

Key Steps for Climate Action in Kentucky

Creating Clean, Healthy Communities and Jobs



A KENTUCKY CONSERVATION
COMMITTEE ISSUE BRIEF

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Why this Guide is Needed

The future of our planet is at a critical point: We must reach 80% reduction in greenhouse-gas (GHG) emissions by 2050 to keep global temperature increases under 2°C (3.6°F). While most efforts toward this goal have been focused on reducing fossil fuel use, new science shows natural climate solutions—based on the conservation, restoration and management of forests, grasslands and wetlands—can deliver up to 37% of the needed emission reductions by 2030. Combined with wider adoption of renewable energy and other technologies, natural climate solutions are essential to keeping our climate safe.

Core Principles

The recommendations in this booklet—and its companion website—are guided by the principles that healthy air, land, water and food are a public right. Toward that end, we strive to:

- Internalize the real costs of carbon pollution via laws or regulations.
- Phase out subsidies that increase climate risks, e.g., tax incentives for fossil fuel extraction or subsidized flood insurance.
- Provide government investment, including incentives, into research and development, resilient infrastructure, and workforce training to support a clean energy transition.
- Lower regulatory and financing barriers to clean energy projects.
- Evolve to an efficient, clean energy economy without leaving behind impacted communities.
- Assist Kentuckians most vulnerable to impending physical and economic climate impacts, such as floods and droughts.
- Adopt policies that leave family farms more sustainable and resilient.
- Provide incentives for carbon sequestering within our natural lands.
- Plan efficient new development and redevelopment, e.g., efficient buildings accessible via walking, bicycling and public transit. Reduce energy costs through new technologies, more efficiencies, including the rehab of older residential units.

Additional Kentucky climate resources can be found

Climate Action

Acknowledgements

We would also like to thank our members as well as the Kentucky Conservation Committee's partner groups for their input to this guide. We particularly would like to acknowledge the Louisville Climate Action Network, Kentucky Resources Council, and the Kentucky Environmental Foundation.

Principles in Working with Communities



The Kentucky Conservation Committee was founded in the 1970s as a collaborative for organizations and citizens to come together, find common ground and take action to protect the Commonwealth they love.

Starting with four conservation organizations then, we now partner with over two-dozen nonprofits and coalitions to provide assistance to citizens and address sustainability issues of impacted communities in Kentucky.

Today, we recognize all citizens have a fundamental right to a healthy environment. And we believe citizen engagement will drive much of whatever progress Kentucky realizes. KCC believes in lifting up the voices of those who are directly affected by the impacts of pollution and of having less than a fully representative democracy.

KCC supports the Jemez Principles of Democratic Organizing as a philosophy for ensuring that local communities have a voice in decisions affecting them.

The basic principles are:

- Be inclusive
- Emphasize bottom-up organizing
- Let people speak for themselves
- Work together in solidarity and mutuality
- Build just relationships among ourselves
- Commit to self-transformation

Collaborative initiatives, such as the Climate Justice Alliance, also have worked to outline guidance for frontline communities on core conservation areas, including:

Building Local Living Economies • Zero Waste • Regional Food Systems • Public Transportation • Clean Community Energy • Efficient, Affordable, Durable Housing • Ecosystem Restoration and Stewardship • Building Community Resilience • Grassroots Economies • Rights to Land, Water, Food Sovereignty.

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Buildings, Cities and Towns

The "Sustain Louisville" plan sets 17 goals for sustainability



Key Steps to Curb Carbon:

Align state building codes with the International Energy Conservation Code.

Expand partnerships to promote energy efficiency in buildings, including weatherizing, insulation, lighting and programmable thermostats.

Promote local adoption and utilization of **Energy Project Assessment Districts** (EPAD, also known as PACE financing) in more communities throughout Kentucky.

Offer incentives for efficient and net-zero buildings, such as the Green Schools initiative.

Share strategies among communities adopting "complete streets" initiatives.

Energy Efficiency and Smart Design

According to the U.S. Green Building Council, buildings and transportation systems account for more than two-thirds of all GHG emissions. Improving the efficiency of buildings can significantly reduce emissions with smart design, zoning and site selection that takes walkability and public transit into account, creating efficiencies that prevent carbon pollution and boost health. Incentives like targeted financing can more easily make such investments a reality.

An example of comprehensive, city sustainability planning is the **Sustain Louisville** initiative, which has set 17 city-wide goals with target dates in six cate-

gories: energy, environment, transportation, economy, community and engagement. In addition to energy efficiency, the plan also addresses urban heat islands and urban forestry, and includes a GHG inventory for tracking progress.

Energy Project Assessment Districts

The Energy Project Assessment District Act (the "EPAD Act" or HB100), was passed with bipartisan support and signed into state law in 2015. The act provides an innovative, proven way for commercial property owners to pay



Ivy Knoll in Covington, financed by EPAD

and Towns

Boone Tavern, Kentucky's first LEED (Gold) Certified hotel



for energy- and water-efficiency upgrades and on-site renewable energy projects. (Bank funding for project costs is repaid by the property owner via a voluntary assessment or lien on their property tax bill over up to 20 years. The assessment may be transferred with the property if sold.)

Net Zero Buildings and Green Schools

While Kentucky's per capita carbon impact is high compared to most states, we claim some major successes when it comes to school buildings.

Richardsville Elementary

near Bowling Green, is home

to the nation's first Net Zero School! Its solar panels produce as much clean energy as it consumes, saving enough to pay for two extra teaching assistants.

Kentucky consistently has led the way with recognition from the USEPA's **EnergyStar** program. The **School Energy Managers Project** (SEMP) is a statewide program formed in 2010 to help school districts "reduce rising energy costs that are straining school budgets."



To date, 173 school districts have significantly improved efficiency in 448 schools, eliminating \$225 million in energy costs.

Walkable Communities and "Complete Streets"

This approach to urban, suburban and rural planning integrates people and place into the planning, design, construction, operation and maintenance of our transportation networks. It ensures streets are safer for people of all ages and mobilities, balances the needs of different modes and supports local land uses, economies and natural landscapes.

According to the AAA, the annual cost of operating a personal vehicle is over \$8,000. Complete Streets offer more choices to Kentuckians who cannot, or choose not, to operate private automobiles—raising employment, reducing collision injuries, expanding recreation options and improving public health.

Many communities in Kentucky have adopted specific "complete streets" planning policies, including Corinth, Dry Ridge, Independence, Louisville and Williamstown among others.



Additional Kentucky climate resources can be found

on our website at www.kyconservation.org/climate

Land Use: Wild lands



Projects such as the Pine Mountain Wildland Corridor provides habitat resilience from climate change while sequestering carbon

Key Steps to Curb Carbon:

Protect and expand Kentucky's remaining forested areas to increase carbon sequestration, climate mitigation and forest resilience. Provide tax incentives and work with landowners to increase private land preservation and improve forest health.

Limit forest fragmentation and develop forested corridors to improve species preservation, improve wildlife habitat and ecological function.

Increase reforestation of abandoned and mined lands and other vacant lands.

Update guidance on woody biomass as a fuel source, to address climate impacts and reduction targets.

While most climate protection efforts have been focused on reducing fossil-fuel use, science shows **natural climate solutions**—the conservation, restoration and management of forests, grasslands and wetlands—can deliver up to 37% of the needed emission reductions.

Protect Kentucky's Remaining Forested Areas

Approximately 49% of our land in Kentucky is forested, about 1.5% is wetlands and 48% is human modified. The loss of forests to development is one of the most serious threats, and invasive species (Emerald Ash Borer, Woolly Adelgid, etc.) are killing the state's Ash and Hemlock trees.

The world's 1.9 billion acres of temperate forests are valuable, carbon seques-

tration sinks. According to the World Resources Institute, more than 1.4 billion more acres are good candidates for restoration—as large-scale forests or more sparsely growing trees, and land uses such as agriculture. While Kentucky's forests are not threatened by the large-scale deforestation altering the tropics, half of our forested land is significantly fragmented, leaving it more vulnerable to the costly impacts of climate change: hotter, more frequent droughts, longer heat waves, more severe wildfires and worsening insect and disease damage. Growing biomass demand from wood pellet mills and poor logging practices are also a concern. Left unchecked, these disturbances will push our forests beyond their coping capacity, so protection and restoration efforts must evolve.



Accelerating the reforestation of mined land can expand carbon sinks and provide jobs for mining communities

Limit Forest Fragmentation, Develop Forested Corridors

Kentucky's estimated 12.4 million acres of forest are some of the most diverse hardwood species mixes in the nation, with 88% owned privately. Therefore, providing public incentives for land conservation and improving forest health are critical, especially for contiguous tracts. Fragmented forests can prevent plants and animals from easily migrating. Conversely, contiguous forests protect biodiversity by serving as migration paths to more suitable landscapes. Recent studies have shown the average species has moved nearly 12½ miles per decade poleward, and over 38 ft. per decade up in elevation, based on historical climate changes. Climate zones are now shifting nearly 4 feet per day.

The Kentucky Natural Lands Trust's **Pine Mountain Wildlands Corridor** is a great example of large landscape conservation. Its effort to create a contiguous migratory wildlife corridor from Virginia through southeastern Kentucky to Tennessee will provide both suitable migration corridors and carbon sinks through forest preservation. It's the largest conservation project in Kentucky's history, and is built on the cooperation of conservation

federal, state and nonprofit partners, as well as landowners who want to protect the mountain's mixed mesophytic forest in perpetuity.

Increase Reforestation

Over 800,000 acres have been surface-mined in Kentucky, with very little of it fully restored to its original use. Many former surface mines are near prime forests and wildlands, interrupting the carbon sink and species resilience benefits of contiguous forests. Among those restoring such lands into viable forest area is the nonprofit Green Forest Work. By converting mined, non-native grasslands and shrublands into healthier, productive forestland, Green Forest Work is providing jobs for equipment operators, nursery workers and tree planters, and improve the environment by eradicating non-native species and restoring ecosystem services, along with the added benefit of providing more carbon sinks.

The state's land management agencies should explore ways to accelerate the reforestation of abandoned mine lands and similar vacant lands to increase carbon sequestration and job creation within mining communities.

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Land Use: Food & Agriculture



Local, organic, plant-based sustainable agriculture can provide much needed rural jobs and curb carbon

Key Steps to Curb Carbon:

Provide more incentives for local sustainably-grown food.

Encourage the promotion of plant-based food consumption.

Expand programs that encourage reduction of food waste.

Encourage well-sited and managed composting and waste-to-energy programs, provided these programs address environmental justice concerns.

Increase educational resources on regenerative agriculture, farmland restoration, nutrient management and rotational grazing to reduce pollution/build healthy soils. This includes restoring urban soils for safe use as well as enriching rural farmland.

Promote Local, Sustainably Grown Food

According to the Farmland Information Center, Kentucky has over 13 million acres of farmland, but statistics have shown a steady decline as land is developed. The American Farmland Trust claims Kentucky loses about 45 acres of farmland per day. According to a UN report, the energy that goes into the production, harvesting, transporting and packaging of wasted food, meanwhile, generates more than 3.3 billion metric tons of carbon dioxide.

Two state marketing programs, Kentucky Proud and Appalachia Proud, raise the visibility of locally-produced foods. The Kentucky Department of Agriculture also promotes the Buy Local program, focused on supplying local restaurants, and also

programs to promote more local foods in Kentucky schools such as Farm to Campus and Farm to Schools. The KDOA also does a good job in promoting local farmer's markets throughout the state.

Best practices for climate mitigation includes maximizing the use of food that is plant-based, with minimal transport (100 miles or less by truck), avoids the use of synthetic fertilizers and pesticides, and promotes a local food economy (creates jobs within 100 miles of the community, promotes landowner-managed and non-industrial scale farms).

Mt. Folly Farm in Winchester is an example that has taken a comprehensive approach to their operation, featuring local organic food production and processing and no-till farming to provide a carbon

sink. Their compound features recreational trails and tourism, as well as a restored pioneer cabin powered by solar. They are designing their operation to be part of a learning community with local universities.

Increase Plant-Based Food

Plant-based meat alternatives generate 10x fewer GHG emissions than producing similar beef-based products. The Kentucky Cabinet of Health and Family Services and local schools have attempted to increase the adoption of more plant-based foods, however, the industrial meat and dairy industry is a powerful influence in the debate.

Reducing Food Waste

Agriculture accounts for roughly 10% of global GHG emissions, and as much as 50% of non-CO2 emissions. In 2018, Kentucky passed a joint resolution requiring state agencies to examine food waste and identify ways to increase food donations to hunger relief organizations and directs the development of food waste reduction guidelines to be used by all state agencies in food purchasing contracts.

Composting/Waste-to-Energy

According to Scientific American, diverting even just a portion of compost and waste to so-called waste-to-energy systems could free up large amounts of landfill space. Biodigesters are one solution to convert organic waste to renewable energy. However, these systems must be considered with several caveats:

- Sites must avoid creating environmental injustices to host communities.
- Feedstocks for these systems should

be true waste materials such as from sustainable agricultural production.

- Operations should not encourage excessive use of factory-farming wastes or diverting organic waste from its natural soil-building function of restoring farmland.

Toyota manufacturing, with a plant in Georgetown, has set corporate targets for 2050, including recycling systems that produce electricity. Their Georgetown landfill gas operation, using municipal solid waste, will be used to power the production of 10,000 vehicles a year. This is the first application of landfill gas at a Toyota plant in the world, and the first private landfill gas project in Kentucky.

Healthy Soils, Rotational Grazing, Nutrient Management

Employing farm practices that rebuild organic matter, soil biodiversity and use smaller-scale, less nitrogen-intensive and organic farming methods are also good for CO2 reduction.

Building organic matter through rotational grazing for example (the process of using only one portion of pasture to graze while the remainder "rests") allows for healthier soils and for forage plants to renew. Healthy soils can help improve resilience to extreme weather events such as floods and droughts—making sustainable soil management a key factor in advancing climate goals. Excessive use of nitrogen fertilizers, especially by industrial-scale farming operations, can worsen an impact of climate change.

Nutrient pollution is expected to cause more harmful algal blooms in waterbodies.

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Energy Transformation



Key Steps to Curb Carbon:

Limit new, long-term investment into older, dirtier and/or less efficient technologies, (e.g., coal-fired plants and gas pipelines) to avoid tying up assets in unsustainable infrastructure and to make more space for renewables.

Deny utilities' requests to shift all fixed costs onto meter charges.

Provide more incentives and pilot projects for distributed renewable power, including solar farms, rooftop solar, geothermal and hydro-power, as well as energy storage within the industrial sector.

Promote expansion of Energy Project Assessment Districts and other energy efficiency incentives for new buildings and rehabilitation of older structures.

Expand the adoption of Combined Heat & Power (CHP), through Industrial Revenue Bonds to support implementation. Modify "Standby Rates" (charges levied by utilities when an on-site system experiences a scheduled or emergency outage) to support CHP.

Encourage the State Energy Environment Cabinet to conduct workshops on energy storage technology, targeting regulators, staff and industry.

Promote resiliency incentives for battery banks, targeting specific vulnerable facilities including schools, hospitals, government buildings that are sensitive to power interruptions and provide incentives for low-income facilities such as halfway houses and missions to stabilize their expenses.

Encourage incentives for utility investment in storage to offset energy spikes.

Increase energy security by providing residential and community access to redundant energy systems (residential solar, energy storage, etc).

Energy Sector Transition

As multi-national companies begin to comply with the goals of the Paris Climate Agreement, they are influencing the energy decisions made in Kentucky, regardless of U.S. participation in the climate accord.

In 2017, 79% of Kentucky's net electricity generation was coal-fired, the fourth-largest share of any state, but a record 13% of Kentucky's net generation is now natural gas-fired, a trend

Additional Kentucky climate resources can be found



expected to continue. And 37% of all new hydroelectricity generating capacity brought into service in the U.S. was located in Kentucky, supplying 90% of our renewable electricity generation.

As trends show coal being replaced with efficiency, renewables and natural gas, we must choose a rational low-carbon path. The timeframe needed to reach climate goals as outlined in the Paris Accord, does not favor a two-step transition from coal to gas, and then to renewables. Just as "new generation" coal-plant proposals largely were abandoned a decade ago, we must also discourage the build-out of new natural gas infrastructure. Methane, a greenhouse gas that is 100 times more potent than CO₂, can leak during several stages in the production and delivery of natural gas and its byproducts.

Kentucky has already suffered impacts from fracking operations in neighboring states, including illegal dumping of waste in our landfills, threats of eminent domain from cross-state pipeline developers, proposals to barge frack wastewater on the Ohio River and development of new infra-

structure to store petrochemical byproducts in our region.

In order to protect citizens and discourage unnecessary development and delays our clean energy transition, organizations such as the **Kentucky Resources Council** are working to modernize our laws relating to the natural gas industry and are working with communities on local ordinances that protect landowner rights on poorly-sited pipeline infrastructure.

Increase Solar, Hydro, Other Renewables

Solar energy is now cost-competitive with fossil fuels nationwide, as costs have fallen 53% in the past five years, according to the Solar Energy Industries Association. Opportunities for tapping solar energy in Kentucky are diverse, limited only by state statutes favoring the electric utilities' monopoly powers. Within the past decade, Kentucky has built successful community-scale solar models, such as the Berea Solar Farm. Investor-owned utilities in several parts of the state have installed large-scale solar projects. And solar power has become increasingly popular

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Energy Transformation

On-farm solar array



with Kentucky homeowners, too, allowing them to curb their rising utility bills. Solar power's affordability and consumer independence have inspired utilities to push back against existing state laws and regulations requiring them to provide net-metering to their customers' installations. As most solar installations in Kentucky are largely grid-dependent, the utilities' efforts to control all solar power production threatens Kentucky's solar industry. Kentucky's solar industry and nonprofit advocates have worked very hard to ensure private citizens have continued access to the electric grid via Kentucky's net-metering statutes. Despite spending seven digits, they persuaded the 2017 and 2018 legislature to let the statutes stand.

Kentucky has minimal wind-power potential to develop, but has attractive opportunities for more small-scale hydroelectric projects. Analyses show significant potential to generate even more power from our waterways. There are 33 existing dams within the state or on the Ohio River, built for flood control, water supply and/or navigation, that lack hydroelectric pro-

duction. Oak Ridge National Laboratory researchers estimated in 2012 that retrofitting turbines and generators to those "non-powered" dams could quadruple Kentucky's existing annual hydroelectric production.

Cogeneration

Cogeneration or "combined heat and power" (CHP) is the concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy. The opportunity to reduce emissions and save money through cogeneration is significant due to the inherent low efficiency of electrical generation.



Kentucky's Energy and Environment Cabinet has an active program to promote CHP, in partnership with the Ky. Association of Manufacturers, Ky. Pollution Prevention Center and the Ky. Division for Energy Efficiency, with a goal of offsetting 18% of the state's energy demand by 2025. Their most recent plan,

Kentucky's Ft. Knox is a key example of how technologies such as combined heat and power can enhance energy independence.



released in May of 2015, outlined enhanced CHP education and outreach, along with guidance, reference documentation and technical assistance.



Energy Storage

One of the most promising opportunities for transitioning Kentucky and the nation to a clean energy economy are improvements in energy-storage technologies, including pumped hydro-electric, compressed air, flywheels, thermal storage and batteries.

EnerBlu, Inc., a high-power technology company focused on innovative new energy solutions for utility, military, transport and commercial applications, recently located its corporate headquarters in Lexington, KY. The company provides high-powered batteries as well as fleet transportation vehicles. The **Resilient Power Project**, an

initiative of the Clean Energy Group, is an example of how to increase public/private investment in clean, resilient power systems (solar + storage). Such systems can protect low-income and vulnerable communities from high energy costs with a focus on affordable housing and public facilities. Local solar vendors in Kentucky are also looking at solar + storage packages as alternatives to grid-tied systems.

Electrical demand across the nation has begun to flatline, causing anxiety within the utility industry, especially investor-owned utilities. One utility response has been to regular requests for PSC approval to shift all fixed costs onto their compulsory, fixed meter charges. At face value, this goal might make sense, until we remember Kentucky's utilities are regulated monopolies. They have the right to pass on their costs to their customers and to earn handsome returns on their capital investment in exchange for added regulation and requirements to provide public benefits. High meter fees not only penalize low-income customers, but also erode rates of return on investments into energy efficiency and solar power.

Transportation



Tesla car charging banks

Key Steps to Curb Carbon:

Turn our major highways into a statewide network of “electric corridors” to provide fast electric vehicle (EV) chargers at least every 70 miles.

Shift highway funding models away from gasoline and diesel fuel taxes to a new model that supports improved infrastructure funding, but does not penalize electric vehicle owners and also supports improved public transit. Establish a task force to explore Kentucky’s options.

Electrify fleet vehicles and public transportation.

Expand local BikeShare programs.

Address local land use plans to coordinate transportation between the workplace and residences to minimize the need for single occupancy vehicle miles.

Expand Electric Corridors

Transportation now accounts for 28% of GHG emissions in the U.S. (by end-use sector). The vast majority of these emissions come from passenger cars, making greater fuel efficiency of passenger cars, use of public transit and shifts to electric vehicles especially important.

The National Renewable Energy Laboratory (NREL) suggests it would take just a few hundred corridor fast-charging stations to support long-distance traveling between U.S. cities and roughly 8,000 would be needed to serve urban and rural areas nationwide.

Groups such as Evolve Kentucky, supported by national nonprofits such

as Plug-In America, promote the adoption of electric chargers to accelerate the adoption of plug-in vehicles. These public, fee-free electric car chargers are “adopted” by sponsors. The U.S. Green Building Council also offers information and training on vehicle charging infrastructure at multi-family housing and commercial properties.

Change Highway Funding Models

As technology improves, cars have steadily become more efficient, which means that less gas is required. This efficiency translates to a decrease in state revenues for road and bridge construction and maintenance. Some



Zero-Emission Electric Bus

proposed solutions would penalize alternative fuel vehicles. The National Conference of State Legislatures (NCSL) is tracking different proposed and adopted state policies for the taxation of alternative fuel vehicles. See our resource website for its policy paper, “*On the Move: State Strategies for 21st Century Transportation Solutions*,” which explores numerous innovative surface transportation reform laws, policies and programs being considered or pursued to move the nation’s transportation system into the 21st Century.

Electrification of Fleet Vehicles

Fleet operators are considering more vehicle electrification to stabilize fuel costs, reduce maintenance expenses and project a greener image to consumers. Electric buses have lower GHG emissions than diesel and natural gas buses, even in cities with power grids that depend on coal and natural gas, according to the Union of Concerned Scientists. On average, its study found electric buses produce less than half of the GHG pollution of diesel or natural gas buses.

Louisville’s United Parcel Service, Inc., has made a major commitment to a less carbon-intensive future, setting a goal to source 25% of their annual vehicle purchases to be alternative fuel and advanced technology vehicles by 2020 and 25% of its total electricity needs from renewable sources by 2025.

Expand Transportation access/Bikeshare Programs

Access to personal mobility vehicles such as bikeshare programs are changing the way public right of way is used across the country. Throughout Kentucky, university campuses and urban communities are beginning to adopt sharing programs. Estimating how bike sharing keeps carbon pollution out of the atmosphere is complicated because every bike-sharing program works differently and collects data differently. Regardless, these programs build public support for alternate transportation beyond individual passenger vehicles. They also encourage better health outcomes and create more equitable systems by providing basic transportation opportunities for all income levels.

Water Infrastructure



Key Steps for Climate Mitigation:

Conduct a climate analysis on watersheds, to assess their capacity for storm events.

Create redundancy in water supplies that allow the flexibility to shift between surface and groundwater options where available.

Have cities prepare an action plan for adding decentralized water supply and sanitation options to provide resilience and complement centralized systems. This would include cisterns and grey water recycling.

Integrate more water conservation and green infrastructure options for stormwater management for reducing climate impacts (the ability to withstand increased rainfall, droughts) such as permeable surface materials for paved areas, rainwater collection systems and bioswales.

Develop citizen engagement for a “water smart” culture, to augment official data gathering to introduce water stewardship and climate change concepts. Promote systems where the local community remains involved in critical decision-making on how and where their drinking water is sourced and their wastewater is managed.

Conduct a Climate Analysis When Replacing Infrastructure

Cities are addressing more frequent and intense weather events as CO2 levels rise. These extreme weather events need to be integrated into disaster and emergency planning in every community. Our water and wastewater systems need to not only be more resilient, they need to prepare for system redundan-

cies to address these extreme events. Building and maintaining a water supply system resilient to climate events requires multiple strategies.

Kentucky, similar to many states, is dealing with significant issues related to an aging infrastructure for water and wastewater treatment and delivery. As these older systems are replaced, it creates an opportunity for strategic investment and planning for this new weather reality.

Additional Kentucky climate resources can be found



According to Kentucky's Rural Water Association, the average age of our water treatment plants in Kentucky is over 37 years old, and many water lines are over 50 years old. As for our wastewater plants, the average age is over 35 years old and rural sewer lines are over 50 years old. All told, the expense to modernize drinking water and wastewater infrastructure will total an estimated \$15 billion over the next 20 years.

Our water and wastewater systems are already failing. Citizens in Martin County, Kentucky have been dealing with months of contaminated drinking water and a system that loses 50% of their water supply through pipeline leakages. But according to the U.S. Conference of Mayors, every dollar invested in water infrastructure adds \$6.35 to the national economy. So while the investment will be massive, the benefits are many, particularly if we can also incorporate climate resiliency and redundancy into the infrastructure design.

Green Infrastructure

Because of consent decrees in many cities to separate sewer and stormwater

infrastructure, this has allowed important upgrades to take place. Lexington, for example, has been going through a multi-year conversion of its sewer and stormwater systems, starting with an assessment of high-flood areas, stormwater system vulnerability, and priority project areas. The Kentucky Watershed Watch and Kentucky Waterways Alliance released a full Green Infrastructure Assessment for Lexington in 2014.

Lexington has integrated many different tactics to slow down the amount of water that their systems can absorb in a major storm event, including the integration of more permeable pavement, rain gardens, natural retention basins and major manufactured detention systems. All of these are designed to slow the impacts of a major rain event on the collection system as a whole.

They also have coordinated a rapid response partnership between their Division of Water Quality and their Fire departments to manage emergencies that may affect source water.

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Implementation & Adaption

Key Steps to Curb Carbon:

Look for City and community-level opportunities such as asking your community to sign on to the Mayors' 100% Clean Energy initiative. **Ask your city or county** for information about their local climate preparedness plans.

Engage with local corporations. There are many Fortune 500 companies who have signed on to the goals of the Paris Climate Agreement.

Work with local unions and partnerships such as the BlueGreen Alliance. Identify partners who have common goals, if for different reasons.

Educate yourself and decision-makers on financial incentives such a carbon tax or low-carbon investments.

Continuing Trends

Temperatures across the Southeast Climate Region are expected to increase during this century, ...major warming consequences include significant increases in the number of hot days exceeding 95°F and decreases in freezing events. Projections for the region by 2100 include increases of 10°F for interior states of the Region with a regional average increase ranging from 2°F to 6°F.

The annual number of days with extreme precipitation is expected to increase across most of the region by the mid-21st century, particularly along the southern Appalachians as well as parts of Tennessee and Kentucky. Large cities located on or near waterways, such as the Ohio River, may be more susceptible to flooding; infrastructure in cities may be overwhelmed, leading to releases. Currently 14 Superfund or Superfund Alternative Sites are located in the State; 12 of these sites have ongoing five-year reviews required by residual

waste. The anticipated climate change attributes of heavy rains, increased temperatures and high humidity cycles will likely facilitate this trend to continue whereupon the population will be exposed to poorer indoor air quality. Warmer air temperatures will result in warmer water that will hold less dissolved oxygen making instances of low oxygen levels and hypoxia more likely, foster harmful algal blooms and change the toxicity of some pollutants, and could cause an increased number of waters to be recognized as "impaired".

Cities and Counties Lead the Way

There are now over 100 cities worldwide that are now powered primarily by renewable energy such as hydro, geothermal, wind and solar. Most notably, the city of Georgetown, Texas was the first city in the nation to commit to a transition to 100% renewables, which shows that even in a state where fossil fuels have played a significant role, the transition to a

lower-carbon economy is possible. Much of this momentum at the city level was spurred by the U.S. Conference of Mayors climate protection program that has been encouraging mayors to sign on to the Mayors' Climate Protection Agreement, vowing to reduce carbon emissions in their cities below 1990 levels, in line with the Kyoto Protocol.

Organizations such as ICLEI USA have extensive resources on how cities can also plan for climate adaption. You may find links to these resources on KCC's climate website.

Companies and Industrial Sectors Play a Role

Organizations such as The BlueGreen Alliance unites major labor unions and environmental organizations to solve environmental challenges in ways that create and maintain quality jobs and build a stronger, fairer economy. Unions such as the AFL-CIO have passed climate change resolutions. There are many businesses within Kentucky who can play a supportive role in implementing good clean energy work and climate adaptation.

Market Incentives

Educate yourself and decision-makers on financial incentives such as placing a price on carbon. Emphasize proposals that do not disproportionately affect low-income and heavily-impacted communities. There are also programs that encourage socially-responsible investment into low-carbon alternatives such as the Divest-Invest initiative.



Supporting Organizations

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UK Cooperative Extension
Solar Energy Industries Association

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Your Voice in Frankfort for a Sustainable Kentucky since 1975

We Advocate For: Land Conservation • Biodiversity • Clean Energy and Sustainability Efforts

We Provide: Grassroots Advocacy Training • Community Support • Policy Development

Legislative Analysis • Issue Training and Education

Website: www.kyconservation.org

Online Resource for this guide: www.kyconservation.org/climate



Because The Earth Needs a Friend in Frankfort

Kentucky Conservation Committee • PO Box 1152, Frankfort, KY 40602 • 502-209-9659