



Land Air & Water

Kentucky Energy and Environment Cabinet

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Land Air & Water

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Features



- 1** **Wind energy**
Delve into how the power of wind is sweeping across Kentucky and affects you.



- 4** **Come celebrate**
Join us as we celebrate Earth Day in Frankfort, on April 21st.



- 5** **Chris Oelschlager**
Meet one of Forestry's finest and see how she is working to better the Commonwealth.



- 9** **Protecting Air Quality**
Learn how the Department of Air Quality helps make live fire trainings possible.



- 13** **Bats in the mist**
Learn how bats are being caught in Kentucky to monitor populations.



- 21** **The sugar maple**
Learn how the Department of Air Quality helps make live fire trainings possible.

Our cover

*Our cover photo was taken by
Chris Oelschlager in Hopkins
County, Kentucky.*



Contents

Two decades of progress for brownfield redevelopment in Kentucky	3
Meeting water quality standards.....	8
Industrial-commercial energy efficiency	11-12
Looking through the lens of resiliency	15
Winter brings challenges to Emergency Response Teams	17, 19
Art Winners.....	18
Let the battle begin!	20

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Land Air & Water

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Q&A | Renewable energy- wind

Options for Kentucky's energy independence

As part three of an ongoing series of articles on renewable energy, Land, Air and Water talked with assistant director of Renewable Energy, Kenya Stump, to discuss Kentucky's renewable energy landscape. In this issue, Stump discusses the power of wind in Kentucky.

Is Kentucky a good state for wind energy?

KS: Not compared to our mid-western states but we do have pockets of wind resources where a project could make

sense. To get a better sense for how we compare, there are wind resource maps. For instance, at the 80 meter height for utility scale projects, the map (bottom right, opposite page) shows our average wind speeds. You can see some pockets of tan and brown where our wind speeds are in the mid-range of the scale.

Most small wind turbines (<100 kW), need 3-4 meters/second of wind speed just to begin generating power. To reach their rated capacity, these turbines need upwards of 10 meters/second of wind speed, larger utility scale need upwards of 11-15 meters/second. And then there is the fact that the wind doesn't blow all the time, that's where we see capacity factors ranging from 25-50 percent, this is the percent of the potential generation that is actually achieved. This is highly dependent on location and turbine design.

Does Kentucky have any wind energy projects?

KS: Yes, we have a few distributed small scale wind projects. In total for 2014, we had 16 small scale wind projects, totaling 56 kW of installed capacity. For example, there are two in Mt. Sterling, Kentucky shown left). On average, a five kW wind turbine would power a house and that would be at a height of anywhere between 30-140 ft. These turbines can range in cost between



Kenya Stump

\$5,000 and \$70,000 depending on size, height and installation costs.

Why don't we see more wind energy projects in those areas that can support it?

KS: For large scale projects (greater than 100kW), you have to remember the scale of these projects. With new technology, heights of turbines are exceeding 100 meters. At 110 meters, that is 360 feet tall or the length of a football field. The blades themselves are about 40 meters (130 ft.) in length and together these blades can sweep an area of 1-2 acres. That's a lot of equipment and it's not like they go unnoticed, so it is understandable that communities have questions relating to noise and worry about the visual impact.

During the 2014 General Assembly, House Bill 291 passed which established criteria for siting facilities such as wind turbines and establishing requirements for public meetings to inform and answer questions about proposed facility construction project. To assist communities, the Tennessee Valley and Eastern Kentucky Wind Working Group drafted a Model Wind Ordinance for use.

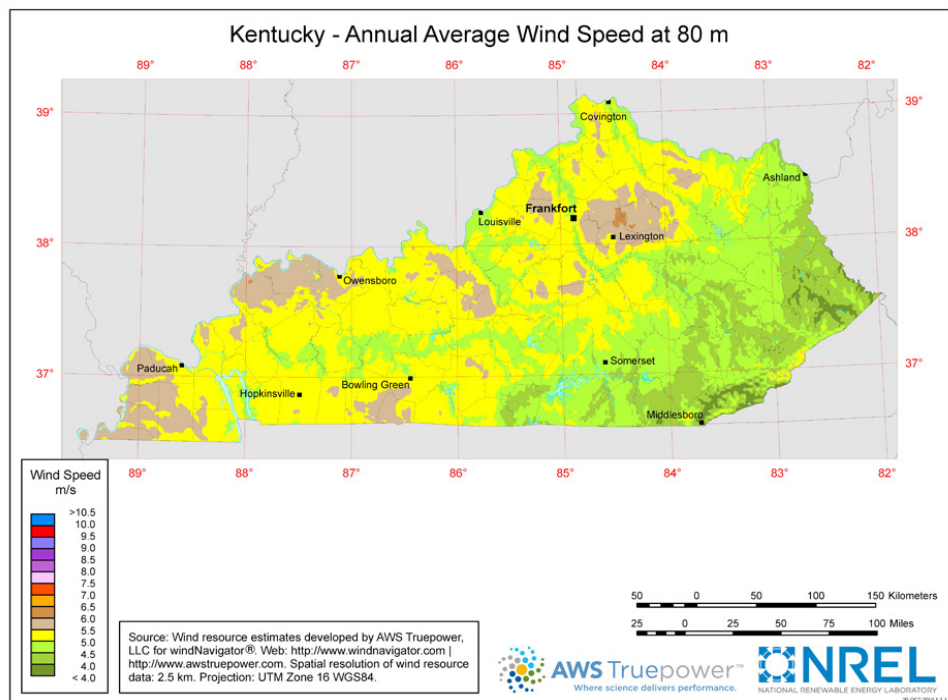
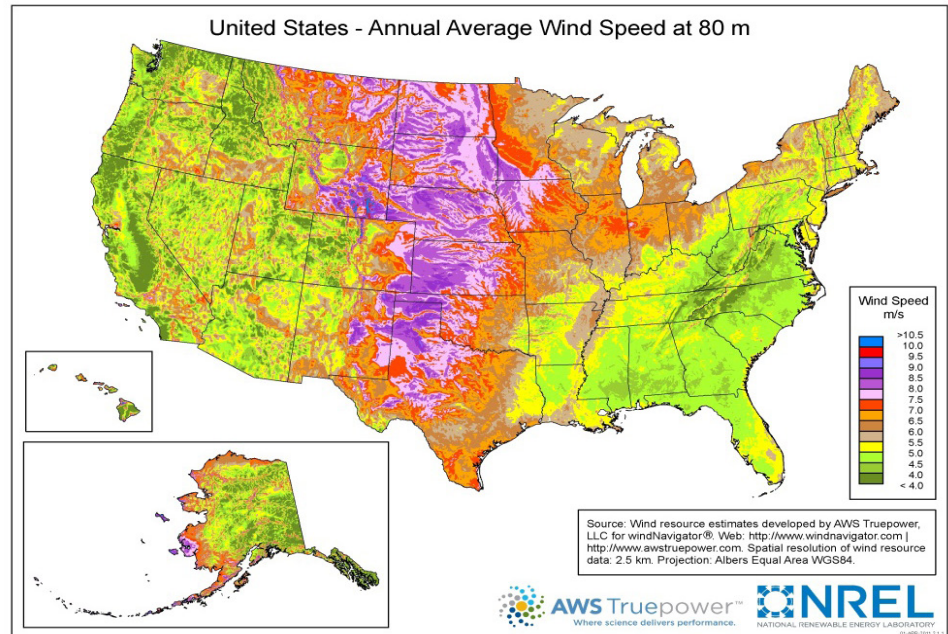


How do turbines affect the environment?

KS: I think it is important to remember that there is no one perfect energy source. Every energy source and resulting technology has impacts to the environment and those around it. Wind is no different; but most impacts can be managed through proper community engagement and application of good siting criteria. Relating to the noise issue, most turbines are in the range of 40 to 50 decibels, which is about the level of sound generated from a window air conditioning unit or your refrigerator. From a wildlife perspective, research into wildlife behavior and advances in wind turbine technology has helped to reduce bird and bat deaths. Visually, either people think they are graceful or an eyesore that obstructs the natural landscape. Altering the skyline for less polluting generation is a topic only the community can decide for themselves. Besides aesthetics, wind turbines can generate what is known as shadow flicker when the sun is positioned at low angles in the morning and afternoon; but siting criteria and best practice management can mitigate this impact.

For someone looking at wind energy in Kentucky, what should they know?

KS: Just because it is windy where you live doesn't mean you have enough resource for wind generation. To assess that, you need at least a year's worth of anemometer readings to establish your wind resource level for all seasons. Typically, winds are strongest during winter and weakest during summer. For a small turbine less than 10 kW capacities, the prices of the turbine itself may not be enough to justify the investment of an anemometer tower which could be several thousand dollars. Finally, you want to look for a contractor who has wind energy project experience. The Department for Energy Development and Independence has a "Will Wind Work for Me?" guide available online for individuals, businesses, and organization. In addition, both the American Wind Energy Association and the U.S. Department of Energy's Wind-Exchange provide resources for project development.



LEFT: Turbines at Henry Dental in Mount Sterling. Photo by Eileen Hardy. Charts above are courtesy of the National Renewable Energy Laboratory.

Two decades of progress

By Herb Petitjean

Division of Compliance Assistance

All things change over time. Back in the 1990s, presentations were commonly printed on transparent sheets of plastic and projected using an overhead projector. Now, presentations are stored on a thumb drive or in “the cloud” and displayed using a projector connected to a computer. Over the last 20 years, brownfield redevelopment has also undergone similarly drastic changes in Kentucky.

Properties that are abandoned or underutilized due to real or perceived contamination are called brownfields. Interest in remediating and redeveloping these properties in Kentucky grew during the mid-1990s, with Louisville playing a

prominent role. Then Louisville Mayor Jerry Abramson raised the issue during his tenure as president of the U.S. Conference of Mayors. In 1995, the city was one of the recipients of an early grant from the U.S. Environmental Protection Agency (EPA) to attempt to address these properties.

In the early days, there was a lot of contention over legislation and regulations to facilitate revitalization of these parcels. However, our most recent regulations were created through a very cordial, collaborative process. The results speak for themselves (“Kentucky nearing century mark on brownfield property reclamations—Nearly 100 properties reclaimed in less than three years.” Land, Air & Water, Winter 2016).

During this time period, the Kentucky Brownfield Redevelopment Program has conducted free environmental site assessments of more than 60 properties on behalf of local governments and nonprofits.

In the past 10 years, Kentucky entities have been awarded \$10.5 million in competitive EPA brownfield grants. The state brownfield program played a major role in this by providing training on grant writing and offering one-on-one assistance with the application process. In 2008, EPA Assistant Administrator Susan Parker Bodine came to Kentucky to present that year’s awards and recognize the tremendous strides the state had made.

Kentucky’s program has been so successful that we have been asked to share our

outreach program with other states. We have also assisted the state of Washington with our method of estimating brownfield numbers, and a group in Alaska contacted us to learn more about how we conduct community visioning sessions. We have even given a presentation to visiting waste management officials from Ukraine. One of our staff members is on a national committee that addresses brownfield issues and is developing a brownfield guide for small towns and rural areas.

The Louisville Waterfront Park, Home of the Innocents and Papa John’s Stadium, have each received Phoenix Awards, national awards that recognize outstanding brownfield redevelopment projects. Kentucky Brownfield Redevelopment Program staff members.

Kentucky’s Brownfield Redevelopment Program is continuing to build on this prolific foundation. Utilizing an EPA grant, the program has established a Cleaner Commonwealth Fund to assist with cleanups of brownfields. The fund has issued two rounds of grants and is about to issue its first loan. This year, the program is reaching out to the banking community to make them more knowledgeable about the brownfield redevelopment process and recent changes in Kentucky law. A proposal is being developed to hold a Central Appalachian Brownfield Conference to gather brownfield advocates, representing a variety of stakeholder groups from across the region to discuss the issues facing redevelopment of brownfields in the mountains. With these and similar projects in the works, the next two decades should be an incredible period of continuing progress in brownfield revitalization for Kentucky.

To read more about brownfield sites that have been cleaned and put back into productive reuse, go to <http://dca.ky.gov/Pages/ResourceDocuments.aspx> under DCA Case Studies: Brownfields.



ABOVE: A brownfield is shown before and after.

Photos courtesy of the Division of Compliance Assistance

Come celebrate Earth Day!

State Government's annual Earth Day celebration offers the opportunity to connect state employees and local citizens with all the good things entities across Kentucky are doing to foster a sustainable Commonwealth. The event also shows attendees how to save energy, protect our air and water and live more lightly on the earth.

This year's event takes place from 10:30 a.m. – 1 p.m. on Thursday, April 21, 2016, at the Thomas D. Clark Center for Kentucky History, located on Broadway in Frankfort.

The celebration includes recognition of Kentucky's university-level Green Ribbon Schools and the newest K-12 Green and Healthy Schools, where students are making a commitment to improved health and well-being by promoting healthy eating choices, improved level of physical activity and time outdoors. These acts translate into improved engagement and productivity by school students.

The Environmental Quality Commission also will present the annual Earth Day awards.

More than 20 exhibitors will be on hand to share resources, demonstrate products and provide educational displays. The Division of Forestry will hand out tree seedlings. Ollie Otter will also make an appearance.



Other confirmed exhibitors include:

Kentucky Environmental Education Council
Division of Forestry
Kentucky State University
Bluegrass Greensource
Walk/Bike Frankfort
Division for Air Quality
Woods and Waters Trust
Kentucky Heritage Land Conservation Fund
Frankfort Public Works
Morehead State University
Division of Waste Management
Reforest Frankfort
Kids Grow Kentucky
Department of Parks
Food Chain
The No Drive Thru Crew
Division of Compliance Assistance
Kentucky State Nature Preserves
Division of Water

It's an educational event that you don't want to miss!

earth
day
Kentucky



Faces of the cabinet

Meet Chris Oelschlager

By Jennifer Turner
Division of Forestry

When asked about the biggest misconception about forestry Chris Oelschlager said, “Some people think that Foresters are Game Wardens or we only fight fires. We do so many different things, but my favorite thing is working with landowners and making lifelong relationships.” Oelschlager, 44, recently accepted the position as Chief Forester for the Division of Forestry’s West Region in Madisonville, Kentucky and brings a special kind of passion to her work.

She began working for Forestry after graduating from the University of Kentucky in 1996. In her job, she loves helping private landowners realize the potential of their woods, whether it is for timber production, wildlife management, or aesthetics. “I found forestry completely by accident. I had been an undecided major for a while, and needed to make a decision about which direction I wanted to go. I took advantage of the University of Kentucky’s career counseling center, where they gave me a personality test and an interest test. The counselor said I should go with Parks and Recreation or something in the College of Agriculture. I looked in the college bulletin, and found Forestry. The smaller-sized classes, course descriptions and the opportunity to work and be outside appealed to me, I couldn’t even identify a single tree at the time! But, it turned out to be a perfect fit!”



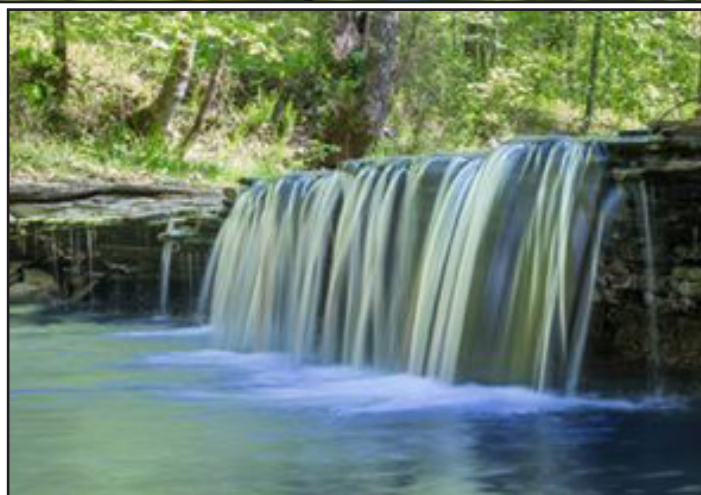
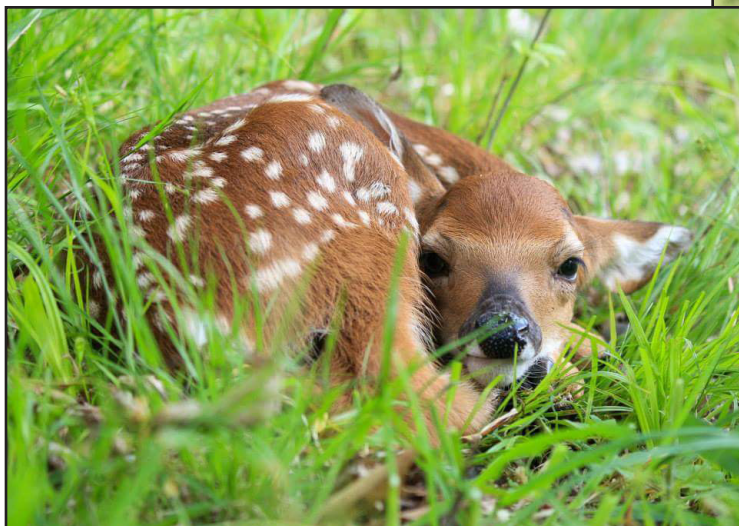
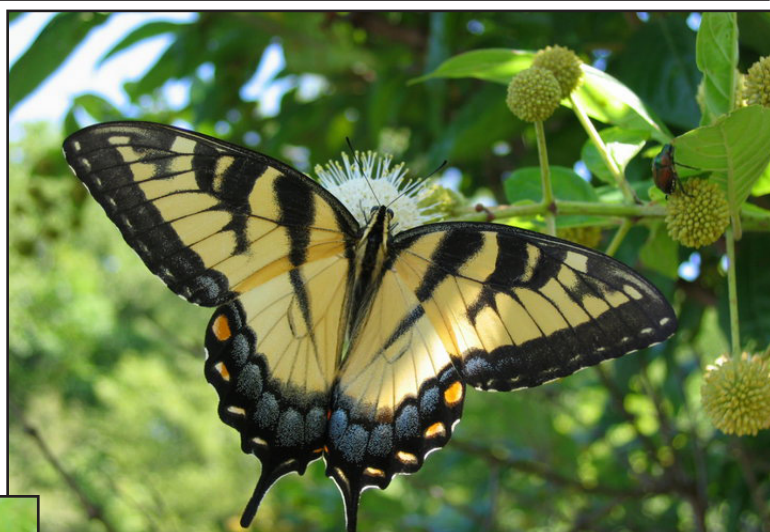
In the 20 years since she joined the division, Oelschlager has found her career choice to be very rewarding. “Our agency provides free services to landowners in so many different ways,” she said. “For example, our foresters are there to help landowners meet their objectives by evaluating their woodlands and making recommendations. This service is provided at no cost and with no obligation in every county.”

To access these free services, a landowner must first fill out a Forest Stewardship Program Application. The application assesses the type of assistance the landowner needs. This can range from wildlife management to soil and water conservation. Once completed, the application is then sent to the individual landowner’s county forester and the real work begins.

The foresters form a Kentucky Forest Stewardship Plan for each individual property which includes a description of the property, recommendations and a map of the land. Once provided, the landowner can decide if they wish to follow the recommendations. Those recommendations are based off the observations of the foresters. “It’s not always easy either,” said Oelschlager. “We have to find the balance between what is best for the landowners and the trees.”

Some recommendations may be delaying a harvest

Continued on Page 7



Photos shown have been taken by Chris as work and pleasure have taken her across the Commonwealth. Photography is just one of her many talents and passions. CLOCKWISE FROM LEFT TO RIGHT: A self portrait of Chris , Chris is photographed by her friend Stephanie Collins. A frog and butterfly in Union County. A waterfall at Perryville State Forest. In Mahr Park in Madisonville, a fawn. Winter leaves in a shallow stream, a spiderweb at the Madisonville City Park. Ice and icicles freeze on a rock cliff.

Faces of the cabinet

Meet Chris Oelschlager

Continued from Page 6

until trees are more mature or harvesting in a controlled manner that's best for that forestland, but foresters also do more than just evaluate land. They also teach how to care for abandoned fields, grow new trees, teach educational programs, work with cities and help with Urban Forestry programs. "We even go out to visit homeowners and help them with sick trees," said Oelschlager. "Basically, if it has anything to do with trees we will help, and if we aren't able to help, we will refer you to someone who can."

By helping others and doing her job with passion and dedication, Oelschlager has left a lasting impression on the Commonwealth and its citizens. "I've been working for KDF long enough now to walk among trees that I helped plant from seedlings and that's a really great feeling," she said.

For more information on Forestry programs you may call 502-564-4496 or find online at <http://forestry.ky.gov/regionaloffices/Pages/default.aspx>.



ABOVE RIGHT: Chris works with children, demonstrating how to use a borer to determine a tree's age and rate of growth. Photo courtesy of the Department of Forestry. ***LEFT:*** A turtle Chris photographed during her travels.

Improving water quality

By Lanny Brannock

Department for Environmental Protection



ABOVE: Jessica Schuster wades through Strodes Creek. Photo by the Department for Environmental Protection.

There are days when you don't need the rain to feel wet all over and the air is as thick as molasses. Environmental biologists Katie McKone and Jessica Schuster know just that feeling as they wade knee deep into the Strodes Creek Watershed in Bourbon and Clark Counties to take water samples, which they've been doing for the last 18 months. They're collecting the data necessary to develop a pollutant reduction strategy, known as a Total Maximum Daily Load (TMDL), with the goal of taking the impacted watershed from polluted to meeting Kentucky water quality standards.

Collecting the necessary data can be difficult, especially when the water is very high or when vegetation surrounding the waterways is more than head high, but it's an important job because the data gathered could directly affect efforts to help make Kentucky's waterways cleaner and healthier for all of the Commonwealth's inhabitants.

Kentucky ranks in the top 15 for miles of navigable water in the lower 48 states. With all those waterways comes the great responsibility that we all share, to keep our waters clean because, in one form or another, we all live in a watershed. A watershed is an area or ridge of land that separates waters flowing to different rivers, basins or seas. All of Kentucky's small streams, creeks, rivers and lakes ultimately lead to larger bodies of water like the Ohio River, to the Mississippi River and then on to the Gulf of Mexico.

We rely on many of these bodies of water for our drinking water supply, swimming, fishing and several other purposes. If not properly managed and monitored, refuse, oil, pesticides and fertilizers may end up in the water we use daily.

Water pollution primarily transported by runoff is called non-point source pollution. Point source pollution, on the other hand, is waste released through pipes into waterways from industrial processes and sewage treatment plants and is regulated by the Kentucky Pollutant Discharge Elimination System permit process. No matter what pollutants end up in our waterways or their source, they must be cleaned in water treatment plants before it is consumable.

Kentucky Division of Water's biologists Schuster and McKone use instruments to measure flow and depth of streams, collect water chemistry samples, bacteria samples, macroinvertebrate samples and measurements to achieve a big-picture story of the Strodes Creek Watershed. They work with a team who uses their data to calculate a pollutant reduction strategy, a TMDL. A TMDL must be written for any waterbody on the 303(d), or List of Impaired Waters, according to the Clean Water Act, which is sent to Congress. A TMDL assesses what's in the stream, and how much of a particular pollutant that

Continued on Page 16

Protecting Air Quality by burning down the house

By Roberta Burnes
Division for Air Quality



Frankfort City Fire Captain John Redfern is very familiar with the health risks of smoke. “Dealing with smoke is just part of the job when you’re a firefighter,” says Redfern, “but not all smoke is created equal.” Depending on what materials are being burned, some smoke may contain toxic gases that can overcome the strongest firefighter in a matter of seconds.

Proper training is essential for a firefighter, and the most effective way to learn is in something called “live fire training.” Such training allows firefighters to stage and extinguish real fires in a structure that has been specially prepared for the training. Firefighters who are lucky enough to participate in this type of training can gain invaluable experience that cannot be matched in a classroom setting.

“There’s no substitute for hands-on experience with a real structure fire,” says Redfern. “We appreciate the support we receive from the Division for Air Quality to enable live fire trainings like these to happen, and to be as safe as possible for both human health and the environment.”

In Kentucky, it is illegal to demolish any structure by burning – except in the case of live fire training. If certain conditions are met, fire departments may burn a structure to train their crew in proper fire fighting techniques. Any fire training that involves intentional burning of a building must meet the requirements of the state Fire Commission and the Division for Air Quality.



“It’s not easy to find the right building for live fire training,” says Marc Rudder, Director of State Fire Rescue Training. “The structure has to have room around it for fire trucks and plenty of space between it and other buildings. The floors need to be strong enough to support our people and equipment, and there can’t be any holes in the floors, walls, or ceiling.”

Even a building meeting all of these requirements must be properly prepared before it is burned. Live fire trainings are subject to several state regulations necessary to protect air quality from hazardous pollutants (see side bar).

“Where there’s fire, there’s smoke,” said DAQ inspector Eli Caudill. “Our role is to make sure that any materials likely to produce toxic smoke are removed first, before the fire training takes place.” To the extent practicable, that means stripping the structure of carpeting, furniture, siding and asphalt roofing shingles. Asbestos-containing materials such as siding, roofing, floor tiles, and insulation must be removed and properly disposed of by an approved asbestos abatement contractor.

Even once all the hazards have been removed, it’s impossible to eliminate all pollution from a burning building, but it’s a trade-off that can actually improve public safety in the long run, says DAQ director Sean Alteri. “The short-term impacts on air quality are outweighed by the long-term benefits these trainings provide to our first responders,” says Alteri. “Live fire trainings are necessary to the safety of our brave firefighters, and that benefits everyone.”

Depending on the size of the structure, live fire training may last from a few hours to a few days. During that time, numerous small fires are set and extinguished throughout the structure, giving firefighters real-life experience in a variety of scenarios and settings.

Live fire trainings are limited. In 2015, only 12 were conducted across Kentucky. “It’s a rare opportunity to experience,” says Captain Redfern. “The lessons our men and women learn at these trainings may save lives in the future, possibly even their own.”



CLOCKWISE FROM LEFT TO RIGHT: Captain John Redfern helps direct a live fire training in Frankfort. Wood pallets are used to start fires during the training. A fireman pulls a hose as he works the blaze. Department of Air Quality Inspector Eli Caudill and Branch Manager Eric Eisiminger conduct an inspection of the site to identify materials that will need to be removed prior to the training. All photos are courtesy of Natasha Parker of the Department of Air Quality.

Save MONEY with energy efficiency

By Eileen Hardy

Department for Energy Development and Independence

The message bears repeating. “Good things are happening in Kentucky,” said Brad Thomas, associate manager of economic development at East Kentucky Power Cooperative, during his presentation to kick-off the “C-Suite Energy Forum” last January. And for the 30 corporate leaders attending the forum, this message was echoed by fellow presenters from utility companies and industry leaders as they highlighted personal success stories of energy conservation, dollars saved, and the dynamics between Kentucky’s energy and economic landscape.

The C-Suite Energy Forum—The Business Case For Corporate Leaders was first in a series of regional energy programs organized by the Kentucky Energy and Environment Cabinet (EEC), the Kentucky Pollution Prevention Center (KPPC) and partnering organizations, the Kentucky Association of Manufacturers (KAM) and ENERGY STAR. Since the initial workshop, energy efficiency sponsors and utilities around the state have been ramping up efforts to support energy saving goals for Kentucky’s industrial and commercial markets. What sets the educational sessions apart are the relevant topics tailored to Kentucky companies, all designed to help energy intensive facilities build self-sustaining energy- and cost-savings programs.

Greg Higdon, President and CEO, Kentucky Association of Manufacturers, said of the forum, “Energy delivery, reliability, and cost remain critically important to Kentucky’s manufactur-

ers. The C-Suite Forum provided a tremendous opportunity to address these issues and help industry stay competitive.”

“Energy and environmental concerns are intertwined in Kentucky’s unique economic fabric,” said Lee Colten, assistant director for the Energy Cabinet’s division of efficiency and conservation. “Energy efficiency is key to our future by enabling us to do more while using less. The development and implementation of energy-efficient products, technologies, and services saves consumers and businesses money, drives innovation and productivity, and supports a cleaner environment. Most importantly, it does so without sacrifice. Energy efficiency enables us to do more while using less energy.”

Kentucky’s industrial and commercial markets account for more than half of the energy consumed annually across the Bluegrass state. This also represents great opportunity for energy savings. Aron Patrick, assistant director responsible for data analysis in the cabinet, provided a snapshot of Kentucky’s energy dynamics during his presentation, “Kentucky’s Energy Profile” (5th Edition 2015).

“Kentucky remains a leader in energy production and consumption,” said Patrick. “In 2014, 40 percent of the energy and electricity consumed went to manufacturing alone, which remains our largest source of revenue and leading source of employment. In addition to large flagship manufacturers such as



LEFT: Milton Elementary’s library is shown as they are a great example of energy efficiency. Natural daylight fills the room and sensors monitor the lights. The room is also heavily insulated and sealed.

Photo courtesy of the Department for Energy Development and Independence

General Electric, Toyota, and Ford, who have located in Kentucky—in part due to the low energy costs and central location—Kentucky is also home to particularly energy-intensive manufacturing processes including aluminum smelting, iron and steel mills, paper mills, chemical production and glass manufacturing.”

Patrick also noted after more than two centuries of commercial mining operations, Kentucky’s domestic supply of coal remains the state’s primary source of energy and an important component of Kentucky’s economy. Coal accounts for 87 percent of Kentucky’s own electricity portfolio and 50 percent of our total energy consumption. Historically, Kentucky’s low energy costs stimulate economic growth by lowering the costs of doing business.

However, in the past several years, the coal industry has struggled due to competition from natural gas, rising production costs in eastern Kentucky coalfields and more stringent environmental standards. Given these changes and uncertainties, and the industrial and commercial sectors as major drivers of Kentucky’s economy, the efficient use of energy can contribute to positive economic growth.

With the opening sentence, “Good things are happening in Kentucky,” Brad Thomas discussed Kentucky’s economic development landscape, noting that Kentucky added manufacturing jobs at three times the national rate in 2015.

“Kentucky is an advanced manufacturing state,” said Thomas. One example of our growing momentum is illustrated in manufacturing industry employment which has increased 12.2 percent between 2010 and 2014. This is compared to a 5.7 increase nationally. Our automotive industry employment increased 72 percent since 1990 while nationally falling 26 percent. Thomas identified other good things happening in Kentucky such as our expanding international influence and increase in exports. “Kentucky is home to 447 internationally owned facilities from 33 nations,” he said. “These facilities employ 89,500 people. In the past five year’s Kentucky’s exports have shattered records. In 2015, we exported a record \$27.6 billion in goods to 198 countries, which supported 125,000 Kentucky jobs.”

Thomas also discussed challenges facing the industrial and commercial markets, including the need to pursue a skilled workforce and the uncertainties of maintaining affordable, reliable energy. Workforce has emerged as a vital issue in the successful implementation of energy efficiency through all sectors.

Panel discussions by other C-Suite presenters, Louisville Gas and Electric/Kentucky Utilities and Duke Energy, highlighted opportunities for low-cost energy savings from utility energy efficiency programs. Programs provide incentives to commercial and industrial consumers for installation of high efficiency equipment in applications involving new construction, retrofit, and replacement of failed equipment. A highlight of the day featured executives from Western Kentucky University, Kellogg Company bakery and Olin Brass manufacturing who presented real

world examples of their ongoing work to conserve energy, and improve the environment, including their strategies for success.

“Corporate energy management drives improvement across the company,” said Bruce Bremer, in making the business case for energy management. Bremer Energy Consulting Services, Inc. is a Strategic Advisor ENERGY STAR.

“Energy costs are controllable,” he said, “and should be managed with the same expertise and passion used to manage other parts of the business. Why manage energy? The answer is multi-faceted. Energy management addresses unpredictable energy prices, risks of supply reliability and is a low-cost solution to the impacts of legislation. It provides a competitive advantage, controls costs, supply chain risk mitigation, and, it’s the right thing to do.”

“We designed the forum as a meeting place for all types of business leaders in Kentucky, large and small,” said Lee Colten. The C-Suite Energy Forum offered opportunities to network and exchange ideas as well as provide information about the technical and financial resources to assist Kentucky businesses. Attendees learned there are tremendous opportunities to instill the tenets of energy efficiency in industrial and commercial market sectors that employ and influence millions of Kentuckians.

Upcoming workshops and events that will provide strategies and resources for sound energy management that can help Kentucky companies realize significant cost savings while maintaining environmental and social responsibility. The 2016 workshops and events are listed below.

• **ENERGY STAR® Showcase Events (2016)** – Various events will be hosted by ENERGY STAR® partners throughout the nation, including Kentucky, to showcase efforts related to energy efficiency strategies and implementation. Visit www.energystar.gov/industrialshowcases for details.

• **KAM Energy Conference (May 10-11, 2016)** – Hosted by the Kentucky Association of Manufacturers (KAM), the 2016 Energy Conference will be held in Lexington. Visit www.kam.org for event details.

• **KPPC Coaching Sessions (April – June 2016)** – Brief coaching sessions will supplement the on-site events to support utilization of tools and resources introduced at the events and increase opportunities for implementation.

For more information, visit the Kentucky Energy and Environment Cabinet website, www.energy.ky.gov

Bats in the state

By Zeb Weese

Kentucky Department for Natural Resources
and

Zack Couch

Kentucky Division of Water



The Kentucky Heritage Land Conservation Fund (KHLCF) conserves 90,000 acres statewide, from the banks of the Mississippi River to Cumberland Mountain on the Virginia state line. While these sites provide opportunities for people to hike, paddle, and hunt, they also protect the habitat for many species of wildlife, forest-dwelling bat species that particularly benefit from this habitat conservation. Unfortunately, due to overall habitat loss and the impact of “White Nose Syndrome”, a disease that is devastating hibernating bats throughout the Eastern United States, bat populations in America are declining at an alarming rate. Several Kentucky bat species have been on the federal endangered species list for decades, but another (*Myotis*

septentrionalis, the Northern long-eared bat) was just added in 2015 with the possibility of more to come.

Not only does the KHLCF help agencies like DOW purchase and conserve natural land for future generations, it also helps them improve the bats’ habitats. However, before improvement begins, it is necessary to determine what species live there, or could live there with the right management. Biologists from the KHLCF and DOW regularly conduct zoological inventories to monitor the use of these natural areas by wildlife, including special bat surveys to determine the presence of rare bat species and guide habitat management strategy. These surveys often involve physically capturing bats using mist-nets, which are fine-meshed nylon nets specifically designed to catch bats. These nets are strung between two poles typically 30 feet apart, set above a creek or other water source at dusk, and then checked every 10 minutes for several hours during the night. Any bat captured is identified, measured, evaluated for damage and the released unharmed. Sometimes, other animals moving through the forests during the evenings are caught in the mist nets. From prothonotary warblers to flying squirrels, even to the occasional coon dog - a bat biologist never knows what to expect when the nets are up and the survey begins!



ABOVE: An Eastern red bat captured at Western Kentucky University’s Green River Bioreserve hibernates in a cave.

RIGHT: A red bat captured at Lawler Bend. Photos courtesy of Zack Couch.

Not all bats are federally endangered, of course, but because of the potential to capture endangered species by using this method, biologists must first obtain a federal permit from the US Fish and Wildlife Service before attempting to capture bats. Over the last few years, species identified at KHLCF sites include the federally endangered Indiana bat (*Myotis sodalis*), the gray bat (*Myotis grisescens*) and the federally threatened Northern long-eared bat. The more common Eastern red bat (*Lasiurus borealis*) and the big brown bat (*Eptesicus fuscus*) are also a few others that have also been captured using the mist nets.

While netting bats, acoustic monitoring of the bats using an ultrasonic frequency sonar is also conducted. Special bat moni-



TOP: The mist net is set up at Lawler Bend. **ABOVE LEFT:** A prothonotary warbler is caught in the mist net and banded with the permission of a federal permit. **ABOVE MIDDLE:** A male flying squirrel. **ABOVE RIGHT:** An endangered gray bat. Photos courtesy of Zack Couch with the Kentucky Division of Water.

tors are deployed in suitable habitat to record these bat calls. Each bat species calls at a slightly different frequency. These calls are then downloaded onto computers and analyzed by special software which can indicate which species made each calls. This technology is not quite advanced enough to guarantee accurate identification, but it is getting better all the time and very useful when used in conjunction with the mist netting.

Kentucky is home to approximately 15 species of bat. Some species, like the Eastern red bat and big brown bat, occur statewide in a variety of forested (and even urban) habitats. Other species occupy more restricted habitats; the Virginia big-eared bat, for example is only found in nine eastern Kentucky counties where it inhabits caves in oak/hickory or beech/hemlock forests. Regardless of your location in the state, your local bat population provides an important value to your community. From preying on mosquitos that can ruin your family picnic, to controlling populations of crop pests that cause significant economic loss to farmers, the bats you see flying along the tree line at dusk benefit humans everywhere.

It is important to know what species call these areas home for a couple of reasons. First, it helps managers determine the best locations for trails and other infrastructure without disturbing the bats' natural habitats. Next, it opens up partnerships with other organizations such as the Imperiled Bat Conservation Fund and the Kentucky Natural Lands Trust that focus on the conservation of these rare species. Finally, it is gratifying to just know that that your "Nature's Finest" license plates not only get you places to hike, but also provide homes to unique critters, like bats, that make Kentucky's forests special.

For more information on these programs, visit the Kentucky Heritage Land Conservation Fund website at <http://heritageland.ky.gov> and the Kentucky Wild Rivers Program website at <http://water.ky.gov/waterquality/pages/wildrivers.aspx>.

Energy planning for resiliency

By Kenya Stump

Department for Energy Development and Independence

When you think of resiliency, what comes to mind? Resiliency means being prepared and anticipating change. One key component to this is energy. Whether it's the poles and wires to keep the electricity on, fuel deliveries for a power plant or home or making sure the software that runs our electricity grid is secure, energy plays a huge factor in resiliency. Resiliency however, doesn't just happen. It takes diligence, involvement and a continual process of improvement.

Resiliency planning has its roots in the physical and ecological sciences where it is defined as, "The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (Walker, 2004). From a community planning perspective, it is, "The development of material, physical, sociopolitical, socio-cultural, and psychological resources that promote safety of residents and buffer adversity" (Ahmed, 2004). In Kentucky, the community of West Liberty provides us with a great example of resiliency with their planning following a devastating tornado.

In their Rebuilding West Liberty Strategic Report, community stakeholders identified energy resilient initiatives such as developing compressed natural gas transportation and microgrids, creating a geothermal loop for downtown residents and businesses, installing green walking and biking corridors, and building affordable highly energy efficient passive housing. Outside of Kentucky, the City of New York released, "A Stronger, More Resilient New York," that set a plan into action

both for rebuilding the city after Hurricane Sandy but also on increasing the resilience of infrastructure and buildings citywide. Energy was one element of the plan with four key strategies: hardening existing infrastructure against weather events, creating redundancy in utility networks, reducing energy demand within the city, and diversifying customer options in case of a utility outage. Translated this means implementing smart technologies to assess the electric grid in real time, deploying citywide energy efficiency programs, scaling up distributed electricity generation, and ensuring that the in-state power supply is available with access to other power sources if needed.

But resiliency doesn't have to come only from facing natural disasters. Any community could be faced with economic adversities or even terroristic events that could jeopardize the safety and health of its citizens, all the more reasons to look at your family, neighborhood, community and state through the lens of resiliency. Just like within your home or business, communities consider their values, culture and resources in order to be prepared and safe from the unknown and the unexpected. At your home or business, you may become more energy efficient to free up money or time (resources), you may diversify your finances to buffer market volatility, or you may develop new skills in case you need to find a new job, all in an effort to withstand adversity. The same can be said for a resilient community. They must be energy efficient and energy diverse; they must invest in a flexible and skilled workforce and they must ensure their infrastructure is adaptable, secure

and reliable for the safety and health of their citizens.

Now, ask yourself how resilient are you, your family, your business, your community or your state? The 100 Resilient Cities Challenge helps communities develop a roadmap to resiliency, similar to Minneapolis's resiliency story map. The interactive map highlights areas and features that are important to the community's resiliency such as impervious surfaces, tree canopy, water supply, stormwater management, infrastructure vulnerabilities, and extreme weather events. The story map visualizes some of the key vulnerabilities in the city while providing examples and additional resources. For more information, communities can access the Resilient Power Project, the Community Resilience Planning Guide, or the Community & Regional Resilience Institute. Individuals and businesses should contact their local planning agency and workforce development agency about ways to get involved and increase resiliency.

It starts from the ground up with individuals, families, neighborhoods and you. Let's get to work on preparing for our future, the unexpected and the unknown!

Figure 1: Resiliency Planning Process

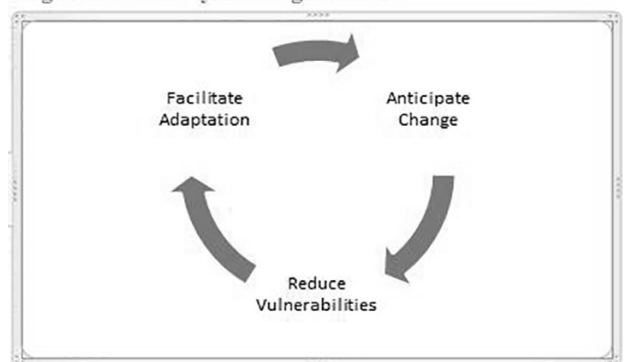


Photo courtesy of Kenya Stump

Improving water quality

Continued from Page 8

stream can assimilate before it has negative effects on water quality and aquatic life.

“Our goal is to collect data we need so we can understand the sources of the pollutants year round,” said McKone. “We want these streams to come off the impaired waters list and meet their designated uses again.”

In areas where point source pollution dominates, regulatory programs play a big role in improving and protecting water quality. Facilities are obligated to meet the standards contained in their permits or they will be subject to the potential enforcement action, including penalties.

Addressing non-point source pollution can be a greater challenge because there are fewer regulatory programs in place to address runoff. The agency places an emphasis on educating and partnering with the public and industry to reduce non-point source pollution. Education starts with reaching out to property owners to explain how the waterway is being impacted by activities taking place in the watershed. The agency also provides landowners with technical assistance and sometimes access to funding to improve the quality of the water running off the property, thereby protecting the environment and the public.

“The sampling we have done so far aims to identify what the problems are, but it doesn’t fix the problem,” said McKone. “With the sampling we do, we are figuring out if the watershed is healthy or not healthy. Actually translating that data into change takes work from several sources including the community. Every little bit of involvement helps.”

The Kentucky Department for Environmental Protection is an agency to protect the environment. By conducting sampling, developing TMDLs, issuing and enforcing permits and providing education and assistance we are continuing to improve watersheds across the Commonwealth.

For more information checkout our YouTube channel, especially our links on watersheds at <https://www.youtube.com/watch?v=zeUk2pbrRmM> and <https://www.youtube.com/watch?v=sITs1erE9qU>.



LEFT: Katie McKone measures the stream’s depth and velocity. **BELOW:** Jessica Schuster and Katie McKone pack away their instruments from the Strodes Creek Watershed.

Photos by the Department for Environmental Protection.



Winter brought challenges to Kentucky

By Lanny Brannock

Department for Environmental Protection

The winter of 2016 has been a particularly busy time for the Kentucky Department for Environmental Protection's Environmental Response Team (ERT). Battling the elements when environmental response is difficult enough, but sometimes the weather itself causes the disaster.

Major weather events like snow storms can cause environmental emergencies all on their own, but even when an environmental emergency happens without the aid of weather, DEP first responders still have to get on the scene, assess the potential environmental impact and do what needs to be done to protect the environment and public health and safety, no matter what the weather might be.

"Our first action at a disaster scene is to immediately make contact with all parties involved with the disaster response. This is usually site owners, local emergency responders and local government officials," said John Rogers of the Environmental Response Team. "We then work alongside these parties to access the scene and identify any immediate threats to human health the environment and develop a plan of action to abate the threat as soon as possible.

So far this winter, three major environmental emergency responses have been caused by harsh winter weather, or impeded the response effort.



ABOVE: An oil boom is caught in the ice after the CSX derailment. **TOP RIGHT:** The Male Order sinks at the Jamestown Marina.

Photos courtesy of the Department for Environmental Protection.

On Jan. 23, a 20-inch snowfall blanketed Lake Cumberland, causing severe damage to the Jamestown Marina covered boat slips. The boat slips were so heavily damaged that the collapsing roofs ended up sinking several boats, including a 115-foot houseboat called the Male Order. Fuel leaked into Lake



Cumberland in a thin sheen. The fuel spill wasn't a long-term environmental, but ice and snow surrounding the lake made removing the fuel as soon as the spill was detected impossible. Rogers said it was such an unusual site, to see 20 inches of snow pushing down on a thin, metal roof. But the more amazing site was seeing just how much damage could be done by an accumulation of snow on water craft.

"The lasting impact at Jamestown could be how the boat slips are designed. The most unusual thing about this type of disaster was the amount of snow that fell in a short period of time" Rogers said. "Usually marina staff have time to clear snow off the boat slip roofs before it can accumulate in large volumes."

But this time was different. Roads weren't passable with heavy accumulations of ice and snow. Even ERT staff couldn't get to the marina due to impassable conditions. What they found when they could access the marina were sunken and damaged boats. Just a few days later, a CSX train derailed when a rockslide caused the tracks to be covered with debris. The accident happened in a rural area of Breathitt County near Wolf Coal.

Continued on Page 19

Contest winners announced

By Johnna McHugh
Division of Conservation

Since 1944, Kentucky's teachers have been presenting conservation lessons in their classrooms in conjunction with the Kentucky Association of Conservation Districts (KACD) and other partners. The students use what they have learned to create posters and essays to demonstrate their knowledge of the topic. Last year's contest was on the topic of wildlife in Kentucky.

In 2015, more than 64,000 students participated in the Jim Claypool Art and Conservation Writing contests. Students submitted 47,082 art entries from 102 counties and 17,665 essay entries from 93 counties.

For each year's contest, an online study guide was available for students and teachers on both the Kentucky Farm Bureau and the Division of Conservation's websites. The study guide this year was titled "The Wild Side of Kentucky." Conservation districts were able to purchase printed copies of the guide through the Kentucky Association of Conservation District Employees for distribution at local schools.

All first-grade through 12th-grade students' entries are judged at the county level by conservation district supervisors, Farm Bureau members and county officials. An art winner and a writing winner are chosen from each county. The winning students' works are then judged by a state-wide panel of environmentalists, conservationists and educators. State, area and county winners receive monetary awards sponsored by the Kentucky Farm Bureau. The local conservation districts also provide local awards to the winners.

The Jim Claypool Art Contest state winners are:

- First Place: Hannah Ates, Ohio County, Western Elementary School
- Second Place: Helaine Alsabrook, Anderson County, Safell Street School
- Third Place: Abigail Adams, Henry County, Eastern Elementary School

The Conservation Writing Contest state winners are:

- First Place: Ian Brockman, Breckinridge County, Breckinridge County Middle School
- Second Place: Lauryn Agathen, Taylor County, Campbellsville Middle School
- Third Place: Skylar Volz, Spencer County, Spencer County High School

These state winners, along with the area winners from each of KACD's nine geographical areas, will be recognized by their local conservation district. The county winners will be presented with a monetary award from the Kentucky Farm Bureau Federation and awards from the district. Area and state winners will also receive monetary awards and certificates from the Kentucky Association of Conservation Districts. 



ABOVE: State winner Hannah Ates receives her award from Todd Bright of the Kentucky Farm Bureau Federation, David Rowlett of the Kentucky Association of Conservation Districts and Representative Tommy Thompson.

Photo by the Division of Conservation.



ABOVE: State winner Ian Brockman receives his award from Todd Bright of the Kentucky Farm Bureau Federation, David Rowlett of the Kentucky Association of Conservation Districts and Representative Dean Schamore.

Photo by the Division of Conservation.

Winter brought challenges to Kentucky

Continued from Page 19

Two locomotives along with several empty cars were involved in the accident, which spilled about 5,500 gallons of diesel fuel. The fuel leak eventually ended up in the Kentucky River, where mother nature once again dealt a difficult hand to ERT responders.

Normally, when fuel or petroleum products go into a stream, oil absorbent booms, specifically made to stop the movement of those materials, are deployed across the stream to capture the materials and get them out of the environment.

For several hours, ERT responders tried to put booms on the stream to stop the movement of the fuel leak, but there was so much ice on the stream, the booms didn't work. But staff did do everything else possible to mitigate the spill and make sure drinking water sources were protected.

Staff set up sampling locations for several miles downstream, to determine the level of contamination of the water, to make sure any water systems that might draw from the water source were notified and to let other stream users know the water was temporarily contaminated.

The most visible ERT response was to the Bluegrass Stockyards fire in Lexington on Jan. 30. The massive fire burned the stockyard to the ground, after it raged for several hours, creating a plume of black smoke that could be seen for miles around.

"When we are asked to conduct air monitoring for a large fire, there are several factors we need to consider," said Kevin Strohmeier, Response Coordinator/State On-Scene Coordinator for the DEP Environmental Response Team.

"We already assume it's going to be a large and persistent fire, so we need to consider what's burning. Is it a fire that's going to produce just smoke or are there chemicals or other fuel sources that may require additional monitoring and sampling?" Strohmeier said. "Is the wind carrying smoke into residential

areas, commercial or industrial areas, or are there sensitive populations such as school children, elderly, or patients that may require evacuation? Are the predicted weather patterns stable or dynamic?"

With all those factors to consider on a fire that's burning a building several acres in size, ERT personnel had to move fast to get monitoring equipment in place to be able to give emergency officials the best data possible about what was in the smoke coming from the fire, and what precautions citizens should take to make sure the air they were breathing wasn't harmful.

"Are we able to provide adequate monitoring with our staff and equipment or do we need to request regional or federal assistance? These are the high-priority questions we need to address within the first few hours," Strohmeier said.

Ultimately, the emergency officials on scene, using information provided by ERT personnel, decided to tell residents to stay inside their homes and close their windows and doors. "Our team had equipment on site and deployed within three or four hours of getting the initial request for assistance," Strohmeier said.

Late January proved to be a difficult week for the ERT members, with less-than-ideal weather conditions and major environmental responses hundreds of miles apart.

When environmental emergencies happen, ERT will be there to ensure the environment, people and property are protected.

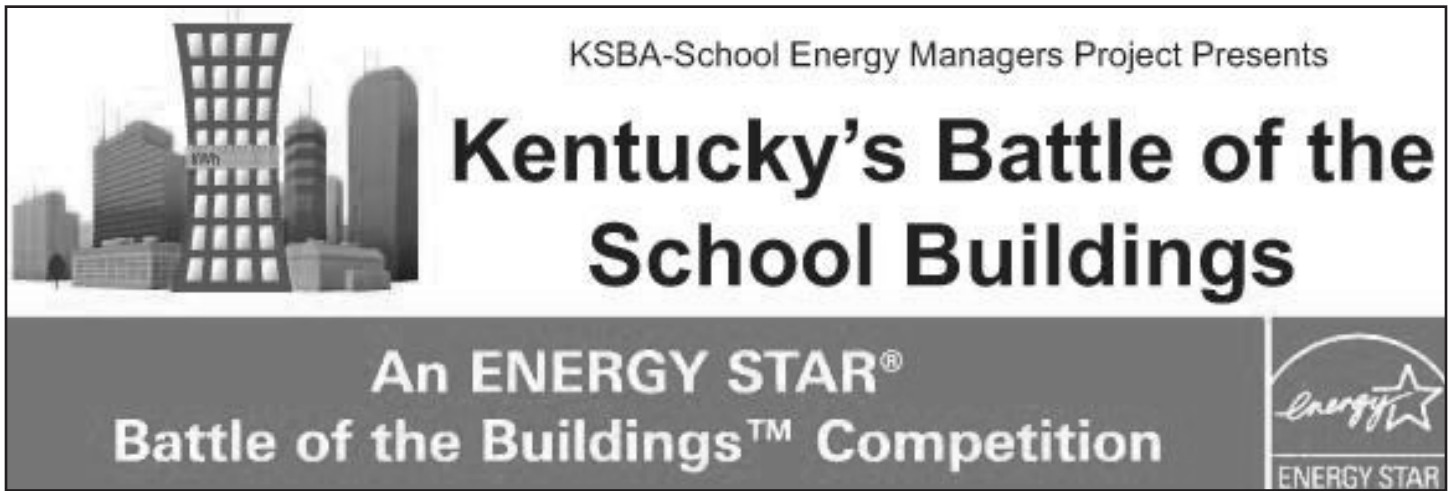


ABOVE: Cars at the Bluegrass Stockyards smolder after the fire.

Photo courtesy of the Department for Environmental Protection.

Let the battle begin!

Kentucky schools battle over energy savings



Kentucky's schools compete on the court, the field, and the track and now during 2016, they are competing at the meter through Kentucky's Battle of the School Buildings! A total of 28 Kentucky school districts representing 118 schools are participating in an ENERGY STAR Battle of the Buildings Competition, a national effort to reduce energy consumption in public buildings. For 12 months, schools will measure and track their monthly energy use for calendar year 2016 using ENERGY STAR's free tracking program, Portfolio Manager.

Kentucky's Battle of the School Buildings provides the opportunity to recognize faculty, staff and students who are involved in saving energy . . . and money! Kentucky's P-12 schools have made significant progress in the last five years eliminating wasteful spending on energy. School boards, staff, and students have become focused on implementing best energy efficiency practices. The Battle of the School Buildings is organized through the Kentucky School Boards Association, School Energy Managers Project (KSBA-SEMP), as part of their energy management services to schools. Ron Willhite, director of KSBA-SEMP explains, "Involving staff and students who are in the building most every day leads to greater success in efficient use of energy resources. Occupants know best if rooms are too hot or too cold, which could point to a potential HVAC savings. They know when rooms are not being used, so that the lights could be turned off. They see the actual opportunities for reducing energy usage. When they realize the cost of that energy, that's when a serious commitment is seen."

KSBA-SEMP will recognize the Top Kentucky School Building, determined by the percentage-based reduction in energy use achieved from 2015 to 2016. KSBA-SEMP will also recognize schools that reduce energy use by 20 percent or more from 2015 to 2016. Competing schools include elementary, middle, and high. A complete list of participating schools is available in the March issue of "Let's Save Energy" newsletter, produced by KSBA-SEMP. <http://www.ksba.org/SEMP%20Newsletters.aspx>. KSBA's School Energy Managers Project provides assistance with energy-related projects at the district level and, through its stakeholder partners, at the state level to help individual districts. SEMP provides funding and training for school energy managers, who are the "boots on the ground" when it comes to uncovering ways to cut costs and increase efficiencies. SEMP personnel help school districts:

- Break down analytical and technical issues.
- Develop and implement energy management plans.
- Comply with statutory and board policy requirements.
- Track energy usage.
- Coordinate recognition events.

Consolidate and report statewide energy data to Kentucky's General Assembly and the Kentucky Energy and Environment Cabinet. For more information about energy efficiency initiatives, visit <http://energy.ky.gov> or the KSBA-SEMP program, <http://www.ksba.org/SEMP.aspx>.



Energy and Environment Cabinet
Office of Communications and Public Outreach
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Frankfort, KY 40601

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Seedling nurseries: growing trees for healthy and productive forests



While commercially planted for its syrup and value as lumber, the sugar maple makes a great addition to any yard or park. One of its most prominent features is its fall color. As the seasons change, the leaves turn vibrant shades of yellow, burnt orange and red.

Just the Facts: sugar maple (*Acer saccharum*)

Growth: Under optimal growing conditions, sugar maples can attain heights in excess of 100 feet. Most mature trees, however, range from 70 to 90 feet in height. Trees grown in the open have trunks that branch near the ground, forming crowns that spread 60 to 80 feet. In contrast, those found in shaded forests normally develop clear, straight boles and

narrow crowns. Leaves are opposite, simple and palmately veined, with five rounded lobes. The fruit is two-winged horseshoe-shaped samaras about one inch long, appearing in clusters, brown when mature in the fall.

Range: The range of sugar maple in North America extends from Nova Scotia and Quebec at its northern edge, west to Ontario, southeastern Manitoba, and western Minnesota, south to southern Missouri, and east to Tennessee and northern Georgia.

Wildlife Uses: Sugar maples are browsed by white-tailed deer, moose, squirrels and snowshoe hare. Squirrels feed on the seeds, buds, twigs and leaves.

Tree Trivia: In 1663, chemist Robert Boyle informed the Europeans about the tree in the new world that produced a sweet substance. John Smith was among the first settlers who remarked about the Native Americans' sugar processing and the fact that they used the product for barter. They also used the inner bark to make a tea to treat coughs and diarrhea. Other historic uses include making soap from its ashes, using the bark as a dye, drinking the sap as a spring tonic and taking the syrup for liver and kidney problems. During the 2001 baseball season, Barry Bonds switched from the traditional ash wood baseball bat to one made of maple and hit 73 home runs, a new record!

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 the Division of Forestry at 1-800-866-0555.