

Mountain Promise

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The Newsletter of the Brushy Fork Institute

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Energy in Appalachia





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Mission of Brushy Fork

For more than one hundred years, Berea College has served the people of Appalachia.

The Brushy Fork Institute carries forward this commitment by working to develop strong leadership in the mountains.

Working with both existing and emerging leaders, we draw on local understanding and vision to help communities build for tomorrow.

A picture of Deregulation in Central Appalachia

by Donna Morgan, Brushy Fork Staff

Early this morning I woke up to my alarm clock, flicked on the lights, took a quick hot shower and made a breakfast of cereal, toast and hot tea for the kids before they headed off to school. In the bustle of getting ready for the day, I gave little thought to the alarm clock, lights, hot water, toast and cold milk, or to how the energy that provides these conveniences was produced. However, when I hear about rolling blackouts and strapped power companies in California, I wonder how and why utility restructuring was done and whether such problems could happen here at home.

What is deregulation/restructuring?

The restructuring of electricity enables consumers to choose a power supplier—that is, the generator, of their power. Transmission and distribution of the electricity remain regulated services and will be provided by utilities that own the power lines and other infrastructure in a geographic area. Prices for the generation of power will be set by the marketplace, while the cost for distribution services will continue to be regulated by public utility commissions.

So what's happening in the region in terms of energy production, use and restructuring? Could what went wrong in California happen in Central Appalachia? The picture varies state-by-state.

Kentucky

Kentucky enjoys one of the lowest average energy rates in the nation, at 5.58 cents* per kilowatt hour. Based on this fact, the state legislature recommended in 1999 that no attempt to restructure the electric industry be made in 2000. The legislative task force will continue to study competition and will make a report by the end of 2001.

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The majority of Kentucky's electricity, nearly 96 percent, is generated by coal. Kentucky ranks third in the nation for coal production and exports 83 percent of its coal to other states for energy production.

Currently, there are initiatives in the state to explore renewable energy sources, including: bioenergy that produces electricity by burning timber residues from logging operations; hydroelectricity; and solar electricity.

Tennessee

Tennessee's power needs are served predominantly by the Tennessee Valley Authority (TVA), a federal utility that is largely exempt from state regulation. Still, the state regulation study committee plans to examine restructuring through 2001. No action has been taken at this time.

The average rate for electricity in Tennessee is 6.34 cents* per kilowatt hour. Coal makes up the largest percentage of energy generation at 58.5 percent, followed by nuclear power, which makes up 30.2 percent.

The most-used renewable energy source in Tennessee is hydroelectric. The state is also working to develop bioenergy—burning biogas, timber residues from logging, and agricultural wastes; and solar electricity.

Virginia

Legislators in Virginia adopted restructuring law in April of 1998. They will continue to fill in the details of the legislation through 2005. Beginning in 2002, customers will be able to choose the producer of their electricity. Rates will be capped until July 2007, when the transition will be complete.

Rates in Virginia are 7.48 cents* per kilowatt hour. Nearly half, 49.3 percent, of Virginia's electricity is generated from coal, while almost as much, 42.7 percent, comes from nuclear power.

In the quest for renewable sources of power, Virginia is working with bioenergy—including using municipal solid waste as a fuel; hydroelectric energy; and solar electricity.

West Virginia

As the nation's second largest producer of coal, it's not surprising that West Virginia generates its power almost exclusively from coal. Energy produced from burning coal makes up 99.4 percent of the state's power. Electricity in West Virginia costs on average 6.27 cents* per kilowatt hour.

In January 2000, West Virginia regulators adopted a plan for consumer choice that was scheduled to begin in January 2001. However, implementation of the plan was contingent on certain legislative action which is not expected to happen in the 2001 session.

West Virginia is exploring hydroelectric power as a renewable source.

** rates are based on 1999 data researched by the U.S. Department of Energy*

Want more information about deregulation in your state? Contact your public service or regulatory commission:

Kentucky Public Service Commission
PO Box 615
211 Sower Boulevard
Frankfort, KY 40602-0615
502.564.3460
www.psc.state.ky.us

Tennessee Regulatory Authority
460 James Robertson Pky.
Nashville, TN 37243-0505
800.342.8359
www.state.tn.us/tra

Virginia State Corporation Commission
1300 East Main Street
Richmond, VA 23219
800.552.7945
www.state.va.us/scc

Public Service Commission of West Virginia
201 Brooks Street
Charleston, WV 25301
304.340.0300
www.psc.state.wv.us

Sources

Electric Competition in the States, A Summary, February 2001, Edison Electric Institute; www.eei.org

Energy Information Administration of the U.S. Department of Energy; www.eia.doe.gov

Power in the Country

The story of electricity in rural America

by Paul Wesslund

Paul Wesslund is editor of Kentucky Living magazine and vice president for communications with the Kentucky Association of Electric Cooperatives.

“Brothers and sisters, I want to tell you this. The greatest thing on earth is to have the love of God in your heart, and the next greatest thing is to have electricity in your house.”

That line from a farmer giving witness in a Tennessee church in the 1940s reflects the passion of what electricity meant to people who had none.

It’s hard to imagine today, but people didn’t always take flipping on a light switch for granted. However, the results of that excitement over electricity can still be seen in the network of nearly 1,000 local, consumer-owned electric cooperatives that provide power for some 34 million people in 46 states.

The story of electric co-ops begins in the 1930s when several crucial trends came together for rural America. One was an activist populism that focused on natural resources and meeting the needs of everyday people. From this movement we got many of

our national parks and economic development projects, including the Tennessee Valley Authority.

Another force was the effort to end the Great Depression with government programs that targeted different areas of the economy.

But the most powerful force may have been the longing by American farm families as they looked at the glowing cities, and realized they were cut off from the benefits of modern society. Farmers were not allowed to have lights, washing machines, radios, irons, or indoor plumbing. At the time, power companies didn’t believe they could make a profit stringing lines to remote farmsteads since there were so few homes per mile of electric line. It was a circular reasoning that

Kentucky’s first electric co-op

On May 19, 1937, some 3,000 people gathered for a pole-raising ceremony in Henderson’s Atkinson Park. Schools let out and several businesses closed at noon. Gov. A.B. “Happy” Chandler, who grew up on a nearby farm, told the crowd that the organization of the Henderson County Rural Electrification Association (now Kenergy electric cooperative) would mean the dawn of a new era, emancipating the farmer, taking farm women out of the drudgery class, and promising a fuller life for farm boys and girls. A little after 2 p.m. that Wednesday, a small group of men raised a pole wrapped in red, white, and blue lights. F.J. Pentecost, the co-op’s attorney, flipped a switch, lighting up the pole. By fall, about 1,200 families around Henderson would have electricity and its modern conveniences for the first time.

frustrated the people living in the country: farmers didn't use electricity, therefore, it wouldn't pay to extend lines to farms.

But several politicians found a lot of support for the cause of the farmers, and in 1935 President Roosevelt created the Rural Electrification Administration, which offered loans for utilities to serve rural areas.

Almost immediately applications for the loans unexpectedly poured in from farm organizations and groups of people organizing themselves into cooperatives. REA staff members split over the advisability of lending to these groups, but within months it became obvious that co-ops would be the primary providers of electricity in the countryside. Local organizers would ride from farm to farm, signing up members for \$5. For many the first light going on was a magical experience they would remember the rest of their lives.

The local cooperatives moved quickly, and by 1939 they brought electric service to more than 1 million people. World War II resulted in a slowing of activity, with even greater growth returning after the war ended.

The cooperative form of ownership provides several unique traits that have helped make electric cooperatives such successful businesses:

1. **Consumer ownership.** The way a co-op works is that the consumers who use the service are members of the co-op, and they own the company. They vote on members of the board of directors that sets policy and hires a manager to run the co-op. It's a form of organization that allows a special relationship between the customer and the company.
2. **Not for profit.** Since the customers own the co-op, there's no need to generate profits for shareholders. This not only holds down costs, but allows all resources to be devoted to lowering costs and improving service, rather than producing dividends for investors.



After raising the first pole of Henderson County Rural Electrification Association, a troop of Boy Scouts raised the flag at Henderson, Kentucky, May 19, 1937. The troop's bugler played taps at the demise of the sooty kerosene lamp.

3. **Local nature.** The nature of a consumer-owned electric utility means it is based in the community it serves. In these days of multinational corporations, it means a lot that the board of directors and top management all live in the community.

In the 1950s the rural electric co-ops were becoming so successful they could no longer grow efficiently by buying power from the city utilities. So many of these "distribution co-ops" that delivered power to their members, got together to form power supply co-ops. These "generation and transmission co-ops" had the resources to build the relatively expensive power plants and lines the distribution co-ops needed to keep growing. During all this growth, electric rates actually decreased every year from 1950 to 1970.

Today, much of non-urban Kentucky, representing some 1.5 million people, gets its electricity from cooperatives. The 17 distribution co-ops in the eastern part of the state receive their power from East Kentucky Power Cooperative, the generation and

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transmission co-op based in Winchester. Three co-ops in the west are served by Big Rivers generation and transmission co-op based in Henderson. Five other Kentucky distribution co-ops in the western part of the state receive power from the Tennessee Valley Authority, which produces power for co-ops and municipal utilities in seven states.

As the existence of electricity in the home becomes routine, much of the old passion for electric co-ops has faded. But co-ops, which now serve about 11 percent of the people in the country, have been keeping pace with other changes under their overall mission of providing a better quality of life. As user-owned, community based organizations co-ops are able to fight for other concerns facing people living outside the city. Promoting economic development



“Preacher” Gloria Allender delivered the funeral oration on June 16, 1938, as a kerosene lamp was buried and lines of Blue Grass Rural Electric Cooperative in Nicholasville, Kentucky, were energized.

to keep jobs from moving away, setting up subsidiaries to provide hard-to-find services in rural areas like cell phones and Internet access, and providing more than \$100,000 a year in scholarships, are just three examples of how electric co-ops today are trying to keep their members connected to the benefits of the modern world.

And co-op customers are changing. With fewer full-time farmers in Kentucky and the nation, co-op members are more likely to be retired people or families wanting a more rural lifestyle.

New challenges arise in the basic job of keeping the lights on. While 24 states have adopted utility restructuring or deregulation programs, electric co-ops have been among the leaders in trying to make sure that consumers are protected from changes to an industry that is working well.

Electric co-ops in Kentucky have supported the state’s policy of moving carefully on utility restructuring, preferring to monitor activities in other states to make sure any changes here would help rather than hurt. Among the things that Kentucky co-ops think are worth preserving are the excellent record of service and the low rates for electricity. Thanks in part to abundant, in-state coal reserves, Kentucky’s electric rates are among the lowest in the nation.

As they have done for more than 60 years, Kentucky’s electric co-ops will try to protect those rates, and to make sure that electric co-op members continue to get services comparable to what’s available in the rest of the modern world.

Next issue: Food in Appalachia

Send us your recipes, stories about food production and preservation or memories of mountain foods. *Mountain Promise* is published quarterly. Our summer issue deadline is May 31, 2001. To contact us:

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TVA Offers Green Power Switch

Consumers in the Tennessee Valley now have a choice in how the power they buy is generated. The Tennessee Valley Authority and local public power companies, working in cooperation with the environmental community, developed the Green Power Switch program as a way to offer green power—electricity that's generated by cleaner, renewable resources.

Green Power Switch energy is generated by solar, wind, and landfill gas resources. A year-long market test began in April of 2000, and more than 40 additional distributors of TVA power expect to offer the option to their customers in 2001.

Residential consumers purchase 150-kilowatt-hour blocks of green power (about 12 percent of a typical household's monthly energy use). Each block adds \$4 to the customer's monthly power bill. Consumers can buy as many blocks as they like. Commercial and industrial consumers buy blocks of Green Power Switch based on the amount of energy they use.

By the end of last year, customers of participating power distributors had signed up for 9,406 blocks of Green Power Switch a month. Of that number, 2,697 residential customers in the market test areas had signed up for 4,536 Green Power Switch blocks. Two blocks of green power (an investment of \$8 per month) equals the environmental

benefits of planting an acre of trees in the Tennessee Valley or not driving for four months.

Green Power Switch will eventually provide nearly 7 megawatts of green power to the TVA system through 11 solar sites, a wind park and a landfill gas facility.

Six solar sites are currently in operation, one each at Cumberland Science Museum in Nashville; Dollywood Tram C in Sevierville; Ijams Nature Center in Knoxville; Gibson County High School in Trenton, TN; Duffield Primary School in Scott County, TN and Cocke County High School in Newport, TN.

Three wind turbines on Buffalo Mountain near Oak Ridge will produce some 6 million kilowatt-hours of electricity a year – enough to serve more than 400 typical Tennessee Valley households.

The proposed landfill gas site facility is located at the Middle Point Landfill near Murfreesboro. It is expected to generate enough power for about 1,500 homes. The generator is powered by landfill gas, which consists mainly of methane and carbon dioxide produced when organic wastes in landfill sites decay. Although landfill gas is primarily a pollutant that needs to be controlled, the methane it contains makes it valuable as a fuel for powering an electric generator.

To learn more visit
www.greenpowerswitch.com.

Energy Tip

Cars and trucks are responsible for more than half the smog-forming pollution in the U.S. One of the most effective ways we can help keep our air clean is by driving less: combine car trips; bike; walk; take a bus or train; telecommute or carpool.

from the web site of Rocky Mountain Institute
www.rmi.org

Renewable Energy

Some choices for sustainable energy production

by Tina Rae Collins, Brushy Fork Staff

When I was a student at Pikeville College I owned a t-shirt that had “Coal Miner’s Daughter” emblazoned across the front. I was wearing it one day when a male student said, “You’re a coal miner’s daughter?” I said yes, and he said, “So am I.” We both laughed, but the fact is that many of us born and reared in Kentucky are coal miners’ kids.

In 1998 coal miners in Kentucky numbered 18,025, ranking the state first in the nation. Kentuckians appreciate the importance of coal, but we also need to focus on renewable energy sources. Renewable energy comes in many forms, a few of which we will briefly touch on, hoping to whet your interest enough that you will want to investigate further.



Wind Energy

As I consider the energy of the wind, my thoughts take me back to my childhood. Remember the pinwheel? When you were riding along in your parents’ car and grew bored with pestering your little sister, you could roll down the window, stick out your pinwheel and watch the wind spin the little plastic blades ‘round and ‘round. Or you could use the power of your own breath to make the pinwheel spin by blowing on it.

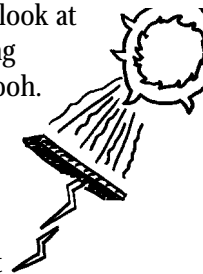
For hundreds of years the wind has entertained us and made our work easier. Many of us have been mesmerized as we watched a windmill pump water or grain—if not in our own world, then certainly in the world of television. Today wind turbines, the windmill’s modern equivalent, utilize the wind’s energy to generate electricity. Turbines capture the wind’s energy with two or three blades mounted on a shaft to form a rotor. The blades perform like an airplane wing, as lift and drag turn the rotor like a propeller. The turning shaft spins a generator to make electricity.

Wind turbines are commonly used for water pumping or communications. However, farmers and homeowners in windy areas also use them as a way to

lower their electric bills. Sometimes many wind turbines are built close together to form a wind plant, which electricity providers use to supply power to their customers.

Photovoltaic (Solar Cell) Systems

Tick, tick, tick, tick. When I look at my watch I see little bees swarming around the head of Winnie the Pooh. Ever wonder what makes your watch work? Some of them use photovoltaic (PV) cells. We also use photovoltaics to power solar calculators. We make PV cells out of semiconducting materials similar to those used in computer chips. These materials absorb sunlight. This absorbed solar energy knocks electrons loose from atoms, and the electrons flow through the materials to produce electricity. This process of converting light (photons) to electricity (voltage) is called the photovoltaic effect.



PV cells are combined into modules that hold about 40 cells. About ten of these modules are mounted in PV arrays that can be as long as several meters on a side. We can mount these arrays at a fixed angle facing south, or on a tracking device that follows the sun. This allows them to catch the most sunlight during the day. Ten to 20 PV arrays can provide enough power for one household. Electric utilities and industries need hundreds of arrays interconnected to create a single large PV system.

We measure the performance of a PV cell in terms of its efficiency in turning sunlight into electricity. Some of the sunlight is absorbed by the materials that make up the PV cell, and only certain energies of sunlight work efficiently. About one-sixth of the sunlight striking the cell actually generates electricity. Therefore, a typical commercial PV cell has an efficiency of 15 percent. While we might hope for more, this is an improvement over the first PV cells, built in the 1950s, which had efficiencies of less than 4 percent.

Hydropower

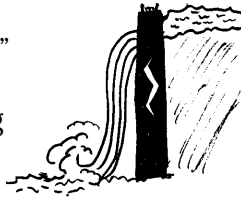
“Water, water everywhere....”

Next to the air we breathe we cherish water more than anything because it is so necessary to life.

We love swimming and water sports. Some of us even like to play in the rain. We enjoy watching and listening to a rushing waterfall. But what fascinates us most about a waterfall is the force with which the water flows. Flowing water creates energy. We call electricity captured from the energy of flowing water hydropower.

Typically hydropower plants use a dam on a river to store water in a reservoir. Water released from the reservoir flows through a turbine. The spinning turbine activates a generator to produce electricity. Hydropower does not require a large dam. Hydropower plants can use a small canal to channel river water through a turbine.

Some hydropower plants store energy. Power grids force the power into electric generators. The generators spin the turbines backward, which pumps water from a river or lower reservoir to an upper reservoir, where the power is stored. Later, the water is released from the upper reservoir back into the river or lower reservoir. This spins the turbines forward, which activates the generators and produces electricity.



Geothermal Electricity

I looked in my thesaurus for the word *steam*. The best synonym I found was *oomph*. That says it all; steam is power. Most power plants need steam to generate electricity. Geothermal power plants use steam produced from reservoirs of hot water found a few miles beneath the surface of the earth. We employ three types of geothermal power plants: dry steam, flash steam, and binary cycle.



Dry steam power plants use underground resources of steam. Pumped from underground wells to the power plant, steam is directed into a turbine/generator unit. We are aware of only two underground resources of steam in the United States. These are the geysers in northern California and Old Faithful in Yellowstone National Park in Wyoming.

The most common power plants are flash steam plants. Water at temperatures greater than 360°F (182°C) flows up through wells in the ground. As the water flows upward, the pressure decreases and some of the water boils into steam. The steam is separated from the water and used to power a turbine/generator. Any leftover water and condensed steam are injected back into the reservoir, making flash steam a sustainable resource.

Binary cycle power plants operate on water at temperatures of about 225°-360°F (107°-182°C). These power plants use the water's heat to boil a working fluid, usually an organic compound with a low boiling point. This fluid is vaporized and turns a turbine. The water is injected back into the ground to be reheated. Because the water and working fluid are kept separated, the process produces few air emissions.

Renewable energy has shaped our history, and it is the wave of the future. Coal from Kentucky and other states will continue to provide power, even as we seek to make better use of renewable energy. In the new millennium we will be amazed and electrified at the new and diverse ways we can utilize and sustain our natural energy resources.

Sources

National Renewable Energy Laboratory, Clean Energy Basics: www.nrel.gov/clean_energy

Energy Information Administration:
www.eia.doe.gov

Bioenergy



Old Man Winter has come and gone, but we still enjoy vivid images of sitting by the fireplace or wood-burning stove

drinking hot cocoa and watching the snow fall. We have used energy from biomass (organic matter) for thousands of years—ever since someone rubbed two sticks together and discovered he could start a fire to cook his supper or warm himself. Wood is still our largest resource for bioenergy, but today we also use plants, residues from agriculture or forestry, and the organic component of municipal and industrial wastes. Even fumes from landfills are a good source of energy.

Bioenergy has the potential to reduce our greenhouse gas emissions. It generates about the same amount of carbon dioxide as fossil fuels. However, each time a new plant grows, carbon dioxide is removed from the atmosphere. As long as we continue to grow new plants, the emission of greenhouse gases will be offset.

PLUGGING THE LEAKS

Building a Strong Economy through Sustainable Energy Practices

Some Brushy Fork Associates are familiar with the Rocky Mountain Institute's (RMI) Economic Renewal Program, which proposes steps communities can take to build a strong local economy. One of those steps is to plug leaks in the local economy—that is, to find ways to retain resources that are leaving the community.

Energy use in a community can be the source of leaks in several ways. Communities that don't produce energy locally must expend resources to meet their energy needs. Conventional energy practices often sacrifice environmental integrity through climate change, pollution and scarred landscapes.

In its *Community Energy Workbook*, RMI challenges community residents to ask new questions about how their community meets its energy needs. The following is excerpted from the workbook and is reprinted with permission.

Ask New Questions

We can save billions of dollars by asking new questions about the way we meet energy needs. The conventional approach has asked: "How do we get more barrels of oil? How do we generate more kilowatt hours of electricity?" Yet nobody wants barrels of sticky black goo or raw kilowatt hours for their own sake. What we are really after are the hot showers and cold beer, lighting, productivity, mobility, comfort, and the other "end-use" services that energy provides.

Instead, we could ask: "How can we provide these hot showers and cold beer in the cheapest and most efficient way, counting all financial, social, and environmental costs?" Answering this question opens up a wealth of win-win environmental and economic opportunities. Taking advantage of these opportunities is also much more profitable than developing expensive new energy sources. This "end-use/

least-cost" approach typically reduces energy use by at least a third, and up to 90% in some cases, with the same or improved quality of service.

Take lighting, for instance. Although many assume the typical household incandescent bulb is the only way to get light, there are other ways to meet that objective with less energy and money. Replacing ordinary incandescent light bulbs with compact fluorescent lights (CFLs) saves

3/4 of the electricity and provides the same or better quality light. Because CFLs last 8 to 10 times as long, they also cut the costs of buying and installing replacements.

To tap even greater savings, we can design buildings that require little or no electrical lighting in the daytime. It's cheaper to construct and operate a super-efficient building that maximizes sunlight than it is to

In a typical town, 70 to 80 cents of every dollar spent on energy immediately leaves the local economy. Finding ways to reduce these costs and plug these leaks initiates a series of local economic benefits.

use conventional design approaches and pay the resulting electricity bills.

Asking questions about how we meet our lighting needs adds up to big results. The Environmental Protection Agency has helped some businesses cut lighting bills by up to 90%, while improving lighting quality. These enhanced work conditions noticeably reduced absenteeism and increased productivity. The EPA maintains that lighting improvements could save as much as 50% of all electricity used for lighting across the country. These energy savings would allow consumers nationwide to save \$18.6 billion on their utility bills, free up \$60 billion for other economic purposes, avoid the cost of building new power plants, and prevent 200 million tons of CO₂ from entering the atmosphere.

Lighting is just the beginning. Exploring how we can create comfortable indoor climates reveals other areas of money-saving opportunities. Well-insulated buildings that are heated by the sun or cooled by natural means are more efficient and cost-effective than buildings that are heated or cooled by electricity. Such buildings are also more pleasant and healthy places in which to live or work. Since electricity is a highly refined energy source best suited for performing sophisticated tasks like running computers, using it to provide heat is like using an eighteen-wheeler as a personal car.

Matching tasks with the appropriate kind of energy and then using that energy as efficiently and cost-effectively as possible can lead to significant savings in all end-uses. America can save more than half of all energy used to cool and heat buildings, heat water, refrigerate food, and run motors for industrial processes.

This end-use/least cost approach for delivering energy services can deliver a healthy dose of economic benefits. Thanks to the use

of more efficient automobiles, buildings, computers, appliances, and factories, the U.S. has already reduced energy expenditures by more than \$150 billion a year since 1973 levels. While part of this energy bill reduction is attributable to the economy's shifting from manufacturing to services, at least 75 percent of these savings are due to increased energy efficiency. As impressive as these improvements are, far greater savings remain untapped. A transition to efficiency and renewables would result in billions of dollars freed up for domestic investment, more than a million new jobs created by 2010, new export opportunities, a healthier environment, and greater comfort and productivity. All this from asking a few new questions about how best to meet our energy needs!

Tap Local Economic Opportunities

Billion dollar economic benefits at the national level, as reported by national statistics, don't always mean more money on Main Street. However, improving local energy practices will create the tangible economic benefits that are sometimes missing from reported improvements in the national economy.

In a typical town, 70 to 80 cents of every dollar spent on energy immediately leaves the local economy. Finding ways to reduce these costs and plug these leaks initiates a series of local economic benefits. When households,

businesses, and government cut energy expenses, they have more disposable dollars to spend on other priorities. Local schools can spend more money on education instead of on lighting classrooms. Businesses can increase productivity instead of pouring money out their windows. And families can increase their quality of life instead of worrying about high heating bills.

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Think in **negawatts**: A watt saved is a watt earned. Negawatts are based on management of the demand side of energy. Increasing energy efficiency and decreasing demand reduces the need to build expensive power plants, use limited resources and produce needless pollution.

Plugging the Leaks continued from page 11

In addition to these direct benefits, the money saved from reduced energy bills circulates in the community economy, creating additional benefits. Depending on the type of products made and sold locally, and the degree to which residents and businesses make purchases locally, a “multiplier effect” creates a ripple of benefits throughout the community.

Sustainable energy practices can also directly generate new jobs and businesses. They require an investment in insulation, efficient light bulbs, solar water heaters, super-efficient windows, and other technologies, as well as new skills and services. Local businesses can offer these products and services and benefit from the increased demand for them. If such products and services are unavailable in your area, community entrepreneurs can create new jobs and businesses to meet the demand.

Build Real Wealth

Improving how we use energy may seem like an “experts only” issue, to be handled by utility planners, the federal government, and various energy professionals. The good news is that there are no experts when it comes to implementing sustainable energy practices. Citizens and businesses don’t have to wait for anyone else to lead the way.

You can start right now in your community to put energy efficiency to work. Homes, neighborhoods, workplaces, shopping centers, schools, transportation systems, and public buildings are all cash cows waiting to be milked. Some people in your community may have already independently tapped efficiency opportunities in their homes and businesses and reaped the rewards.

While energy efficiency and renewable energy have tremendous economic and environmental advantages, there are barriers to their implementation. Some of these barriers originate at a

national level, such as lack of market incentives for efficiency, cost assessments that don’t count environmental and social harms, and subsidies that favor inefficient energy practices.

Other barriers exist right in your community. Many people have not taken advantage of energy opportunities because they don’t know they exist, it’s difficult to get upfront financing, or they just don’t have the time. Furthermore, institutions that shape overall community energy use, such as utilities and the building industry, may not yet see how promoting sustainable energy practices can benefit them.

Joining forces with other citizens creates tremendous opportunities for addressing these issues. Pooling resources and efforts, communities can develop programs that will make it easier to overcome barriers or succeed in spite of them. Rather than working individually to change light bulbs in one home or business at a time, a joint effort enables individuals to create a ripple of long-term energy improvements throughout the community.

By working with other citizens to make your community as energy-efficient as possible, and by tapping renewable sources, you are bringing the idea of a sustainable economy to life. Rather than being caught in the trap of creating ever-greater supplies, whether they be energy, highways, or consumer goods, developing a sustainable economy means remembering to ask, “What are we really after?” and “What’s the best way to provide it, counting all costs and benefits?” By working together to answer these questions citizens can create the real wealth that makes communities good places to live, for this generation and the ones to come.

Developing sustainable energy practices in your community will create a thriving economy and a healthy environment today, and build a vibrant foundation for tomorrow.

The *Community Energy Workbook* is available from Rocky Mountain Institute for \$16.95. For more information, contact:

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www.rmi.org

Can *Waste Coal* Provide Fuel for *Power*?

Last October, residents in Martin County, Kentucky, and in counties downstream witnessed one of the worst environmental disasters in the region's history. More than 250 million gallons of coal slurry, that is waste products from the mining of coal, spilled from a containment pond into Coldwater Fork and Wolf Creek. Approximately 225 similar compounds exist throughout Appalachia.

Coal waste lies in gob piles that are scattered about the region. Gob piles are perhaps most noticeable when they catch fire, often smoldering for years and leaving a heavy, sulfurous fog in the vicinity. Gob piles created before modern coal-washing plants were available might be comprised of up to fifty percent of salvageable coal.

Now, Kentucky Mountain Power, a subsidiary of EnviroPower LLC in Lexington, Kentucky, has proposed a plan to burn this waste as fuel for a new power plant. The 500-megawatt power plant would be located at the convergence of Knott, Perry and Breathitt Counties in southeastern Kentucky. The coal would be burned using a technology called circulating fluidized bed or CFB, in which waste coal is combined with limestone and supplemented with newly mined coal.

The demand for coal-fired electricity is on the rise in the United States. According to the National Mining Association, coal demand is expected to total 1.085 billion tons, 21 million tons greater than the record 1.064 billion tons used in 2000. The proposed power plant could provide jobs for an estimated 50 to 70 people in the Knott, Perry and Breathitt area and would cost around \$600 million to construct.

While increased jobs and the clean-up of waste coal piles would be beneficial, the proposed power plant is not without concerns. Representatives at the Great Smoky Mountains National Park, about 100 miles south of the proposed plant site, worry that air pollution from the plant will increase the haze that is already a problem there. Park officials note that the proposal should be reviewed carefully and consideration should be given to the fact that the plant could turn coal waste from the ground into air pollution that could cause more widespread environmental harm. The National Parks and Conservation Association has put the Smokies on its top 10 list of endangered parks.

Sources:

"Coal Use Will Reach Record Levels in 2001." Environmental News Service: <http://ens.lycos.com/ens/jan2001>

"Power Plant to Use Coal Waste as Fuel Source." Appalachian Focus: http://www.appalachianfocus.org/_mine/000000ae.org

"Park Protests Possible Pollution: Officials Fear Power Plant Would Make Smokies Smokier." Cincinnati Enquirer: Sunday, November 19, 2000: http://enquirer.com/editions/2000/11/19/loc_park_protests.html

Energy Tip

Changing from incandescent bulbs to compact fluorescent lamps in your most used areas can save 50% on your energy bill. A 27-watt compact fluorescent lamp costs \$5.91 per year to operate and lasts an average of 4.5 years. A 100-watt incandescent lamp costs \$21.90 per year to operate and usually lasts around six months.

from the Department of Energy's *Energy Savers Booklet*
www.eren.doe.gov/consumerinfo/energy_savers/

DRIVING THE FUTURE?

Electric Car Provides a Cleaner, Quieter Ride

by Donna Morgan, Brushy Fork Staff

The engine and gas tank in this car have been replaced with a bank of batteries and an electric motor. Thanks to Joshua Bills for providing information and a test drive. Contact Joshua at sunbelievable@whale-mail.com.



How would you like to have a car that never needs a tune-up or an oil change and has a motor with an expected life of 800,000 miles? Joshua Bills of Appalachian-Science in the Public Interest (ASPI) in Mount Vernon, Kentucky, has a Dodge Colt with these very characteristics. He and other ASPI staff have converted the car to run off electricity.

The conversion meant replacing the gasoline powered motor with a small electric motor and a bank of 20 golf cart batteries. The electric motor has one moving part as opposed to the over 200 moving parts of a typical gasoline motor. While the most efficient gasoline-powered motor might get 40 miles per gallon (at \$1.59 per gallon of gas), the electric motor holds an 80-mile charge for \$1.50 worth of electricity (based on rates in Mount Vernon).

The electric motor requires no oil, no coolants and no spark plugs. Maintenance of the batteries entails adding a cup of distilled water about every two months.

A challenging aspect of converting the car was welding supports for the batteries, which weigh 70 pounds each. The 1400 pounds of batteries replaced



Just \$1.50 worth of electricity powers this car for about 80 miles. The radio and lights operate from the solar panel on the trunk.

the weight of the gasoline motor and tank that were removed. The electric motor connects to the existing transmission, so those parts of the car remain the same.

Joshua and his colleagues are working to perfect some parts of the car. The power brakes will be connected to an electric pump to facilitate their operation. They plan to add an electric heater and fan, which, when in use, will reduce the car's range from 80 to 60 miles per charge.

So how does the car charge up? Joshua brought out a bright orange extension cord and popped open the gas tank cover. Just under the cover is an electric plug that fits a standard 110 outlet. About nine hours of being connected to the outlet leaves the car fully charged and ready for the next 80 miles. Joshua noted that if the car was plugged into a 220 outlet, the charge time would be reduced. He also pointed out that charging the batteries before they were completely depleted extended their life. He said a driver could expect to replace the batteries every seven years.

The great thing about an electric car, Joshua explained, is that you can usually squeeze a few extra miles from a power charge. With a gasoline motor, when you are out of gas, you are out of power. The battery-powered motor is somewhat like a flashlight in that you can turn off the power for a while, then turn it back on and get some more energy from the batteries.

With the electric car, he said, you can feel a reduction in power as the batteries are drained. Usually when you notice that power loss, you can still travel another five or so miles.

While we focus much attention on energy efficiency in our homes, most of our energy is actually consumed by our vehicles. An electric gauge at the electric car's dashboard serves as a constant

reminder of just how much energy we use moving cars and other vehicles on the road. The gauge measures DC amps and is marked for 400 amps. The typical house, Joshua explained, has a 200 amp circuit.

As he accelerated to 50 miles an hour, we watched the needle jump to well over the 200 amps that might be used to serve energy needs in an entire house. However, as the car coasted, the gauge needle dropped to zero. Another benefit of the electric car is that anytime the driver's foot is not on the throttle, the car uses no energy.

Our gas-powered cars also produce more pollution than an electric car. While some might argue that electric cars simply change the pollution source from the tailpipe to the smoke stack, Joshua noted that electric power plants actually produce 75% less pollution than gasoline vehicles.

Historically, electric vehicles have been touted for their cleanliness. In fact, some of the first cars were electric and were marketed to young women as

being very clean. Riders in an electric car enjoy a quiet drive, with the motor barely purring when the car is moving at top speeds.

Safety issues were a concern as Joshua developed the electric car. The crew worked to affix the heavy banks of batteries securely in the vehicle. They also set up a circuit breaker that is easily accessible by the driver or front seat passenger in case the power needs to be shut down. Joshua also recommends that a driver carry some baking soda that can be used to neutralize battery acid, if needed.

The electric car represents one of many appropriate technology projects undertaken by the staff of ASPI. The organization offers the largest appropriate technology library in the region and makes its materials available on-site to people who want to research anything from solar energy systems to greenhouses and gardening to building affordable, efficient housing.

More about Appalachia-Science in the Public Interest

ASPI's goal is to make science and technology responsive to the needs of low-income people in central Appalachia. Some of their other energy-related projects include:

The Rockcastle Resource Center

Appropriate Technology Demonstration: a cordwood building on 180 acres, solar house, dome, yurt, examples of solar space and water heating, greenhouses, cisterns, compost toilets, intensive organic gardens, picnic pavilions and camp sites.

Main Office (pictured above)

Urban Demonstration Office: 7,000+ volume appropriate technology library, attached solar greenhouse, raised bed gardens and electric car.

Publications: books, reports, technical papers, videos and other items for order by mail.

Resource Assessment Service: has performed 175 assessments in 30 states to help people transform their properties into self-sustaining centers for communities.

Women in Appalachia: an upcoming project for young women to experience science and technology.

To learn more about ASPI or to request a list of their technical papers, contact them at 50 Lair Street, Mt. Vernon, KY 40456; 606.256.0077; www.kih.net/aspi.



As Coal's Fortunes Climb, Mountains Tremble in West Virginia

Energy Policy Is Transforming Lives

reprinted from The Washington Post, February 25, 2001

The past eight years have been lean ones for the coal titans of West Virginia, whose power shapes the lives of tens of thousands of families that live and work in the towns and villages nestled amid the state's mountainous crags.

Slowed by Clinton administration environmental restrictions and shunted to the sideline in favor of cleaner-burning natural gas, coal for much of the past decade has been the stepchild of America's energy policy.

A month into the Bush administration, however, there's a growing feeling that coal is back. And that is arousing an equal measure of excitement and concern among the people who owe their livelihood to the state's dominant industry and others who view coal extraction as a threat to their lives, homes and environment.

As the Bush administration launches its drive to reduce America's reliance on foreign energy, most of the attention has been focused on oil and natural gas development. But the domestic coal industry is quietly gearing up for what it expects will be a dramatic shift in policy in Washington toward encouraging increased coal production and use in generating electrical power. Coal accounts for 52 percent of all energy production nationally, and coal mining companies are eager to expand their share.

"Coal has been the ugly sister of the energy industry," said John Grasser of the National Mining Association. "If we're intent on weaning ourselves from imported oil, coal is one of the best ways to do it."

Environmentalists and many homeowners in coal country are alarmed. In particular, they fear coal companies will be encouraged to step up the controversial practice of mountaintop removal in which they literally shear off the tops of mountains to get to rich seams of valuable low-sulfur coal. Opponents of the practice say it has driven hundreds of families from their homes and polluted and obliterated streams and valleys. Over the past two decades, mining companies have leveled an estimated 300,000 acres of tree-lined mountains in the state and filled in 1,000 miles of streams.

But with mounting concern about California's energy crisis and the skyrocketing cost of natural gas, the stars seem aligned in favor of coal, nationally a \$23 billion-a-year industry. Nowhere will that be felt more directly than in West Virginia, which produces 168 million tons of coal a year, second to Wyoming.

Bush carried West Virginia in November after charging the Clinton administration "fears coal" and pledging to spur increased coal production and use. Bush's interior secretary, Gale A. Norton, and Environmental Protection Agency director, Christine Todd Whitman, have demonstrated records of championing the interests of business and industry in environmental disputes. Norton, whose department oversees surface mining activities, spent years as a lawyer in Colorado defending western miners.

The mining industry has other powerful allies in Washington as well, including Rep. W.J. "Billy" Tauzin (R-La.), the new chairman of the House Energy and Commerce Committee, and Sen. Robert C. Byrd (W.Va.), the ranking Democrat on the Appropriations Committee. "There's a whole range of issues the administration and our committee will look at, but clearly coal will be a major focus of our supply-demand review," Tauzin said.

West Virginia environmental groups and community activists who have fought mining companies for years say the pending change in national energy policy will seriously undermine their efforts to oppose the practice of mountaintop removal.

"The short-term impact will be very bad for this area," said Cindy Rank of the West Virginia Highlands Conservancy, a volunteer group seeking to preserve the state's natural resources. "We've been in court to try to enforce the laws because our state agencies aren't enforcing them and the people are suffering."

Julia Bonds, the daughter of a coal miner who grew up in the mining town of Marfork, about 30 miles southwest of Charleston, once was torn between her appreciation of the livelihood mining brought to her family and her concern about the damage it was doing to the environment and peoples' health.

That was before the A.T. Massey Coal Co. in 1997 began blasting off the tops of mountains near her home along the Coal River and sought permits to enlarge a coal slurry holding pond to 20 times the capacity of one that ruptured in Inez, KY, last year.

Bonds and scores of her neighbors were forced to move out, chased by the dust and noise of dynamite blasting, and by the fear that the coal slurry impoundment could one day break. Today Bonds heads Coal River Mountain Watch, a group that is fighting mountaintop removal. "We don't mind being poor, but we do mind being trampled upon and our lives put in jeopardy," she said.

Activists like geologist Rick Eades point to studies such as a draft report prepared by the U.S. Geological Survey last year that concluded the Kanawha River, which flows through Charleston, has been polluted by sulfates and sediment from upstream coal mining activity. The pollution is killing off mayfly, stonefly and other insects eaten by fish that are a vital part of the food chain. Experts also warn that heavy metals left behind after the coal is washed are leaching into the groundwater system. "It's a colossal nightmare long-term," Eades said.

Armed with such warnings, the Clinton administration made it more difficult for coal companies to receive new permits to mine. But the Bush administration and congressional Republicans have begun examining ways to ease restrictions to boost coal production. They are also examining proposals to find new uses for coal by investing in research into "clean coal" technology, such as the use of gasified or liquefied coal.

Coal industry officials deny they are seeking a rollback of regulations. Instead, they say, they are seeking more consistent federal enforcement of existing laws and more expeditious action to clear up a large backlog of mountaintop mining permit applications that has forced some mines to cut back or shut down operations.

"There are folks who look you in the eye and say, 'God put that mountain there and you messed it up'," said Robert M. Bays, regional manager of Arch Coal Inc. "I look them in the eye and say 'I respectfully disagree.'"

Mountaintop removal has been around since the 1970s in West Virginia as well as Kentucky and Pennsylvania. Coal companies view the technique as the most efficient and profitable way of getting to valuable but hard-to-reach seams of coal.

The process begins with mining crews leveling the trees and stripping away the topsoil, then blasting away the underlying rock with chemical explosives. Then towering machinery and jumbo trucks move in to scoop up the coal and to cart off the pulverized rock and earth to dump it in nearby valleys and streams.

At one mountaintop operation at Arch Coal's Hobet 21 mine, a sprawling operation kept under tight security about 20 miles southwest of Charleston, the "active" area has the desolate look of a moonscape. Once majestic, jagged peaks have been reduced to mounds. At the epicenter of the operation is an 8 million-pound "dragline," or mega-steam shovel with a 335-foot boom connected to a bucket large enough to hold several city buses.

Coal mining operations have sheared the tops off hundreds of mountains in West Virginia, primarily in the southwest corner of the state. But Bays, the Arch Coal official, stressed that each mountaintop mine is "a work in progress" that eventually will be reclaimed, recontoured with rock and planted with trees and grass.

"Judge us on the basis of how we comply with the law, and how we put it back together," he said. "When we put it back together, we try to sculpt it."

In fact, large portions of the sprawling Hobet mine site that were blasted away more than a decade ago have been reclaimed by Arch in a manner that drew praise from Bruce Babbitt, President Bill Clinton's interior secretary, when he toured the site as well as from some local conservationists. Beaver have returned to a stream and pond created at the foot of a valley fill, and deer can be spotted grazing in a reconstructed meadow.

But critics say that with the original topsoil gone and largely replaced by crushed rock and fertilizer, little can grow on the recontoured remnants of the mountains.

Larry C. Gibson, an ex-miner who has battled the mining companies for years, is one of the last holdouts on Kayford Mountain, where mining companies have sheared away 100-foot segments of the mountain face behind his house. Gibson says the blasting regularly sends shards of rock sailing onto his property.

Standing on a bluff overlooking the mining operation, Gibson said: "This is a place in my memory where I used to play and fish and had wild game for pets. I used to look up to the mountain, but now I look down."

2000 Leadership Development Program Cycle: Closing Workshop Held April 6-7, 2001

The closing workshop for the 2000 Leadership Development Program cycle was held on April 6-7. Teams from Berea College; Clinton County, Kentucky; Doddridge County, West Virginia; Lawrence County, Kentucky; and Upshur County, West Virginia, reported on their six-month projects.

Berea College Team

The Berea College Team's goal was to create a business plan for establishing a radio station to serve Berea's campus and the surrounding community. Realizing that the establishment of the radio station itself was a long-term effort, the group founded an on-campus radio club that could carry on the project. The original team members currently serve as officers of the club.

Establishing the business plan for the radio station entailed collaboration across campus and beyond. The team sent letters and surveys to the community that would be served by the station. They also visited local, low-power radio stations, such as WMMT in Whitesburg, KY. An engineer donated his time to tell them the requirements of setting up the radio station.

Through the project, the team discovered that FCC deadlines and other technicalities were hard to synchronize with Berea College committee schedules, so they came to realize that completing the radio station could take a year or more. The planned station would serve a 3-6 mile radius around the Berea College campus. Programming issues haven't been fully addressed, although the team did survey the campus community regarding programming preferences.

Clinton County, Kentucky

The team from Clinton County developed a two-phase project: coordinating a county cleanup and constructing welcome signs. The group chose

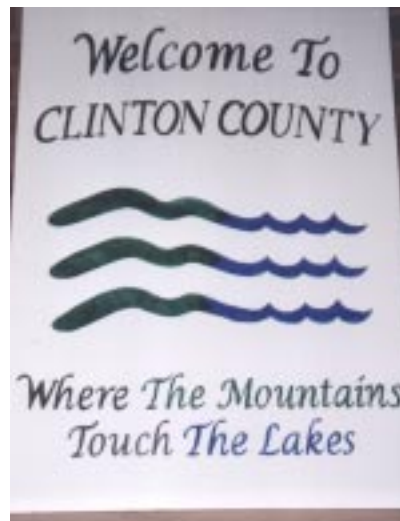
the name All Clinton Countians Engaged in Pride Together (ACCEPT).

Upon returning home, the team recruited some new members, one of whom was the local high school art instructor. The Clinton County school system proved to be a supportive partner as ACCEPT strived to get students involved in developing a county motto and designing the welcome signs and a county flag. ACCEPT combined the student submissions for the winning logo and design. "Where the Mountains Touch the Lakes" describes Clinton County's attractive landscape and recreational opportunities.

As they worked to develop the signs, they received funding and support from local industry, the Clinton County Fiscal Court and the Chamber of Commerce. The area technology center provided services to advance the project.

Another local program, Bright Youth Build, has committed money and labor for signs. Youth Build will do all the masonry work and landscaping for the signs. ACCEPT will provide the painted wooden placards to go in the masonry. The signs will be placed on county highway rights-of-way.

As for the county cleanup, the effort started March 29 and ended April 8. On the last day of the cleanup a community picnic was held to celebrate volunteer efforts. ACCEPT plans to hold the event annually.



Clinton County ACCEPT's welcome sign.

Lawrence County, Kentucky

The group from Lawrence County, Kentucky, wanted to sponsor a community visioning process. Adopting the name Lawrence County Opportunity Council, the group returned home to find that their local leaders were already involved in a visioning process. The team thought that holding an additional process would be redundant, so they chose a new project.

The group settled on an idea to create a welcome station for the county. The station will consist of

a welcome sign, a map marking points of interest and a list of businesses and organizations.

The welcome station will provide a needed service to visitors who are attracted by Kentucky's newest lake, which was recently built in Lawrence County. The lake currently hosts a campground and marina, and work is underway on a golf course.

The Opportunity Council was fortunate to get an updated county map from a group working on 911 service. The team contacted the cartographer to request a clean copy of the map, which will make up one side of the welcome sign. The group plans to see if the company supplying the map can place color coded symbols on it to mark points of interest. Contests will be held in local schools and through the arts council for creating a design for the welcome section of the sign.

The idea for the welcome station was widely accepted in the community, as it fit the local vision of tourism and heritage. The Louisa Tourist Commission and fiscal court were pleased to provide assistance for the project.

Doddridge County, West Virginia

The Brushy Fork team from Doddridge County wanted to market their community to visitors and potential residents. The team selected the name Marketing and Promotion (MAP) of Doddridge County and went to work to design a brochure and a web site to meet their goals.

The group's initial thinking was of the need to get funding for the project. Upon returning home, they wrote letters to civic organizations and other county groups, requesting support for the brochure and web site. They were surprised to find that raising money turned out to be the easy part of the project.

The next surprise for the Doddridge County team was that getting 16 outspoken team members to agree on the design and content for one brochure was not an easy task. Team members were full of ideas. They examined some brochures that already existed

for Doddridge County and surrounding counties. The team decided on a foldable booklet format.

The group approached a local graphic artist who agreed to donate his time to design the brochure and provide camera-ready copy. The theme of the brochure and web site is "Doddridge County: the Road Less Traveled." MAP plans to print 50,000 copies of the brochure and distribute them at strategic locations.

Doddridge County's web page will include information from the brochure and much more. The site will include sections on businesses, communities, history, points of interest, churches, current events, recreation and attractions, information on MAP, and photos not included in the brochure. The county's web site resides at www.visitdoddridge-wv.org.

Upshur County, West Virginia

As Upshur County is celebrating its 150th anniversary this year, the team wanted to focus a project on supporting the festivities. The group originally chose to pick several sites around the community and coordinate local groups to do clean-up and beautification. As the group worked to make contacts and assign work groups to the different areas, the scope of the project seemed too large.

In January, the team re-thought their project strategy and decided to provide festive banners for downtown Buckhannon in commemoration of the 150th anniversary. Working with the Upshur County Historical Society, the team created four different banner designs.

The four designs commemorate sites with historic significance: an old church that houses the historical society; the Pringle Tree; Fiddler's Mill; and the sesquicentennial (150th anniversary) logo. The 22 flags will be placed on utility poles lining Main Street and other sites throughout the county seat during the year. They will occasionally be interchanged with other banners such as 4-H flags in celebration of 4-H week.



Mavis Shiflett shares a design for the Upshur County banners.

WE INVITE YOU. . .

to visit Brushy Fork's redesigned web site!

In an effort to provide additional support to Brushy Fork Associates and communities throughout Central Appalachia, we have redesigned our web site. The site now includes:

- ✓ Downloadable back issues of *Mountain Promise*.
- ✓ Contact information for all Brushy Fork staff.
- ✓ Descriptions of our various programs and services.
- ✓ Downloadable toolbox handouts to use with community groups.
- ✓ An online discussion area for Brushy Fork Associates and friends.

We encourage you to visit our site at:

www.berea.edu/brushyfork

Your feedback is welcome!

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