennessee, with better protection for fish and wildlife. From researching and developing complex reservoir models to organizing local pollution-control efforts, the people at TVA are making a real difference for Tennessee waters.”

Paul Davis
 Director, Tennessee Division
 of Water Pollution Control

Clinch-Powell Watershed Team.

Dry weather in recent years has reduced water flow through the river system, affecting the ecological health of TVA reservoirs. In 2001, special water releases at Apalachia Dam near the Tennessee-North Carolina border reduced the impact of low-flow conditions on the Hiwassee River and Apalachia Reservoir. This move helped keep the Hiwassee whitewater flowing and lowered river temperatures—a boon to both whitewater rafters and trout anglers. TVA



Monitoring aquatic life is an important part of TVA’s environmental stewardship.

also combined heavy releases from Cherokee, Douglas, and Fort Loudoun Dams to increase the movement of water in reservoirs on the upper Tennessee River. The faster movement prevented stagnation by raising the level of dissolved oxygen in the water, which improved its quality for fish and other aquatic life.

The task of monitoring reservoirs and seeing that water-aeration systems remain in good working order presents an ongoing challenge for TVA. Many of the systems were experimental when they were installed and have required technological upgrades. In 2001, TVA was able to reduce the duration of outages caused by equipment failure from days to hours.

One test of whether these efforts are working is the life-sustaining potential of reservoir water. There is good news to report one year after the reintroduction of lake sturgeon into the French Broad River below Douglas Dam. Radio tracking and monitoring indicate that the fish are dispersing throughout the Douglas tailwater and into Fort Loudoun and Cherokee Reservoirs.

Aquatic Biologist Award to Charlie Saylor

Many fish stories are exaggerated, but the one about Charlie Saylor, a TVA Aquatic Biologist, is for real. In 2001, Saylor received the greatest honor the natural sciences can bestow: a newly discovered species was named after him. It’s a fish, the 50- to 76-millimeter (two- to three-inch) *Phoxinus saylori*, which Saylor discovered back in 1976 during a biological assessment of a stream on the Walden Ridge portion of the Cumberland Plateau. At the time, he thought he was collecting a reference sample of the Southern redbelly dace, a fish indigenous to the Tennessee Valley.



Saylor preserved the black, yellow, red, and gold minnows in a jar, which sat on a shelf for more than 15 years. Then, after reading *Fishes of Tennessee*, by ichthyologists David Etnier and Wayne Starnes, he realized that he might have scooped up a completely new species. Horn Branch Creek, where he’d found the fish, was outside the range of Southern redbelly dace. In 1993, Saylor took his preserved minnows to Etnier for inspection. Yes, said the ichthyologist—the biologist had probably discovered a brand-new species of fish.

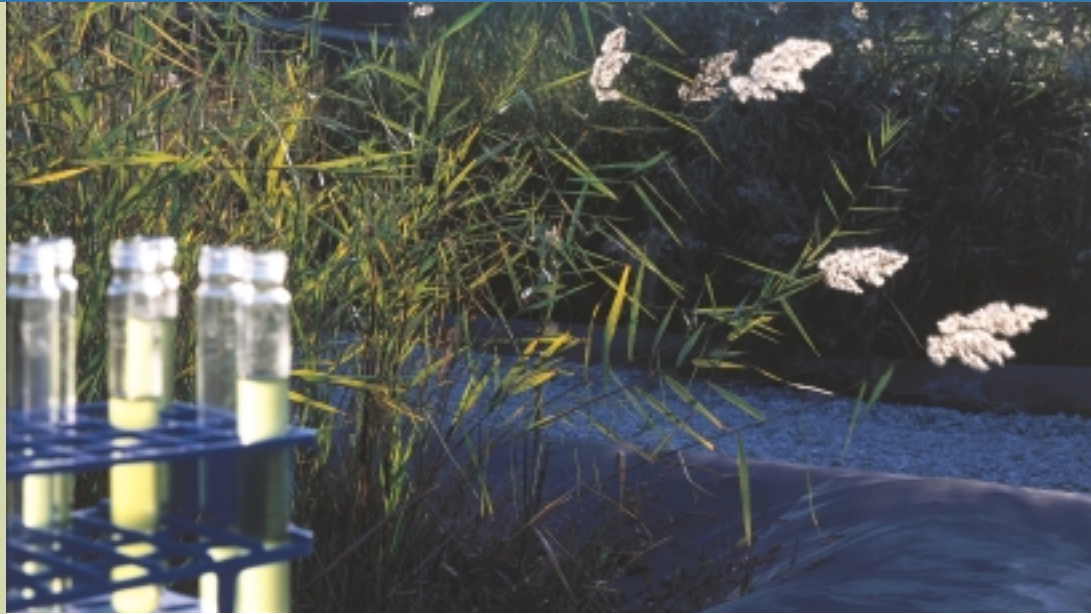
A former University of Tennessee graduate student, Chris Skelton, studied Saylor’s fish for his graduate dissertation and chose to name the new species after the man who’d discovered it 25 years earlier. Skelton’s formal description of *P. saylori*, otherwise known as the laurel dace, was published in a 2001 edition of *Copeia*, a quarterly scientific journal for ichthyologists and herpetologists.

Says Saylor, “It was a tribute I never expected. It’s an honor among your peers, since it’s mostly ichthyologists who use the scientific names of species. In the scientific community, it’s a pretty big deal.”

Native-Tree Seedling Donation

In various TVA cooperative watershed-improvement projects during recent years, the agency has hand-planted about 100,000 mixed hardwood tree seedlings. Last year, in addition to those efforts, TVA found homes for 2,000 native-species seedlings left over from a shipment donated through the Community Tree Planting Grant, which gives away seedlings to be planted on private land. Native tree species represented in the shipment included Shumard red oak, loblolly pine, redbud, and river birch. In June 2001 the surplus trees were exposed to the elements and dying fast, so TVA stepped in to help get them in the ground and growing as quickly as possible.

Approximately 600 young trees were planted on TVA land, and another 600 were donated to various stakeholders. TVA's Chickamauga Watershed Team used many of the trees to stabilize stream banks and replant large tracts of land devastated by Southern pine beetle infestation. Other young trees were sent north to be planted in Hopkinsville, Kentucky, and in Paris, Tennessee. The remaining trees were donated to the Boy Scouts' Camp Buck Tom on Watts Bar Reservoir and used to replant campground and park areas affected by the pine beetle epidemic.



Sampling shows that the sturgeon have doubled in size and appear to be in excellent condition—a finding that reflects the higher levels of life-sustaining oxygen below Douglas and Cherokee Dams. Two additional releases of approximately 2,000 lake sturgeon took place in November and December 2001 at two locations near Knoxville, Tennessee. The reintroduction of the sturgeon was made possible by the partnership and cooperation of the Tennessee Aquarium, the Southeast Aquatic Research Institute, the U.S. Fish and Wildlife Service, the Tennessee Wildlife Resources Agency, the World Wildlife Fund, and TVA.

Of course, TVA's commitment to protecting the environment extends far beyond the Tennessee River basin—to transmission-line rights-of-way (ROWs) and easements, for example. TVA works with property owners to plant low-growing native vegetation along ROWs in environmentally sensitive areas. A total of 27,400 kilometers (17,000 miles) of transmission line serves all regions of the Valley, stretching through rural and urban landscapes. The electrical clearance standards imposed by the National Electrical Safety

Code require TVA to cut trees that might interfere with power transmission.



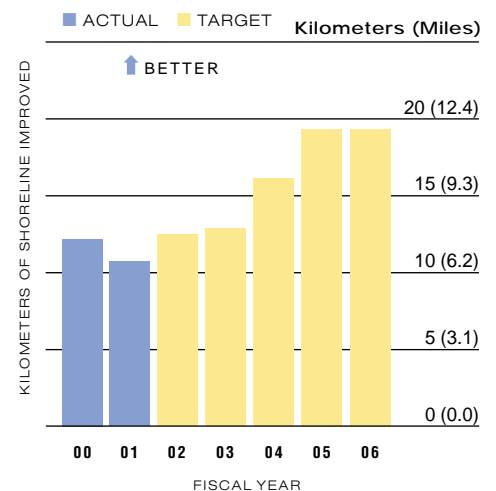
Sturgeon are once again populating Valley waters.

Consequently, 200,000 to 400,000 trees in and adjacent to ROWs must be cleared each year. To reduce the number of trees cut in certain locations that meet specific criteria, TVA plants low-growing native vegetation, which minimizes the need for maintenance in wildlife areas. As a way of promoting the planting of

native vegetation by agencies and states throughout the Valley, TVA has developed a



Critically Impaired Shoreline Improved



brochure and a notebook identifying trees and shrubs that are ideally suited to ROW landscaping.

In addition, pilot work is under way in some locations where new transmission lines cross streams and no vegetation currently exists. These areas are being planted with native, low-growing tree species or native warm-season grasses that stabilize bare banks, provide habitat, and control tall-growing trees. For more information on TVA's work in this area, visit www.publicpowerinstitute.org.

Over the past century, the Valley region has lost more than 60 percent of its wetland acreage, but in recent years state and federal wetland-protection laws, guidance, and executive orders have slowed the trend. Protecting wetlands has always been part of TVA's mission, and the agency's adherence to a "no net loss" policy preserves and protects such areas remaining on TVA land. The agency also integrates the goal of wetland protection into its land-management policies, ongoing technical development programs, and environmental review of new projects.

Despite continuing efforts to stem the epidemic of Southern pine beetle infestation in 45 Tennessee counties, TVA and

landowners have lost many acres of commercially and ecologically valuable timber. Thousands of trees have died or been removed at Watts Bar, Fort Loudoun, and Norris Reservoirs, and TVA is replanting trees in some of the devastated areas.

Cycles of infestation recur naturally every two to 15 years, but drought has contributed to the problem. The beetles kill trees by boring through their bark and hollowing out egg galleries. Under normal conditions, a healthy tree produces a flow of sap so strong that when the beetles bore into it they are pushed back out by the flow. How much sap a tree produces, however, depends in part on the amount of moisture in the soil. While rainfall in the Valley is returning to normal levels, the full benefit will not be felt until ground moisture is thoroughly replenished.

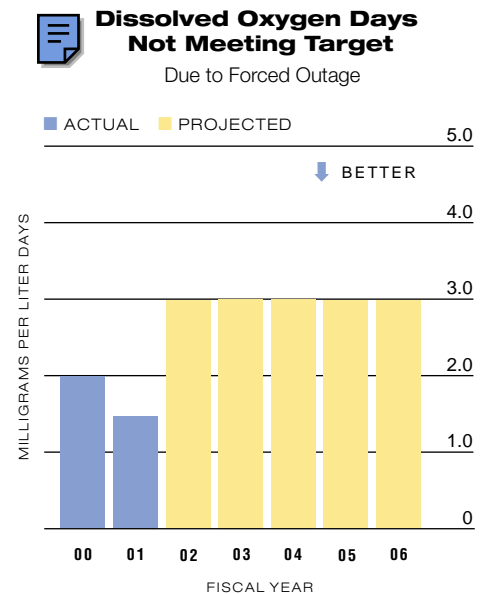
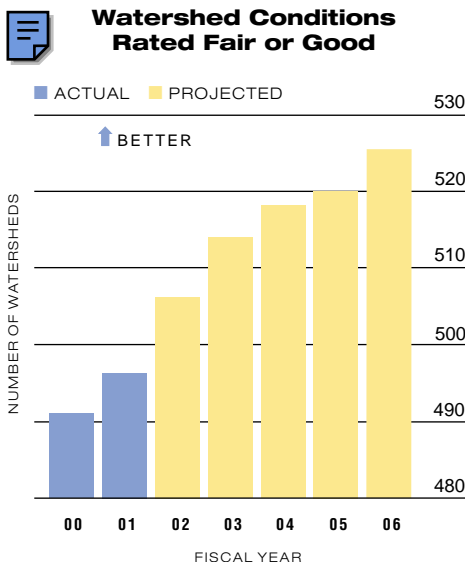
TVA's drive to modernize its hydropower facilities, launched in 1992, continued in 2001 despite challenges. The investment initiative, which is designed to ensure the availability of reliable hydroelectric generation in the future, has added over 385 megawatts of peaking capacity to the TVA system since its inception and has improved the facilities' efficiency by an average of 4.8 percent. The result is more electricity

generated from the same amount of water. However, a conversion from automatic turbine-greasing systems to a newer bushing technology proved problematic last year. The new bushings swelled, causing operational difficulties. Consequently, TVA has returned to the original type of greased bushings at some plants until other alternatives can be field-tested.

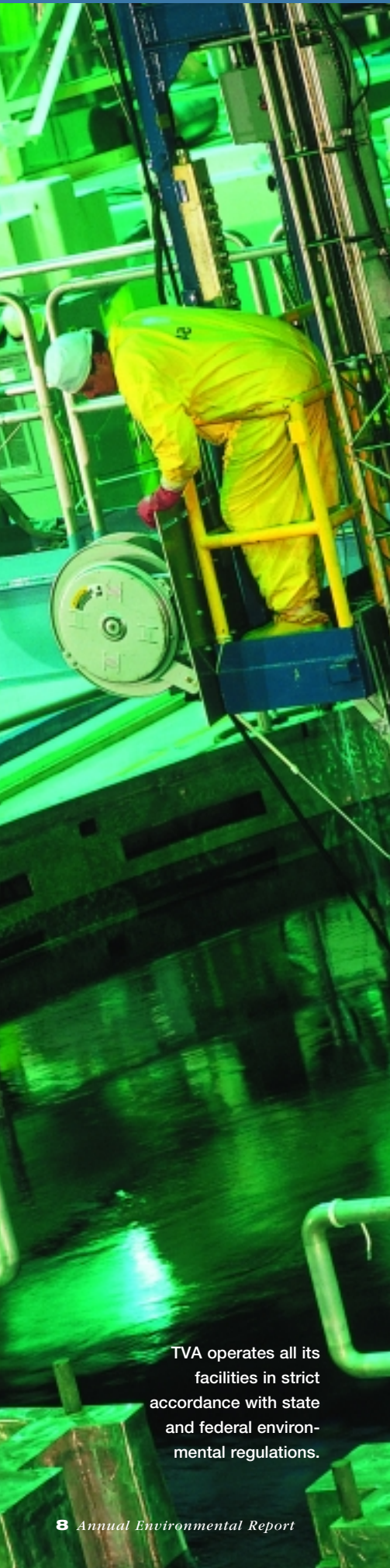


At www.tva.com/environment

- Aquatic plants are a nuisance to boaters but a haven for fish and waterfowl. Read how TVA works with stakeholders to balance environmental protection and other competing interests.
- TVA's environmental stewardship earned acknowledgment from various state and national organizations in 2001. Learn about the agency's award-winning people and programs.
- Find out about Kentucky Watershed Team Manager Don Allsbrooks' career-long, award-winning contributions to a better environment and the wildlife-management profession.



Environmental Compliance



TVA operates all its facilities in strict accordance with state and federal environmental regulations.

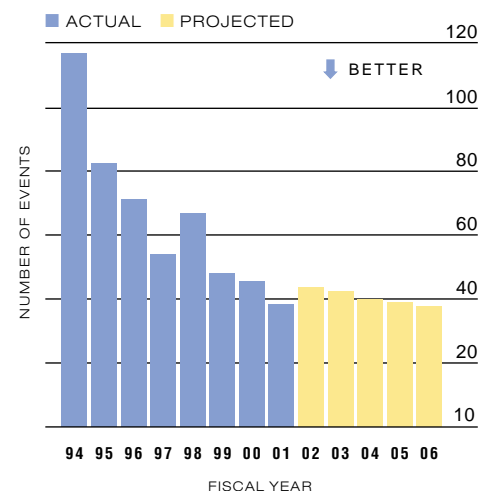
In 2001, TVA experienced 39 Reportable Environmental Events (REEs), down 13 percent from the previous year's 45. REEs, which may include overflows or small releases of oil (in quantities that can produce a sheen on water), are events serious enough to trigger notification to or enforcement action by a regulatory agency. Of TVA's 39 REEs in 2001, 27 (69 percent) involved oil releases, effluent spills, and wastewater bypasses, the majority of them at power generation facilities. The four REEs that had the greatest potential effect on the environment are described in detail here:

1 The first REE, an oil spill at the Kingston Fossil Plant in Tennessee, originated from the Unit 7 generator seal oil cooler as workers were putting it back into service after maintenance. Approximately 3,028 liters (800 gallons) of oil spilled from the cooler into the discharge channel, which leads directly to the Clinch River. A low-oil alarm immediately alerted TVA workers that a spill had occurred. Oil skimmer booms were placed across the discharge channel to contain the spill, but some oil reached the Clinch River. To keep the oil from being carried downstream by the current, workers stopped the water flow downstream at Watts Bar Dam. This step, combined with favorable wind conditions, caused the oil to drift upstream and against the TVA shoreline. The oil spill spread about two miles along the shore, and TVA's environmental emergency-response staff contained it with booms, removed it with special oil-recovery vacuum trucks, and filtered the water through a coal pile that

safely absorbed the oil. TVA's quick action and thorough cleanup earned praise from the Environmental Protection Agency (EPA). An investigation determined that one of the seal rings had not been installed when the cooler was assembled. It was also found that during start-up the cooler's water system had been controlled with the wrong valve, which produced a high oil-pressure differential. To prevent similar spills in the future, TVA has revised the postmaintenance testing procedure to include a check of equipment performance prior to use.

2 In the second REE, a catastrophic transformer failure at the Shelby substation in west Tennessee resulted in the release and burning of an estimated 3,785 liters (1,000 gallons) of insulating mineral oil. The upper portion of the 500-kilovolt transformer, which was new and being tested before full operation, exploded during initial use. Oil entered the transformer's storm-

 **Reportable Environmental Events**



“TVA’s Blended Low Enriched Uranium Program converts highly enriched uranium to a usable nuclear fuel. We can now reduce the cost of disposing of surplus highly enriched uranium by converting it into something useful to fuel America’s economy.”

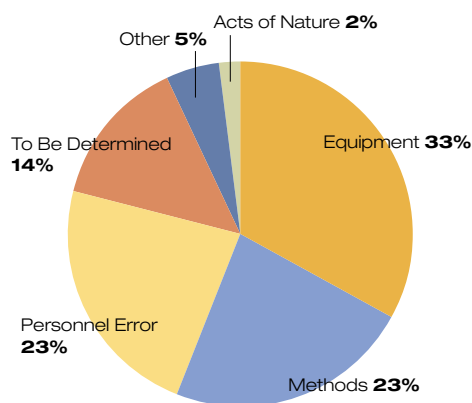
Dwight B. Ferguson
President, Nuclear Fuel Services Inc.

drainage system, but less than 38 liters (10 gallons) of it was discharged into a storm drain on TVA property. The oil produced a sheen approximately 46 meters (150 feet) long on the water in the storm-drainage ditch. In accordance with EPA guidelines, the ditch was diked and the oil and contaminated soil were removed for proper disposal. The faulty transformer was returned to the manufacturer for a detailed design evaluation and was replaced with a new transformer. To help control fluid leaks and reduce the risk of a recurrence, TVA continues to add larger and more effective containment bays around transformer installations. It has also begun providing transformers with full secondary containment before they are put into service.



Causes of Reportable Environmental Events

FISCAL YEAR 2001



3 The third REE occurred when lubricated equipment became submerged in a flooded basement at the powerhouse of TVA’s Apalachia Dam in southeastern Tennessee. A clogged strainer caused a cooling-water pressure regulator to fail, leading to the opening of the pressure-release valve. The drain system, also partially clogged, was unable to handle the discharged water, which flooded into the rest of the basement. Eventually it backed up and covered the unit wheel pits, causing oil and grease to float out of the bearings. Workers closed and drained the valves and removed most of the oil and grease through the station sump. A slight sheen was detected on the river, but the amount of oil and grease that actually reached the water was very small. To prevent a recurrence, TVA reviewed and revised its maintenance procedure, removed the clogged strainer, cleaned the floor drainpipes, and enlarged and rerouted the pressure-release valve pipe.

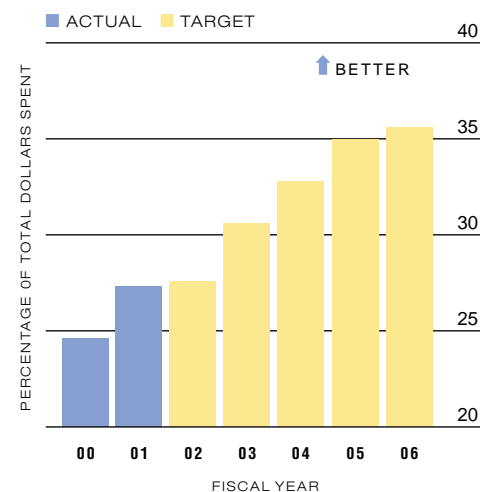
4 The fourth REE involved approximately 18 metric tons (20 tons) of lead-contaminated sandblast grit that had been used to remove paint from plant equipment undergoing repair at the Power Service Shops in Muscle Shoals, Alabama. Samples of the grit had been collected several weeks earlier and were being tested so that TVA could determine how best

to dispose of it. When a waste transporter arrived at the site for an unrelated pickup, the driver mistakenly hauled away a single dumpster filled with the sandblast grit. It was transported to and deposited in a landfill that was not permitted to accept such material. Three days later, the test results indicated that the grit contained leachable lead contamination slightly above the EPA limit. On the basis of the sample data, TVA estimated that the waste mistakenly deposited in the landfill contained approximately 136 grams (0.3 pounds) of leachable lead. Even though the regulator allowed the contents of the dumpster to remain in the landfill, TVA acted to prevent a recurrence by equipping the bulk special-waste dumpsters with locks that can be removed only by authorized personnel.



Recycled-Content Items Purchased

EPA-Designated Items With Recycled Content



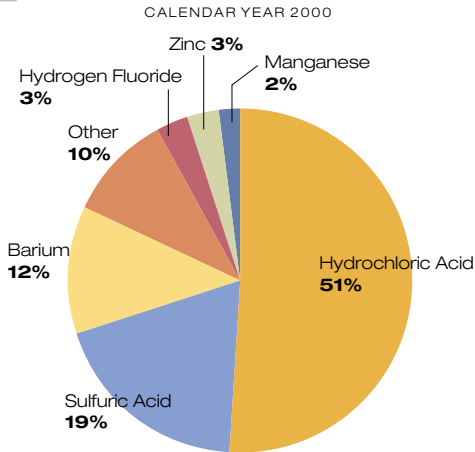
TVA is working in a variety of ways to reduce the number of its REEs. The agency maintains an internal REE indicator that tracks individual occurrences. Employees at plants and other facilities conduct quarterly assessments of the events, and audits are done by a central staff of Environmental Specialists. These audits monitor the

effectiveness of the Environmental Management System at TVA facilities and help to ensure compliance with local, state, and federal regulations. Since 1995, the audit findings have decreased steadily.

Another area of focus is the emissions produced by TVA's coal- and oil-burning plants. The EPA's Toxics Release Inventory (TRI) requires about 31,000 U.S. facilities to report the release of approximately 650 chemicals defined by the EPA as potentially hazardous to human health. TVA releases 21 of the chemicals on the EPA's list in



Toxics Release Inventory



quantities sufficient to require TRI reporting. An increase in power generation between 1999 and 2000 caused the agency's TRI-reported emissions to rise by about 4 percent. Changes in the EPA regulations also required TVA to report the release of several chemicals not previously listed in the TRI. The addition of these substances, however, did not result in significant changes in the total reported amounts of chemicals released.

Because of the number of fossil-fueled plants TVA operates, it ranks high among the top TRI-reporting industries in Alabama, Kentucky, and Tennessee. Every year, to better understand the potential effects of power plant emissions, TVA voluntarily performs inhalation health-risk assessments for each of its coal-fired plants. The tests provide estimates of exposure conditions within a radius of 50 kilometers (31 miles) around each facility, the area of greatest potential impact. These risk assessments consistently demonstrate that concentrations of emitted chemicals are very low and pose no significant health risk to any TVA power plant employees or Valley residents living within 50 kilometers of the plants.

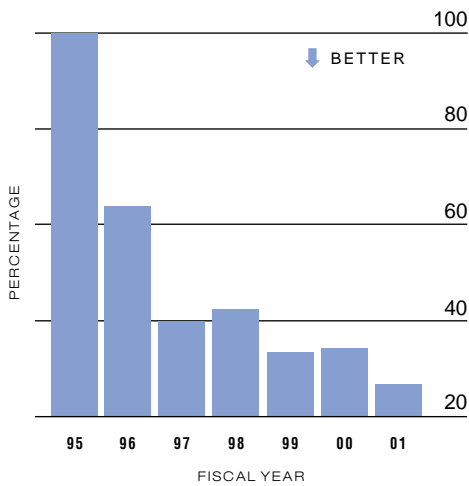
Last year TVA conducted a comprehensive health-risk assessment for the Widows Creek Fossil Plant in northeast Alabama. The assessment examined the risk of exposure to potentially toxic TRI releases by way of ingestion, inhalation, and absorption through the skin. The detailed information collected

in a study like this one helps establish the potential impact of TRI releases and is a key element in TVA's environmental management decisions. The Widows Creek facility was selected for assessment because it presents the most complex emissions and terrain features of any TVA plant. This comprehensive study, like the inhalation health-risk assessments at other plants, confirmed that TRI air, land, and water releases from the Widows Creek facility pose no significant acute, chronic, or cancer health risk to plant employees or people living nearby. Visit www.tva.com/environment/air/tri.htm for more information on the health-risk assessments and for data on TRI emissions at Widows Creek and other TVA plants.

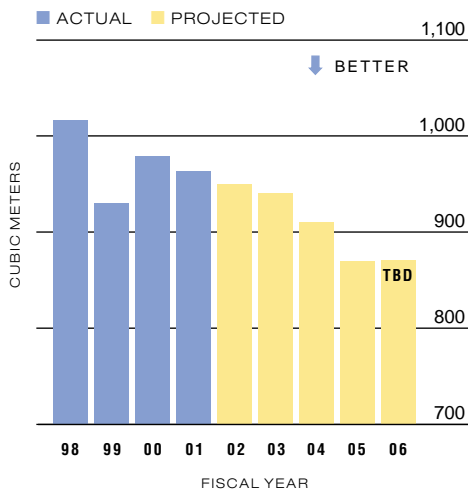
TVA continues to work to reduce the amount of hazardous waste produced by its standard operations. The agency has made substantial progress in this area, but its success has been offset by a few large-scale remediation and plant-cleanup projects that have increased the total amount of hazardous waste generated.



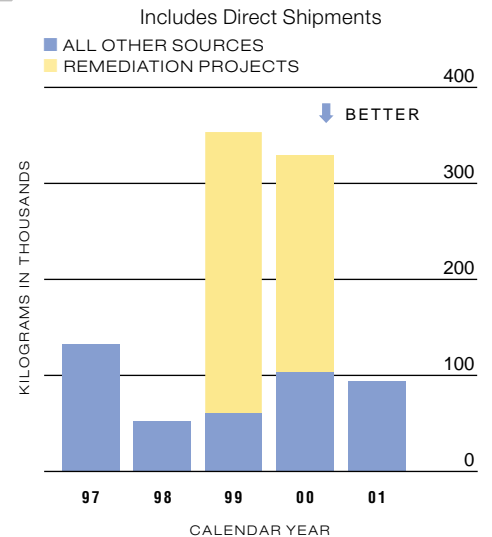
Percentage of Audit Findings Compared With 1995 Baseline



Low-Level Radioactive Waste Generated



Hazardous Waste Generated



Increases resulted from these large-scale remediation projects: Power Service Shops (1999) and Tellico Battery Project and Environmental Research Center (2000).



Nuclear power provides a solid base of available energy while producing far fewer emissions than fossil-fuel combustion.

For instance, environmental and safety initiatives were conducted at TVA's Watts Bar Fossil Plant, which was placed in stand-by mode in 1984 and permanently shut down in 1997. Included in these initiatives was the removal of smokestacks, electrostatic

precipitators, and the coal-conveyor housing containing asbestos and lead-based paint. This work is part of a multiyear process, and TVA still intends to remove large amounts of lead-based paint, asbestos, solid waste, devices containing mercury, and oil. The agency will provide updates on progress at Watts Bar Fossil Plant in subsequent issues of this report.

In 2001 TVA identified, removed, and properly disposed of contaminated oils and small amounts of hazardous substances at the Bowling Green Steam Plant in Kentucky, which was retired in 1960. The facility had housed an inventory of paints, solvents, spare electrical equipment and parts, and containers of oil. As a first step, TVA notified the EPA and the Kentucky Department for Environmental Protection, and an action plan was developed and implemented.

Two other cleanup projects that generated significant amounts of hazardous waste were the removal of lead paint from the Allen Fossil Plant and from fabrication and repair work done at the Power Service Shops.

TVA remains committed to the goal of decreasing its overall production of low-level

radioactive waste, and in 2001 its generation of this material fell by 1.5 percent. But the agency, like other operators of nuclear power plants, is hampered in disposing of these wastes by the lack of economical licensed and permitted disposal sites. TVA will store some radioactive waste at its facilities until a better solution is available.

The use of polychlorinated biphenyls (PCBs) continues to present a potential compliance problem, especially since EPA regulations have changed to include thousands of additional units of small electrical equipment. Although most high-risk PCB equipment at TVA facilities has been removed or retrofilled, some remains and could release PCBs if fires, spills, or other accidents occurred. An internal team of TVA experts has reviewed current removal plans and has begun inventorying the remaining PCB equipment and developing a standardized approach for the removal and disposal of PCBs.

To further reduce the amount of waste generated by its operations, TVA has selected five chemicals for progressive elimination from its procurement lists and inventory. The substances targeted for priority action are mercury from switches and measuring devices, lead solder, pentachlorophenol, PCBs, and silver used in photography and radiology. By the end of 2005, TVA expects to have reduced use of these hazardous, toxic, or carcinogenic substances by 50 percent.

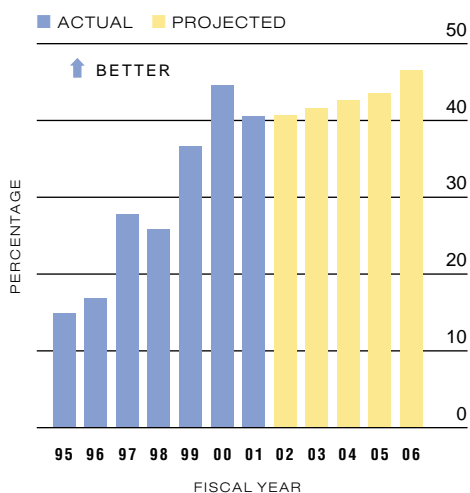


STAYCONNECTED

At www.tva.com/environment

- Read information on TVA's purchases of EPA-designated items containing recycled materials.
- TVA reduces solid wastes as a federal charter partner in the EPA's WasteWise Program. Learn more online.

Utilization of Coal-Combustion By-Products



Increased power generation in 2001 caused the production of more by-products, decreasing the overall utilization percentage.



Pollution Prevention

Affordable electric power helps sustain the Tennessee Valley region's high quality of life and low cost of living. TVA has found that the best way to achieve these ends is to treat its power generation facilities and the ecosystems in which they operate with a balanced, integrated approach.

TVA derives energy from a variety of sources, ranging from fossil and nuclear plants to renewable resources like hydropower, wind, and sunlight. But coal-burning power plants provide 60 percent of the electricity generated by TVA. These plants also affect the region's air quality by emitting sulfur dioxide (SO₂) and nitrogen oxide (NO_x). That's why TVA continues to take steps to reduce emissions from its

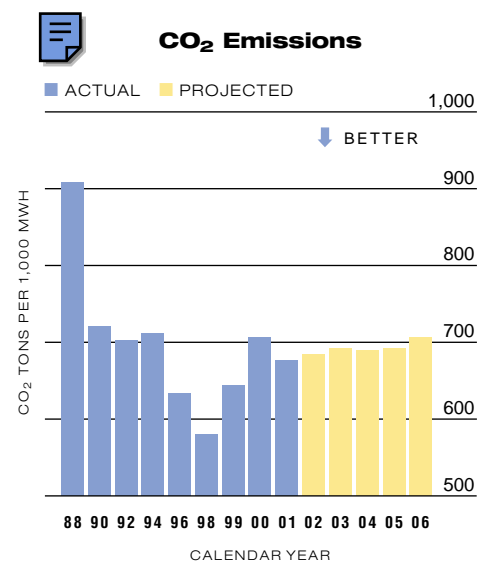
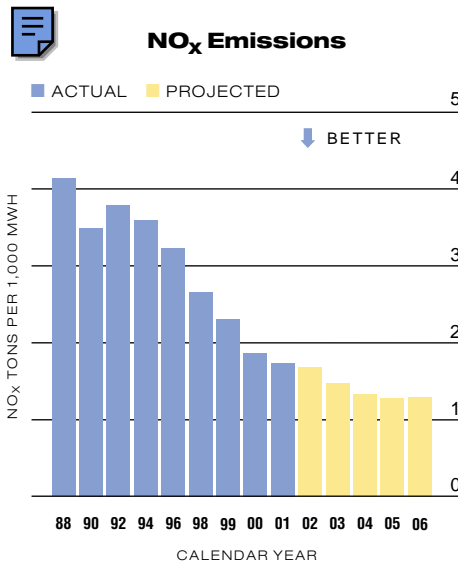
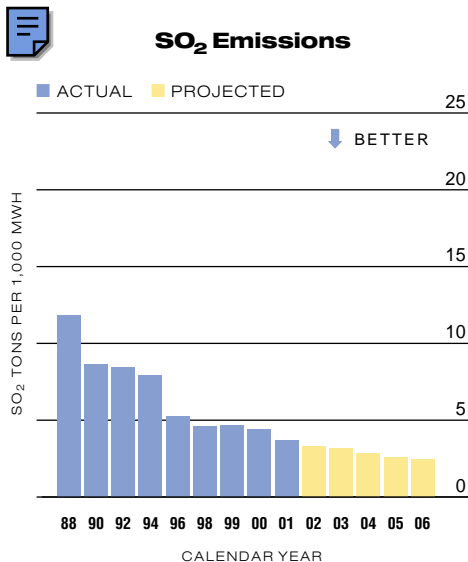
fossil plants.

A major effort to lower summertime emissions of NO_x continued in 2000 with the installation of TVA's first selective catalytic reduction system (SCR) at Paradise Fossil Plant in Kentucky. A second SCR was installed at Paradise in May 2001. The experience gained in overcoming start-up and operational problems that arose during the first installation made TVA better prepared to complete the second.

An SCR system removes NO_x by directing a plant's flue gas into a reactor where ammonia is injected. In the presence of a catalyst, the ammonia reacts with the NO_x in the flue gas to form harmless nitrogen gas and water vapor. By 2005, TVA expects to

have installed a total of 18 SCRs or their equivalent at 25 coal-fired generating units located at seven of its 11 fossil plants, at a cost of \$1.2 billion. This effort, one of the most massive pollution-control programs in the nation, aims to reduce NO_x emissions at the fossil plants by 70 to 75 percent during the ozone season, which lasts from May to September. Before the SCR program began, TVA had already spent more than \$300 million to acquire and install other NO_x emissions-control equipment.

When increased power demand by consumers caused TVA to add peaking capacity by installing combustion turbines, the agency's commitment to reducing NO_x emissions led it to choose the lowest-emissions turbines available. Last year eight of these turbines were installed at Lagoon Creek near Brownsville in west Tennessee; another eight are scheduled for installation in 2002.



“Oak Ridge National Laboratory is an enthusiastic participant in TVA’s Green Power Switch program. Like many customers across the Valley, the laboratory is eager to plug into renewable energy. TVA should be commended for taking the lead in this effort.”

Dr. William J. Madia

**Director, Oak Ridge National Laboratory
U.S. Department of Energy**

When the process is complete, TVA will have 72 combustion turbine units with a capacity of 5,000 megawatts.

One way TVA decreases SO₂ emissions is by burning low-sulfur coal—a method it occasionally enhances by burning the coal in combination with natural biomass materials. In 2001 TVA also announced plans to design, build, and operate five flue-gas desulfurization systems, or scrubbers, that will further reduce SO₂ emissions from coal-fired power plants. Collectively, these new scrubbers, costing a total of about \$1.5 billion, will decrease emissions of SO₂ by more than 181,437 metric tons (200,000 tons) per year. This will bring TVA’s total SO₂ emissions down to 85 percent below 1977 levels.

Six scrubbers are already in operation at TVA’s larger units—two at Cumberland Fossil Plant, two at Paradise, and two at Widows Creek. New scrubbers will be installed at Bull Run, Kingston, Paradise, and Colbert Fossil Plants. TVA chose these sites because they will provide the greatest environmental benefit for the investment, including improved air quality in the mountains of east Tennessee and western North Carolina.

Power distributors and environmental groups are partnering with TVA to clear the air by promoting Green Power Switch® (GPS), a program that offers consumers the opportunity to purchase cleaner, greener

energy generated from sunlight, wind, and methane gas. Block sales to consumers in 2001, the first full year of the program, exceeded expectations by 20 percent. However, construction-related delays in landfill-gas generation created an imbalance in supply and demand. Although nine of 12 solar generating systems and three wind turbines were operating by the end of GPS’s first year, the Middle Point Landfill generation project came online several months later than expected. This resulted in a supply deficit, forcing a temporary reduction in the program’s marketing. Current production meets existing demand, and the accumulated supply deficit should be eliminated by the spring of 2002.

As more consumers make the Green Power Switch, TVA is working to develop an adequate portfolio of supply options to meet the demand for renewable energy. For example, plans are in the works to establish a solar generation site in Mississippi to add to the 12 solar sites currently online. Two more solar sites are also planned for 2002. Another new source of energy, the co-firing



STAYCONNECTED

At www.tva.com/environment

- **Read the latest on *energy right*®, the TVA program that promotes residential energy efficiency.**

Energy Star®

At TVA, environmental stewardship begins at home. A noteworthy example is the agency’s energy-conserving Edney Building in Chattanooga, Tennessee, which in 2001 was certified as an Energy Star Building under the Energy Star Program run by the EPA and the U.S. Department of Energy. TVA’s Chattanooga Office Complex had received Energy Star certification the previous year.

A symbol of energy efficiency, the Energy Star label was introduced by the EPA in 1992 as part of a voluntary labeling program designed to identify and promote energy-efficient products and structures. Energy Star encourages both responsible energy management and care for the environment through reduced carbon dioxide emissions. Buildings that bear the Energy Star label are recognized as the most energy-efficient facilities in the federal government.

The 11-story, 8,640-square-meter (93,000-square-foot) Edney Building boasts an array of features that helped it earn the Energy Star label in 2001. The most prominent of these is its energy-efficient hydronic loop heat-pump system, used for both heating and cooling. The system’s pumps are designed to be maintenance-free for 10 years.

Other energy-conserving features of the Edney Building include:

- Occupancy sensors to turn off lights when they’re not needed
- A system that maximizes energy efficiency by controlling the building’s operation and lighting
- Energy-efficient lighting and electrical circuitry
- Recycling to reduce waste production
- Variable-frequency drives on the cooling tower that provide better control and save energy.

For more information on Energy Star label requirements and Energy Star products, visit www.energystar.com.



Last year Green Power Switch block sales to consumers exceeded expectations by 20 percent.

of methane from the Memphis wastewater treatment facility with coal at Allen Fossil Plant, is online for GPS use and will enable TVA to make up the supply deficit that resulted from construction delays and capacity reductions at Middle Point Landfill. The co-firing at Allen means that more than 15,422 metric tons (17,000 tons) of coal will not have to be burned to produce power for the Valley.

As TVA continues to work on new ways of reducing pollution, it is exploring the option of bringing an additional 20 megawatts of wind-generated electricity online by October 2003. The challenge is locating good, available wind-farm sites while continuing to work with communities to increase local support for wind-powered generation. Together with other federal and state agencies, TVA is monitoring bird and bat mortality at its Buffalo Mountain wind farm to develop a strategy for protecting wildlife at wind generation sites.

Nuclear power has generated a solid base of available energy while producing far fewer

emissions than fossil-fuel combustion. The Nuclear Energy Institute reports that between 1973 and 2000, nuclear generation worldwide kept 60 million metric tons (66.1 million tons) of SO₂ and 30.5 million metric tons (33.6 million tons) of NO_x out of the air. In the U.S., this translates into 4.6 million metric

tons (5.1 million tons) of SO₂, 2.2 million metric tons (2.4 million tons) of NO_x, and 164 million metric tons (181 million tons) of carbon that didn't enter the atmosphere. Last year TVA's nuclear facilities continued to set records for safety and performance. They were ranked among the 25 best-performing units in America by the industry trade publication *Nucleonics Week*.

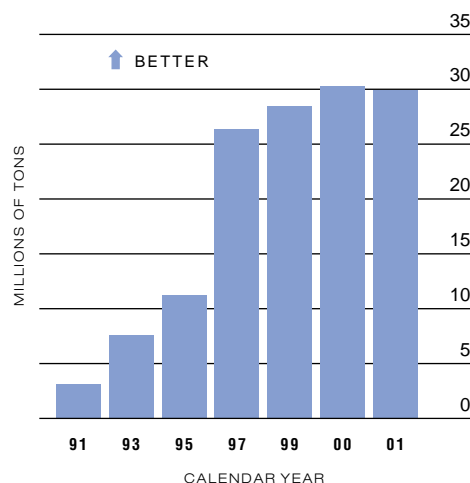
TVA works to prevent pollution, not only by making its own power production as environmentally friendly as possible, but also by partnering with other entities to develop new, clean technologies for use in various industries. The agency collaborated on a three-year, commercial-scale demonstration project that used an ingenious new wetland technology called ReCip™ to treat concentrated wastewater at a swine farm in Aliceville, Alabama. The new process pumps wastewater back and forth between adjacent wetland cells that are drained and refilled on a two-hour cycle. The Aliceville project confirmed that ReCip produces a substantial reduction in ammonia, nitrate, noxious odors, and biological oxygen demand. The treated water is conserved and reused to clean barns and irrigate fields.

If developing cleaner power is pollution-

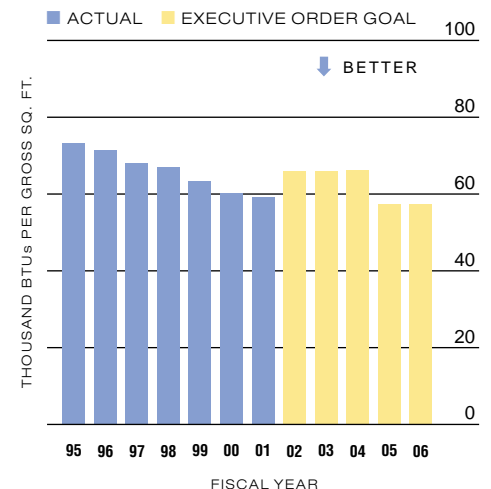


CO₂ Emissions Avoided

As Reported in Global Climate Challenge



TVA Buildings' Energy Consumption



prevention management on the supply side, demand-side management prevents pollution by finding ways to use energy more efficiently. TVA promotes the installation of energy-saving geothermal heat pumps in schools and government buildings, offers businesses efficient lighting and energy-management systems, and helps homeowners lower their electricity bills. The agency has

begun providing commercial and industrial customers with the opportunity to reduce their power use (and stress on the TVA system) during periods of peak demand, then share in the savings produced by this arrangement through a buy-back option. By smoothing out peaks in generation, the program offers TVA new ways to meet power demand and control emissions as well.

TVA Recycling Effort: Old Computers

Home computers have become so affordable that it's usually easier and cheaper to buy the latest model than to upgrade.

That's great for computer retailers, but bad for the environment. When old electronic products are dumped in landfills, the lead, cadmium, mercury, and other hazardous materials they contain leach out, potentially contaminating the groundwa-



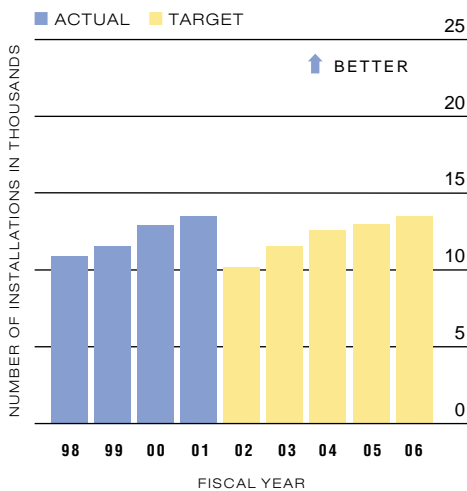
ter, harming the environment, and damaging the health of local communities.

Offering consumers a simple but cleaner and greener way to part with their old computers was the main goal of the recycling event held last May at a CompUSA store in Knoxville, Tennessee. TVA teamed up with the City of Knoxville Solid Waste Office, the Oak Ridge National Recycle Center, CompUSA, WBIR-TV, and the Knox County Solid Waste Division to sponsor the one-day collection of used electronics.

More than 300 vehicles pulled up to unload almost nine metric tons (10 tons) of old equipment during the event. The huge haul included 4,709 kilograms (10,382 pounds) of monitors and 4,215 kilograms (9,292 pounds) of such miscellaneous computer equipment as CPUs, peripherals, and printers. At the end of the day, the used electronics were hauled to the Oak Ridge National Recycle Center for processing.

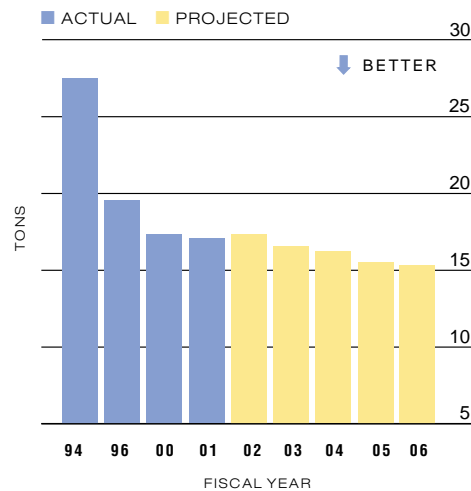
"TVA was a great help in this event," says waste reduction specialist John Homa of the City of Knoxville Solid Waste Office, who helped coordinate the recycling effort. "But neither TVA nor the city of Knoxville can do this alone."

Number of Energy-Efficient New-Home Installations through energy right® Program



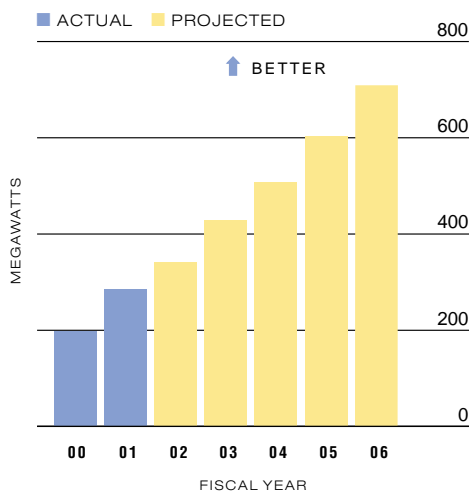
Forecast reflects a slowdown in the economy and in new housing construction.

Solid Waste Going to Landfills

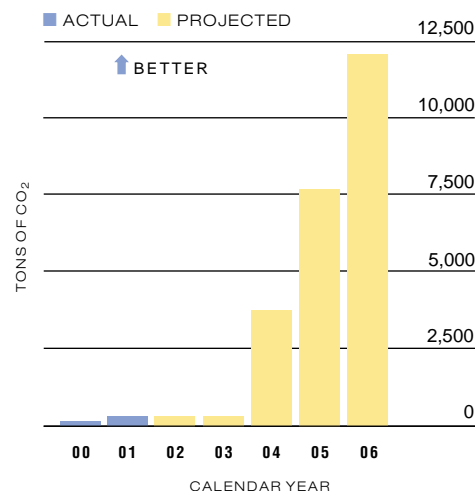


The FY02 forecast reflects an increase in transmission construction projects.

Reduction of Peak Energy Demand



Reduction of Greenhouse-Gas Emissions Attributed to Facility Energy Use





Partnerships *and* Public Involvement

The best way to build anything of lasting value is from the ground up. That's why the 12 TVA Watershed Teams form partnerships with citizens at the grassroots level to promote environmental awareness and responsibility. Each team, assigned to a specific area in the 108,800-square-kilometer (42,000-square-mile) TVA watershed, supports and works with community coalitions to inform people about sustainable land use and to help them protect and restore their portion of the watershed.

The Clinch-Powell Watershed Team, for example, supports the work of nine citizen-led coalitions in four counties of southwestern Virginia. The coalitions have obtained grants totaling \$2 million for water-quality improvement projects. Last year those projects included stream-bank stabilization, cleanups of illegal trash dumps, extensive water-quality monitoring, improved agricultural practices aimed at preventing fertilizer runoff, and the reclamation of land at abandoned mines along the Guest and Upper Powell Rivers.

TVA collaborates with state and local environmental regulatory organizations to achieve improvements in air quality. One such collaboration provides public-health ozone forecasts for Nashville and middle

Tennessee and for the Tri-Cities area of east Tennessee and southwest Virginia. The partnership—which includes TVA, the Environmental Protection Agency, the Tennessee Division of Air Pollution Control (TDAPC), the Nashville Metro Health Department, the American Lung Association, the Tennessee Environmental Council, and the Ozone Action Partnership of East Tennessee/Southwest Virginia—put together a forecasting and outreach effort that developed, tested, and distributed daily ozone forecasts.

In May 2001, the TVA ozone-forecast team began providing TDAPC and the Nashville Metro Health Department with forecasts for Nashville and middle Tennessee. Tri-Cities forecasting began the following month. The participating organizations distributed the results to stakeholders and updated the EPA's AIRNow Web site, which

provides national air-quality forecasts. TVA expects the ozone-forecast program to expand its coverage to include most of Tennessee in 2002.



TVA Chairman Glenn McCullough, Jr., and TVA Director Skila Harris participate in a TVA watershed team exercise. Meanwhile, Park Superintendent Mike Tollefson looks on as TVA Director Bill Baxter tries out an electric bike used by the rangers in the Great Smoky Mountains National Park.

“I was pleased with my participation in the Regional Resource Stewardship Council and with the way TVA responded to our recommendations for management of the Valley’s natural resources. I came out of the experience with an appreciation of the importance TVA attaches to protecting the environment, and a firsthand demonstration of the agency’s willingness to work with a wide variety of people to get things done.”

Lee Baker

**General Manager,
Newport Utilities Board**

TVA is an active partner in the Southern Appalachian Mountains Initiative (SAMI), a voluntary, consensus-based partnership of state and federal environmental agencies, federal land managers, industries, environmental activists, academics, and residents of the Valley. SAMI is completing an integrated assessment of the sources and effects of air pollution in the Southern Appalachians. This work has resulted in a better understanding of issues and policy options related to air quality. In 2002, SAMI will publish a final report targeted to state environmental officials, federal land managers, utility and industry executives, and members of the public who are interested in air-quality issues in the Southern states. The report will include data collected during the eight years of the initiative’s existence, as well as technical analyses and policy recommendations.

Other partnerships between TVA and local communities support economic development in the Valley with targeted initiatives designed to safeguard natural resources that are essential to sustained growth—among them, a reliable supply of energy, clean



TVA is partnering with regional and national agencies to protect natural resources for the next generation.

water, and clean air. TVA’s Quality Communities Program helps communities evaluate economic development resources, analyze their economic bases, and implement strategies. TVA sponsors the Quality Communities Program in Murray, Kentucky, and participates in other ongoing initiatives, including the Cumberland Region Tomorrow’s 10 county effort, which is centered on Nashville; Nine Counties, One Vision in Knoxville; and the Quality Communities Program in East Ridge, Tennessee.

Smokies Solar Water Heater

The water faucets and sinks in the Sugarlands Visitor Center restrooms might seem like an odd launching site for an effort to improve air quality and reduce energy use in the Great Smoky Mountains National Park—but that’s exactly where an innovative TVA environmental project is taking place.



Several years ago, in partnership with Sevier County (Tennessee) Electric System and the Department of Commerce’s National Institute of Science and Technology (NIST), TVA funded a solar-powered water-heating system that has dramatically reduced energy use and hot-water consumption at the heavily used visitor center.

The results of a four-year study completed in February 2001 show that energy consumption at Sugarlands’ restrooms has decreased by more than 50 percent. Hot-water consumption has fallen by almost 40 percent, even though the number of visitors to the center has remained constant during the study. Environmental Protection Agency calculations for a system this size indicate that emissions of sulfur dioxide, nitrogen oxide, and carbon dioxide are also significantly reduced by the use of solar energy instead of more conventional methods of water heating. Assuming that the system replaced water heaters powered by coal-generated electricity, researchers calculate that it will prevent the production of more than 102 metric tons (112 tons) of carbon dioxide over the projected 25-year life of the solar-powered system.

The study was initiated to help advance the development of technologies that use renewable energy sources like wind, solar power, and methane gas.

Mitchell-Nielson Elementary School Energy Conservation

The goal of most top teams is to win the big game. But the Energy Team, a group of fourth and fifth graders at Mitchell-Nielson Elementary School in Murfreesboro, Tennessee, has its sights set on a nobler prize: promoting energy conservation. In 2001, the team's efforts earned top honors in a competition sponsored by the National Energy Education Development Project.

The students gave energy conservation a boost in a variety of imaginative and educational ways. They coordinated a newspaper-recycling project and created puppet shows, public-service announcements, school menus featuring energy tips, and 20,000 messages for educational tray liners used at local McDonald's restaurants.

They also wrote a book—*Tennessee Gets Turned On*, a tale about a young Tennessee Valley farm girl named Margaret and her family during the Great Depression. The story tells of the dramatic improvements TVA and electricity make in their lives. Included in the book are many

simple, commonsense energy-saving tips for both children and adults. The student team was sponsored by TVA, the Middle Tennessee Electric Membership

Corporation, and the Murfreesboro Electric Department.

Tennessee Gets Turned On has been distributed through school libraries in Murfreesboro and parts of Mississippi, the home state of Margaret Guilene Towery, whose life inspired the story. To obtain a copy of the book, send an e-mail request to tvainfo@tva.com.



Open air chambers help researchers assess air-quality impacts on trees.

TVA also sponsors workshops and conferences that help developers, planners, and community leaders acquaint themselves with the best practices for achieving desirable economic growth. In May 2001, TVA hosted an environmental conference focusing on the state of the environment and the challenges and issues facing the electric-utility industry.

In June, the agency played host to a conference for community leaders at which water supply, water quality, sustainable development, and water-resources management in the Tennessee River region were discussed. More than 150 representatives of municipal water suppliers, local and state governments, and businesses and industries participated in the event.

The conference enabled TVA to improve its working relationships with municipal water suppliers and industry; brief local, state, and federal officials on the links between land use, water quality, and water supply; and set the stage for additional cooperation with regional steering groups to take action where needed. By working with state and regional organizations to deliver

information to local governments and developers, TVA builds lasting partnerships for future progress.



STAYCONNECTED

At www.tva.com/environment

- Get a list of links to the Web sites of TVA's partners in environmental stewardship across the Tennessee Valley.
- The Southeast Natural Resource Leaders' Group (SENRLG) is a collaboration of 11 regional federal agencies in the Southeast whose missions include the management of natural resources. One of the 11 is TVA. Learn more online about SENRLG's activities.
- Find out how TVA and the Renewable Energy Policy Project organized stakeholder meetings to investigate biopower as an energy source.

At www.tva.com/rrsc

- Two years ago TVA set up the Regional Resource Stewardship Council, a stakeholders' advisory body on natural-resource management. Read its recommendations and TVA's responses online.



Innovation *and* Technology

Today's research is tomorrow's technology. Significant scientific and technological breakthroughs and incremental advancements require time, good science, financial investment, and a commitment to continuous improvement. TVA's Public Power Institute (PPI) tests new applied solutions to real problems in real-life settings, using TVA's operating facilities as a living laboratory. As it develops technologies and strategies, PPI demonstrates the delivery of low-cost, reliable power in an environmentally conscientious way.

At TVA's Paradise Fossil Plant in western Kentucky, researchers are testing new techniques for the accurate measurement of mercury emissions. The ongoing effort investigates ways in which monitoring of mercury emissions can be improved. The emerging new methods are designed to ensure confidence in the accuracy of measurements of minute quantities of mercury. TVA has already been granted several patents for its techniques; it is now working with other utilities to test these techniques by attempting to replicate the results.

Another ongoing project at Paradise is an analysis of whether the new selective catalytic reduction systems (SCRs) that are being installed at TVA plants to control nitrogen

oxide emissions may reduce mercury emissions as well. Scientists are working to determine whether SCRs convert the mercury in flue gas into a form that can be removed by existing emissions-control equipment. If so, TVA will have greater flexibility as it examines ways of meeting future requirements to remove mercury from flue gas. Sampling is taking place at Paradise and several other commercial plants, with various configurations testing a range of technologies.

TVA is also testing microturbine power



Microturbine power generation is being tested by TVA at some of its facilities.

generation at its facilities. Microturbines are a highly efficient, reliable, environmentally secure source of energy and heat. The gas-powered microturbine uses basic turbine technology, but on a smaller scale. A demonstration model of the Capstone Microturbine™ has been installed in a building at Huntsville Utilities in Huntsville, Alabama, to demonstrate the 60-kilowatt microturbine's ability to supply power.

The technology is also showcased at PPI headquarters in Muscle Shoals, Alabama, where a second Capstone Microturbine has been installed. The microturbine produces 28 kilowatts of power, enough for three to four residences or one commercial enterprise. It powers a portion of the building's lighting and air conditioning, and the balance is run by the power grid. The gas turbine, air compressor, and generator are all mounted on a single shaft, which spins on air bearings at 96,000 rpm. The microturbine can be started, operated, and monitored remotely.

TVA's research on converting biomass—wood and agricultural wastes—to fuels and chemicals has been under way since the early 1980s. The latest emphasis is on the conversion of municipal solid waste to the clean-burning fuel ethanol, which can also be made from corn. TVA has experimented with turning cornstalks and household garbage into sugars that can be distilled into ethanol.

In blended gasoline, ethanol serves as an oxygenate. The use of oxygenated fuels in many areas of the country is federally mandated by the Clean Air Act as a means



The new TVA Regenesys plant in Columbus, Mississippi, will store electricity during off-peak periods and release it for use when the need for electricity is high.

“Last fall TVA’s 2001 Energy Technology Expo brought together national legislators, energy-technology business owners, environmentalists, and others in a remarkable showcase. Global Energy Partners was fortunate enough to participate in this event, which I believe demonstrated the leadership role TVA has assumed in the development and deployment of new energy technologies.”

Gary M. Hirsch
Vice President,
Global Energy Partners

of reducing pollution, particularly carbon monoxide. Currently, methyl tertiary butyl ether (MTBE) is the most commonly used oxygenate in blended gasoline, but this substance is a suspected carcinogen that has been banned in a number of states. Increased gasoline use and the banning of MTBE create a stronger demand for ethanol, and biomass ethanol could help meet the demand.

The residue that remains after the extraction of ethanol from municipal solid waste is rich in lignin, which has a high energy content. At TVA’s Colbert Fossil Plant, scientists are testing the co-firing of this residue with coal as a method of evaluating energy production and emissions. Using solid waste from landfills for ethanol production would extend the life of existing landfills and produce an environmentally beneficial transportation fuel. PPT’s research-and-development efforts are

helping to move biomass-conversion technology into the commercial sector, a step that will promote economic development and energy stability.

TVA has promoted the deployment of advanced technologies to the commercial sector. Strickland Produce Inc., a food processor and Nashville Electric Service (NES) electricity customer, is pioneering the use of ozone-processing technology to wash fruits and fresh-cut vegetables. The ozonation project is the result of TVA’s partnership with Strickland Produce, the Electric Power Research Institute, and NES. TVA believes that promoting technologies beneficial to public



Strickland Produce President Walter Strickland (left) and TVA’s Tedd Battles sample salads washed with ozone.

health is an important factor for growth and prosperity.

In ozonation, an electric spark processes oxygen to generate ozone, a naturally occurring element in the atmosphere. The ozone is injected into a water solution, which is used

to wash fruits or vegetables. This ozonated water kills bacteria, helping to prevent premature spoilage and increasing the shelf life of produce shipped to stores and restaurants. Most of the ozone dissipates from the produce within minutes after washing. The processing equipment destroys any remaining ozone, thus reducing the amount of wastewater treatment needed.

In the past Strickland, like others in the food-processing industry, used chlorinated water for washing produce. The newer ozone process uses 50 percent less water. This reduces waste, makes the process friendlier to the environment, and leaves no chemical residue on the produce. The water-saving ozone process could be extremely useful in the many parts of the world where supplies of fresh, clean water are limited.



STAYCONNECTED

At www.tva.com/environment

- Last year TVA began construction of the nation’s first large-scale flow-battery power storage facility in Columbus, Mississippi. Find out more online.



A **look** to the **future** . . .



While the energy and environmental debates rage in Washington, D.C., here in the Valley we're focused on working closely with our stakeholders and with local and state governments to improve the environment and protect public health. Working with stakeholders helps us make better business decisions, and that's good for the Tennessee Valley.

The future looks promising. To remove nitrogen oxides from coal-plant emissions, TVA has begun installing 18 selective catalytic reduction systems at a cost of \$1.2 billion. And we're decreasing sulfur dioxide emissions by equipping coal-fired generation plants with emissions controls.

In its stewardship of the Tennessee River system, TVA is continuing to pursue the successful Clean Marina Initiative and to build watershed-protection partnerships. Both efforts raise public awareness and encourage changes in personal behavior in ways that protect and restore water quality. TVA's environmental performance is improving with the implementation of our new Environmental Management System, and our research-and-development investments in cleaner energy are contributing, incrementally but effectively, to a system of power generation that will have less impact on the regional environment. All these initiatives, both small and large, are good for business and good for the Tennessee Valley.



Kathryn J. Jackson, Ph.D.

In other words, TVA is taking care of business here in the Valley. We're focused, and we are getting things done. Young people are taking jobs at TVA because they want to be part of an enterprise that is distinguished by its good works.

For all these reasons, the outlook is very positive. Although we know that no great goal is reached without difficulties, we're committed to working with others to face and overcome whatever challenges may arise.

Kathryn J. Jackson, Ph.D.
*Executive Vice President, River System Operations and Environment,
and Environmental Executive*