



Land Air & Water

Kentucky Energy and Environment Cabinet

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Land Air & Water

since 1988

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From the Secretary's Desk

The current issue of *Land, Air, and Water*, with stories that cover diverse aspects of energy, the environment, and natural resources conservation, perfectly conveys the mission and vision of the Energy and Environment Cabinet.

Our mission is to improve the quality of life for all Kentuckians by protecting our land, air, and water resources; utilizing our natural resources in an environmentally conscientious manner; and innovating and creating efficient, sustainable energy solutions and strategies that reduce greenhouse gas emissions and create a base for strong economic growth.

The cabinet's vision is to be recognized as a leader among the states for holistically addressing energy, natural resources, and environmental challenges. This was the vision of Gov. Steve Beshear when he created the cabinet in 2008.

Businesses and communities across the Commonwealth are increasingly adopting their own integrated approach to energy and environmental stewardship. An example of this is the story on Page 4, highlighting an initiative of Kentucky American Water to reduce energy use in the company's facilities, improve wildlife habitat on company land, engage in public outreach on conservation, and promote recycling companywide.

Small businesses are also focused on sustainability. Look no further than the story on Page 3 about a Mt. Sterling dentist who is committed to energy efficiency and renewable energy. The article also discusses a range of affordable opportunities available to people who are interested in renewable energy.

Community examples of sustainability abound throughout the state, and in this issue we highlight an important project in Bowling Green—a Habitat for Humanity project that will encompass energy efficient homes and 'green' infrastructure designed to protect water quality.

Another community example of sustainability is the Fort Knox army base (see Page 5). The leadership exemplified here is extraordinary. Recognizing that energy security is national security, Fort Knox has made energy efficiency and off-grid alternative energy a priority. The initiatives at Fort Knox serve as an important demonstration of how these activities can be cost effective on a larger scale.

I am so pleased that we have stories like these to share with our readers—to show that what we talk about in theory regarding sustainability has very real and wide-ranging applications. The investments these businesses and communities are making in energy efficiency, water conservation and protection, and alternative energy will reap long-term rewards for everyone.



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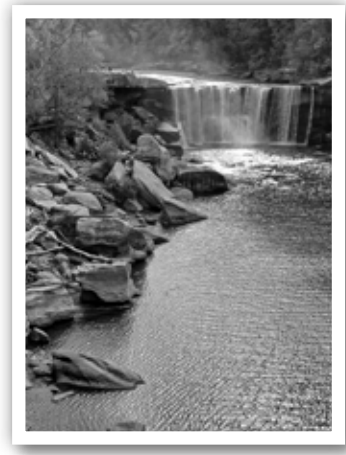
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1 Green Habitat project
A Bowling Green community development uses innovative designs to reduce stormwater, improve habitat for wildlife.



9-10 Effects of ozone
Johnathan Jernigan looks for signs of ozone injury on plant life at Mammoth Cave National Park.



Cumberland Falls, sometimes referred to as the “Niagara of the South” is one of the great natural attractions of Kentucky. Photographed by Joe Forgacs of Danville. Forgacs works for the Division for Air Quality in Frankfort.



13 Maxey Flats final cap
Actions are being taken to prepare the Superfund site for the third stage of the remedial process—constructing the final cap.

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Kentucky's first 'green' Habitat for Humanity project is under way in Bowling Green

Development uses innovative designs that reduce stormwater impacts on the community of Durbin Estates

**By Brooke Shireman
Division of Water**

Imagine a world where everyone has a decent place to live. That is the vision of Habitat for Humanity. For one Bowling Green community, this vision has expanded beyond the walls of a house into the outside environment. This multi-phase project to develop a sustainable and affordable community is becoming a reality on the 14.3-acre Durbin Estates development.

The development will include more than 40 energy-efficient homes, a community center, and green infrastructure such as cisterns, rain gardens, bioswales and pervious parking areas to manage and treat

stormwater runoff from the development and surrounding areas.

All developments require extensive site plans, and the process of planning and designing can be costly. Because Habitat for Humanity was willing to use innovative design ideas that reduce stormwater impacts, the Kentucky Division of Water's (DOW) Nonpoint Source Pollution Control program was able to provide funding to cover those costs.

Each year DOW receives federal funding, also known as the Clean Water Act Section 319 (h) grant, from the U.S. Environmental Protection Agency to fund projects that address nonpoint source pollution (see sidebar). In 2010, Western Kentucky University's Center for Environmental Education and Sustainability (WKU CEES) along with Habitat for Humanity Bowling

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What is Nonpoint Source Pollution?

Nonpoint source pollution, also known as runoff pollution, is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands and groundwater.

Green Infrastructure

Green infrastructure uses vegetation, soils and natural processes to manage stormwater and provide environmental and community benefits.



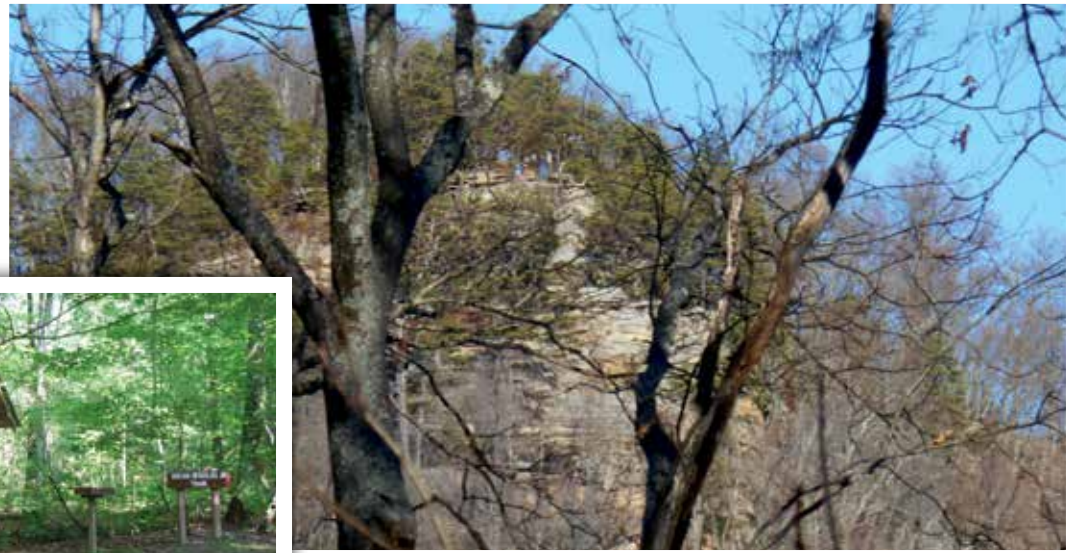
CLOCKWISE:
(bottom left to right) Pervious pavers; first habitat house under construction; an educational sign explaining features of the site; a vernal pond that treats stormwater.
Photos by DOW



Kentucky's Nature Preserves

RIGHT: From Sage Point Trail, hikers can be seen atop Pilot Knob. Photo by Kyle Elliott

BELOW: A kiosk at the Oscar Gerald's Jr. Trail.
Photo by KSNPC



Pilot Knob State Nature Preserve

Millstone history observed along the trail

By Joyce Bender
Kentucky State Nature Preserves Commission

Fall is a perfect time to visit Pilot Knob State Nature Preserve in Powell County. It is a favorite place for history and geology buffs as well as hikers. The 742-acre preserve has a promontory that is supposed to be the knob Daniel Boone and his party climbed in 1769 to try and get a good look at the country through which they were travelling. The climb is just challenging enough to get your heart pumping, and the view from the 730-foot elevation is fabulous when the skies are clear. Fall colors pop like a crazy quilt and spring's softer pastels of pink and rose and chartreuse look like a watercolor painting.

The trail system offers several choices for exploring the preserve. The 2.5-mile round-trip hike to the summit along the Oscar Gerald's Jr. Trail is considered moderately strenuous due to the elevation gain. The view is worth the hike! The Sage Point Trail is a 2.0-mile loop trail that departs mid-slope from the Gerald's Trail. It climbs and descends an adjacent knob known as Sage Point, and takes hikers to a stream at the bottom of a ravine before ascending to a saddle between Rotten Point and Pilot Knob and reconnecting to the Gerald's Trail nearer to the summit. It is considered very strenuous. A quarry

site with several unfinished millstones is located on Pilot Knob's lower slope and can be seen along the 0.5-mile easy-to-moderate Millstone Quarry Trail.

The preserve protects a good quality second-growth oak-hickory forest, which is representative of the knobs in this region. There are a number of forest communities, each associated with different environmental conditions such as elevation, soil type, bedrock, soil moisture and exposure to sunlight. Changes in forest composition are evident as you climb to the top of the knob. For example, the trees common to the summit are exposed to more sunlight and wind and less moisture than those at the base of the knob. The trees at the summit, mainly blackjack oak and Virginia pine, are stunted and small in diameter, but they have adapted to the harsh conditions. Blackjack oak is not found at the lowest elevations for the same reason tulip poplar and red maple are not present on the summit.

The sandstone outcrop near the summit is approximately 240 million years old. This type of sandstone is called

conglomerate—a mixture of sands and gravels deposited by an ancient stream that once flowed here. The large amount of quartz pebbles incorporated into the rock makes it good for grinding. Millstone makers began working in the Pilot Knob area by the 1790s and continued until the mid-to-late 1800s. Several millstones in various stages of production are found along the quarry trail. Unlike many large millstone quarries, the one at Pilot Knob was not a deep pit from which stone was exposed and removed. The quarrying activities at Pilot Knob were limited to splitting and shaping boulders that rolled off the top of the knob. The remnant stones were abandoned at different stages of production due to external flaws. These rejected millstones provide valuable insight into their manufacture.

The preserve is open from sunrise to sunset daily. Although infrequently encountered, there are venomous snakes on the preserve. Remaining on the trail and being observant are the best ways to avoid them. Hunting, camping, pets, rock climbing, plant or rock collecting, horseback riding and mountain biking are not permitted.

Renewable energy: what option is right for you?

One Kentucky doctor reduces his energy footprint and encourages students to explore alternative energy projects

By Kenya Stump
Department for Energy Development and Independence



Don't be surprised if you see two wind turbines as you drive along I-64 through Mt. Sterling, Ky. They tower above the office of Dr. Richard Henry of Henry Dental. Why, you might ask, would a dentist be interested in renewable energy?

Dr. Henry is not your ordinary dentist. He is part of a growing movement of 'green' dentistry.

"I do it because it's fun, exciting, and it's the right thing to do," said Henry. "I'm a tinkerer and am always looking for projects. Being a dentist helps support my interests in technology and alternative energy."

Henry's system is composed of a 1.5 kilowatt (kW) German Windgen turbine, a 2.5 kW Skystream turbine, and a 1.0 kW solar photovoltaics (PV) array that converts sunlight into electricity. The system does not provide nearly the electricity needed by Henry's office and it is not "net metered." This means the electricity gen-



Renewable Energy Facts

- The largest solar installation to date in Kentucky is located at Fort Knox at 2.1 megawatts (MW).
- Kentucky has ~10 MW of distributed renewable resources statewide.
- Eastern Kentucky Power Cooperative leads the way in landfill gas-to-energy projects.
- Renewable energy in Kentucky accounts for 250 gigawatt hours (GWh) of net electricity produced.
- Approximately 3 percent of Kentucky's net electricity generation comes from hydroelectric power.
- The majority of renewable energy development has occurred within the Tennessee Valley Authority area due to its incentive programs for renewables.
- Kentucky's agricultural sector is one of the largest for renewable energy deployment due to U.S. Department of Agriculture funding coupled with funding from the Governor's Office of Agricultural Policy.

erated stays behind the meter and serves the office first; it will never go to the grid and Henry won't be compensated for any excess electricity produced.

But, Henry's passion for energy doesn't stop there. He is replacing lighting in his office and working with local students on alternative energy awareness projects. His latest project involves working with the school industrial technology program to build a tracking system for additional solar panels that will light the sign for his dental office. Henry tries to conduct one project a year with the students.

His future plans include an electric car charging station in partnership with the local Dairy Queen, a solar hot water system, and more solar PV panels.

"I'm not in it for the economic payback, and these projects may not be feasible for most people but it is something that I do for myself, those that work here and the community, not to mention it is great advertising," said Henry.

In fact, for many Kentuckians, installing a solar or wind energy system may not be an option for their homes. From a resource standpoint, Kentucky's wind potential is not practicable at less than ~4.5 to 5.5 meters per second. The

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ABOVE AND LEFT: Dr. Richard Henry holds a mockup drawing of his solar project and solar panels that will light his dental sign. Two wind turbines produce energy to power Henry's dental office. Photos by Eileen Hardy



Kentucky American Water focuses on 'green' practices

Energy reduction, recycling lessens company's environmental impacts

**By Mary Jo Harrod
Division of Compliance Assistance**

Energy usage is a major expense for most businesses, including Kentucky American Water in Lexington. A member of KY EXCEL, the Commonwealth's voluntary environmental leadership program, Kentucky American Water partnered with Sustainable Energy Now from the Kentucky Pollution Prevention Program to do an evaluation of the energy usage of the main office and pumping stations as one of its KY EXCEL projects.

"We are committed to reducing energy usage by 2.5 percent each year for the next 10 years," says David Shehee, superintendent of Water Quality and Environmental Compliance and leader of the company's Green Team. "Our pumps use 98 percent of the company's energy, so data loggers were installed on the pumps to evaluate their efficiency. This should give us a really good jump on energy usage, trimming it where we can. Also, we are evaluating several variable-speed pumps to get better energy efficiency."

Kentucky American Water pumps an average of 40 million gallons of water daily, has 133 employees and charges customers less than \$0.01 per gallon.

Working to minimize energy usage in other areas, the company requested an energy audit, which has led to replacing T-12 and metal halide lights with T-8 and

fluorescents. Motion sensors are on the lights in every room of the buildings.

Kentucky American created a Green Team of 18-20 employees to lead the company's environmental efforts. It is involved in several projects, including the planting of native grasses on four of the property's 85 acres to encourage more wildlife, getting rid of nuisance plants, decreasing the amount of mowing needed, and beautifying the area. Home to deer, foxes, geese, a variety of birds and other animals, the property has been designated as a wildlife friendly habitat by the Kentucky Division of Forestry and the Kentucky Department of Fish and Wildlife Resources.

In addition, WaterFest is held annually at the company's Lexington property for the public and draws about 600 people. There are exhibits, tours of the plant, and activities to focus on protecting the state's waterways.

"Our goal is to show that we do more than ensure our customers have clean drinking water," says Susan Lancho, external affairs manager for the water company. "We promote the environment and encourage people to make small changes at first."

Recycling is a major project for the company. Shehee says the goal is to recycle 10 percent more than the previous year. This year, it has recycled approximately 12 tons of commingled recyclable materials, including paper, glass, cardboard, cans, plastics and office paper. This doesn't include the 652 meters, numerous CFL lightbulbs, batteries, electronics and plastic bags that were recycled.



TOP: (left to right) Kentucky American Water's main office in Lexington; recycling bins used to collect glass, cardboard, cans and plastics. LEFT: A reusable cup distributed by the water company that promotes its green practices. Photos by Mary Jo Harrod

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Fort Knox

By Eileen Hardy and Bill Lunsford
Department for Energy Development
and Independence

Army base ensures strong energy security, influences initiatives around the globe

Fort Knox has been on a mission since the 1970s to minimize energy consumption and promote energy efficiency. While this mission has been required by federal mandates, the leadership at Fort Knox raised the bar to a new level following the 2009 ice storm that compromised its ability to provide services. Fort Knox supports its troops and their families with necessary training and human resources, which is fundamental to their daily lives. The interruption of electrical power highlighted the need for energy security on the base.

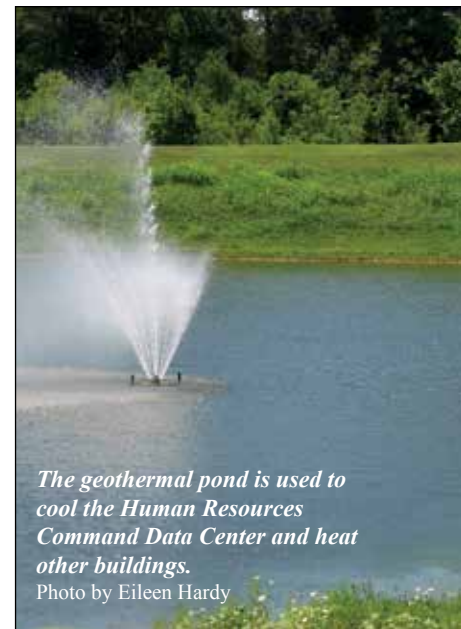
“Any time we can reduce energy consumption, we are saving lives,” explained Pat Walsh,

Fort Knox public works director. “Our security is our ability to maintain operations without interruption.”

By achieving the ability to fully generate all power needs on-site, Fort Knox has become a global leader in the net-zero arena and realized additional benefits along the way.

In the pursuit of energy security, energy conservation and efficiency goals were not lost. On the contrary, the first step to any good energy program is to maximize efficiency and conservation, and that is exactly what Fort Knox has done. They have implemented a range of projects, including demolition of their oldest structures, installation of geothermal throughout the base, and installation of efficient water, lighting and other facility upgrades. Since 2003, the base has reduced energy consumption by 51 percent. By reducing energy needs, generation demands have been minimized, which allows the energy security project to be possible.

For the Army, mission critical activities depend on a reliable source of power regardless of



The geothermal pond is used to cool the Human Resources Command Data Center and heat other buildings.

Photo by Eileen Hardy

the location. Fuel transportation should be minimized and critical infrastructure such as hospitals require back-up power in the event of an emergency. Technology development and implementation and lessons learned from the Fort Knox initiatives are already being credited across the Army and the world.

Base Energy Manager R.J. Dyrdek explains the primary way in which Fort Knox tracks its energy usage is through an advanced metering and energy management system—a result of a public-private partnership with utilities, energy service companies and technology experts. Nolin RECC, LG&E and Harshaw Trane are key partners in the design, construction, commissioning and operation of the initiative.

“The second largest bill on post is our monthly electric bill that runs about \$1 million,” said Dyrdek. “Using computer-based remote control and automation,

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LEFT AND INSET: *The Fort Knox monitoring system detects the energy levels in 300 individual buildings; Energy Manager R.J. Dyrdek.* Photos by Tim Hughes

Discover a state forest — Pennyrile



By Jennifer L. Turner
Division of Forestry

Pennyrile State Forest and Pennyrile State Resort Park—located mostly in Christian County near the city of Dawson Springs, was originally settled by John Thompson in the early 1800s. The area was a farming and logging community until the Great Depression in the 1930s. In 1932, the U.S. Department of Agriculture Resettlement Administration bought 15,331 acres and helped to relocate many of the original families. During the next five years, the Works Progress Administration (WPA) rehabilitated 14,000 acres of eroded farm land and cut-over timber. The WPA also planted 2 million seedlings (mostly pine), built a lodge, cabins and the Pennyrile Lake Dam. In 1946, the Kentucky Division of Forestry (KDF) obtained rights to the forest and began managing timber for

resource utilization. A portion of the property was deeded to the Kentucky Department of Parks, and Pennyrile State Resort Park officially opened to the public in 1954. Today, the state forest and state park encompass 16,399 acres.

Despite a long history of practicing forest stewardship at Pennyrile, there have been many challenges in achieving overall health of the forest. Disease, insects, storm damage, drought and other forest health impacts have taken a toll over the years. In 2001, an infestation of southern pine beetle heavily impacted the pine forest leaving dead and dying trees. As a result, KDF began harvesting the pines in an effort to convert the low-quality pine stands to native hardwoods. KDF foresters found that a complete removal—or regeneration harvest—

was the most effective course in converting the non-native pine to hardwoods, while allowing higher-quality southern yellow pine to regenerate as a mixed oak/pine stand.

Ecosystem management goals for Pennyrile are to maintain biodiversity, promote wildlife habitat and provide recreational opportunities while maintaining a sustainable forest resource. These goals are achieved using forest management techniques, including harvests, thinnings, mid-story removal and other types of timber stand practices.

Pennyrile State Forest is also home to Clifty Creek Natural Area, a combination of five separate sites that in 2006 were designated as “natural areas” due to their ecological significance. The combined sites cover about 75 acres. They are clustered in a

1-square-mile area south and southeast of Pennyrile Lake and west of Clifty Creek in Christian County.

The Clifty Creek sites include rare natural communities, including limestone barrens and prairie remnants, and support two species considered threatened in Kentucky—the Swamp metalmark butterfly and Carolina larkspur, a flowering plant. The sites also are home to a variety of more common plants and animals. Expanded protection of the sites will ensure critical habitat for plants and animals but also continued recreation such as hiking, hunting and bird watching for visitors.

The general public can enjoy many recreational opportunities at Pennyrile State Forest, including more than 50 miles of trails. There are specific trails for horseback riding, mountain biking and hiking. Several miles of the forest share a shoreline with Lake Beshear.

The Kentucky Division of Forestry owns and manages 10 state forests with a combined total of nearly 48,000 acres. They are working forests and each contains an educational demonstration area. The state forests are open to the public for hiking, wildlife viewing, picnicking and other activities. Primitive camping, horseback riding and regulated hunting and fishing are also permitted on specified state forest properties. Off-road vehicles, including ATVs are prohibited on all state forests.



ABOVE (left and right): Pennyrile State Forest is home to Pennyrile Lake and a mixed stand of oak and pine. KDF photos

Renewable energy: what option is right for you?

Continued from Page 3

state's solar potential is about mid-range at 400 to 440 watt hours/ft²/day, making solar workable but not optimal in Kentucky (see wind and solar maps created by the National Renewable Energy Laboratory at <http://tinyurl.com/b38lo9h> and <http://tinyurl.com/bpeu8mh>).

Where do you start?

Investing in an energy audit is a good first step in determining how you can reduce your energy footprint. Then, consider what renewable energy options are the right fit for you and your budget.

While the price of solar panels has dropped 50 percent since 2008, it still costs a homeowner in Kentucky between \$3 to \$5 per watt. That equates to a homeowner paying between \$10,000 and \$20,000 for a rooftop system and expecting to break even in 20 years or less.

Specific prices on systems vary based on the needs of the homeowner and other conditions like roof size and location; therefore, anyone interested in solar installation should get a quote from and work with a professional certified by the North American Board of Certified Energy Practitioners. To address these budget challenges, the U.S. Environmental Protection Agency's Sunshot Initiative is working to lower the price of solar electricity to about \$0.06 per kilowatt-hour over the lifetime of the system. This will increase the cost-competitiveness of solar electricity with other nonrenewable forms of electricity.

What else is available?

Even if the economics of owning a solar electricity system aren't feasible for most Kentuckians, there are other renewable energy opportunities. Geothermal heating and cooling, as well as solar hot water heaters are viable in today's market. Solar thermal heating can have paybacks in five to 10 years, and geothermal systems in the range of two to seven years. Also biomass, in which sustainably sourced wood can be used to heat homes through a traditional direct fire or boiler system, is not out of the question. However, biomass systems are not emission free.



If investing in a renewable energy system is out of reach, most utilities offer "green" power programs that allow customers to participate for a monthly fee, usually ranging from \$2 to \$5. These programs enable customers to support renewable energy by allowing the utilities to purchase renewable energy credits from in-state and out-of-state renewable energy generating facilities such as hydroelectric, landfill gas, biomass, wind and solar. To learn more about green power programs and how you can participate, contact your local utility company.

Like Henry, every Kentuckian has an option for supporting renewable energy development. Whether driven by economics or values, there are choices to fit everyone's needs. For more information, visit the Kentucky Division of Renewable Energy website at <http://energy.ky.gov/renewable/Pages/default.aspx>.

TOP AND LEFT: *Dr. Henry's wind turbine systems.* Photos by Eileen Hardy

Fort Knox

Continued from Page 5

we can monitor and control electricity usage in more than 300 buildings. Controlling peak electricity demand is also very important as it can account for as much as 50 percent of the electricity bill. This energy management software allows Fort Knox to adjust usage in real time with a positive impact to operating expenses," Dyrdek continued.

The generation units used for the energy security project utilize technologies best suited for the application, but they also support long-term sustainability. In the event that the base would need to become an 'energy island' with no power received from the utility grid, the combined 52 megawatts (MW) of power generation technologies are available in the form of diesel generators, three combined heat and power (CHP) units (base load units that operate all of the time) and the ability to use 'peak shaving' during roughly a quarter of the year. The CHP units utilize the on-site natural gas wells for fuel. There is estimated to be enough natural gas supply to last 30 years. Peak shaving refers to the ability to supply power above a certain cut-off point so that the utility charges associated with peak power delivery are minimized. In addition, Fort Knox also has a 10-acre, 2.1 MW solar array on post—the largest to date in Kentucky—and 1.56 MW of solar power installed at various locations on post.

By undertaking all of these activities Fort Knox will realize energy security goals, while managing energy usage, pursuing sustainability, and setting a global example as an energy leader.

Kentucky's first 'green' Habitat for Humanity project is underway in Bowling Green

Continued from Page 1

Green-Warren County (HFH BG-WC) was awarded a \$655,000 319(h) grant. The funds were used to develop the master plan for the Durbin Estates site, begin construction of the green infrastructure features, and build an educational program.

"The 319 funding was integral in getting this project up and running," stated Rodney Goodman, former executive director for HFH BG-WC. "The funding portion was huge in putting in the needed infrastructure, but the process of the funding (advisory council) helped us to solidify powerful community partnerships that strengthen the project over the long haul. The partnerships in education, housing and community will play a huge role in the life of the Durbin project and in breaking the chains of poverty in our community," he said.

The project is definitely a group effort. To ensure its success, Habitat for Humanity and Western Kentucky University formed local and regional partnerships with Bowling Green independent schools, Arnold Consulting and Engineering Services (ACES), Bowling Green Division of Stormwater Management, Service One Credit Union, Bluegrass GreenSource, and BGGreen Partnership for a Sustainable Community. In addition to the 319 funding, the DOW provided staff who met multiple times throughout the project to create a master plan for the site using designs created by ACES.

"This project also exemplified a spirit of true partnership, where the project partners shared not only in the vision, but they rolled up their sleeves to do the work to ensure positive outcomes and project success," remarked Nancy Givens, principal investigator for WKU CEES and the project manager for the 319(h) grant.

To date their efforts have resulted in the implementation of the first stages of the master plan leading to multiple



ABOVE: *Volunteers install the liner for the vernal pond. LEFT: Bald cypress trees planted in the bio-retention basin.*

Photos courtesy of WKU CEES

improvements to the site.

"The site still receives 270-plus acres of offsite stormwater and retains all of the stormwater that falls on the site, but now it happens in a managed way and looks great," stated Dale Reynolds, DOW's Green River Basin coordinator. Native flowers and grasses were planted to stabilize soil, reduce the need for irrigation and provide aesthetic value. Volunteers installed a vernal pond that helps treat stormwater and provides habitat for wildlife. The portion of completed road includes a bioswale and pervious pavers that help infiltrate and treat the stormwater runoff.

The site has become a learning laboratory for the local community and organizations throughout the Commonwealth. Elementary schools are using the site to teach students about water quality, green infrastructure and habitats. The city of Bowling Green Public Works and HFH BG-WC hosted an all-day stormwater

training for local/regional buildings professionals and HFH chapter affiliates that included a site visit to Durbin. The Kentucky Habitat for Humanity 2013 annual conference offered training about the site, plus the organization plans to learn from the development process to integrate these practices into other Habitat communities.

Although the 319 grant for the project is coming to a close, HFH BG-WC has received additional funding from Community Block Development Grants, the General Motors Foundation and local funding to continue the development. The first two energy-efficient homes have been constructed and the building of a passive solar house will begin soon.

Habitat for Humanity requires families living in the community to provide sweat equity and part of this requirement will be achieved through residents helping with maintenance and upkeep of the site.

"Such involvement contributes to building a sense of pride and a personal stake in the community; it creates a sense of shared responsibility for stewardship of place among site residents and the community," stated Givens.

To learn more about the Durbin Estates project site, visit <http://tinyurl.com/lzv4spb>

On a warm, summer day, Johnathan Jernigan prepares to dive into a tall grass meadow in the northwest corner of Mammoth Cave National Park. After applying plenty of sunscreen and tick repellent, strapping on snake gators (to protect against rattlesnake and copperhead bites), and grabbing clipboard and hand lens, Jernigan is ready. His goal? To search for evidence of plant injury caused by air pollution.

As a scientist with the National Park Service Air Resources Division and Cumberland Piedmont Network, Jernigan monitors the health of living systems in Mammoth Cave National Park. This includes native trees and other plants that are particularly sensitive to ground-level ozone pollution.

“It’s been a cooler than usual summer,” says Jernigan. “Ozone levels haven’t been that high, so we may not see much damage.”

In Kentucky, ground-level ozone (O₃) is primarily a summertime pollutant. It is created through a photochemical reaction when emissions from vehicles, power plants and other sources “cook” in the warmth of the summer sun. Ozone concentrations generally measure the highest during July and August in Kentucky.

Peering at a milkweed leaf through a hand lens, Jernigan finally sees what he’s been looking for—dozens of tiny, dark spots that may indicate the early stages of ozone damage. After recording his findings on his data sheet, Jernigan removes and tags the leaf, then places it in a plant press to preserve it. Specimens like this one will be sent to a lab for confirmation.

“The results of this survey can help us track the effects of air pollution in the park,” says Jernigan.

Good Up High, Bad Nearby

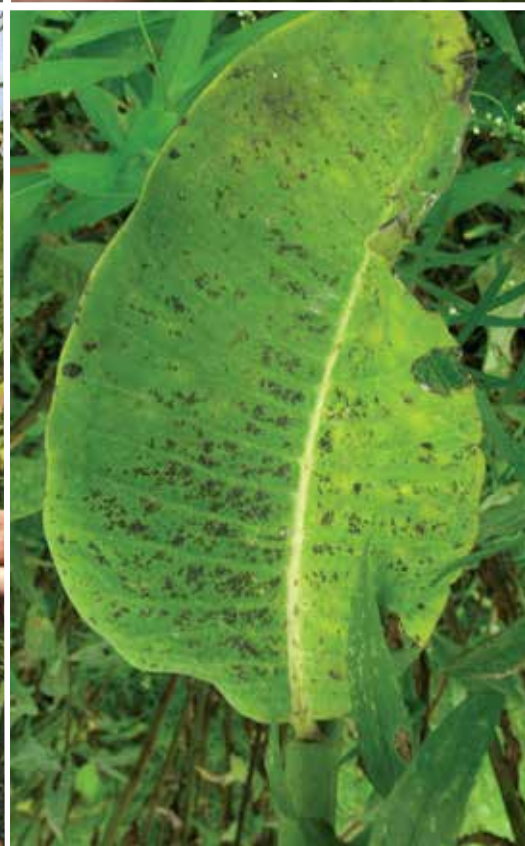
Is ozone good or bad? Both, actually—and it’s all about location.

When it is high in the atmosphere in the earth’s ozone layer, ozone protects us



tracking air quality

Article and photography by Roberta Burnes
Division for Air Quality



from the sun's harmful ultraviolet radiation.

But when ozone forms at ground level, the highly reactive ozone molecule creates serious health problems for many living things, including humans. So in a sense, ozone is good when it's up high, but bad when it's nearby.

In humans, ozone damages the cells that line the airways of the lungs. This causes respiratory problems such as coughing and wheezing. People with asthma and other respiratory diseases are especially sensitive to ozone pollution.

Plants also breathe, through tiny openings in the upper leaf surface called *stomata*. When a plant is repeatedly exposed to ozone, the stomata can suffer damage. Early symptoms of ozone leaf injury appear as dark pigmented areas known as *stippling* between the veins, usually on the leaf's upper surface. Severe ozone damage may cause the leaf—and eventually the entire plant—to yellow and die prematurely.

Some plants are more sensitive to ozone than others. In the park, Jernigan searches for sweet gum, tulip poplar, black cherry, milkweed and blackberry—all of which are indicator species for ozone damage. Like the proverbial canary in the coal mine, an indicator species can provide an early warning that something is out of balance in the environment.

The National Park Service has been conducting ozone injury surveys at several of its parks since 2008. Results of the surveys are checked for correlation with measured ozone levels in each park. Generally, you'd expect leaf injury to increase as ozone levels go up—but that isn't always the case.

Take the summer of 2012, for example. Record-breaking temperatures contributed to unusually high ozone levels across Kentucky and much of the southeast. Yet, Jernigan's surveys revealed no confirmed ozone injury on plants at Mammoth Cave.

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OPPOSITE PAGE: Monarch on milkweed. CLOCKWISE (from top left): Johnathan Jernigan stands beside a DAQ continuous particulate matter (PM) monitor; small filters used by the monitor to measure PM; ozone injury to a milkweed leaf (photo by National Park Service); Jernigan examines a sweet gum leaf looking for signs of ozone damage.

Study monitors the effects of ozone on plant life at Mammoth Cave National Park



Grant writing: the wrong way

By Amanda LeFevre
Division of Compliance Assistance

It's the start of federal grant writing season across the country and thousands of entities are busy preparing seemingly endless documents to convince the U.S. Environmental Protection Agency or other funding agencies to support their projects. In the end, it's about describing your project clearly, concisely and in a digestible manner. What makes an application rise to the top? Often, it means you avoid some common errors. Whether it's a brown-field grant or an education grant, there are some simple faux pas to avoid when crafting your proposal. Here are 12 common errors.

1. You didn't read the guidance.

Grant guidance, especially of the federal kind, can be upward of 100 pages. While it may seem daunting and painful, it's important to read the guidance to understand what is requested, the priorities and other fundamental nuggets of information. Not only should you read it, you should read it multiple times.

2. Your project does not match the needs of the funding agency.

If the agency wants to support projects that target economically disadvantaged areas, your project located in a middle-income neighborhood would not be a good match. Your idea may be good, but if it doesn't fit into the parameters, it doesn't matter. Information on priorities is often found buried in the guidance.

3. You didn't follow the format.

Answer every question in the order in which it is asked and don't skip any questions. Even if the question seems redundant or doesn't pertain to you, answer it anyway. Also, make sure that you number and label your application properly to make it easier for reviewers to find information.

4. You don't pay attention to the scoring criteria.

In the end, grant writing is a points game. Federal grants are allotted based on an overall score. Each question you answer has an assigned point value and some questions are worth more than others. So, it is important that you pay

attention to each question's point value. For instance, if you spent three pages on a question worth 10 points, but only one page on a question worth 40, chances are you will not receive a high overall score. As mentioned before, this is also why it is important to address every question. Even if you say that a particular item does not pertain to you, it signals to the reviewer that you acknowledge the question and didn't skip it. That would result in a score of zero.

5. Your proposal is hard to understand.

Did you use lingo that is not understandable to the outside world? Are your ideas not well-described? This can be an issue for many grant writers. Remember that the person reviewing your grant may have been pulled from a different federal program or is an outsider, so everything should be easily understood by a layman. To avoid this complication, have someone else review your grant. Even better, find someone from outside your organization that will catch the use of lingo and any vision communication issues.

6. Your organization is not credible.

In order to be funded, you have to convince those reading your proposal that their money is in good hands. To do that, you have to promote your credibility as a grantee. Describe your organization, its history, its impacts and its abilities to manage funds. If you don't have that, are there organizations that you can partner with to

make up for that gap or someone on your staff who has experience from previous employment?

7. You submitted your proposal incorrectly.

Are you supposed to submit by mail? How many applications do you send? Do you send those applications to the same place? Can you submit through Grants.gov? Does your application have to be at its destination on a certain date or just postmarked by that date? All of this can be found in your guidance (see error No. 1). Also note that if you are a first-time user of Grants.gov, you need to allow two to three weeks for the process of setting up an account.

8. Your project idea is a duplication of services.

If your proposed project is out there in another form, your proposal will not be attractive to funding agencies. Funding agencies are often looking for programs that can successfully supplement current projects or ones that come at a problem in a new and innovative way.

9. You didn't look at the frequently asked questions (FAQs).

Other than completely reading the guidance, there is no better source for information on a grant than the FAQs. This document, which often accompanies federal grants, can clear up gray areas, give insight into eligibility, and help pinpoint the kinds of activities funded.

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tracking air quality

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“Turns out, Mammoth Cave was in the midst of a drought in 2011-2012,” says Jernigan. “During those periods, plants close their stomata and gas exchange decreases. This results in decreased plant exposure to ozone, even when the ozone concentration is higher.”

Native plants aren’t the only species sensitive to ozone pollution. Each year, agricultural crops in the U.S. suffer billions of dollars in crop losses due to ozone damage. Wheat, soybeans, tobacco, cotton, squash and potatoes are some of the cash crops most susceptible to ozone injury.

Working Together for Clean Air

Biomonitoring for ozone damage is just one of the ways that Mammoth Cave National Park is keeping tabs on air quality in the region. The park’s air monitoring site houses equipment that measures ozone, acid rain, sulfur dioxide, and particulate matter, just to name a few. A complete meteorological station provides data on weather conditions, which may impact air quality as well.

Bobby Carson is the chief of the Science and Resources Management Division at Mammoth Cave. He heads up the air monitoring program at the park and works closely with the Kentucky Division for Air Quality (DAQ), sharing monitoring data and even housing one of the division’s air monitors in the park. DAQ frequently includes the site’s data in air quality analyses and conducts quarterly performance audits of the park’s continuous monitors to ensure data quality.

Carson also gives the division a “heads up” whenever the park is planning to do a prescribed burn. Prescribed fire helps park staff manage natural areas by preventing the spread of invasive weeds and recycling nutrients in the soil. Prior to any burn, Carson is careful to check meteorological conditions such as wind speed, wind direction and humidity.

“Mammoth Cave National Park used to be one of the worst national parks in the nation for regional haze, but thanks to pollution controls required by the Clean Air Act, things have improved significantly.”

Bobby Carson
Chief of Science and Resources Management
Mammoth Cave National Park



FAR LEFT and LEFT: Milkweed leaves that were collected and tagged will be studied at a laboratory. Bobby Carson shows off several of the park’s air quality monitors.

Photos by Roberta Burnes

“Our goal is to minimize the impact of smoke on people,” says Carson.

Perhaps most significantly, Carson and Jernigan both partner with DAQ on Kentucky’s regional haze plan, which requires states to restore natural

visibility conditions at Class I areas like Mammoth Cave by the year 2064. The Clean Air Act grants Class I areas the highest level of air quality protections, especially regarding visibility degradation.

Regional haze affects visibility over large regions including national parks, forests and wilderness areas. It is typically caused by fine particle pollution, often transported across great distances.

“Mammoth Cave National Park used to be one of the worst national parks in the nation for regional haze,” says Carson, “but thanks to pollution controls required by the Clean Air Act, things have improved significantly.”

DAQ Environmental Scientist Martin Luther agrees. Luther recently submitted Kentucky’s Five-Year Periodic Report on Regional Haze to the EPA.

“Kentucky has made great strides in the past decade toward cleaner air and improved visibility,” says Luther. “We are on track to meeting our goals for regional haze improvements.”

Of course, the same pollutants that impact visibility or plant life in Mammoth Cave National Park also impact human health. And that means everyone benefits from this joint venture for cleaner air.

“Working with partners like Mammoth Cave National Park allows us to gain a better understanding of how air pollution is impacting living systems in our most biologically sensitive areas,” says DAQ Director Sean Alteri. “The progress we’re making in air quality improvements means healthier air for all Kentuckians.”

Final cap coming to Maxey Flats Disposal Site

By Virginia Lewis
Division of Waste Management

The Maxey Flats Disposal Site in Fleming County, Ky., will receive a state-of-the-art, engineer-designed final cap that will cover its black 55-acre liner in the near future.

It is part of the recent actions being taken as prescribed in the 1991 Record of Decision (ROD), which is a public document that explains the remedial action chosen for the Superfund site. The ROD describes the remedial options and the selected remedy and requires that components be reviewed and approved by the U.S. Environmental Protection Agency (EPA).

“The plan for how we place the final remedy specified in the Record of Decision at Maxey Flats is now undergoing final edits and is expected to be approved by EPA by the end of 2014,” said Shawn Cecil, P.G., project manager for the Kentucky Department for Environmental Protection. “We have completed sump abandonment activities and have one remaining early action item to complete prior to having the facility ready for cap construction.”

In spring 2014, while final cap design work was progressing via engineering firm URS Corporation, protrusions through the existing liner were cut off below the surface and properly prepared for the final cap.

Many of these protrusions were sump risers that extended up through the liner and down to the waste trenches. Bentonite, a swelling clay often used in well abandonment to plug the well, was placed in the sump risers and then they were filled with grout used to properly seal the sumps. The geomembrane liner was cut around the sump riser, the riser was cut below the surface, repairs were then made to the liner, and a 1.5-inch-thick piece of high-density polyethylene flat stock was placed over the sump and secured with steel spikes. Finally, a patch was placed over the flat stock to ensure the integrity of the liner.



CLOCKWISE (from top): Contractors interested in bidding on the final cap walk across the existing liner during a tour of the property; bentonite is placed in the sump risers as part of the sealing process; final patching of the liner; high-density polyethylene flat stock is placed over the riser that has been cut below the surface of the liner. DWM photos

Finishing the top surface of the sumps in this manner is a critical design feature. It ensures that the top surfaces of abandoned sumps are completed in such a way that, over time, settlement does not allow the sump risers to penetrate the final closure cap. It also ensures the integrity of the liner, preventing rain water from entering the waste trenches.

Since the ROD was published, technology has progressed and, according to Cecil, the final cap will demonstrate some modern advancements.

“The ROD provided for use of technological updates in planning the placement of the final cap, but it was also fairly prescriptive. Our design effort has really been about how to construct the prescribed cap on the ground we have and, for the most part, we’re constructing the cap as prescribed.

“One area where we’ve proposed to modernize due to technological advancement is in the layer that was intended to serve as the deterrent to the infiltration of rain water. The ROD prescribes that 2 feet of clay be used in that capacity but what we’ve proposed is the use of a synthetic layer that is less than 1 inch in thickness. With fairly steep slopes surrounding most of the waste, getting a reduction in thickness helps us to construct a slope that will adequately shed water and minimize erosion, but also can be placed largely in the existing footprint of the interim cap,” Cecil said.

Another way modern technology is being used is by utilizing GPS, which has developed quite a bit in the time since the interim cap was constructed.

“We started that effort with a LiDAR (light-based survey conducted by fly-over), and it will continue with the use of heavy equipment equipped with GPS for greatly reduced time and cost, and increased accuracy,” said Cecil.

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Earth Day every day—even in June

Article and photography by Ricki Gardenhire
Office of Communications

Kentucky First Lady Jane Beshear observed Earth Day April 15 by recognizing schools that have made energy conservation a priority. A ceremony was held in the rotunda of the state Capitol where Fayette County's Wellington Elementary was recognized as a Green Ribbon school; Jefferson County's Farnsley Middle School was recognized as a Kentucky Green and Healthy School; and West Hardin Middle School was recognized as a model Green and Healthy School, meaning West Hardin serves

as a mentor to other schools in completing environment-related projects.

Due to unusually cold weather in April, the exhibition portion of the celebration was held in June on the grounds of the Old State Capitol in downtown Frankfort. Twenty-one local and state agencies participated in the outdoor event, displaying a variety of information and hands-on learning opportunities for visitors. A few are highlighted below:



Ollie Otter

Ollie Otter, the mascot for the Kentucky Division of Water (DOW), made an appearance at the event. Ollie is part of the environmental education program at DOW. The "Ollie" suit may be reserved for environmental events at your school or organization.
<http://water.ky.gov>
and
<http://water.ky.gov/www/Pages/MascotSuit.aspx>



Capital City Beekeepers Association

This Frankfort group hosts meetings, honey sales and other events, and has a mentoring group where new and expert beekeepers can meet and find answers about their hives.
<http://capitalbees.weebly.com>

Kentucky State University

Jennifer Hubbard-Sanchez, College of Agriculture, Food Science and Sustainable Systems at Kentucky State University, provides a demonstration about watersheds and nonpoint source pollution.
<http://kysu.edu/academics/cafss/>



"Capture the Earth" photography winner

Energy and Environment Cabinet Secretary Len Peters stands with Christina Howard of West Jessamine Middle School as she holds her photograph that won the "Capture the Earth" middle school photography contest. Photo by Lawrence Howard



Kentucky State Parks

Lisa Deavers with Kentucky State Parks uses a skull to show visitors how many teeth a raccoon has in its mouth.
<http://parks.ky.gov>

Soil is topic of annual contest

By Johnna McHugh
Division of Conservation

Soil is a necessity of life. It is the foundation for growing the foods we eat and for the trees and plants that help purify our air. This fall, thousands of Kentucky students will learn about soil through the Jim Claypool Art and Conservation Writing contests. The annual contests—an art contest for students in grades one through five and a writing contest for students in grades six through 12—allow the students to use the knowledge they have gained about soil and the environment and transform it into creative works of art and essays.

Each year, the Kentucky Association of Conservation Districts and the Kentucky Farm Bureau Federation sponsor the contest and provide materials that can be used in classrooms or at home to help the students learn about the topic chosen for the year. The articles and suggested projects in the materials help students understand why soil is so vital.

“It is an important fundamental that children learn that soil is the very foundation of life,” said Kimberly Richardson, director of the Kentucky Division of Conservation. “The contests allow that fundamental to be taught in a fun and easy-to-understand manner.”

This year, students will learn about healthy soil, the damage of soil erosion and how to prevent it, how soil is formed, and animals and plants that help the soil. Students can earn monetary prizes for their artwork and essays on school, county, regional and state levels.

For more information about the contest, visit your local conservation district office or <http://conservation.ky.gov/Pages/ArtandWritingContest.aspx>. Winners will be announced in spring 2015.

Grant writing: the wrong way

Continued from Page 11

10. You didn't use a checklist.

Federal grants often provide a checklist of the documents that you should include with an application. If they don't provide one, make one as you read the guidance.

11. Your partners are not really partners.

When you provide letters of commitment from partner organizations that will be assisting with your project, make sure that the letter explicitly states what that partner will bring to the table. Reviewers like to see a project with strong support and partners that can complement one another.

12. You didn't paint a picture.

Put yourself in the shoes of a reviewer. After about 15 applications, they all look the same. Unless you paint a vivid picture of your project or community that entices the reviewer, you may be overlooked.

Grant writing is a complex subject and people teach weeklong classes on it, so this article just scratches the surface. Hopefully, these tidbits can help you gain a few points when you next apply for a grant. If you really need help, try finding a grant writing course. The Kentucky Division of Compliance Assistance and its Brownfield Redevelopment Program offer a free grant writing course every fall and at times in the spring. While brownfield grants are discussed, the morning portion of this workshop always focuses on general grant writing skills that can be used for any grant. If you are interested, email Amanda LeFevre at amanda.lefevre@ky.gov for more information.

Kentucky American Water focuses on 'green' practices

Continued from Page 4

Kentucky American Water partnered with the local government in its Med Toss/National Take-Back Day to collect old prescription drugs. It collected more than 397 pounds, which was more than any other location that day.

Other projects include participating in Adopt-a-Highway, using rain barrels to collect rainwater to water flowers, an annual river sweep, tree planting with Re-forest the Bluegrass, environmental grants program and scholarships.

Through its projects, the water company is saving money and lessening its environmental impact by using energy-efficient lights and pumps. The waste stream is decreased through recycling, which incurs fewer landfill expenses. By planting native grasses, the company mows less and saves on gasoline and labor expenses.

“The biggest challenge is getting people to buy into going green,” says Shehee. “Start out with the low-hanging fruit. Once people start buying into the positives, then you can go beyond to larger things. In KY EXCEL, you can learn from other members.”

The Kentucky American Water projects help to protect the waterways and educate the public about the importance of not polluting the streams. The recycling program donates old cell phones to the local police department and ensures that other items are disposed of properly. Wildlife habitats are being restored to benefit animals in the area.

“If you teach people how to do the small things, they can have a huge impact on the environment,” says Shehee.

For more information about the KY EXCEL program, call 1-800-926-8111 or visit <http://dca.ky.gov/kyexcel/>.

New KYEXCEL members

- Hampton Inn & Suites Waterfront—Davies County (advocate)
- Stephen Hillenmeyer Landscape Services—Fayette County (advocate)

Cash for trash

Muhlenberg County program for unwanted appliances a success

By Shanna Drake
Division of Conservation

The Muhlenberg County Conservation District offers a unique opportunity for county residents to properly dispose of certain unwanted household appliances and receive money for doing so through the “Cash for Trash” incentive program. Appliances such as dishwashers, refrigerators, freezers and stoves can be disposed of at a collection site near the conservation district office in Greenville, Ky.

Participants must follow some general guidelines to be eligible to participate in the program. After the requirements are met and proper disposal is verified, participants can receive \$25 per appliance, with a maximum of \$200 per household.

“The Muhlenberg County Conservation District has been extremely successful in taking an active role to clean up the county,” said Emily Knight, administrative secretary for the Muhlenberg County Conservation District. “The Cash for Trash environmental grant was a great success,

and participation has increased every year the district has offered the program.”

To date, the program has accepted 643 appliances. The proper disposal of appliances helps protect the environment and provides aesthetic benefits to homes and communities as well. The Cash for Trash incentive program was made possible through an environmental grant from the Kentucky Soil and Water Conservation Commission. For more information, contact the Muhlenberg County Conservation District at 270-338-3743.

Final cap coming to Maxey Flats Disposal Site

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The final cap will cover nearly 60 acres, the surface area of about 45 football fields including both end zones. An anticipated 1 million-plus cubic feet of fill material will be required for the cap—this is enough material to fill more than 11 Olympic-size swimming pools.

Contractors interested in bidding on the contract for final cap construction walked across the existing liner and completed site tours as part of mandatory pre-bid meetings. They competed in a sealed bid process to construct the engineer-designed final cap in which bids were submitted by Sept. 4.

As part of the tests conducted onsite by the Commonwealth and URS Corporation in preparation for the final cap construction, an advanced procedure was performed to specifically test the levels of gamma radiation existing at the site.

“As a part of our early action, a gamma survey was conducted to aid in the

determination of the appropriate level of protection for workers during construction,” said Cecil. “The report is not yet finalized, but we anticipate that levels will support the use of a general construction approach for most of our activities.”

Also in the interest of public and worker safety, the Commonwealth has made every effort to keep construction efforts confined to the Maxey Flats site, including the buffer properties, said Cecil. Historical efforts and preparation for the final cap involved the purchase of 725 acres, in addition to the original 280-acre site, bringing the total up to approximately 1,005 acres. As a requirement of the ROD, the Commonwealth purchased buffer zone property surrounding the original site that operated as a low-level radioactive waste landfill years ago. And more recently, the Commonwealth purchased additional properties to serve as borrow areas for the final cap, to help maintain site security, and to address some points of public access.

“Based on our tentative schedule, the remainder of the year will be spent on these activities, cutting a high point to an acceptable grade, finalizing our contractor

selection for cap construction, and working with that contractor on work plans so that we can begin construction activities in earnest in 2015,” said Cecil.

In accordance with the ROD, after the final cap has been constructed, the fourth and final phase will begin in which monitoring, maintenance and five-year reviews will be conducted in perpetuity.

“The remedy prescribed in the ROD was intended to be part of a protective strategy that serves in perpetuity. Completion of the final cap doesn’t mean we’re going to eliminate our on-site team or many of the activities that we currently perform to monitor and maintain the Maxey Flats Disposal Site. We will plan our activities for the time following cap installation in the coming months, but it will include ongoing monitoring and maintenance for the foreseeable future,” said Cecil.

Alternative 5, Natural Stabilization, is the remediation plan that was approved by the EPA in the ROD to address the approximately 4.7 million cubic feet of low-level radioactive waste that was buried at the site from 1963-1977. By the time this article is published, the winning contractor will be selected and working with Cecil and URS Corporation on plans for the final cap construction. To learn more, visit <http://waste.ky.gov/SFB/Pages/MaxeyFlatsProject.aspx> or contact Shawn Cecil at 502-564-6716, ext. 4754.

KENTUCKY, NATURALLY

Book highlights 20 years of KHLCF purchases and conservation



KHLCF Chairman Dr. Richard Kessler (left) presents Energy and Environment Cabinet Secretary Len Peters with a copy of Kentucky, Naturally. Cabinet photo

By Zeb Weese

Kentucky Heritage Land Conservation Fund

Award-winning Kentucky nature photographer Dr. Thomas G. Barnes has published a new book *Kentucky, Naturally* in celebration of the properties that have been purchased with the assistance of the Kentucky Heritage Land Conservation Fund (KHLCF) during the first 20 years of the program. The book displays hundreds of beautiful photographs of the state's protected lands and provides detailed descriptions of each site, including the natural flora and fauna, as well as directions for planning your hiking trips. The areas featured include Kentucky state parks, state nature preserves, wildlife management areas, wild river corridors, state forests, and smaller city and county parks. To date, KHLCF has protected more than 86,000 acres statewide.

"Author and photographer Tom Barnes is truly an artist whose paintbrush is a camera," said Don Dott, director of the Kentucky State Nature Preserves



ABOVE: White trillium and waterleaf near one of the forks of the streams in Dry Fork Gorge, Metcalfe County. LEFT: View of the Green River in the morning atop a bluff at High View Hill Park, Ohio County. BELOW: Twin Branch Falls drops approximately 40 feet over sandstone cliffs to a small stream that empties into the upper Red River.

Commission and KHLCF board member. "Kentucky, Naturally will beguile you with scenes and descriptions of intriguing places here in the Commonwealth, with revealing close-ups of wildlife and wildflowers like Indian paintbrush, monkey faced orchid, Great blue herons, Ribbon snake and Shining ladies' tresses, to name a few. If you appreciate the beauty of nature, you will love this book. Let it introduce you to Kentucky's best."

"Only Tom Barnes could do such an inspirational and accurate job of showcasing the people and places conserved through the board's programs, staff and supporters," said Hugh Archer, director of the Kentucky Lands Trust and KHLCF board member. "His understanding of the conservation community and its best scientists make him an expert on where the wild things are, and how they are being protected or in need of attention."

The book is available in local bookstores, state park gift shops and from online retailers. For information on the KHLCF, visit <http://heritagelands.ky.gov> or email zeb.weese@ky.gov.



About the Author:

Thomas G. Barnes, Ph.D., is a professor in the Department of Forestry at the University of Kentucky. Barnes has written extensively on the natural history of Kentucky and has authored more than 50 scientific research articles, 60 cooperative extension publications and 100 magazine articles.



Cleaner Commonwealth Fund issues first round of grants

Lincoln Hall, Columbia Theatre to receive a total of \$98,000 to redevelop properties

By Herb Petitjean
Division of Compliance Assistance



Two historic properties are being restored and put back into beneficial use with the assistance of two grants from the Kentucky Department for Environmental Protection’s Cleaner Commonwealth Fund.

Lincoln Hall is the centerpiece of the Anville Institute in Jackson County. Built in 1923, the beautiful, three-story, colonial revival-style building features massive white columns on the front with a clock tower on the roof. A \$49,000 grant will help remove asbestos to redevelop the building as a cultural center and provide a reception hall and classrooms for after-school and summer youth programs.

The Columbia Theatre in Paducah operated from 1927 to 1987. Though it has undergone a number of renovations, it still retains many of the historic architectural features of its past. It, too, is receiving a \$49,000 grant to assist with asbestos removal.

“We are very excited and thankful for this grant to kick off the first step in restoring our magnificent theatre,” said Randy David, Columbia Club Inc.

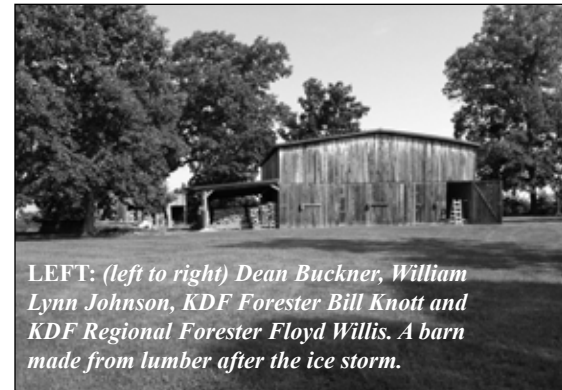
The restored theatre will be used as a cinematic art house and provide a venue for live music and educational programs.

The Cleaner Commonwealth Fund was established through an \$850,000 U.S. Environmental Protection Agency Brownfield Revolving Loan Fund grant. It is administered by the Division of Compliance Assistance and provides financial assistance for projects that clean up brownfield properties, including old factories, former gas stations and other properties that are abandoned or underutilized due to environmental contamination.

Another round of grants for local governments and nonprofit entities will be available this fall. A loan program, which will be open to public, private and nonprofit entities, will be launched in 2015. For more information, contact Herb Petitjean or Amanda LeFevre in the Kentucky Brownfield Redevelopment Program at 800-926-8111.

CLOCKWISE (from top): Inside the Paducah Theatre; the facade of Paducah Theatre dated August 1947; striking architectural features of Lincoln Hall; the clock tower atop Lincoln Hall. Photos of Lincoln Hall provided by Jake Moss. Photos of Paducah Theatre provided by Randy Davis

Awards



LEFT: (left to right) Dean Buckner, William Lynn Johnson, KDF Forester Bill Knott and KDF Regional Forester Floyd Willis. A barn made from lumber after the ice storm.

Johnson named Outstanding Forest Steward of the Year

Article and Photography by Jennifer L. Turner
Division of Forestry

William Lynn Johnson is an advocate of healthy forests. After the 2003 ice storm destroyed many of the trees on his 165 acres in Carter County, he began working with the Kentucky Division of Forestry (KDF) to remove and utilize the downed timber and to establish forest improvements and wildlife habitats throughout his property. His efforts were recently recognized when he was chosen from a group of five regional winners and named the 2014 Outstanding Forest Steward of the Year at the Kentucky Association of Conservation Districts annual conference in July.

Every year, KDF, with the aid of the U.S. Department of Agriculture Natural Resources Conservation Service and the Kentucky Department of Fish and Wildlife Resources (KDFWR), honors a forestland owner(s) who has promoted the Kentucky forest stewardship program, understands the importance of forest resources, and works to sustainably manage his or her forest.

Johnson, who is the northeast regional winner, rented a portable sawmill in 2004, cleared the downed trees and sawed 17,000 board feet of lumber. He built a pole barn from the lumber and plans to use the rest for smaller projects. He and his worker, Dean Buckner, cut approximately 25 ricks of firewood each year. In addition, Johnson completed 136 acres of forest improvements, which included removing competing vegetation from around potential timber producing trees, adding wildlife watering holes, food plots, fire breaks and best management practices on access roads. He has 3.5 miles of maintained trails and a farm pond that is stocked with bluegill and bass.

Johnson enjoys sharing the recreational opportunities of his farm with neighbors, friends and family. Several youth have had the opportunity to hunt and fish with him on his property.

Other regional winners included:

- **Barry Michael, central region**—Michael wanted to improve the woods on his 263-acre farm in Lincoln County for wildlife and recreation and his farmland for cattle

production, crops and improved timber. The woodlands had been logged by a previous owner for high-grade timber, leaving only lower-quality trees on site. Working with KDF and KDFWR, Michael implemented a timber stand improvement plan to improve the wildlife habitat on this property and completed 151 acres using various federal cost share programs. He planted apple, pear and persimmon trees for wildlife, added 6 acres of food plots, eradicated 4 acres of fescue and planted warm season grasses, and put in five watering holes. Since implementing his stewardship plan, Michael has seen a rise in the number of deer and turkey available to hunt. Michael is a member of the American Tree Farm System.

- **Emily Godfroy Lofald, north central region**—Lofald grew up on a working farm and wanted a similar experience for her two boys. She and her father bought 106 acres in Owen County in 2009 and immediately started to work on a multiple use farm management plan. Since her property had established forests, Lofald randomly spot planted in thinly stocked areas. About 1,000 trees, including red and white oak, black walnut and persimmon, were planted for habitat improvement and erosion control along the creek. Approximately 82 acres of timber stand improvement have been accomplished with the assistance of federal cost share programs, which includes 5 acres of invasive species removal and 8 acres of

Continued on next page

edge feathering. In addition, an old pond was reworked and an additional pond was established for wildlife.

Lofald saw property that her family could mold into what they wanted—a multi-use farm for hunting and recreation, for raising most of their food, and a place for her boys to run and grow up in the outdoors. Lofald is a member of Appalachian Voices, Kentucky Woodland Owners Association, and Land Stewardship Project.



- **Flying Rooster Farms Inc., southeast region**—Ten families got together in 2000 and bought 520 acres at auction. The property was an abandoned strip mine, seemingly a biological desert where nothing would grow. For the next two years, the families planted 5,000 trees with only a 5 percent success rate due to soil compaction and erosion. Family member Lee Bryant contacted KDF, KDFWR and the Division of Abandoned Mine Lands for assistance. The Appalachian Regional Reforestation Initiative (ARRI), an organization dedicated to restoring forests on coal mined lands in the eastern United States, was enlisted to help in cross ripping and planting 50 acres with trees. The American

Chestnut Foundation also helped to plant trees on the site. Today, 25 to 30 different upland hardwood species have been established on the property. The families also implemented warm and cool season grasses on approximately 40 acres. All 520 acres are available to the landowners for recreational purposes. Every family has their own designated section for hunting, and in spring they all know that it's tree planting time. Bryant will tell you that it's all part of a multi-family process to heal the earth.

The farm has also earned the Wildlife Cooperative Award from Natural Resources Conservation Services; the Friends of Conservation Award from the National Conservation Soil District; and the Earth Day Award from Kentucky Department of Fish and Wildlife Resources.

- **Edrington Family Trust, west region**—More than 65 years ago, Lawrence Edrington's father bought 90 acres in Carlisle County. In 1962, the family began looking at improving their 75 acres of woods. The oldest planting is a stand of cottonwood trees that Edrington's father planted more than 40 years ago. Timber stand improvement and a few harvests have been completed over the years; however, the 2009 ice storm left gaps in the canopy of the forest. At KDF's recommendation, Lawrence began planting trees—more than 2,400 of three species of oaks and 600 silky dogwood. He planted each tree by himself, one at a time. Edrington manages the farm for himself and his three sisters but says the work is easier since his father had the foresight to enriching the woods so long ago and to establish proper best management practices. The Edrington farm is also home to the state champion American hornbeam.

ABOVE: Lee Bryant (left) with KDF Forester Michael Froelich. Photo by Jennifer L. Turner

Newcastle, Pikeville students recognized for outstanding energy projects

By Eileen Hardy
Department for Energy Development and Independence

Energy projects from two Kentucky schools earned national awards by the National Energy Education Development (NEED) Project during the 2014 National Youth Awards Celebration in Washington, D.C.

Students and teachers from Newcastle Elementary School and Pikeville High School were among 600 students across the U.S. to receive this prestigious honor for their energy education, outreach and community service projects. Also attending the four-day event were teams from Kentucky's NEED Elementary School of the Year, Chance School of Louisville, and Kentucky NEED Junior Rookie of the Year schools, Tichenor Middle School of Erlanger and West End School of Louisville.

Earlier this year, 23 project portfolios were submitted to the Youth Awards Program and were showcased at a statewide event held in Frankfort in partnership with the Kentucky Green and Healthy Schools program. Full details may be found at <http://need.org/Youth-Awards> or by emailing Karen Reagor at kreagor@need.org.

The NEED Project is a nonprofit organization with programs in all 50 states, the U.S. territories, and several other nations. NEED has developed innovative materials and implemented programs that not only teach about energy, but also develop leadership and critical thinking skills. NEED's *Kids Teaching Kids* philosophy encourages students to take responsibility for their own learning and that of others. NEED is sponsored by both renewable and nonrenewable energy companies, federal, state and local agencies, energy consumers, and by national and state energy and education associations.



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Seedling nurseries: growing trees for healthy and productive forests



Pecan is from an Algonquian word meaning a nut requiring a stone to crack. The pecan is a deciduous tree native to North America. It belongs to the same family (*Juglandaceae*) as English walnut, black walnut and hickory. The nuts are rich in vitamins A and E, folic acid, vitamin B and several minerals.

Seedlings are available from early fall to early spring from the Division of Forestry's nurseries. Orders are shipped at your request for planting projects during the dormant period throughout the winter. To obtain an order form, visit <http://forestry.ky.gov/statenurseriesandtreeseedlings/Pages/default.aspx> or call 1-800-866-0555.

ABOVE: The Kentucky state pecan tree is in Trigg County. It has a circumference of 277 inches and is 120 feet tall. KDF photo

Just the Facts: Pecan (Carya illinoensis)

- **Growth:** Pecan trees are large and capable of reaching 70 or more feet in height and 6 feet in trunk diameter. Pecan leaves are alternate and odd pinnate. Pecan leaves consist of between nine and 15 leaflets. The fruit is a stone or nut enclosed in a thick, green husk that splits into four parts at maturity. The inside of the nut (kernel) is usually liquid until September, when it solidifies.
- **Range:** The native zone of these trees is along the Mississippi River Basin. The southeastern states such as Alabama, Louisiana, Georgia, Florida, Mississippi, North and South Carolina create the eastern boundary. Texas, Oklahoma, New Mexico and Arkansas form the western border. States north that are also within the zone include Kansas, Kentucky, Ohio and Missouri.
- **Wildlife Uses:** Pecans have a distinctive nutty taste that is attractive to birds and wildlife. The shelled pecans can be broken into perfect halves allowing wildlife grazers a high food value yield without much effort. Pecans are favored by squirrels, possums and raccoons that feed on them abundantly for several months into the winter.
- **Tree Trivia:** The Native Americans used the pecan as a food source for thousands of years before the arrival of Spanish and European explorers. Native Americans and fur traders disseminated the nuts from the Mississippi Valley eastward. Pecans soon became an important trade item. The first recorded shipment to England was documented in 1761.