STATE OF THE
ENVIRONMENT

• BERKS COUNTY, PA •

Learn what you can do to make Berks County greener through simple, everyday choices.

Brought to you by:

Berks Nature

Table of Contents

Executive Summary

Welcome to the tenth annual State of the Environment report for Berks County.

In this report, we revisit the data that we used and the recommendations that we made in our very first report. It examines our progress over the past decade.

Given how many people in the community still use the first report as a reference and how many teachers use it in the classroom, perhaps the best way to think about this edition is an update to a school textbook. The structure and format remain the same as the original report, but we have updated the data. Close readers will see similar and even identical language in parts; they will also see revised data, new stories, and updated indicators.

We launched the first State of the Environment report a decade ago with the philosophy of "what gets measured, gets done." It was the first time anyone had undertaken a comprehensive analysis of the state of the environment in Berks County. We identified 25 environmental indictors across five critical categories – Water, Energy, Air, Waste, and Land – and shared the data, assigning a thumbs up when the data was positive or moving in the right direction and a thumbs down to indicate areas where we needed to work harder.

When we released the initial report, we knew that it would take years for some of the indicators to show signs of improvement. The environmental concerns we identified in the first report were not created overnight. They grew slowly over multiple decades as a result of poor understanding, neglect, or indifference. We knew that we could not solve all of the challenges overnight or even over a single decade, but we knew we had to try.

That first State of the Environment report inspired efforts by a variety of municipalities, organizations and individuals to improve the local Berks County environment. Groups of people concerned about poor water quality adopted watersheds and worked to protect them. Municipalities recognized the value of coordinated planning and began working together to tackle environmental and other issues collaboratively. Individuals recognized the importance of protecting the environmental value of their land and placed it under permanent easement.

In the decade since the first report, there have also been positive shifts at the national and global levels that have created benefits for us in Berks County. Federal clean air standards, for example, encouraged energy companies and manufacturers to find less-polluting ways to make their products. The discovery of vast reserves of less expensive natural gas made it possible to reduce the amount of coal we burn to generate electricity. Automotive companies began making less-polluting, more fuel-efficient vehicles and new technologies made electric vehicles more reliable and affordable. Large companies are making public pledges to address their contributions to climate change and they are releasing their own corporate sustainability reports that allow shareholders and others to measure the companies' environmental performance.

You can see the benefits of some of these improvements in the updated State of the Environment data.

Despite all of these positive steps, the State of the Environment data for Berks County shows that we still have a long way to go. While we have made progress and some of the indicators are moving in the right direction, there is still work to be done. We're going to do our part. Will you?

STATE OF THE ENVIRONMENT STEERING COMMITTEE

Gavin Biebuyck, Air Chair
Liberty Environmental, Inc.

Scot Case, Consultant
Sustainability Consultant

Tracey Ciesnolevicz, Energy Co-Chair
UGI Utilities, Inc.

Jerry Griffith, Land & Program
Kutztown University

Eric Grindrod, Water Chair
SSM Group, Inc.

Ronald Long, Energy Co-Chair
Met-Ed, FirstEnergy Corp.

Jane Meeks, Waste Chair
Solid Waste Authority of Berks County

Kimberly Murphy, Program
Berks Nature

Shannon Rossman, Land & Program
Berks County Planning Commission

Becca Gregg Sansom, Communications
Berks Nature

Tami Shimp, Program
Berks Nature

Report Overview

When the original State of the Environment report was published, Berks Nature (then known as the Berks Conservancy) identified the following five broad categories of environmental indicators to evaluate the environmental health of Berks County:

- Water
- Energy
- Air
- Waste
- Land

For each category, Berks Nature selected five critical environmental indicators to measure and track. These indicators are used to determine how well Berks County is doing to ensure the overall health within each category. How well are we doing in Berks County to protect the safety of our water? How well are we doing to reduce air pollution and improve air quality? How wisely are we using the available land within the county?

The following chapters provide an overview for each of the five environmental categories and details about the five indicators within each category. Each chapter includes an overall assessment of our progress in Berks County to ensure that the environmental indicators are moving in the right direction.

About the Thumbs

The thumbs throughout the document point up, sideways, and down as an indicator of how well Berks County is doing to move the critical environmental indicators in positive directions. In some cases, the data makes it easy to assign a thumbs up or a thumbs down. In other cases, the positive things we are doing are not yet fully reflected in the data. It takes decades, for example, for a river to fully recover from decades of abuse but we might assign a thumbs up because the positive actions we are taking now will create the improved results we are seeking.

The direction that the thumbs are pointing is a combination of what the data shows, what actions Berks County residents are taking, and our expert panel's consensus around political and citizen commitments to continue doing what it takes to improve our local environment.

The 10 educational publications produced for the State of the Environment program are available for free download at www.berksnature.org

Summary of Indicators

THUMBS UP
This is generally encouraging; keep up the good work!

THUMBS DOWN
This is not tracking the way we want to see it; hard work to do.

THUMBS NEUTRAL
We'll need to track this a while longer to see what happens.

WATER

1. GROUNDWATER ELEVATIONS
Berks County could use more monitoring wells.

2. MILES OF IMPAIRED STREAMS
Projects are having a positive impact on water quality, but 332 miles remain impaired.

3. WATER SYSTEMS WITH PROTECTION PLANS
36 of 63 community water suppliers have water protection plans, covering 97% of the population!

4. STATUS OF SEWAGE FACILITY PLANS
14 municipalities have updated their 537 plans in the past five years, but most are more than 10 years old.

5. AQUATIC LIFE IN STREAMS
Only 34% of stream monitoring locations fall within the "good" rating in the MAIS system.

ENERGY

1. VEHICLE-MILES TRAVELED PER YEAR
Berks residents are not reducing miles traveled per resident as other counties in PA.

2. RESIDENTS USING PUBLIC TRANSPORTATION
Berks residents use public transportation less than the PA average.

3. ELECTRICITY GENERATION & USE
Berks County relies mainly on fossil fuel for energy with few renewable sources available.

4. HOUSEHOLD ENERGY USE
Homes are getting more efficient in Berks, but we could focus much more on energy savings.

5. NEW "GREEN CERTIFIED" CONSTRUCTION
Berks significantly increased the number of LEED registered buildings in our community.

AIR

1. NUMBER OF "BAD AIR DAYS"
Number of Bad Air Days are decreasing, but traffic congestion challenges our air quality.

2. LEAD AIR QUALITY
Lead-in-air levels have decreased and all of Berks meets the lead standard.

3. AIR TOXICS
Air toxic releases to the air decreased significantly over the past five years.

4. REGIONAL AIR POLLUTION
Particle pollution levels have decreased significantly over the past five years.

5. LOCALIZED AIR POLLUTION
Traffic congestion and trash burning continue to challenge air quality is some areas of Berks.

WASTE

1. WASTE GENERATED IN BERKS COUNTY
There is no evidence that Berks County is attempting to reduce the amount of waste it generates.

2. WASTE DISPOSED OF IN BERKS COUNTY
The amount of waste disposed of in Berks is increasing after declining for several years.

3. ELECTRONIC RECYCLING WASTE
The volume of waste electronics and people recycling waste electronics are both increasing.

4. SPECIAL WASTE COLLECTIONS
More people continue to participate in the special waste collections.

5. RECYCLING RATE
The recycling percentage for Berks County has fallen below 30%, not meeting state or local goals.

LAND

1. PROTECTED LAND
15% of Berks' lands are permanently protected, and continuing to trend in a positive direction.

2. TREE COVER
Forested lands make up the largest land-cover category in Berks County.

3. IMPERVIOUS COVER
Impervious cover makes up about 12% of Berks, but municipalities are addressing stormwater issues.

4. MULTI-MUNICIPAL COOPERATION
Multi-municipal cooperation and planning is on the rise.

5. OUTDOOR RECREATION AREAS
Outdoor recreation has increased, but more connections and promotion are needed.

25 Tips to Go Green

WATER

1. Save water by turning the water off when you are not using it such as brushing your teeth and washing the dishes. Check for leaks in your faucets and toilet. Install a water-saving showerhead and faucet.

2. Never dump anything into storm drains or streams. Everything that enters the storm drains ends up into streams, rivers and drinking water. Don't dump oil, trash, leaves, pet waste or any other material into the drains. Avoid pesticides and lawn chemicals that will harm aquatic life.

3. If you have well water, get your well water tested periodically. Be aware of changes in land use around you. New developments or land use practices could affect local groundwater quality and/or quantity.

4. The toilet isn't a garbage disposal. Never flush medicine, cat litter, disposable diapers, sanitary napkins, tampons, paper towels, facial tissues, coffee grounds, or cigarette butts. If you have a septic tank, perform regular maintenance.

5. Protect riparian buffers (streambank plantings). Don't mow to the edge of streambanks. Allow native vegetation to grow freely in at least a 10-foot strip along the bank to reduce erosion and filter out pollutants.

ENERGY

1. Green your commute to work or school. Start a carpool at work. Make several errands in one trip. Utilize the school bus for your children.

2. Familiarize yourself with BARTA routes and bus stop locations. Utilize bus transport for traveling around town and out of town.

3. Conserve energy. You can save significant energy and money with simple measures such as adjusting your thermostat or shutting down equipment. Unplugging appliances such as televisions, stereos, and computers while not in use can have a big impact. Use power strips for easier on/off powering to multiple electronic devices.

4. Make sure your home is energy efficient. Have your home insulated, windows caulked and check weatherstripping. Utilize residential energy use analyzers from your utility provider. Ask your electricity provider if you can purchase Renewable Energy for your home.

5. Plant trees. Trees and other plants absorb carbon dioxide and convert it into oxygen which is released into the atmosphere. Planting a tree in your neighborhood can help beautify the area while absorbing 2,000 pounds of CO_2 over its lifetime.

AIR

1. Reduce waste. Manufacturing of unnecessary or disposable goods often produces air pollution, so reduced purchasing of disposables will help.

2. Eliminate toxic chemical use at home. A surprising number of household or home shop chemicals are toxic and volatile. Many release vapors into the air, inside the home and out. This can be a serious health threat to your family, and contributes to community-wide levels of air pollutants.

3. Modify your transportation. Your car is a significant source of air pollution, so switching to a more gas-efficient vehicle will be a big help.

4. Check your home for radon levels. Radon is a cancer-causing radioactive, odorless, colorless gas, known to exist in Berks County. Testing is the only way to know your home's radon levels, and you can administer the test yourself. Test kits can be purchased at most hardware stores.

5. Talk to your legislators. Many of our current governmental regulations are not strong enough to address our air pollution problems. Citizens need to contact their legislators and ask for better policies.

WASTE

1. Compost. Composting is a natural process that breaks down organic material into a rich, organic fertilizer. By composting, you can reduce the amount of garbage you send to the landfill, grow healthier plants, and save money. It is easy to do at home.

2. Reduce waste you generate by reducing the number of disposable (i.e., throw-away) items you buy and use, and by recycling those materials that are accepted in their existing municipal or county recycling programs.

3. Recycle! Make sure you know what items can be recycled, set up containers in your house or business for storage of recyclables, and know the municipal schedule for pick-ups or drop-offs.

4. Become aware of Berks County's special waste collections - what they accept, and when and where the collection events are scheduled. Items such as tires, pharmaceuticals, and other hazardous materials are collected seasonally. Visit www.co.berks.pa.us/recycling/site/default.asp for a complete schedule.

5. Never dump garbage, rubbish, old building materials, or other solid wastes in Berks County.

LAND

1. Utilize the open space and recreational resources that exist in Berks. Help promote these public resources and get involved/volunteer to help maintain them. This will help allow the governments and organizations that manage these resources to devote more time and energy to planning for future parks.

2. If your property includes forested areas, try to keep some or all of those areas intact; if your property lacks trees, consider planting trees where they are compatible with property use.

3. Establish a rain garden! Rain gardens are landscaped areas planted with wildflowers and other native vegetation that soak up rain water.

4. Landscape organically with native plants. Native plants are the trees, shrubs, flowers, grasses, ferns and other plants that have evolved in a particular area over thousands of years. They are well-adapted to local conditions, therefore requiring little maintenance once established.

5. Get involved in your community through an Environmental Advisory Council (EAC). EACs advise the local planning commission, park and recreation board and elected officials on the protection, conservation, management, promotion and use of natural resources in the commnity.

County of Berks

Albany Township ♦
Alsace Township
Amity Township
Bally Borough
Bechtelsville Borough
Bern Township
Bernville Borough
Bethel Township ♦
Birdsboro Borough
Boyertown Borough
Brecknock Township
Caernarvon Township
Centerport Borough
Centre Township
Colebrookdale Township
Cumru Township
District Township ♦
Douglass Township
Earl Township
Exeter Township
Fleetwood Borough
Greenwich Township
Hamburg Borough
Heidelberg Township
Hereford Township
Jefferson Township

Kenhorst Borough ♦
Kutztown Borough ♦
Laureldale Borough
Leesport Borough ♦
Lenhartsville Borough
Longswamp Township ♦
Lower Alsace Township
Lower Heidelberg Township
Lyons Borough
Maidencreek Township
Marion Township
Maxatawny Township
Mohnton Borough
Mount Penn Borough
Muhlenberg Township
New Morgan Borough
North Heidelberg Township
Oley Township
Ontelaunee Township
Penn Township
Perry Township
Pike Township ♦
Reading City ♦
Richmond Township

Robeson Township ♦
Robesonia Borough ♦
Rockland Township
Ruscombmanor Township
Saint Lawrence Borough
Shillington Borough
Shoemakersville Borough
Sinking Spring Borough ♦
South Heidelberg Township
Spring Township
Tilden Township
Topton Borough
Tulpehocken Township
Union Township ♦
Upper Bern Township
Upper Tulpehocken Township
Washington Township ♦

♦*Indicates EAC is formed and active.*

Wernersville Borough
West Reading Borough ♦
Windsor Township
Womelsdorf Borough
Wyomissing Borough

Acreage
865.30 square miles (553,792 acres)

Population
411,442 (2010 census), grown 10% since 2000 census. There are 152,451 households averaging 2.63 people per household.

Municipalities
72 municipalities which includes: 44 townships, 27 boroughs and the City of Reading.
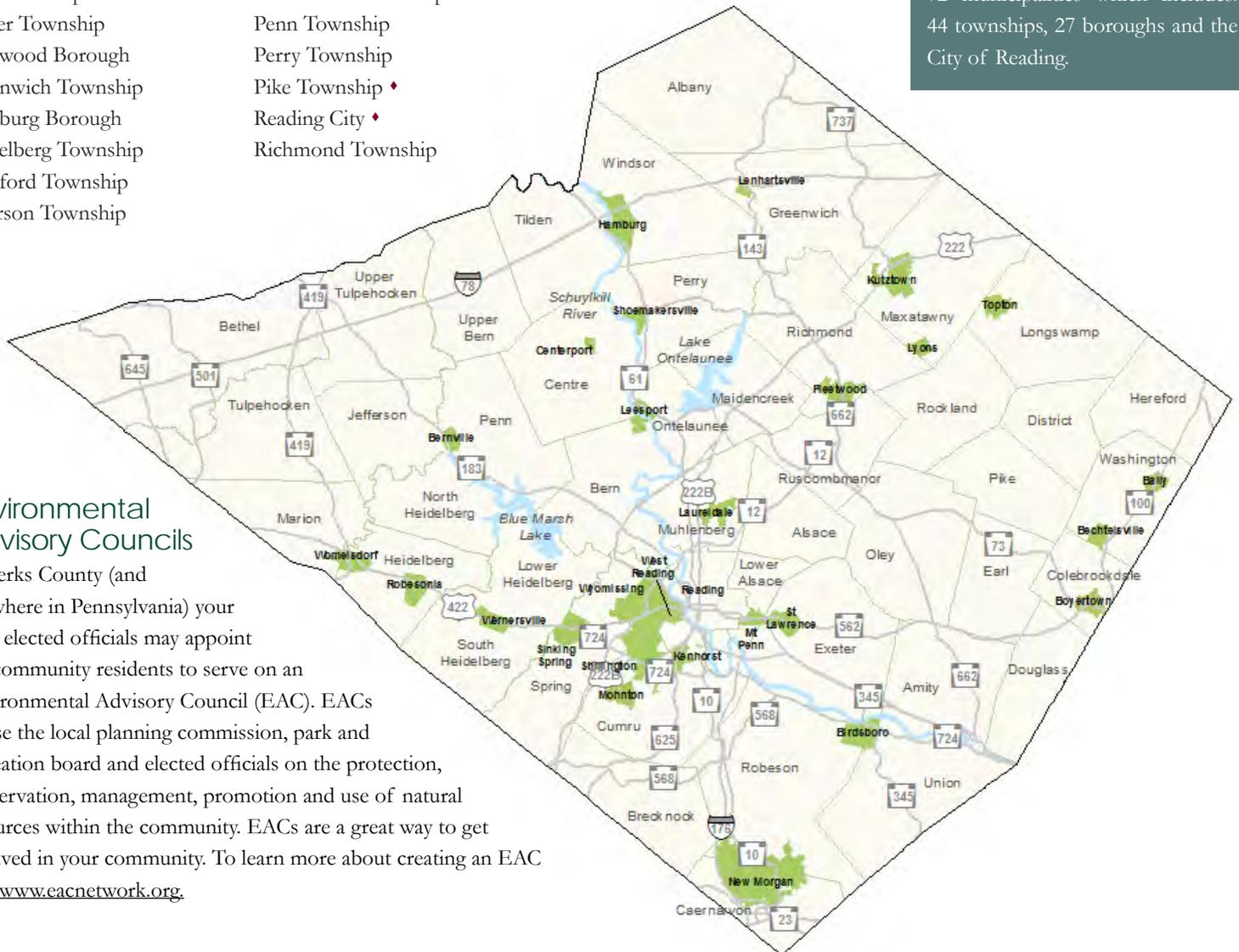
Environmental Advisory Councils

In Berks County (and elsewhere in Pennsylvania) your local elected officials may appoint 3-7 community residents to serve on an Environmental Advisory Council (EAC). EACs advise the local planning commission, park and recreation board and elected officials on the protection, conservation, management, promotion and use of natural resources within the community. EACs are a great way to get involved in your community. To learn more about creating an EAC visit www.eacnetwork.org.
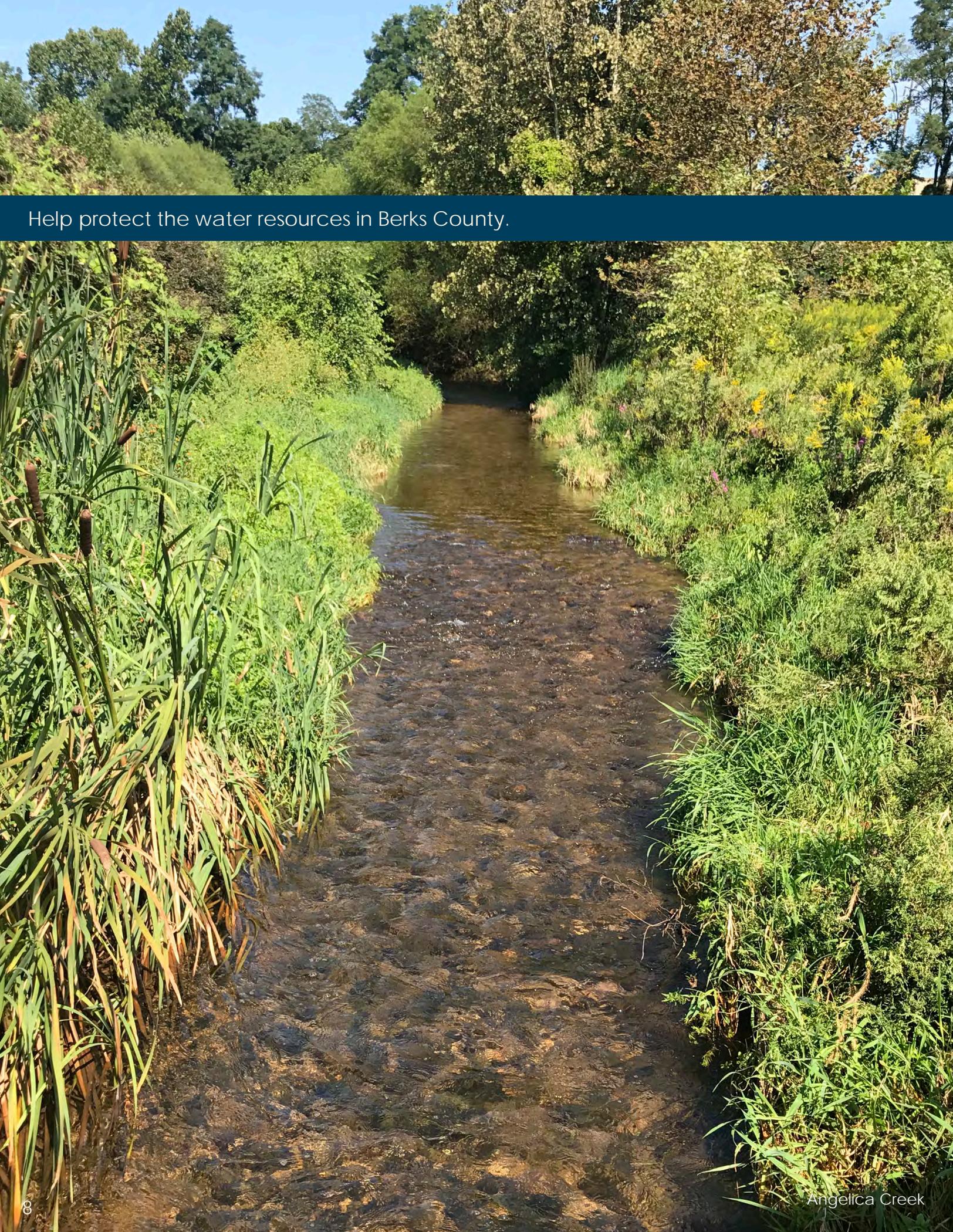
Help protect the water resources in Berks County.

Angelica Creek

Water

Without a doubt, clean water is a fundamental measure of environmental health. We rely on both surface water and groundwater for cooking and drinking, for irrigating crops, for industrial processes, and for outdoor recreation. Good water quality is essential for aquatic ecosystem integrity and healthy biological communities. In addition, clean water -- free-flowing streams and rivers or serene ponds and lakes -- has always been admired for its natural beauty. Water resources has generally been at the forefront of environmental laws and regulations at the federal, state, and local level.

Protecting and enhancing the health of surface water and groundwater has generally been at the forefront of environmental laws and regulations at the federal, state, and local level.

Many of our current water regulations are directly or indirectly linked to the Federal Water Pollution Control Amendments of 1972, which substantially strengthened earlier Federal water quality legislation. Major amendments were added in the Clean Water Act of 1977 and the Water Quality Act of 1987.

The U.S. Congress passed the Safe Drinking Water Act in 1974 to establish federal standards for the protection of U.S. drinking water quality. It was amended in 1986 and 1996 and additional water quality standards have been included as part of other federal legislation. As a result, there are clear standards for measuring water quality.

Water quantity is also measured and tracked. The amount of rain, for example, is tracked closely on the nightly television weather reports and in newspapers because of its importance to farmers, gardeners, and anyone who spends time outdoors. Rainfall averages determine whether our region is in a drought or whether we have adequate water supplies based on comparisons with long-term averages. The amount of rain that percolates into underground aquifers, our "groundwater" resource, is another critical measure. We rely on wells for much of our drinking water and, if the aquifers are not recharged, our wells may run dry.

Rainwater that does not percolate into underground aquifers contributes to flows in our streams and rivers and is often stored in lakes as future drinking water. Water flowing across the land carries soil and chemicals that can reduce the quality of the water flowing into streams and rivers.

Anything you place on the ground – pesticides, herbicides, fertilizers, oil, antifreeze, industrial chemicals, or trash -- is likely to make its way into our local streams, rivers, and lakes.

Humans, of course, are not the only organisms that depend on high-quality water to survive. Clean water is home to a wide variety of fish, amphibians like frogs and salamanders, birds, insects, and plant life. Polluted waters support fewer plants and animals and have far less diversity. As a result, the health of a stream can be measured with precise water quality and chemical analysis and by observing and quantifying the kinds of plants and animals that live in the water.

Our Water Indicators look at groundwater resources, stream condition and health, and written plans to protect water resources in Berks County.
- Groundwater Elevations
- Miles of Impaired Streams
- Water Systems with Protection Plans
- Status of Sewage Facility Plans (Municipal PA Act 537)
- Aquatic Life in Streams

Water Indicator One

GROUNDWATER ELEVATIONS

Although surface water – lakes, ponds, rivers, streams, and tributaries – are the most obvious of our water resources, the water stored below the ground is a critically important resource. This groundwater is tapped for drinking water by individual and community wells and also feeds the surface streams and rivers through seeps and springs. Groundwater is replenished from the surface when rain percolates through the soil and into the underlying bedrock.

Only a fraction of the annual precipitation percolates deep enough to recharge our groundwater reservoir. When groundwater levels are low, our wells must be deeper to reach it. As a result, the depth we must drill to reach groundwater is an important measure of available groundwater.

The United States Geological Survey (USGS) monitors a groundwater well at Fleetwood in Berks County. USGS tracks the depth it takes to reach the groundwater. The chart below shows how deep below the surface we must go to reach water.

✊ Groundwater levels at Fleetwood are within expected ranges, but Berks County only has one monitoring well. We could use more monitoring wells so that we have a better understanding of groundwater levels across the county. Nearby Montgomery County, for example, has 18 monitoring wells.

What the data tells us

Groundwater elevations at the Berks County monitoring well in Fleetwood have varied over a relatively narrow range since 1994 with an average of 134 feet below ground surface. For the limited area of Berks County that this well monitors, groundwater elevations have been relatively stable over this period.

Maiden Creek

DEPTH TO GROUNDWATER

FEET BELOW GROUND LEVEL

(Chart showing annual depth to groundwater from 1994 to 2017, with values ranging between approximately 125 and 140 feet below ground level.)
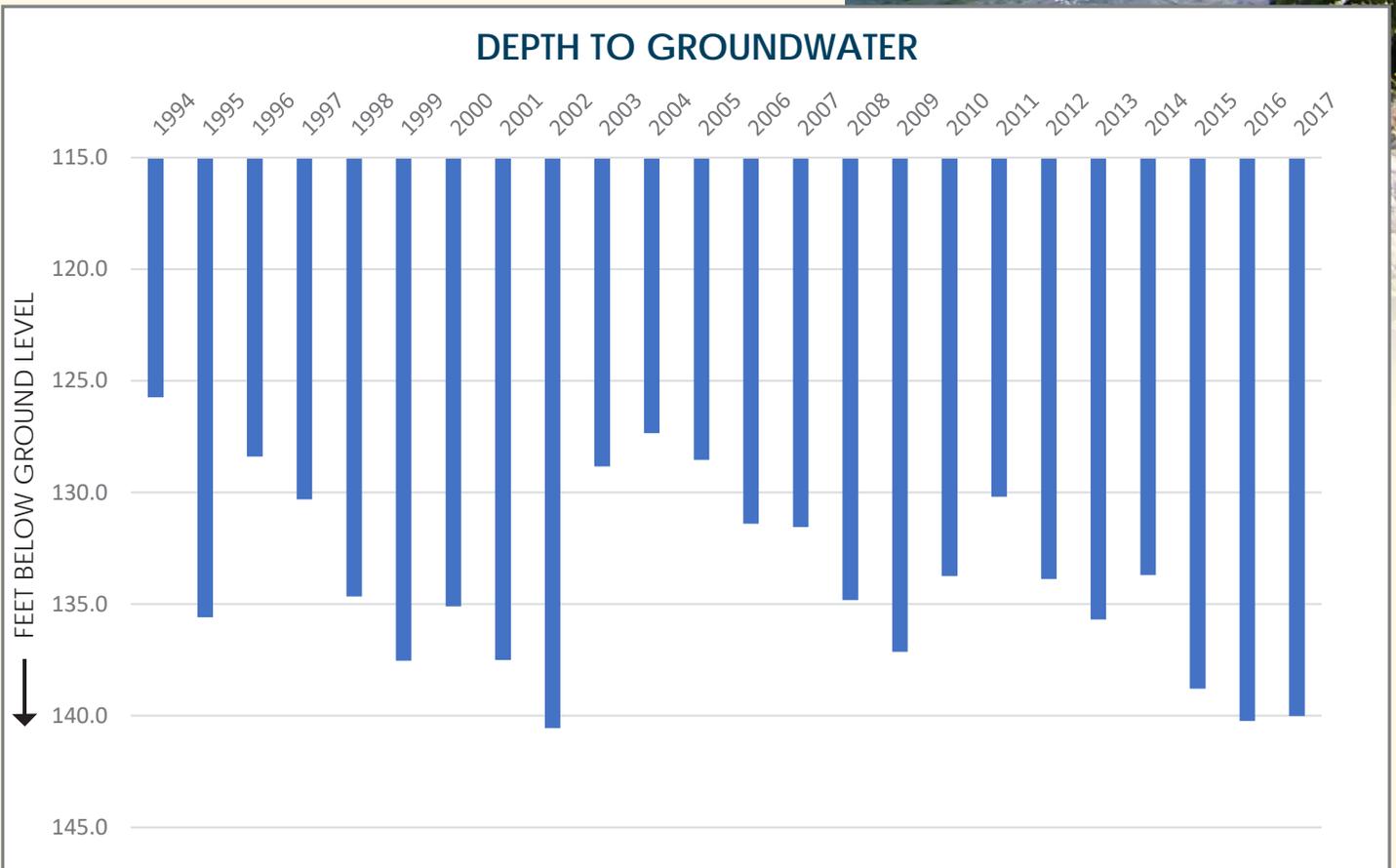
How do we make things better

Groundwater levels are dependent on three primary factors: (1) how much water we use; (2) the amount of precipitation (i.e., rain and snow); and (3) how much of that precipitation percolates through the ground to refill the underground water reservoirs, a process called groundwater recharge.

While we cannot control the amount of rain and snow, we can control the amount of water we use and we impact groundwater recharge rates by what we do with the land above. We can also increase the number of groundwater monitoring wells so that we are better able to track our groundwater quantity and quality.

Saving Water
Simple, common-sense measures to reduce unnecessary water use – turning off faucets when brushing your teeth or using low-flow showerheads – reduce the overall demand on groundwater resources.

Recharging Groundwater
The amount of groundwater recharge, the volume of rain and snow that filters through the ground to refill underground water supplies, is dependent on the permeability of the surfaces above the groundwater. Forest cover and natural vegetation, for example, allow more water to percolate into the groundwater below than land covered by buildings, roads and parking lots. We can help accelerate groundwater recharge by installing raingardens and using pervious materials for sidewalks and parking lots. (See the sidebar below.)

Improving Groundwater Monitoring
Berks County residents could work through the Berks County Planning Commission and the Pennsylvania Department of Environmental Protection (PADEP) to demand additional monitoring wells in Berks County to better monitor the quantity and quality of our groundwater.

Ways to Save Water
- Turn off the water while brushing your teeth or washing your face at the sink.
- Install water-saving showerhead and faucets.
- Turn water off while you are washing the dishes. Don't rinse your dishes before loading the dishwasher. Most dishwashers are designed to handle unrinsed dishes and, in fact, they may perform better if dishes are not pre-rinsed.
- Routinely check toilets for leaks. Most toilets will need their inner parts replaced at least once every year or two to prevent unnecessary leaks. If you need to replace your toilet, install a low–flush toilet to save money and water.
- Use a rain barrel at the bottom of your gutter downspouts to collect rainwater for watering your garden and plants.
- Reserve a portion of your lawn for native plants to grow. Typically, species of plants native to Pennsylvania require less watering and are more tolerant of drought.

Rain Garden at the Berks County Agricultural Center

STORIES FROM THE COMMUNITY

RECHARGING GROUNDWATER AT THE BERKS COUNTY AGRICULTURAL CENTER

The Berks County Agricultural Center in Leesport has a number of demonstration projects showing how we can make sure that more of the rain and snow percolates below ground to recharge our groundwater levels.

Pervious Parking Lot
A large section of the Ag Center's parking lot is made with pervious pavement, which allows the rainwater to percolate through the parking lot to recharge the groundwater rather than washing off the parking lot into the sewer. As an added bonus, this portion of the parking lot has fewer problems with snow and ice during the winter because much of the water soaks through the pavement rather than freezing on the surface.

Pervious Sidewalks
The Ag Center also has sidewalks made from a variety of pervious surfaces, including a pervious concrete sidewalk and one made from paving blocks. Each of the surfaces allows rainwater to percolate below ground to help recharge the groundwater. Like the pervious parking lot, they also create fewer problems with snow and ice during the winter.

Rain Garden
One of the most striking features of the Ag Center between the parking lot and the main entrance is the large rain garden containing a variety of water-loving grasses, trees, and other plants. The rain garden is designed to temporarily collect rain water that rushes off the non-pervious part of the parking lot and sidewalks and from the roof drain spouts. During the rain, the rain garden fills up with water like a pond and the water then slowly percolates into the ground to recharge the groundwater.

In addition, a group of volunteers is installing a riparian buffer in phases along a small stream. The stream will be used to show farmers and others how a riparian buffer works and how the stream health improves after a buffer is planted.

Water Indicator Two

MILES OF IMPAIRED STREAMS

The Pennsylvania Department of Environmental Protection (PADEP) evaluates the status of surface waters (e.g., lakes, ponds, rivers, streams, and tributaries) within the state on a regular basis. It determines whether the surface water meets its criteria for such general uses as aquatic life, fish consumption, recreation, and drinking water supply. Pennsylvania identifies specific water quality requirements for each use. Surface waters that do not meet the requirements for their designated use are identified as "impaired."

There are several categories of impairment from failing to meet one of the surface water use requirements to multiple shortcomings. For some impaired surface waters, PADEP establishes Total Daily Maximum Load (TDML) restrictions on discharges that create additional legal requirements to protect the water.

The table below presents PADEP data from 2009, 2013, and 2018 on miles of impaired streams in Berks County and the specific types of impairments that have been documented.

MILES OF IMPAIRED STREAMS AND REASONS			2009 Total Miles	2013 Total Miles	2018 Total Miles
Source	Description	Reason			
Agriculture	Agriculture	siltation, nutrients	246.8	230.0	254.9
Erosion/Development	Land Development	siltation, urban runoff	11.7	9.9	9.9
	Erosion	erosion from derelict land			
	Removal of Vegetation	siltation			
Hydromodification	Channelization	habitat alterations	6.1	5.9	5.9
	Draining or Filling	draining or filling			
	Impoundment	upstream impoundment			
Runoff	Golf Course-Related	siltation and pesticides	30.9	33.9	38.7
	Residental Runoff	water flow variability, siltation			
	Urbn Runoff/Storm Sewer	siltation, water flow variability			
Point Source	Industrial Point Source	metals, salinity, total dissolved solids, chlorides	12.1	12.4	12.1
	Land Disposal	cause unknown			
	Mining	surface mining, siltation, flow alterations			
	Municipal Point Source	pathogens			
Other	Natural Source	siltation, water flow variability	53.2	34.4	10.5
	Unknown	PCB (source unknown)			
	Other	organic enrichment, low dissolved oxygen			
TOTAL			**360.9**	**326.5**	**332.0**
Total Stream mileage	1366		**26.4%**	**23.9%**	**24.3%**

What the data tells us

Many factors impair our local waterways, while not reflected in the table above, impervious surfaces and stormwater are among the most significant. Agricultural effects on surface waters are the principal reason many Berks County waters as classified as impaired. This makes sense because a relatively large percentage of Berks County is used for agriculture and most farms are located near streams.

About 332 miles or 24.3% of the 1,366 miles of streams and rivers in Berks County are impaired, but more and more farmers and other land owners are taking action to protect them.

How do we make things better

All landowners can implement Best Management Practices (BMPs) to protect waterways on or adjoining their property. Farmers can get information on agricultural BMPs from the Berks County Conservation District.

For non-agricultural properties and owners, many of the same BMP's recommended for farms apply to residential, commercial, and industrial sites. Try to minimize land disturbances and soil erosion, apply the minimum amounts of pesticides or fertilizers to achieve your objective, and don't discard hazardous materials where they can enter the soil or surface waters. Although a direct connection may not always be self-evident, many contaminants eventually make their way into our drinking watersources.
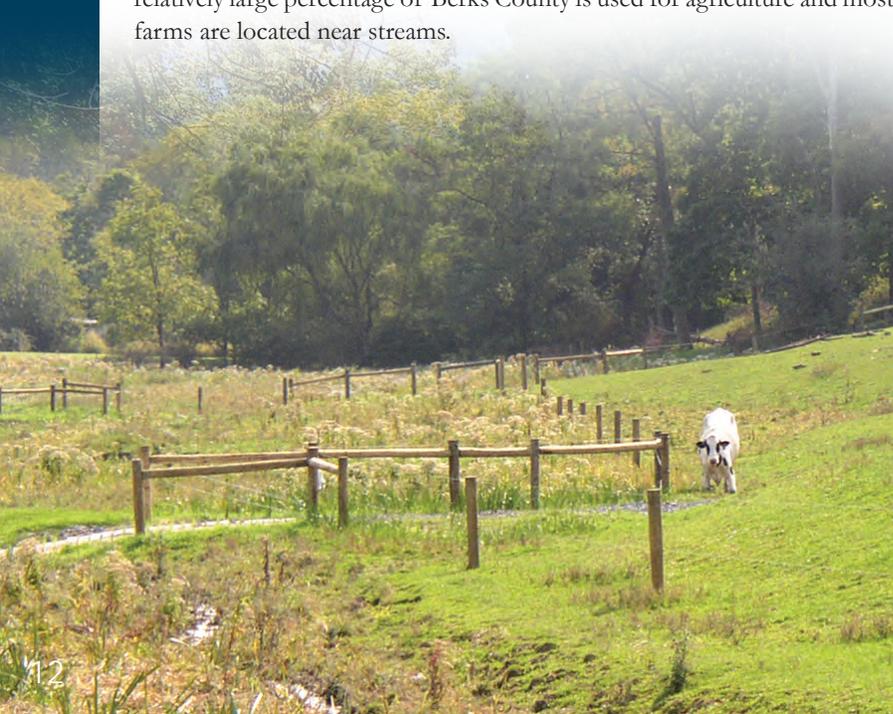
STORIES FROM THE COMMUNITY
IMPROVING THE SAUCONY CREEK WATERSHED

The Saucony Creek watershed is a 33-square mile area that provides drinking water for more than 15,000 people in Lyons Borough, Maxatawny Township, and the Borough of Kutztown. It is also the source for the water in Saucony Creek, the 17.3-mile stream that flows through Kutztown.

Due to concerns about high nutrients and nitrates polluting Saucony Creek from the many farms in the watershed, Berks Nature, Trout Unlimited, the U.S. Department of Agriculture (USDA's) Natural Resources Conservation Service (NRCS), and others partnered to address the pollution sources.

Working together with farmers and landowners, they completed 29 individual Best Management Practice (BMP) restoration projects throughout the watershed. The BMPs included projects like:

- Creating manure storage units so that the manure from barns and feeding areas does not pollute the streams while providing farmers with convenient access to a natural fertilizer
- Installing streambank fencing to keep cattle out of the water
- Building cattle crossings so cattle can cross streams without destroying the streambanks
- Planting riparian buffers so that the streambanks are protected by trees and uncut grasses that stabilize the streambanks and prevent soil, manure, and other pollutants from washing into the streams

These agriculture BMPs were installed to reduce nitrates (from manure and fertilizers) and soil sediment from entering the waterways and harming water quality.

As the chart below illustrates, nitrate concentrations in the groundwater have declined following the watershed restoration activities. They have dropped from a concentration above 8 milligrams per liter (mg/L) between 2000 and 2007, which is approaching the U.S. Environmental Protection Agency's maximum contaminant levels, to well below 8 mg/L in the latest data. This is a terrific trend!

In addition to improving the health and quality of the drinking water for the 15,000 people who depend on the Saucony Creek Watershed for their water, the water-quality improvements flow all of the way downstream to Lake Ontelaunee, the drinking water source for the City of Reading.

Cleaner water arriving from Saucony Creek means that the Reading Area Water Authority (RAWA), which provides water to the city, has lower costs to clean the water from Lake Ontelaunee before delivering it to its customers. If similar BMPs were implemented throughout the larger 216-square mile Maiden Creek Watershed, which provides most of the water in Lake Ontelaunee, RAWA could save even more money.

Keep our
WATER CLEAN

- Never dump anything into storm drains. Everything that enters the storm drain ends up in the water. Don't dump oil, trash, leaves, pet waste or any other material into the drains.
- Pick up pet waste. Stormwater will carry pet waste left on the ground into the storm drains, contributing to harmful bacteria, parasites and viruses in our water.
- Practice environmentally friendly lawn and garden care. Use only organic fertilizers and use them sparingly. Avoid pesticides. These chemicals will be swept into local waterways by stormwater runoff and harm aquatic life.
- To reduce runoff, direct downspouts over unpaved surfaces or use a rain barrel to collect rainwater for later use on your lawn or garden.
- Practice environmentally friendly automotive care. Check your vehicles for leaks and fix immediately.
- Don't dump anything into streams. Even garden debris like leaves, branches and grass clippings are hazardous to our waterways because excess amounts hurt aquatic life.
- Don't mow to the edge of streambanks. Allow native vegetation to grow freely in at least a 10-foot strip along the bank to reduce erosion and to help filter out pollutants.
- Raise the height of your lawnmower blades so that the grass is kept slightly longer. This promotes water infiltration into the groundwater, which helps improve water quality and can help sustain streams during droughts and low-flow periods.
- Take your unused pharmaceuticals to a collection program. Don't flush them down the toilet or pour them down the drain.
- Participate in community cleanups.

KUTZTOWN BOROUGH WELLS
HIGH AND LOW CONCENTRATION PER YEAR

Average values: 8.4 (2000), 8.2 (2001), 8.2 (2002), 8.0 (2003), 8.3 (2004), 8.3 (2005), 8.1 (2006), 8.1 (2007), 7.5 (2008), 7.0 (2009), 7.9 (2010), 7.9 (2011), 7.3 (2012), 7.0 (2013), 6.8 (2014), 4.7 (2015), 4.1 (2016)

Y-axis: Milligrams per Liter of Nitrate

Legend: Average — Maximum — Minimum
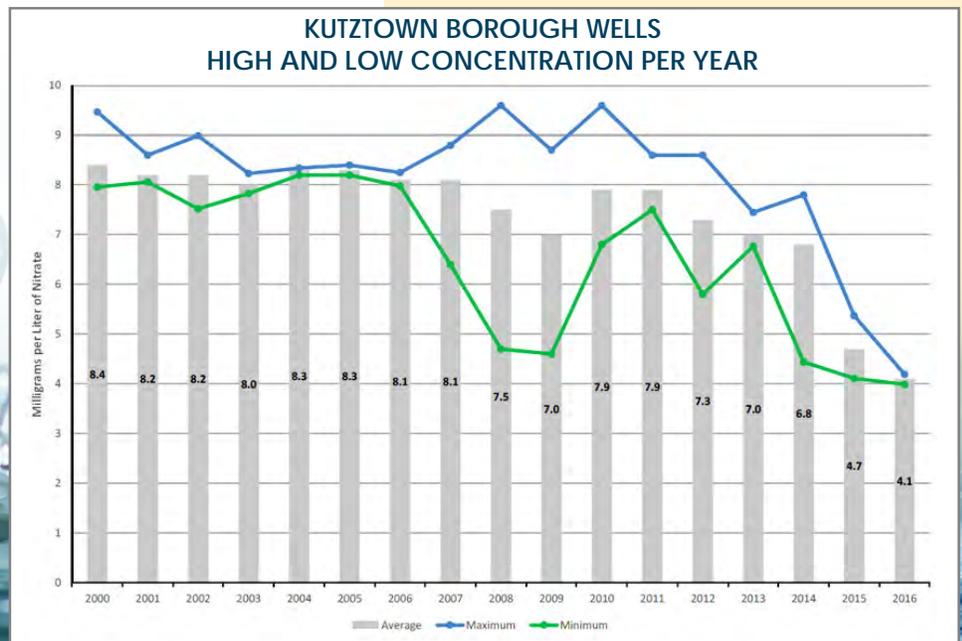
Water Indicator Three

WATER SYSTEMS WITH PROTECTION PLANS

The Federal Safe Drinking Water Act (SDWA) Amendments of 1996 require that each state develop a Source Water Assessment and Protection (SWAP) Program for all drinking water sources - groundwater and surface water - that serve community water systems. The requirements for the SWAP program were adopted by the Pennsylvania Department of Environmental Protection (DEP) as regulations (Title 25, Chapter 109).

The SWAP program for a Community Water System (CWS) consists of two parts: assessment and protection. The assessment part is mandatory and many of the assessments were completed in the early 2000s. They provided a very general evaluation of the immediate protection area for existing water sources.

The second part of SWAP - protection - is voluntary and is an important water indicator selected for this report. A CWS may voluntarily choose to develop a more detailed, comprehensive, and community-oriented source water protection (SWP) plan following DEP's regulations.

In 2007, DEP initiated the Source Water Protection Technical Assistance Program (SWPTAP) to help community water suppliers develop a protection plan for their water sources. All Community Water Systems are eligible to participate in this program through their regional DEP office.

Lake Ontelaunee is the water supply for the City of Reading.

BERKS COUNTY PUBLIC WATER SYSTEMS WITH SOURCE WATER PROTECTION PLANS

36 OUT OF 63

Thirty-six out of 63 Berks County community water systems have SWP plans, which is a significant improvement over the six communities who had SWP plans ten years ago. These 36 plans cover 97% of the population that is covered by a community water system.

What the data tells us

As the table demonstrates, more than half of Berks County community water systems have SWP plans, but that means that 27 of 63 community water systems do not yet have plans in place to protect their source water. SWP assistance is available through DEP.

How do we make things better

Upon completion of SWAPs, public meetings are held to discuss results, recommendations, and enhancements. Find out about the status of source water protection plans for your area and try to attend public meetings discussing these issues. Encourage your water supplier and municipality to participate in the SWAP program. Landowners, commercial, and industrial facilities in proximity to designated source water protection areas should evaluate the potential for their sites to affect source waters and take reasonable steps to reduce potential adverse impacts (e.g., spill protection plans).

What if you have well water?

If you get drinking water from your own well, you should take some precautions to assure that the water you are pumping out of the ground is safe.

- Get your well water tested periodically.
- Use lawn fertilizers and pesticides per the label instructions. Excess chemicals could enter your well.
- Be aware of changes in land use around you. New developments or land use practices could affect local groundwater or surface water quality and/or quantity.
- The area around your well cap should be graded so that surface water does not collect around the cap where it could possibly contaminate the well.
- Visit http://mwon.cas.psu.edu - a good resource for well owners in Pennsylvania.

WATER SYSTEMS WITH PROTECTION PLANS

Does *your* water supplier
have a Source Water Protection Plan?

Water Authority	DEP Approved SWP Plans	Active in SWP Program	Completed Small Systems Program	Consecutive System with sources covered with a SWP Plan
Bern Township Municipal Authority				x
Bernville Borough Authority	x			
Birdsboro Municipal Water Authority	x			
Boyertown Water Authority	x			
Caernarvon Township Authority		x		
Country View Mobile Home Park			x	
Fleetwood Borough Water System	x			
Geisingers MHP			x	
Hamburg Municipal Water & Sewer Authority	x			
Kutztown Borough	x			
Laurel Health Resources			x	
Lyons Borough Municipal Authority	x			
Maidencreek Township Water Authority		x		
Maxatawny Township	x			
Meadows at Bethel MHP			x	
Mohrsville Water Association			x	
Mt. Penn Municipal Water Authority	x			
Muhlenberg Township Authority	x			
North Heidelberg Water System	x			
Oley Township Municipal Authority	x			
Ontelaunee Township Municipal Authority				x
PA American-Glen Alsace	x			
PA American-Golden Oaks			x	
PA American-Penn District	x			
Perry Township Municipal Authority				x
Reading Area Water Authority	x			
Shillington Municipal Authority				x
Shoemakersville Borough Water System		x		
Urban Acres MHP			x	
Valley View MHP Blandon			x	
Village at Pleasant Hills			x	
Wernersville Municipal Water Authority	x			
West Reading Borough Water				x
Western Berks Water Authority	x			
Womelsdorf-Robesonia Joint Authority	x			
Wyomissing Borough Water System				x
TOTALS	18	3	9	6

*NOTE: Bold-faced italicized authorities had SWPs in place in 2008 when the first State of the Environment report was issued.

Water Indicator Four

STATUS OF SEWAGE FACILITY PLANS (MUNICIPAL 537 PLANS)

Whenever people live in close proximity, they must address two basic environmental concerns: access to clean drinking water and the treatment/disposal of sewage. While the original Berks County settlers might have been able to rely on a well and an outhouse to meet these needs, increased population and density requires more comprehensive planning to protect human health and water resources.

A 537 Plan is a Wastewater Management Plan that complies with the requirements of Act 537, the Pennsylvania Sewage Facilities Act. Act 537 was enacted in 1966 to correct existing sewage disposal problems and to prevent future problems by requiring proper planning and permitting for all types of sewage facilities ranging from municipal wastewater treatment plants to individual on-lot disposal systems (septic systems).

Under Act 537, all municipalities must develop and implement an official sewage plan that addresses current and future sewage disposal needs. These 537 Plans may require occasional revision due to new land development projects or other changes in demands on a municipality's sewage disposal capabilities. Changes in municipal 537 Plans are reviewed by the Pennsylvania Department of Environmental Protection (PA DEP). The chart below lists the "ages" of Berks County 537 Plans, a measure of how long the plan has gone without revision.

What the data tells us

Because 537 Plans only need to be revised when a municipality's sewage disposal needs change, an "older" 537 Plan is not necessarily outdated. However, revisions to 537 Plans generally incorporate technical improvements to reflect current best practices.

How do we make things better

Everyone should recognize that using less water means reducing the amount of wastewater that needs to be treated, either in an individual on-lot system or in a public wastewater treatment plant. Conserving water is an important first step we can all take.

Property owners with on-lot septic systems can practice good management by having their systems pumped out on a regular schedule. On-lot septic systems serving individual residences should be pumped out every 3 to 5 years, depending on the number of users. However, because some municipalities may have ordinances specifying pump-out intervals for on-lot septic systems, it is good practice to consult your municipal officials before setting your schedule.

AGE OF MUNICIPAL 537 PLANS

Legend: ■ 2009 Plans ■ 2018 Plans
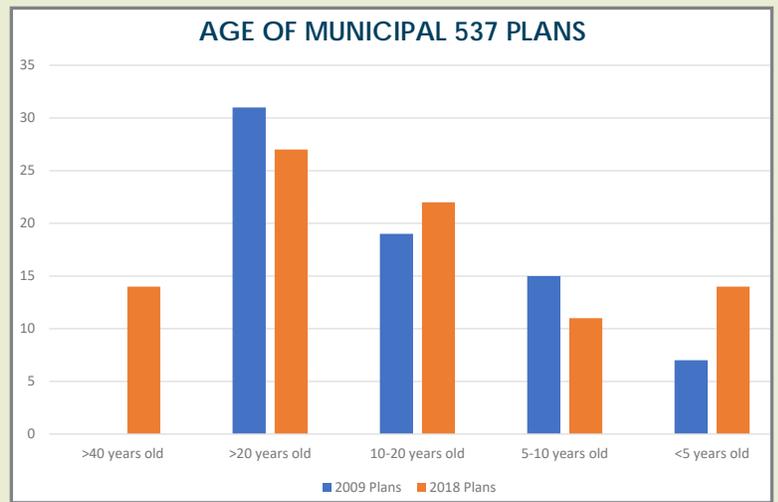
Most Berks County 537 Plans are more than 10 years old and several are more than 40 years old, but 14 municipalities have updated their plans within the past five years.

Tips to Care for your SEPTIC TANK

- Divert rainwater from the septic drain field. A soggy drain field won't absorb and neutralize liquid waste. Plan landscaping and roof gutter drains so that excess water is diverted.
- Perform regular maintenance. Check with a professional to see how often you need to clean out your septic tank.
- The toilet is not a garbage disposal. Never flush medicine, cat litter, disposable diapers, sanitary napkins, tampons, paper towels, facial tissues, coffee grounds, or cigarette butts.
- Keep trees at least 100 feet away from the septic system. Tree roots that invade your septic system can do major damage.
- Avoid hazardous chemicals. Varnish, paint thinners, motor oils, gasoline and other chemicals can ruin your system and are a hazard to groundwater. Dispose of them properly.
- The septic drain field should be graded so that stormwater does not accumulate on the drain field.

INDIVIDUAL ON-LOT SYSTEMS

Municipalities or local agencies are required to employ Sewage Enforcement Officers (SEO's) who are certified by the state and are responsible, among other duties, for reviewing permits for construction of on-lot septic systems.

GOVERNOR MIFFLIN DIVES INTO WATER EDUCATION

Under the direction of Bill McKay, the Assistant Superintendent for Elementary Education, the Governor Mifflin School District is working hard to ensure that future leaders of Berks County understand the importance of enhancing and protecting our local water quality.

Working closely with Larry Lloyd (Berks Nature), Stan Kemp (Angelica Creek Watershed Association), and others, students and teachers from all six Governor Mifflin schools are diving in to a variety of projects to protect and celebrate the Angelica Creek Watershed. The projects include:

Naming an Unnamed Tributary

Recognizing that people have a stronger connection to bodies of water when they can call them by name, Governor Mifflin worked with the Angelica Creek Watershed Association to name a formerly unnamed tributary of Angelica Creek. After students and members of the community brainstormed names and voted online, the U.S. Geological Society (USGS) officially named the tributary "Rabbit Run" in 2016. The tributary, named after one of world-famous Shillington author John Updike's novels, runs through several of the Governor Mifflin campuses before connecting to Angelica Creek.

Building a Riparian Buffer

After naming the tributary, Governor Mifflin focused on improving it. Working closely with Berks Nature throughout the 2017/2018 school year, the High School students researched and designed a riparian buffer to protect Rabbit Run. The Middle School students dug holes for almost 100 trees and the Elementary School students came along and planted the trees. The trees will provide shade to keep the water cool enough to support plant and animal life.

Other Elementary School students built and installed bluebird boxes along the edges of the buffer. In addition to providing nesting places for the birds, the boxes serve as a visual reminder for the groundskeepers not to cut the grass near the water. The long grass and the trees help stabilize the stream bank and help prevent soil and other pollution from washing into the stream.

To further enhance the riparian buffer, the students planted several pollinator gardens to attract bees, butterflies, and beneficial insects.

Celebrating Angelica Creek

To help the Governor Mifflin community understand and appreciate the connection between the Rabbit Run tributary and Angelica Creek, the school district hosted a regatta. Elementary and Middle School students designed and built small boats and other watercraft to race down Angelica Creek. The event attracted hundreds of people to Angelica Park and Berks Nature's The Nature Place to enjoy the competition and to learn about ways to protect our waterways.

Educating the Public

While the next phases of the Governor Mifflin water quality project are still being developed, teachers are already planning to help students educate the public about what they can do to protect local water quality. They are considering projects that teach neighbors along Rabbit Run and Angelica Creek what they can do to make a difference, including encouraging neighbors not to dump grass clippings in the water and to instead plant their own riparian buffers. To recognize the value of the school district's efforts to protect drinking water, the Schuylkill Action Network presented Governor Mifflin School District with its "Protecting Our Water" award.

Water Indicator Five
AQUATIC LIFE IN STREAMS

One important measure of stream health is whether the stream supports a diverse community of plants and animals. Animals like frogs and salamanders, that typically spend some or all of their lifecycles in fresh water are good indicators of stream health.

Scientists also focus on macroinvertebrates, organisms large enough to be seen by the naked eye (although a magnifying lens is helpful). Macroinvertebrates include flatworms, snails, clams and insects, such as dragonflies and mayflies. They can be collected and counted using nets. After they are counted and identified, the data can be evaluated using a variety of ecological measures.

The Stroud Water Research Center in Avondale, PA, has implemented a long-term assessment of streams in the Schuylkill River Basin, sampling benthic macroinvertebrates at more than 60 locations. The data are assessed using the Macroinvertebrate Aggregated Index for Streams (MAIS), which combines or aggregates several conventional ways of assessing the health of a stream's invertebrate community.

MAIS scores range from 0 to 20 with higher scores indicating a higher quantity and diversity of aquatic life and, therefore, higher water quality. The scores are divided into "good," "fair," and "poor" based on the following ranges:

MAIS Classification	MAIS Score Ranges
Good	13.1 – 20
Fair	6.1 – 13
Poor	0 – 6

Benthic macroinvertebrates are animals without backbones living on the bottom of streams and ponds. This group includes crayfish, snails, clams, and many immature forms of insects (e.g., mayflies, caddisflies, gnats, midges, dragonflies).

Only 34% of the stream monitoring locations fall within the "good" rating in the MAIS classification system.

What the data tells us
Only 34% of the stream sampling sites fall within the "good" rating under the MAIS classification system. Most of the sites fall within the "fair" rating, but 7% fall under the lowest rating of "poor." There is certainly room for improvement.

How do we make things better?
Surface water quality is highly dependent on what is happening in the surrounding watershed, the land area that is the source for the water in the river, stream, or tributary being evaluated.

The following activities can help increase aquatic life in streams, which is an important indicator of water quality:

- Eliminate or reduce the use of lawn and farm fertilizers, which can increase algae growth in water and may promote episodes of low oxygen in streams;
- Avoid improper disposal of motor oils, antifreeze, and other chemicals that can enter streams from roadside culverts and drains;
- Plant trees and leave the grass uncut along the edges of streams to help reduce water temperatures and decrease soil and other pollutants from entering the water;
- Raise the blades on your lawnmower to allow grass to grow longer and establish "no mow zones" on your property to allow more water to infiltrate into the soil and groundwater, both of which act as filters before the water enters local streams.

The table on the next page details the Stroud Water Research Center MAIS data for the stream monitoring locations within Berks County. The locations include spots along Manatawny Creek, Hay Creek, Maiden Creek, Northkill Creek, Tulpehocken Creek.

STORIES FROM THE COMMUNITY
MASTER WATERSHED STEWARD PROGRAM

Berks County's Master Watershed Steward Program, part of a statewide Penn State Agricultural Extension Service program, launched in August 2016.

After 40 hours of training and passing an exam, volunteers spread across the county as "citizen scientists" to enhance and protect the quality of Berks County's water through activities such as:
- Organizing stream cleanups
- Creating rain gardens
- Planting trees
- Building and installing rain barrels
- Monitoring water quality
- Installing riparian buffers along lakes, rivers, and streams
- Educating the public

Under the leadership of Karin Wulkowicz, the program graduated its first group of Master Watershed Steward volunteers in June 2017 with a second class the following year. Thirty-nine people in Berks County have completed the necessary training and are now volunteering throughout the community.

Additional volunteers are always welcome. Information on joining the program can be found on the Penn State Extension Master Watershed Steward website at https://extension.psu.edu/programs/watershed-stewards/counties/berks.

STROUD WATER RESEARCH CENTER MAIS DATA FOR BERKS COUNTY

Stream	Brief Site Description	MAIS average (2013-18)
Furnace Creek	Furnace Rd. & Freeman St.	14.6
Hay Creek	Birdsboro Park on Hay Creek Rd.	10.4
Hay Creek	Mountz Rd. near Weaver Rd./Furnace Rd.	8.6
Hay Creek	Hay Creek at Hay Creek Rd. near Rock Hollow Rd.	11.6
Hay Creek Tributary (unnamed tributary outfall from Grace Mines pond)	Tributary to Hay Creek at Mountz Rd. near Weaver Rd./Furnance Rd.	11.7
Hay Creek Tributary (unnamed tributary to Beaver Run)	Hay Creek (unnamed tributary to Beaver Run) at Buck Hollow Rd. near Mayfair Dr.	17.0
Irish Creek	Irish Ck Rd. near Blarney Circle	11.2
Laurel Run (downstream)	Mt Laurel Ave. & Hill Crest Ave.	6.8
Laurel Run (upstream)	Mt Laurel Ave. & Hill Crest Ave.	9.9
Lesher Run	Skyline Dr near Haftzingertown Rd.	8.7
Licking Creek	Bright School Lane & Snyder School Rd.	10.6
Licking Creek	Snyder School Rd. & N. Garfield Rd.	6.8
Maiden Creek (downstream)	Rt. 143 & Sousley Rd.	15.4
Maiden Creek (upstream)	Rt. 143 & Sousley Rd.	17.2
Maiden Creek	At Dunkels Church Rd. & Rt.143	15.0
Maiden Creek (unnamed tributary - Manor Creek downstream of small tributary)	Kunbels Dahl Rd. near Baily Rd. (Brown property) - downstream of tiny tributary	6.3
Maiden Creek (unnamed tributary - Manor Creek upstream of small tributary)	Kunkels Dahl Rd. near Baily Rd. (Brown property) - upstream of tiny tributary	6.2
Maiden Creek (unnamed tributary -small tributary to Manor)	Kunkels Dahl Rd. near Baily Rd. (Brown property)	3.2
Maiden Creek (unnamed tributary)	Rt.143 & Hawk Mountain Rd.	5.6
Maiden Creek (unnamed tributary)	Kempton Fire Co, Rt.143 & Rt.737	9.9
Maiden Creek (unnamed tributary)	Hass Rd. (Adams Farm)	9.9
Maiden Creek (unnamed tributary)	Ontelaunee Trail (Schroeder Farm)	8.6
Maiden Creek Tributary	Dreibelbis Rd. & Hein Rd. near Yeager Rd.	11.1
Maiden Creek Tributary (Furnace Creek)	Rt.143 & Old U.S. 22	12.4
Maiden Creek Tributary (Hill property)	Ontelaunee Trail near Farview Rd. & Rt.143	7.9
Maiden Creek Tributary (Moyer property)	Rt. 143 & Sousley Rd.	14.8
Maiden Creek Tributary (Pine Creek)	Hemlock Springs Rd. & Hawk Mnt Rd.	12.9
MaidenCreek Tributary (Blue Rocks)	Rt. 143 & Blue Rocks Rd. & Mountain Rd.	15.0
Manatawny Creek	Near Fisher's Mill Rd. & Manatawny Rd.	13.9
Manatawny Creek	Mudd Run Rd. near Herbien Rd.	8.2
Manatawny Creek	Manatawny Rd. near Park Rd.	10.2
Manatawny Creek	Glasgow St. bridge near Manatawny St. & Glasgow St.	10.6
Manatawny Creek (unnamed tributary)	Bertolet Mill Rd. (US Oley Valley Youth League)	7.8
Manatawny Creek Tributary (Pine Creek)	Longlane Rd. & Heiligs School Rd.	15.8
Manatawny Creek Tributary (Pine Creek)	Longlane Rd. & Mill Rd.	17.0
Manatawny Tributary (Trout Run)	Manatawny Rd. near Longview Rd.	16.0
Mill Creek Tributary (Yonkers property)	Hottenstein Rd. & Gun Club Rd.	15.4
Mollhead Creek	Pinehill Rd. & Old US 22	16.1
Mollhead Creek	Tully Dr & Pinehill Rd.	14.7
Monocacy Creek	Benjamin Hwy near Limekiln Rd.	8.9
Moselem Creek (downstream of golf club)	Moselem Spring Rd. & Forgehill Rd.	8.6
Moselem Creek (upstream of golf club)	Moselem Spring Rd. near Mine Rd.	6.8
Northkill Creek	Northkill Rd. & Feick Dr.	12.7
Northkill Creek	Shartlesville Rd. near Irish Creek Rd.	13.7
Northkill Creek	Northkill Rd. & Campsite Rd.	12.8
Perkiomen Creek	MSSC1 control on West Br. Perkiomen on Mensch Mill Rd. near Long Lane.	8.2
Plum Creek	MSLC1 control headwaters of Plum Creek on Plum Rd. near Ernst Rd.	12.1
Punches Run	Nolde State Park on Nolde Park Lane near New Holland Rd.	16.9
Sacony Cree	Bowers Park at Bowers Rd. & Fleetwood Rd.	8.7
Sacony Creek	Dunkles Church Rd. & Front St.	13.8
Saucony Creek	Smoke Town Rd. & Sally Ann Furnace Rd. (Dent Farm)	11.5
Saucony Creek	Deysher Rd. (Martin Farm)	6.8
Saucony Creek	Kohler Rd. at Kutztown Elementary School	6.0
Sixpenny Creek	Rt345 (Chestnut St.) near Davidheiser Rd.	14.1
Spring Creek	Tributary to Spring Creek at Peacock Rd.	12.0
Spring Creek	Meadow Rd. at Clover Hill Vineyards	9.4
Spring Creek	Milestone Rd. near Heidel Rd.	10.2
Stoney Run (unnamed tributary)	Oswald Rd. & Dotterer Rd.	13.0
Tulpehocken Creek	Station Rd. near Christmas Village Rd.	5.4
Wyomissing Creek (upstream)	Wyomissing Rd. near Vermont Rd.	16.6
Wyomissing Creek (downstream)	Wyomissing Rd. near Vermont Rd.	18.6

STORIES FROM THE COMMUNITY
BERKS NATURE AND DRWI PARTNERS
WORKING WITH FARMERS FOR CLEANER WATER

It's been called the "bread basket" of colonial America, containing some of the most fertile farmland in the Delaware River basin- of which the Schuylkill River is the largest tributary. The Middle Schuylkill Cluster covers more than 500,000 acres, including much of Berks and Montgomery counties, as well as parts of Bucks, Lebanon and Lehigh Counties.

Berks Nature is proud to be a partner in cleaning up its water through the Delaware River Water Initiative, a new chapter in a long, proud history of local leaders championing clean water. In the 1730s, Benjamin Franklin led a petition drive to stop tanneries from dumping chemicals into a tributary of the Delaware. In the 1800s, significant conservation efforts took root in the Brandywine Valley, the Poconos and the Catskills.

Now, local leaders are building on this legacy of conservation. The Delaware River Watershed Initiative, created and funded by the William Penn Foundation, unites more than fifty organizations, including Berks Nature, along with countless home and landowners working to protect forests and farms, clean up streams, and make our cities and suburbs greener. From the New Jersey Highlands to the Pine Barrens, Pennsylvania farm country to Philadelphia and the bay, the Delaware River Watershed Initiative is bringing people together to ensure swimmable, fishable, drinkable water for the 15 million people who depend on the Delaware River for years to come.

Here in the Middle Schuylkill Cluster, Berks Nature is working on the ground with partners from Stroud Water Research Center and the Partnership for the Delaware Estuary, through grant support from the William Penn Foundation. Most importantly, our relationships with willing landowners makes all of this important restoration work possible.

The Schuylkill River that flows through this cluster is the Delaware River's largest tributary. Among the Schuylkill's largest tributaries, Perkiomen, Maiden, Tulpehocken, Manatawny and Monacacy creeks all flow through Berks County.

The Middle Schuylkill Cluster contains 1,191 miles of streams, including 182 miles of High-Quality and Exceptional-Value streams that drain from the most-heavily forested lands. These important ecological and recreational resources support the greatest diversity of aquatic and terrestrial plant and animal life, and are popular fisheries for wild and stocked trout.

We're looking out for clean water for you!

Proud to be part of the Delaware River Watershed Initiative.

#4states1source
www.drwi.net

The cluster also provides drinking water to more than 350,000 people nearby and downstream in Philadelphia. Intense land and water use have so degraded 352 miles (29 percent) of these waterways that they are on Pennsylvania's list of officially impaired streams. Hundreds of additional stream miles are also measurably degraded.

Agriculture, as the dominant land use, generates most of the impairments to Middle Schuylkill streams, in the form of nutrient loading, stormwater pollution and excessive sedimentation. Together with our partners at Stroud and PDE, we're working to reduce the environmental stressors associated with agricultural practices through better land and water use, and protection of priority areas. Focus watersheds include parts of Maiden Creek (including Saucony Creek), parts of Tulpehocken Creek (including Licking Creek, Spring Creek and Northkill Creek), Manatawny Creek and Upper Perkiomen Creek (home to the currently impaired Green Lane Reservoir).

Since the inception of the project, the Middle Schuylkill organizations and partners have worked with dozens of farms, installing hundreds of best management practices (BMPs) and forested stream buffers. We're looking forward to entering Phase II of our plan in the Middle Schuylkill, and working to make sure we all have access to clean water- from Berks to Philadelphia, and everywhere downstream.
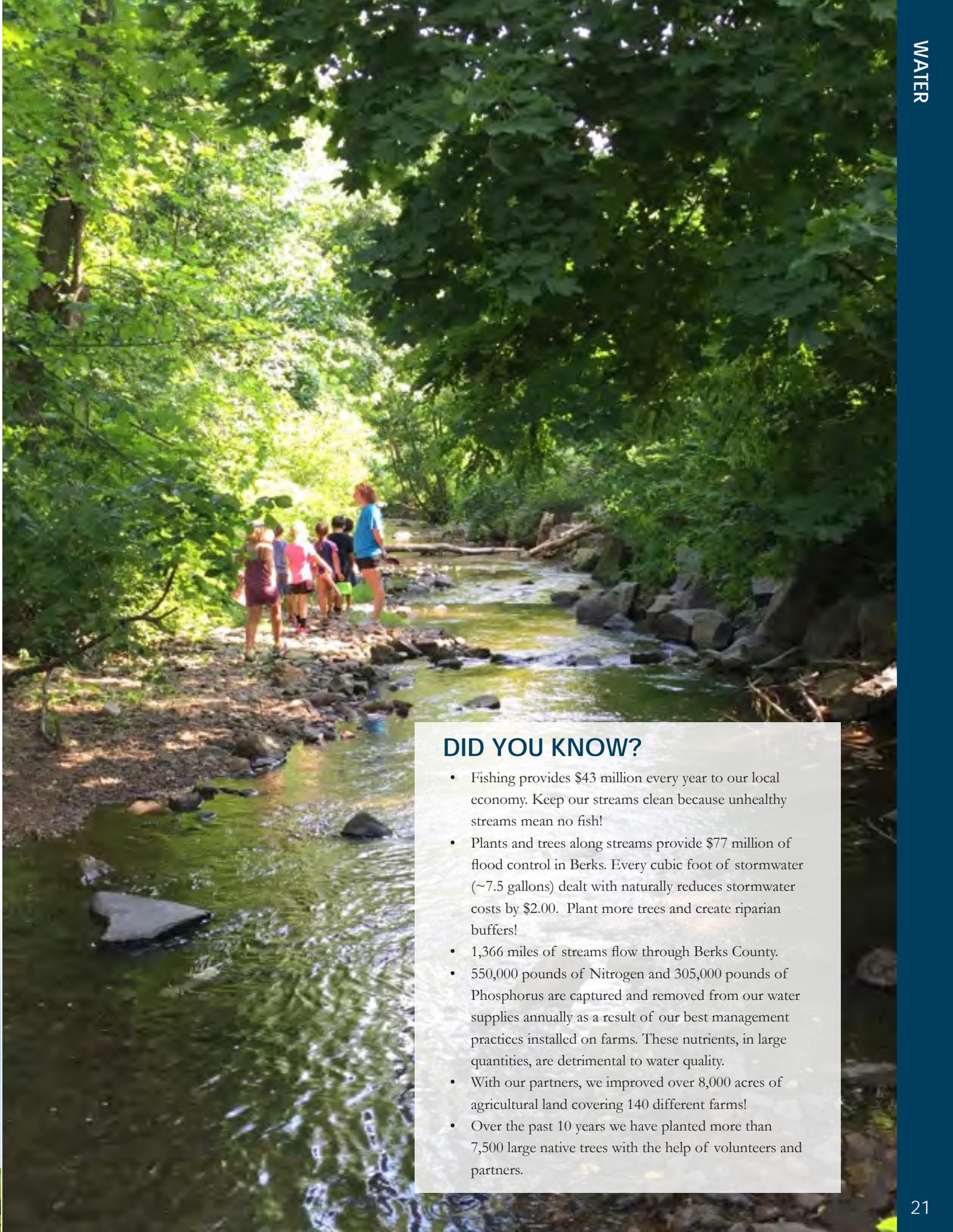
DID YOU KNOW?

- Fishing provides $43 million every year to our local economy. Keep our streams clean because unhealthy streams mean no fish!
- Plants and trees along streams provide $77 million of flood control in Berks. Every cubic foot of stormwater (~7.5 gallons) dealt with naturally reduces stormwater costs by $2.00. Plant more trees and create riparian buffers!
- 1,366 miles of streams flow through Berks County.
- 550,000 pounds of Nitrogen and 305,000 pounds of Phosphorus are captured and removed from our water supplies annually as a result of our best management practices installed on farms. These nutrients, in large quantities, are detrimental to water quality.
- With our partners, we improved over 8,000 acres of agricultural land covering 140 different farms!
- Over the past 10 years we have planted more than 7,500 large native trees with the help of volunteers and partners.

Energy

Do you know where your energy comes from when you turn on the television or turn up the air conditioning? What is the easiest way to reduce electricity use at home? At work? What is the fuel efficiency rating for your car or truck? How many miles per gallon (MPG) does your vehicle get in a typical month? How does the MPG you get compare with others? Are you spending more on electricity and gasoline than your neighbors?

Electricity is generated by a variety of different sources: coal, oil, natural gas, nuclear, hydropower, wind, solar, and other renewable sources. The full impacts of our energy decisions can be challenging to examine in a study like this because of the many factors involved -- gathering the fuel, turning the fuel into power, and delivering it to our homes and businesses. Even though we may not be able to determine the specific energy source powering our lives, we can study the different types of energy sources, how much is being generated and how much energy and fuel we consume.

Knowing what activities consume the most energy will help consumers identify how to prevent waste, reduce their fuel and electricity costs and increase their overall energy efficiency.

Consumers are not the only ones concerned about reducing fuel and electricity use. Businesses, manufacturers, and governments are also motivated to reduce their operating costs by using less energy.

In addition, the companies who generate electricity have a responsibility to provide economical, environmentally sound, and resourceful solutions for the public.

Our Energy indicators for this report include the following:
- Vehicle Miles Traveled Per Year
- Residents Using Public Transportation
- Electricity Generation and Use
- Household Energy Use
- Green Certification Construction

Energy Indicator One
VEHICLE-MILES TRAVELED PER YEAR

Commuting to work is a necessity for most Americans and Berks County residents are no exception. In 2017, the U.S. Census Bureau estimated that Berks County residents spend 24.8 minutes commuting to work, which is just under the average Pennsylvanian time of 26.5 minutes.

Traffic reports each morning and afternoon warn us of congested traffic areas and accidents when our commuting time can be extended even further. With only 8.7% of Berks County residents carpooling and only 1.4% using public transportation, roads will continue to be crowded with single passenger vehicles.

The amount of fossil-fuel needed to drive our vehicles is one area that we can control. We can choose to reduce the amount of fuel we use and the amount of air pollution we generate because we control the fuel efficiency of the vehicles we drive. We can choose to drive more efficient vehicles or to drive less-polluting electric vehicles. We can also control the amount of miles we travel on a daily, weekly or monthly basis.

The Pennsylvania Department of Transportation (PennDOT) tracks vehicle miles traveled per year on a county-wide basis. The graph below shows how Berks County compares with residents across Pennsylvania.

What the data tells us

The data from 2003 to 2016 indicate that Berks County residents have been less successful reducing the number of miles they travel than other residents across Pennsylvania. Berks County residents might be traveling further within or outside the county for work, recreational activities, and shopping than the average Pennsylvanian. By increasing carpool rates and focusing more locally for shopping and recreation, Berks County can reduce the average miles traveled per resident.

Berks residents are not reducing the average miles traveled per resident as rapidly as others across the state.

How do we make things better

- Start a carpool at work.
- Make several errands in one trip.
- When possible, buy local goods and services.
- Explore the local Berks County's parks and recreational areas instead of traveling a long distance.
- Ride your bike, walk, or use the bus for short trips.
- Encourage your children to take the bus to school.

VEHICLE MILES TRAVELED PER CAPITA
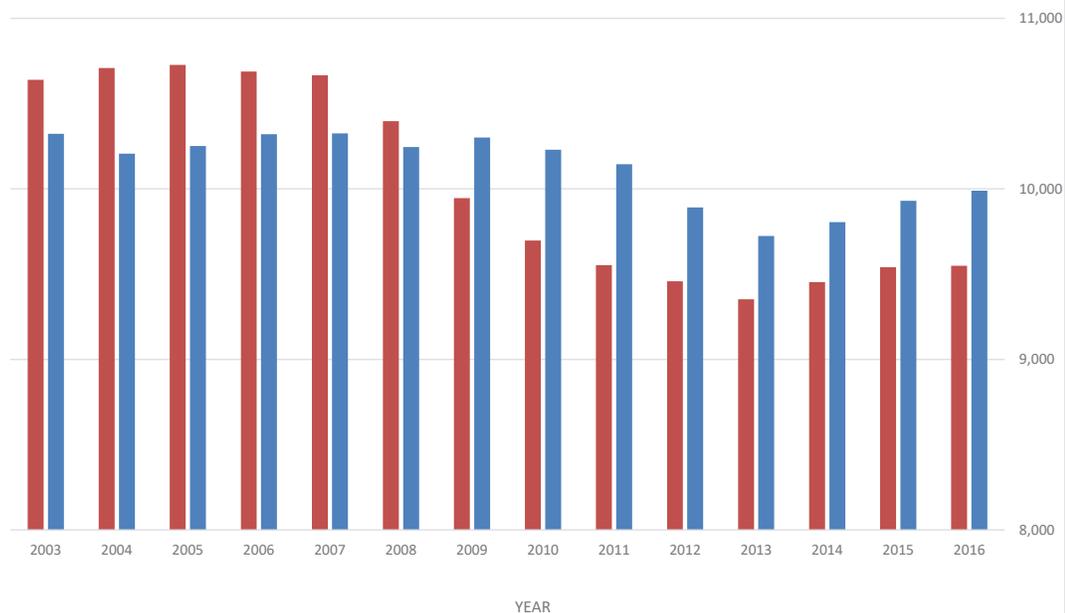
RESIDENTS USING PUBLIC TRANSPORTATION

Another way to reduce fossil fuel consumption is to take public transportation rather than driving your own vehicle. The Berks Area Regional Transportation Authority (BARTA) makes travel throughout the greater Reading area convenient, allowing people to avoid traffic hassles and to make their commutes more relaxing or productive.

Unfortunately, only 1.4% of Berks County residents use public transportation, which is well below the 5.6% average for Pennsylvania. In the City of Reading, 6.7% use public transportation, which is still below where we would like to be.

Berks residents use public transportation less than the PA average.

What the data tells us

BARTA reviews ridership trends and changes routes to meet the community's evolving needs, but ridership remains below the national and state averages because Berks County residents continue to use their personal vehicles.

BARTA RIDERSHIP (NUMBER OF PASSENGERS)

Legend: Fixed Route, Special Services
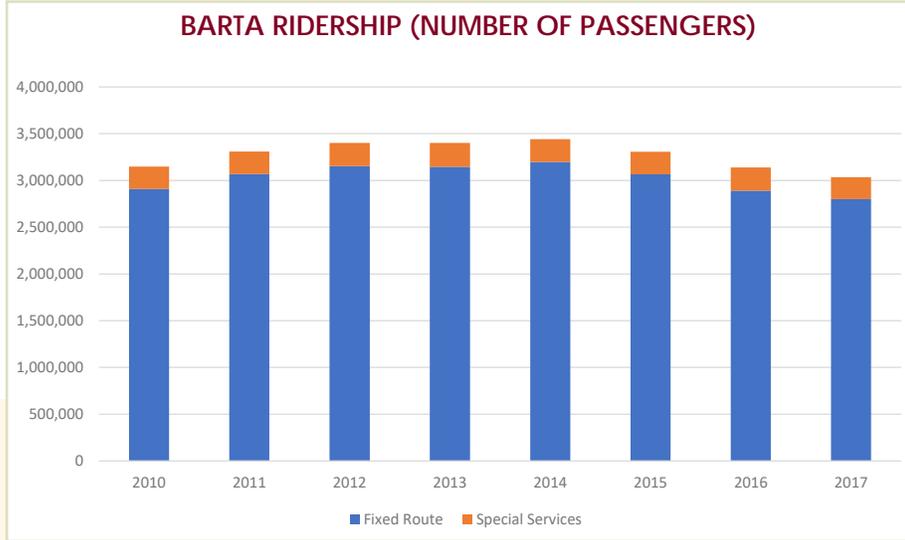
How do we make things better

- Use bus transport for traveling around town.
- Familiarize yourself with BARTA routes and bus stop locations.
- Avoid paying parking fees by using public transportation to special events: concerts, NYC or Philadelphia trips, college sporting events.

Did you know? More than 85% of employees at the DoubleTree by Hilton Hotel in Reading walk to work.

FIND ANOTHER WAY TO WORK WITH COMMUTER SERVICES OF PENNSYLVANIA

One of the most polluting things that many of us do on a daily basis is drive to work, alone, in a gasoline- or diesel-powered car or truck. It creates air pollution. It creates traffic. And it is expensive. To combat the environmental, social, and financial ills of commuting alone, Commuter Services of Pennsylvania works with individuals and employers to find more cost effective and efficient modes of transportation.

Some of their most popular programs include:

- Emergency Ride Home: Anyone who registers and tracks their 'green' commute to work (taking the bus, carpooling, biking, or walking) who needs an emergency ride home because of illness, family emergency, or unscheduled mandatory overtime can get the cost of the emergency ride reimbursed through Commuter Services. They cover up to six rides and up to $100 per ride each year.
- Carpooling: Commuter Services has a matching service to help people create carpools or participate in vanpools throughout a 13 county region, including Berks County. No matter where you work or live in the region, they can help you find people to share a ride to and from work.
- Public Transportation: Commuter Services works with employers and employees to make it easier to take public transportation to and from work. They have even worked with employers to get buses re-routed to make it easier for employees to take the bus to work.

- Commute PA SmartPhone App: The Commuter Services app makes it easy for commuters to track their commutes and to earn points for carpooling, taking public transportation, bicycling, walking, or working from home (telework). The points can be redeemed at hundreds of participating restaurants, retailers, entertainment venues and others.

Employers and Employees Benefit

Growing numbers of employers are working with Commuter Services because employers who make it easier to get to and from work have employees with lower transportation-related absenteeism and tardiness issues. Employees love it because it is easier to get to work to earn a paycheck and the cost savings mean that employees can keep more of their paychecks in their pockets. Some of the local Berks County businesses that have worked closely with Commuter Services to provide these benefits to their employees include:

- Albright College
- Dollar General
- Fleetwood Fixtures
- Sweet Street Deserts
- Reading Area Community College
- Alcon Laboratories
- East Penn Manufacturing
- Pet Smart
- Tower Health

COMMUTER SERVICES OF PENNSYLVANIA   www.pacommuterservices.org

STORIES FROM THE COMMUNITY
PENSKE RACING SHOCKS' BIKE CULTURE

Penske Racing Shocks is known world-wide for designing and manufacturing customized shock absorbers for high-performance racecars, motorcycles, and off-road vehicles. Their downtown Reading headquarters, located near the Reading Area Community College, is full of racing trophies and pictures of winning race teams. Penske Racing Shocks' experts and support vehicles are seen at major motorized racing events all over the world on any given weekend. The company supplies professional racing teams in Formula One, IndyCar, NASCAR, drag racing, motorcycle, and dirt track racing to name a few.

While known for its motorized racing culture, the parking lot at Penske Racing Shocks includes, perhaps surprisingly, a dozen or more bicycles. Tucked inside one of the garages, a variety of high-performance bicycles are securely stored in bicycle racks. There is a group of employees who regularly ride from downtown Reading all around Mount Penn and Neversink Mountain for fun. Several of the employees also use their bikes to commute to and from work.

Jim Arentz, Penske Racing Shocks technical director and an almost 25-year employee of the firm, rides his bike to work almost every day throughout the year. His 13-mile roundtrip ride from the Sinking Spring area takes him about 20-minutes. Another employee, Shelly Kreiser, rides 24-miles roundtrip from Wernersville about twice a week. A few other employees ride occasionally.

PENSKE
RACING SHOCKS®

When asked, Jim and Shelly both emphasize the health benefits of riding to work. Jim, who weighed 235-pounds 10 years ago, is now a svelte 180 pounds. Shelly started riding when a doctor prescribed blood pressure and cholesterol medications. Riding to work a few times a week turned out to be the only medicine she needed.

"I feel more alive on a bike," Shelly explained recently. "I see, smell, and enjoy things that I wouldn't even notice in a car." Jim agreed and talked about the "head clearing benefits" of commuting by bicycle.

Both also talked about the financial benefits of riding to work. They save a lot of money on gas. Jim says that he only fills his car up with gas about once a month and almost none of that gas is used to commute to or from work.

Despite the significant health and financial benefits of riding to work, both Jim and Shelly complained about the poor infrastructure for bicyclists. Jim reported having "close calls with careless or inconsiderate drivers at least once a week." There are very few dedicated bike lanes and relatively few bike paths when compared to other communities around the country. "Greater Reading could be doing a lot better," Shelly sighed.

GREATER READING
TRAILS

DID YOU KNOW?
The Greater Reading Trails Partnership prioritizes and implements projects to help make trails accessible and safe in our community.

MAKE BERKS COUNTY "BICYCLE FRIENDLY"

The League of American Bicyclists awarded three local "Bicycle Friendly" designations for organizations or communities that have taken steps to promote biking to work and cycle-friendly recreation:

- Reading Eagle – Gold (since 2015)
- Penske Racing Shocks – Silver (since 2015)
- City of Reading – Bronze (since 2015)

The League, a nonprofit focused on creating safer roads, stronger communities, and a bicycle-friendly America, has several recommendations for improving local cycling conditions:

- Expand the bike network with more trails and designated bicycle lanes
- Provide bicycle commuting classes to teach commuters ways to ensure their safety on the road
- Increase the number of bicycle friendly events and target women, seniors, and other demographic groups that have been less likely to embrace the benefits of bicycling
- Ensure that police officers enforce rules to protect cyclists
- Deploy public works officials to correct cycling hazards like potholes
- Design intersections, roads, and bridges to be more bicycle friendly

Bicycle Business is Booming

In the bicycling world, the Trek Bicycle Corporation is well known for its elite racing, road, and mountain bikes. Seeking ways to continually improve the performance of its own designs, Trek approached Penske Racing Shocks to collaborate on the development of new shock absorber technology for its mountain bikes. The team at Penske, which is full of bicycle enthusiasts, was more than happy to help.

To test prototypes, the Penske and Trek engineers rode the streets of Reading and the local trails along Blue Marsh, Mount Penn, and Neversink Mountain. The resulting shock technology can now be found on high-performance Trek mountain bikes.

Trek also partnered with Penske Racing Shocks and Tower Health to donate "Police Edition Trek Mountain Bikes" to local Berks County police departments. Over the past four years, they have donated bikes to Reading, West Reading, Wyomissing, Sinking Spring, and Spring Township.

"Every bike on the road is one less car on the road," said Mike Golembiewski, Berks County transportation planner and an avid bicycle commuter. Mike has been riding his bike the 2.5-miles to work for about seven years. "It takes about 15-minutes on the way to work and about 20-minutes on the uphill commute back home." Mike rides every day, rain or shine. He even has special studded tires for commuting in the snow. The Reading Area Transportation Study maintains a Bicycle & Pedestrian Transportation Plan to promote the provision of safe and secure bicycle and pedestrian facilities for all users in Berks County.

ELECTRICITY GENERATION & USE

There are different ways to generate electricity – burning coal or natural gas, nuclear, water flowing over a dam, wind, and solar, among others. Each has a different environmental footprint, meaning that each creates different levels of air pollution, global warming pollution, and other pollution.

The total amount of pollution we create from electricity generation depends on several factors including how much electricity we use and what method we use to generate it.

Burning coal, for example, creates significantly more air pollution and global warming pollution than burning natural gas. Nuclear energy creates even less air pollution and zero global warming pollution (carbon dioxide [CO_2] emissions), but there are concerns about the safe disposal of nuclear waste.

Wind and solar create the least amounts of air pollution and also create zero global warming pollution, but they are not completely pollution free and they are not always available because the wind is not always blowing and the sun is not always shining.

Berks County is a part of the Reliability First/Central – East (RFCE) Sub-Region of the US power grid. The region is grouped together by areas of similar weather conditions, energy resources and emissions. The charts below highlight how the RFCE electricity we use in Berks County was generated in 2005 and 2016. Note how the energy sources have shifted towards less polluting sources.
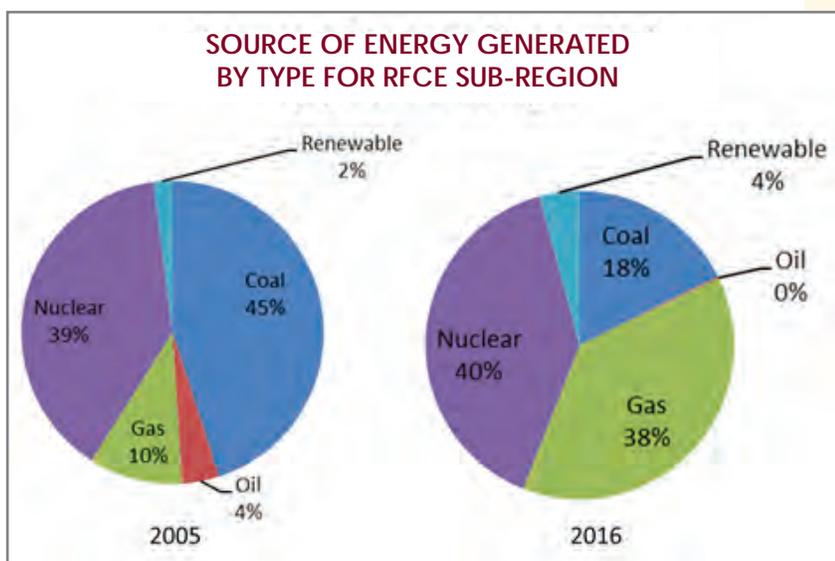
For each type of energy generation, the Department of Energy has calculated the amount of global warming pollution (CO2 emissions) released into the atmosphere for each unit of electrical power generated. By using this information and the percentage of each generation type in the chart above, we can calculate the amount of CO2 we emit for the electricity we use and compare that to other regions.

The chart below shows the amount of CO2 emitted for our RFCE region and compares it to both California (the commendable CAMX region), and the US average. The data shows that Berks County (the RFCE region) creates more global warming pollution per megawatt hour (MWH) of electricity than those living in California (the CAMX region). Berks County is, however, generating less global warming pollution than the national average.

SOURCE OF ENERGY GENERATED BY TYPE FOR RFCE SUB-REGION

2005: Renewable 2%, Coal 45%, Nuclear 39%, Gas 10%, Oil 4%

2016: Renewable 4%, Coal 18%, Oil 0%, Gas 38%, Nuclear 40%

TONS OF CO2 PER MWH GENERATED BY REGION

	2004	2005	2009	2012	2014	2016
BERKS	0.548	0.570	0.476	0.429	0.417	0.379
CALIFORNIA	0.440	0.360	0.331	0.325	0.285	0.264
US AVERAGE	0.685	0.670	0.619	0.582	0.563	0.52
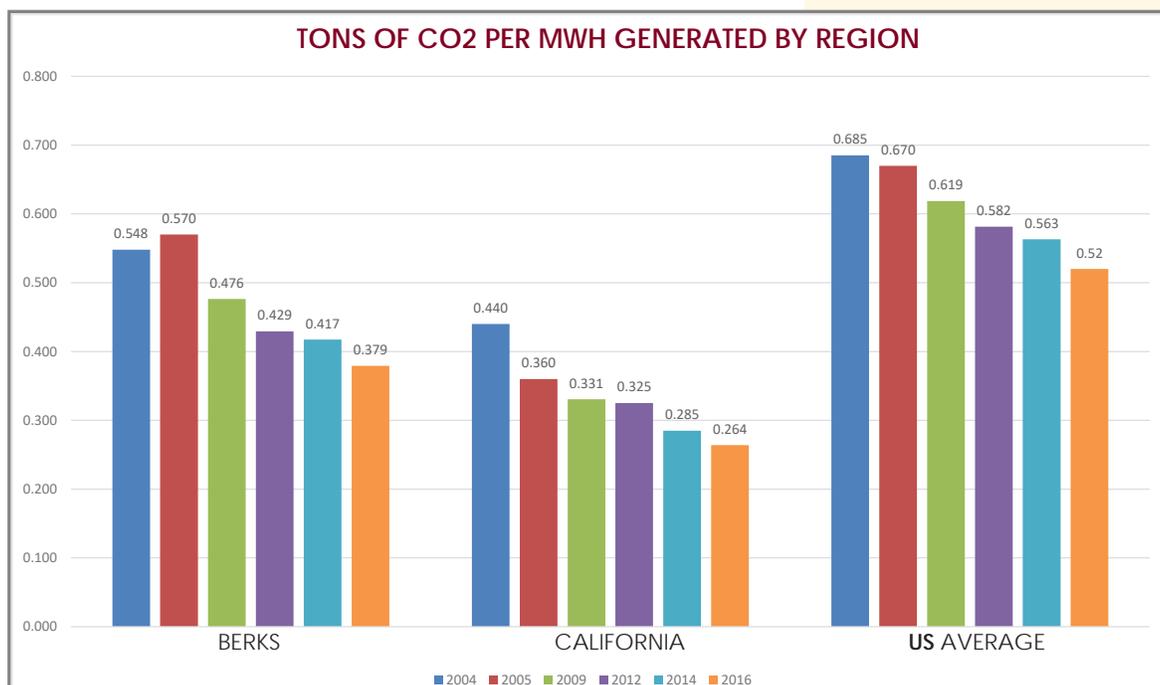
Another important measure for those worried about the environmental risks of electricity generation is the percentage of renewable electricity. Renewable electricity – electricity generated by wind, solar, and water – has fewer environmental risks than non-renewable sources like coal, natural gas, and nuclear.

The chart below again compares Berks County's renewable energy electricity percentages (RFCE) with California (CAMX) and the national average. It clearly shows that at only 4.2% renewables, Berks County is far behind the 18.1% national average and the 36.8% average in California.

What the data tells us

The RFCE region currently produces less global warming pollution (CO_2 emissions) per MWh when compared to the national average due to our reliance on nuclear energy, but this will change with the anticipated closure of the Three Mile Island nuclear plant and economic pressures potentially leading to the closing of other nuclear plants. The RFCE is also significantly behind the national average in renewables generation. This means that since we have not built any new nuclear reactors in decades and there are reactors closing, any increasing demand for electricity is being met with more polluting (higher CO_2 emitting) sources than are being used in other parts of the country. We need to increase the percentage of renewable energy being used in our region.

Berks County relies mainly on fossil fuel for energy with few renewable sources available.

How do we make things better

- Conserve electricity. Consider getting a home energy audit done to identify where you might be wasting energy.
- Use "smart" programmable thermostats that adjust the temperature (and lower your electricity costs) in your house when no one is home
- Research tax incentives for renewable energies available for your home, for example solar panels.
- Write to elected officials to request developing renewable energy generation in Pennsylvania.
- Ask your electricity provider if you can purchase Renewable Energy for your home.

For more information about renewable energy, visit the Mid-Atlantic Renewable Energy Association's (MAREA) website at www.themarea.org. MAREA is a nonprofit organization, dedicated to informing and educating the public on renewable energy production, energy efficiency, and sustainable living through meetings, workshops, educational materials, and energy fairs.

RENEWABLES GENERATION % BY REGION
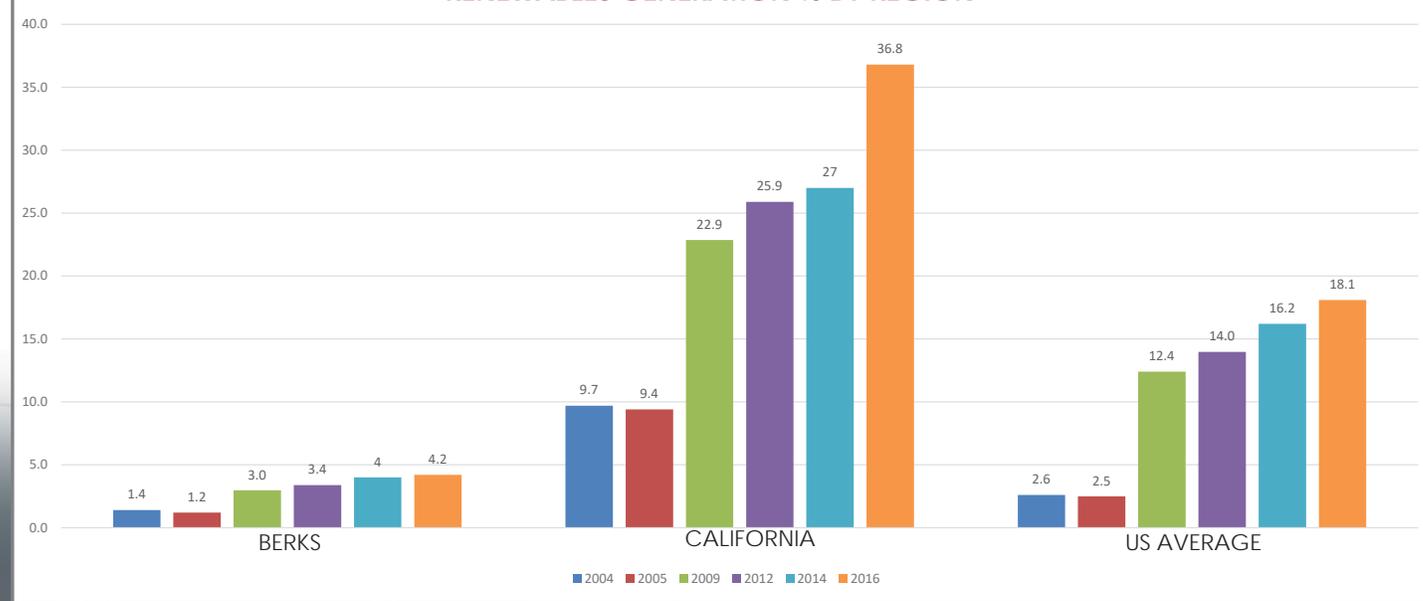
What do you mean by RENEWABLE ENERGY?

Renewable energy is energy generated from natural resources—such as sunlight, wind, rain, running water, tides, and geothermal heat—which are renewable or naturally replenished.

Solar Energy

The sun has produced energy for billions of years. Solar energy is the sun's rays (solar radiation) that reach the Earth. This energy can be converted into other forms of energy, such as heat and electricity. You can capture and convert solar radiation into useful forms of energy in two ways:

- Photovoltaic (PV devices) or "solar cells" change sunlight directly into electricity. PV systems are often used in remote locations that are not connected to the electric grid, although they can be found on the roofs of more and more homes and businesses throughout Berks County. They are also used to power watches, calculators, and lighted road signs.
- Concentrating Solar Power Plants generate electricity by using the heat from solar thermal collectors to heat a fluid which produces steam that is used to power the generator. Most of the large-scale plants are located in California, Nevada, and Arizona.

Wind Energy

Wind can be used to generate electricity by spinning a windmill that powers a turbine. Windmill sizes can vary greatly depending on available space and the generating needs. Small turbines used to power a single home or business can have a capacity of less than 100 kilowatts. Large commercial-sized turbines can have a capacity approaching 10 megawatts and are often grouped together into wind farms that provide power to the electrical grid.

According to the Pennsylvania Department of Environmental Protection (PA DEP), Pennsylvania remains a leader on the east coast of the United States in wind energy production. There 27 "wind farms" generating more than 1,300 megawatts of wind power generation capacity in Pennsylvania. They produce enough electricity to power nearly 350,000 Pennsylvania homes. For more information about wind energy, visit www.depweb.state.pa.us and type in the search: wind energy.

Geothermal Heat

While temperatures above ground change a lot from day to day and season to season, temperatures 10 feet below the Earth's surface hold nearly constant between 50° and 60°F. For most areas, this means that soil temperatures are usually warmer than the air in winter and cooler than the air in summer. Geothermal heat pumps use the Earth's constant temperatures to heat and cool buildings. They transfer heat from the ground (or water) into buildings in winter and reverse the process in the summer.

Geothermal heat pumps are energy efficient and cost effective. According to the U.S. Environmental Protection Agency (EPA), geothermal heat pumps are the most energy efficient, environmentally clean, and cost-effective systems for temperature control. Although most homes still use traditional furnaces and air conditioners, geothermal heat pumps are becoming more popular. One local example is Green Valley Elementary School in the Wilson School District. It uses geothermal heating, which boosts efficiency and reduces the operational costs of the school.

Energy Indicator Four
HOUSEHOLD ENERGY USE

MET-ED & PPL AVERAGE MONTHLY RESIDENTIAL SALES (PER CUSTOMER AVERAGES)

Met-Ed KWh/Month
PPL KWh/Month

PPL values: 976, 972, 960, 955, 963, 914, 958, 973, 964, 917, 896
Met-Ed values: 909, 911, 894, 906, 911, 882, 897, 888, 952, 907, 891

Years: 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
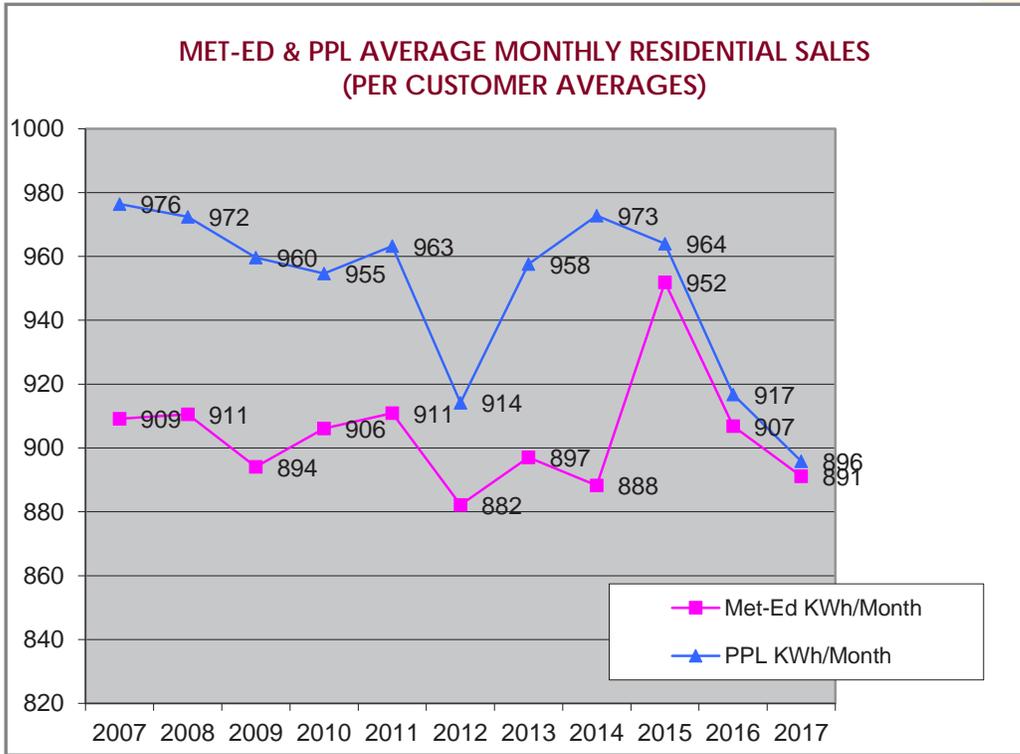
The typical Berks County home uses about 10,750 kilowatt hours (kWh) of electricity every year. Annual averages have come down slightly over the past decade as consumers switch to more energy-efficient lighting such as LED lightbulbs and as older appliances are replaced with more modern, energy-efficient ones. The graphs below highlight average monthly kWh usage for the electric utilities that serve Berks County.

Many consumers are surprised to learn what devices in their homes consume the most electricity. Based on U.S. averages from the U.S. Department of Energy, the typical home uses electricity in the following ways throughout the course of a year:

RESIDENTIAL ELECTRICITY USE PER HOUSEHOLD (2016)

Thousand Kilowatt Hours per Household
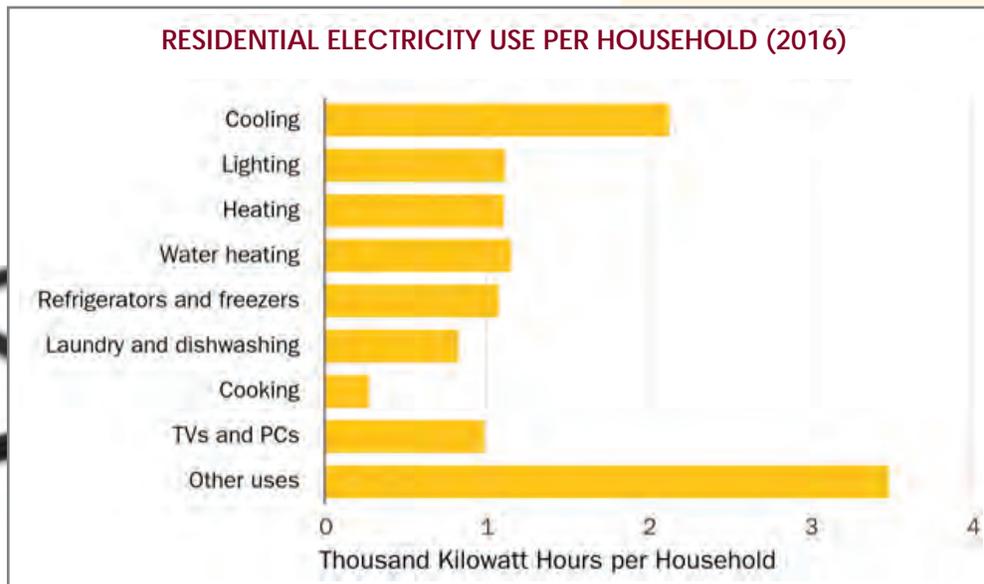
Note that heating and cooling requirements vary depending on where in the country a home is located. Homes in the northern parts of the country spend more energy on heating than cooling. The opposite is true in southern parts of the country where people spend more on cooling than they do on heating.

Across the country, however, the largest percentage of electricity use falls within the "other uses" category. This category includes lots of small "energy vampires" that use more electricity than we realize. A lot of these uses include the electric power plugs that we leave plugged in even when our cell phones, tablets, e-readers, and other rechargeable battery electronic products are not being charged. It also includes coffee makers, toasters, cable television boxes, wireless routers, stereos, "smart" speakers connected to the internet, and other small appliances and electronics that are using power even when they are turned off.

Residential heating accounts for a significant portion of household utility bills. Berks County residents have a variety of heating sources available for their homes, as demonstrated in the first chart on page 30. These sources may also be used for producing hot water. Space heating and water heating are typically half of your home energy use. For the average US citizen, the CO2 emitted by heating their home will be similar to the CO2 emitted by driving their car.

BERKS COUNTY RESIDENTIAL HEATING SOURCES (% FOR EACH SOURCE)

Chart: Percentage for each source, comparing 2000 and 2016, across Natural Gas, Fuel Oil, Electric, Liquified Petroleum Gas, Wood, Other. Y-axis 0 to 50.
Legend: ■ 2000 ■ 2016
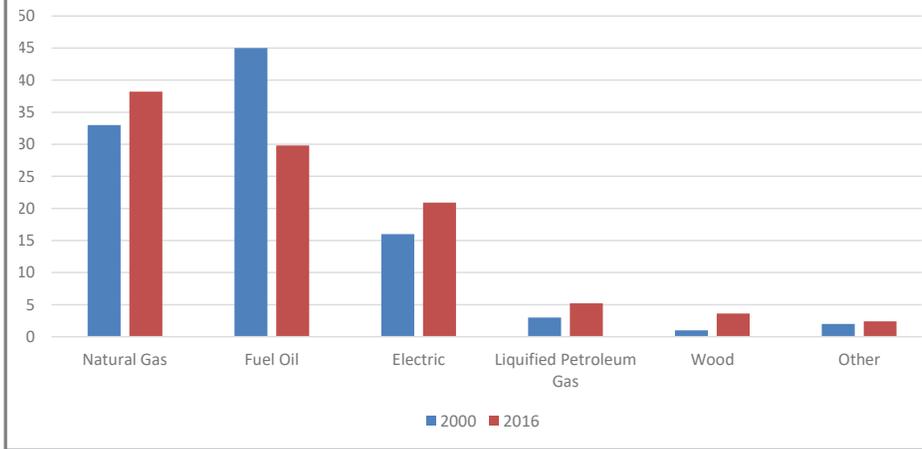
Each fuel source produces a certain amount of heat and releases a certain amount of global warming pollution (carbon dioxide [CO2] emissions). The types of furnaces or appliances used to burn the fuel also have different efficiencies. When you study all the factors involved, you can determine the amount of CO_2 that is emitted for each heating type. The chart below compares average CO_2 emissions per million British Thermal Units (BTUs) of heat generated without factoring in the efficiency of the furnace. Lower values mean less pollution.

When comparing ENERGY STAR-rated systems, consumers can achieve typical combustion efficiencies of 90% for natural gas and propane fuels and 83% using heating oil. Coal furnaces are typically the least efficient obtaining 70-80% combustion efficiency. Electric baseboard heating emits the highest level of CO_2. This is because power plants burning fuel have a much lower efficiency in generating electricity (30-40%) and 5% or more is lost in the transmission and distribution system.

POUNDS OF CO₂ EMISSIONS

Chart: Pounds of CO2 emissions across PA Electric Baseboard, Coal (anthracite), Heating oil, Propane, Natural gas. Y-axis 0 to 400.
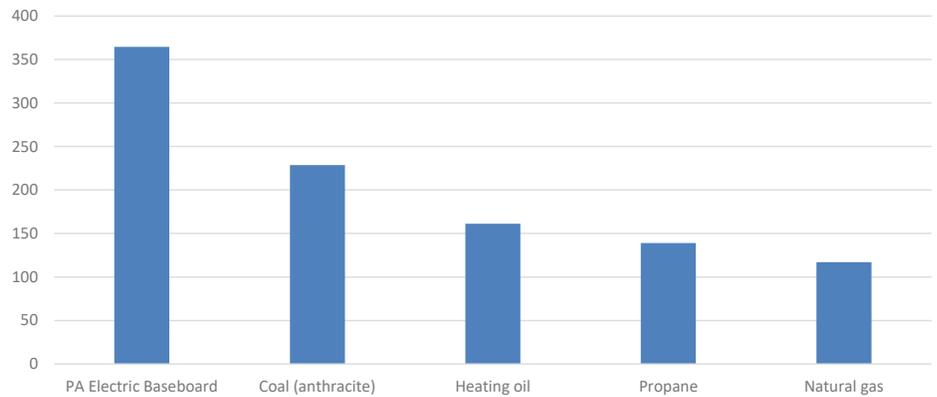
Berks County homes are getting slightly more efficient and a decreasing percentage of residents rely on fuel oil to heat their homes, but we could be significantly more focused on energy savings.

What the data tells us

As you can see in the graphs, more than 50% of Berks County homes are heated by fuel oil or electric, which have some of the highest CO_2 emissions. For comparable geographic areas, Berks residents probably have similar CO_2 footprints (carbon footprints). It is difficult to determine the exact CO_2 emission rates for Berks home heating because it is highly dependent upon furnace efficiencies, the size of homes, and the quality of insulation. You can compare your carbon footprint to others in the United States and around the world at www.carbonfootprint.com.

What is a carbon footprint?

A carbon footprint is a measure of the impact our activities have on the environment, specifically the contribution to climate change. There are many calculators available on the internet to help explain and demonstrate how our daily activities produce global warming pollution. One of the typical sites, www. carbonfootprint.com, evaluates where you live, how you heat and cool your house, how much energy you use at home, how many miles you drive and how many you fly, how frequently you take public transportation and even information about your purchasing habits to estimate your carbon footprint. The most significant factors are miles traveled, electricity consumption, and how you heat your home.

Energy Indicator Five

NEW "GREEN CERTIFIED" CONSTRUCTION

"Green" construction is an effort to build highly energy- and water-efficient buildings with local, recycled-content, and other more environmentally-friendly materials. The U.S. Green Building Council (USGBC) developed its Leadership in Energy and Environmental Design (LEED) system to measure how "green" a building is. It is the most referenced green building rating system in the country.

The rating gives "points" for environmentally preferable design features that lower energy costs such as use of natural light, automated dimmers to adjust lights so that they are only on when needed, window shades that reduce heat in the summer and increase it during the winter, and highly energy-efficient appliances and heating and cooling equipment. Additional points are available for low-flow toilets, using recycled materials, reusing old buildings, being close to public transportation, installing bike racks and showers to encourage people to bike instead of driving, and for the use of natural landscaping and vegetation.

Based on the number of points accumulated, buildings are rated as Platinum, Gold, Silver, or Certified. Some buildings register as potential LEED projects but have not yet completed or decided against completing the formal LEED designation.

In 2009 when the State of the Environment report was first issued, there was only one LEED certified building in Berks County and only nine registered projects. In mid-2018, there were 25.

Berks significantly increased the number of LEED registered buildings with several earning the highest certification levels.

What the data tells us

The number of LEED certified buildings in Berks County demonstrates that people recognize the value of building more energy – and water – efficient buildings, and that local builders are more familiar with how to build green. The buildings are more aesthetically pleasing, have better indoor air quality, and are less expensive to maintain and operate.

How do you GREEN YOUR HOME?

Incorporate green initiatives in your own home:
- Replace any remaining incandescent or CFL light bulbs with LED light-bulbs.
- Use Low-VOC (volatile organic compound) products such as low or no-VOC paints and finishes when painting. When cleaning around the house, use non-toxic natural products or make your own cleaning products.
- Save money on your heating and cooling costs just by setting your thermostat back when you are not home and while you are sleeping. Program your thermostat to 78oF or higher in the summer and 62oF or lower in the winter.
- Air leaks are the greatest energy waster in the home, but they can be simple to plug. Install weather stripping and caulk to stop those expensive drafts.
- Install low-flow showerheads and faucet aerators to save resources without sacrificing water pressure.
- Install an insulating jacket around your hot water heater and insulate the pipes around the water heater. Consider turning down the temperature on the water heater.
- Shade trees can significantly lower your cooling costs. They also make your home more comfortable and provide habitat for birds. In addition, properly placed trees and shrubs act as windbreaks, shielding your home from cold winds and reducing heating costs.

What else can I do?

Ask people at your schools and federal buildings what sustainable practices they have incorporated into their buildings and maintenance procedures. Volunteer and attend your local USGBC chapter or affiliate group meetings, educational sessions and events to learn more about sustainable design practices and initiatives.

LEED PROJECTS REGISTERED

Platinum
Berks County Community Foundation	Reading

Gold
Opportunity House Daycare Center	Reading
Owatin Creek Elementary School	Reading
Penn State Berks Classroom Lab Building	Reading
Holleran Residence	Spring Township
West Elementary	Womelsdorf

Silver
Albright College Science Center	Reading
Berks Nature - The Nature Place*	Reading
Berks Women in Crisis	Reading
Exeter Commons (Renovation)	Reading
Reading Commons	Reading
Governor Mifflin Elementary	Shillington
Kohl's Spring Township	Wyomissing

Certified
Lebanon Valley Distribution Center	Bethel
Maxatawny Marketplace	Kutztown
Green Valley Elementary School	Lower Heidelberg Twp
Exeter Commons (New Construction)	Reading
Sixth & Penn	Reading
RPA Engineering Spring Ridge Building	Spring Township

Registered
Maple Springs Winery	Bechtelsville
Boyertown Area Senior High School	Boyertown
Weis Markets Boyertown	Boyertown
Growing Hearts	Fleetwood
AEM Architects Office	Reading
Reading Utilities Lab and Admin Building	Reading

Source: USGBC online database for LEED registered projects July 2018.

* Certification in process as of the date of this report publication.

Do your part to help keep our air healthy.
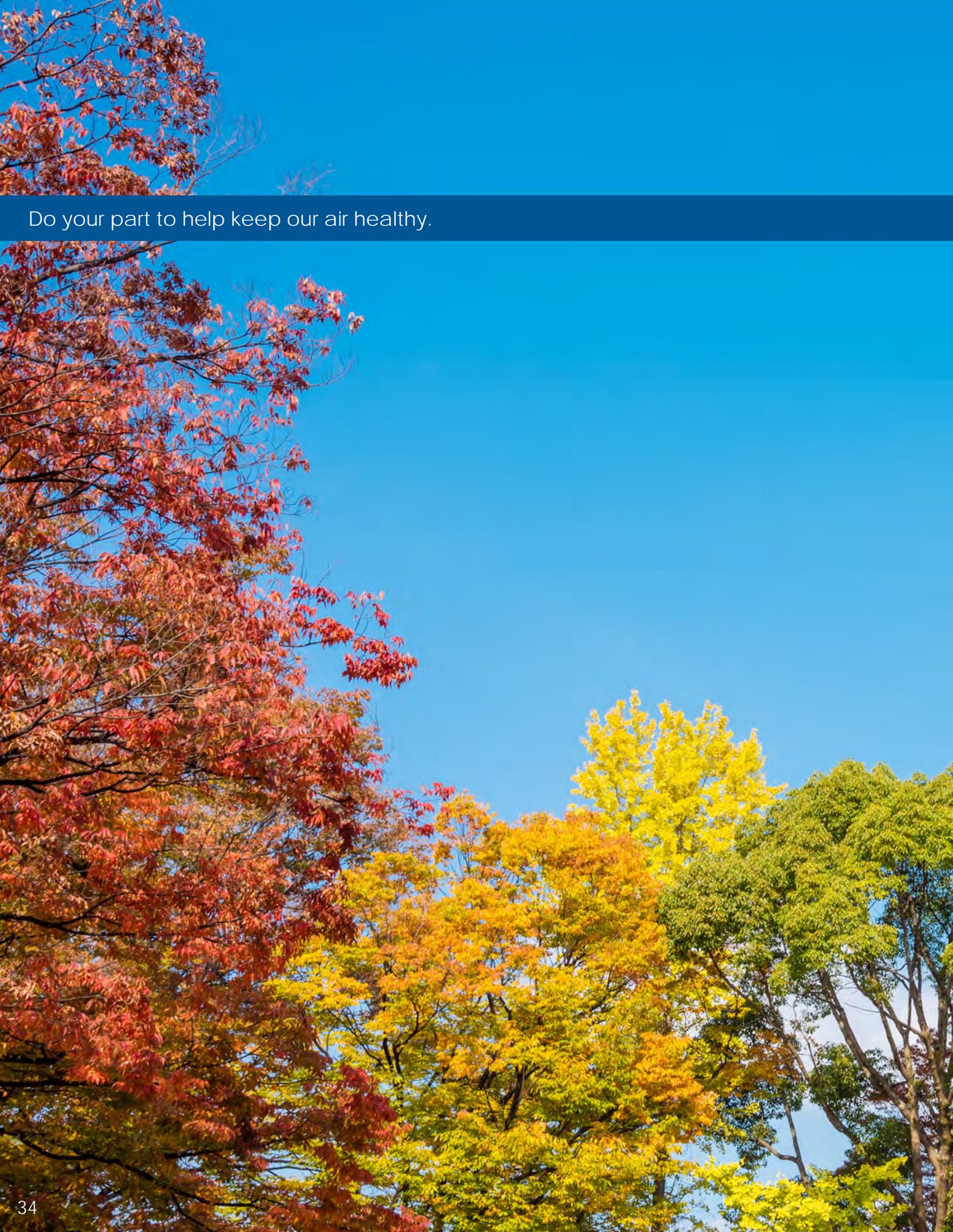
Air

Outdoor air pollution is regulated by the Pennsylvania Department of Environmental Protection (PA DEP) to ensure that counties meet federal National Ambient Air Quality Standards (NAAQS) that are established by the U.S. Environmental Protection Agency (US EPA).

The NAAQS standards are established to protect the public from the following key air pollutants:

Ozone (O$_3$)

A measure of "smog" that is formed in hot weather by photochemical reactions from hydrocarbon fumes (e.g., vehicle exhausts and industrial solvents) and nitrogen oxides (e.g., vehicle exhausts and power plants) reacting with sunlight. The NAAQS for Ozone was lowered in 2015 from 75 parts-per-billion (ppb) to 70 ppb (average over an 8-hour period). Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and airway inflammation. It also can reduce lung function and harm lung tissue. Ozone can worsen bronchitis, emphysema, and asthma, leading to increased medical care. Ozone affects sensitive vegetation and ecosystems, including forests, parks, wildlife refuges and wilderness areas.

Particle Pollution

Particle pollution includes dust, soot and smoke that is emitted from truck diesel engine exhausts, coal power plants, forest fires, and from traffic on unpaved roads. Two forms of "inhalable" particle pollution are of primary health concern based on their ability to penetrate deep into the lungs and to pass into the bloodstream: PM10 – particles smaller than 10 microns; and PM2.5 – particles smaller than 2.5 microns. There are two NAAQS for PM2.5: a short-term daily standard of 35 micrograms per cubic meter (ug/m3) and a long-term annual standard of 12 ug/m3. Exposure to particle pollution can affect both your lungs and your heart. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease; nonfatal heart attacks; irregular heartbeat; aggravated asthma; decreased lung function; and, increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

Nitrogen Dioxide, Sulfur Dioxide, and Carbon Monoxide

Pollutants that result from fuel combustion in power plants, industrial boilers/furnaces, and vehicles. Due to the introduction of new cleaner vehicles, ultra low-sulfur diesel fuel, and the shutdown of many of the older polluting coal power plants, sulfur dioxide and carbon monoxide pollution is no longer a concern in Berks County. Nitrogen oxide (NOx) emissions from vehicles, gas-fired power plants, and cement plants are still of concern due to both NO2 concentrations and the contribution NOx makes to Ozone formation. All three of these gaseous pollutants can reduce lung function and have respiratory impacts.

Lead Pollution

Lead levels in outdoor air were reduced dramatically in the 1980's due to the U.S. phasing out leaded gasoline. However, outdoor air lead levels remained elevated in proximity to lead smelters and battery plants. In 2010 US EPA significantly lowered the acceptable lead-in-air NAAQS concentration from 1.5 to 0.15 micrograms per cubic meter (over a 3-month average). Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The lead effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits and lowered IQ.

Air quality in Berks County is monitored by PA DEP at several locations. Background air pollution levels are measured at the Reading Airport (Ozone, PM10, PM2.5, NOx, SO2, Lead, Air Toxics) and at Kutztown University (Ozone). Lead air pollution levels are also measured in Laureldale near the Exide lead smelter (now idled) and in Lyons near the East Penn Manufacturing lead smelter and battery manufacturing plants.

Air Indicator One
NUMBER OF "BAD AIR DAYS"

This indicator tracks Ozone air pollution levels that are a measure of "smog" that occurs primarily in the summer months. Ozone is a "secondary pollutant" that forms in stagnant summertime air when sunlight reacts with hydrocarbons and nitrogen oxides from vehicle and power plant exhausts. When PA DEP issues "Air Quality Action Day" alerts during heat waves, they are generally for predicted high Ozone levels. Code Orange alerts are for Ozone levels that are "Unhealthy for Sensitive Groups" which include children, people with respiratory diseases, and the elderly. Code Red alerts are for Ozone levels that are unhealthy for all.

Ozone levels have decreased significantly in Berks County and in much of Pennsylvania over the past ten years. More stringent vehicle exhaust standards coupled with the introduction of more stringent limits on the volatile organic compound (VOC) content of many solvent-based products like paints and adhesives has reduced Ozone precursor emissions. These emissions have also been reduced as electrical power plants switch from coal to cleaner natural gas.

NUMBER OF DAYS 8-HR OZONE DAILY MAX > 0.070 PPM 2000-2018 IN BERKS COUNTY, PA

Unhealthy for Sensitive Groups (0.071 — 0.085 ppm)
Unhealthy (0.086 — 0.105 ppm)
Very Unhealthy (>= 0.106 ppm)

Note: Based on ALL sites. Source: U.S. EPA AirData (https://www.epa.gov/air-data) Generated: June 29, 2018
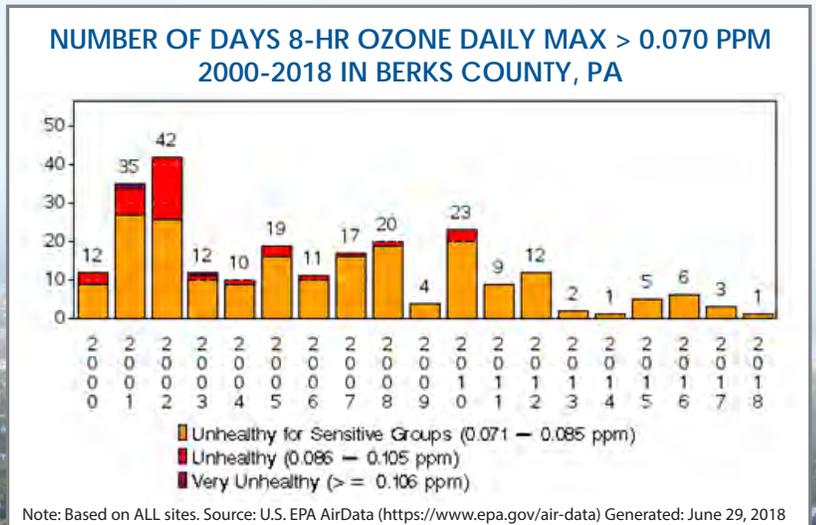
Number of Bad Air Days are decreasing **but traffic congestion continues to challenge air quality.**

What the data tells us

As the graph above illustrates, the number of Bad Air days has significantly decreased over the past 18 years. However, more work can be done to relieve traffic congestion in Berks County which contributes to vehicle air pollution and Ozone pollution.

How do we make things better

- Drive less.
- Take public transportation.
- Ride a bike.
- Don't mow the lawn, refuel your car, or use paints or cleaning solvents during Air Quality Action days.

What does this mean to YOU & YOUR FAMILY?

If ozone concentrations are high in air breathed into the lungs, damage to the lining of airways can occur, leading to irritation, coughing, and shortness of breath. Children, the elderly, and people with respiratory problems are at highest risk for adverse effects when ground-level ozone concentrations are high.

Air Indicator Two

LEAD AIR QUALITY

Lead air pollution levels have historically been a concern in Berks County because of our industrial heritage and the presence of metal industries including several lead-acid battery plants and battery recyclers in the County. Air quality lead concentrations have decreased over the past 30 years in large part due to the phase-out of leaded gasoline. However, lead concentrations in the vicinity of metals industries like lead smelters and battery manufacturers remained a concern in 2008 when the U.S. EPA designated two portions of Berks County ("North Reading" around the Exide lead smelter in Laureldale and "Lyons" around the East Penn Mfg. lead smelter in Lyons) as "nonattainment" with the 2008 Lead NAAQS standard.

The good news is that lead-in-air levels measured in Berks County have consistently decreased over the past ten years and the U.S. EPA has now revised the attainment status of both portions of the county from "nonattainment" to "maintenance" air quality status (December 2014 for the Lyons area and April 2016 for the North Reading area). In addition, background lead levels measured at the Reading Airport and at Kutztown University have all been well below the lead standard. Because the portions of Berks County that were formerly designated nonattainment with the Lead standard have now been re-designated attainment, this indicator is being assigned a Thumbs Up.

What the data tells us

As the graphic below illustrates, lead-in-air levels have decreased over the five year period from 2012-2018. Lead levels are now well below the Lead NAAQS of 0.15 ug/m3 at all Berks lead monitors including those located near lead smelter and battery manufacturing operations. It should be noted that one of the County's two lead smelters was shut down in 2013 (the Exide smelter in Laureldale) which has resulted in a significant decrease of about 40% in County-wide lead emissions (see Air Indicator 3 – Air Toxics) and, perhaps more importantly, has reduced elevated lead impacts in the densely populated North Reading area.

How we make things better

Responsible battery recycling and manufacturing is essential to a healthy environment because energy-storage batteries are essential to much of our modern world's technologies ranging from renewable solar/wind energy storage, to clean, exhaust-free electric vehicles, to our smart phones. Berks County's battery recycling and manufacturing operations are equipped with state-of-the-art environmental controls and enable the safe recovery of battery components and manufacture of new batteries without polluting the air, water, and land.

Lead-in-air levels have decreased from 2012-2016 and all areas of Berks County now meet the Lead standard.>

LEAD MAX, 3-MONTH AVERAGE
LEAD NAAQS - 0.15 UG/M3

Bar chart showing Berks (Reading) lead values by year: 2009: 0.25, 2010: 0.32, 2011: 0.2, 2012: 0.51, 2013: 0.17, 2014: 0.03, 2015: 0.04, 2016: 0.03. Y-axis from 0 to 0.6.

□ Berks (Reading)
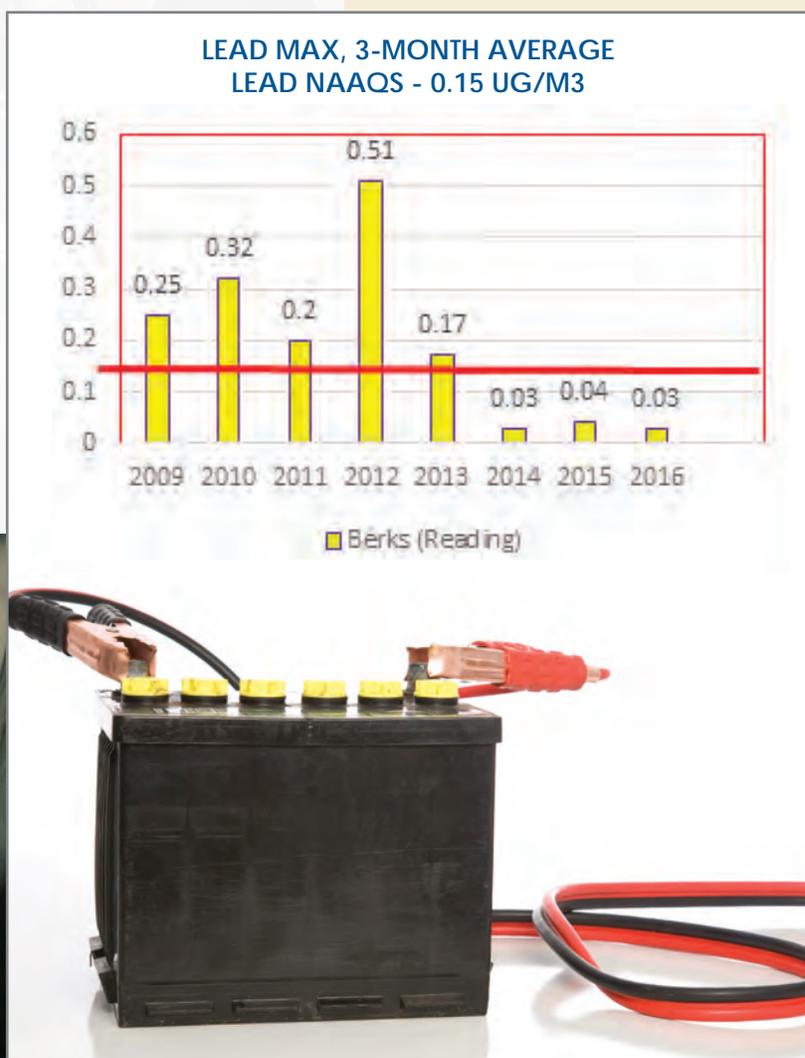
Air Indicator Three

AIR TOXICS

Air toxics are those air pollutants that the U.S. EPA designated as "hazardous air pollutants" (HAPs) in the 1990 Clean Air Act. These 187 pollutants are comprised of three general categories: (1) metals like chromium, nickel, and manganese; (2) organic compounds found in paints, inks, and solvents like benzene, toluene, and xylene; and, (3) acid gases like hydrochloric acid and hydrofluoric acid from coal combustion, brick manufacturing, or metal treatment operations.

Releases of air toxics are required to be reported under the federal Toxic Release Inventory (TRI) program by manufacturers and power plants. The data provided below summarizes total reported releases HAPs in Berks County from 2012-2016 based on data reported through the TRI program. It should be noted that vehicle exhausts and many consumer products like paints and cleaners also result in air toxic releases that are not captured by the TRI data.

The good news is that total County-wide air toxic releases have decreased significantly over the 2012-2016 period (by 30-40% depending on the pollutant). This is in large part due to the shutdown of the Titus Station coal-fired power plant and the Exide lead smelter in 2013. Hydrochloric acid emissions from the coal power plant accounted for 30-50% of the total HAP emissions in Berks County prior to its shutdown. Lead air emissions decreased approximately 40% following shutdown of the Exide smelter.

Because air toxic releases have decreased significantly in Berks County over the past five years, this indicator is being assigned a Thumbs Up.

What the data tells us

As the graphs below illustrate, total County-wide air toxic releases reported on TRI have significantly decreased over the 2012-2016 period.

How we make things better

- Carefully review the hazard warnings on consumer cleaning products and paints.
- Try to avoid using products that include toxic solvents.
- Minimize exposure to gasoline fumes.
- Do not burn your trash.
- Be vigilant about industrial toxic releases in your community – EPA provides toxic release data by zip code at their TRI Explorer website at https://iaspub.epa.gov/triexplorer/tri_release.chemical

TOXICS RELEASE INVENTORY AIR RELEASES

Air Releases Reported by Berks Industry & Power Plants
US EPA TRI Explorer

■ Total HAP Releases

👍 Air toxic releases to the air have decreased significantly over the past five years.

Air Indicator Four
REGIONAL AIR POLLUTION

This indicator tracks particle pollution levels, specifically concentrations of PM2.5. Particle pollution has been identified as a "regional" air pollution problem because of the significant impact transported pollution from upwind areas has on the county's air pollution levels. For example, it is estimated that more than half of our PM2.5 pollution levels are a result of secondary sulfate and nitrate aerosol pollution largely caused by coal-fired power plants located outside Berks County in western PA and along the Ohio River valley in Ohio, West Virginia, and Kentucky.

The good news is that PM2.5 levels have trended downwards in Berks County over the past ten years and levels are below both the Annual and the 24-Hour NAAQS standards. A significant number of coal power plants in the U.S. have either shut down or have switched to natural gas over the past five years. Other coal plants have installed pollution controls and/or have recently been required to operate these controls year-round. The energy revolution in the United States resulting from the availability of low-cost shale gas is transforming the energy grid from polluting coal to cleaner natural gas.

Because PM2.5 levels have decreased significantly in Berks County over the past five years, this indicator is being assigned a Thumbs Up.

PM2.5 - 2ND DAILY MAX BERKS, PA

PM2.5 24-Hour NAAQS - 35.0 ug/m3
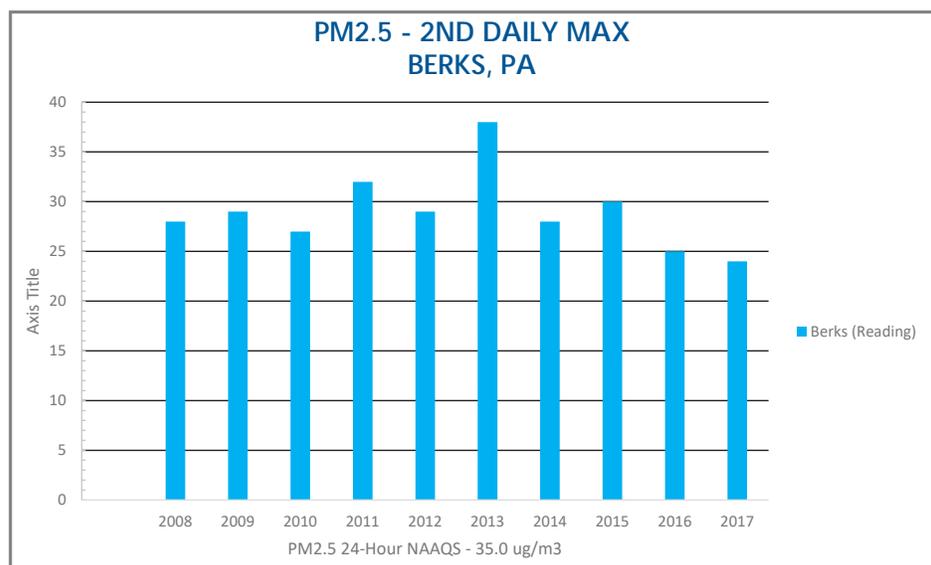
Particle pollution levels have decreased significantly over the past five years.

What the data tells us

The graphs below show PM2.5 concentrations measured by the PA DEP at the Reading Airport monitoring station for the 2007-2017 period. The annual average PM2.5 concentrations have trended downwards and have been well below the Annual NAAQS of 12 ug/m3 for the past four years. The daily average PM2.5 concentrations have also trended downwards and have also been well below the 24-Hour NAAQS of 35 ug/m3 (based on 2nd Daily Maximum) for the past four years.

How do we make things better

Particle pollution is a concern from consumer activities like wood stoves, trash burn barrels, and outdoor wood-hydronic heaters. Only burn clean, dried wood. Don't burn when air quality is predicted to be poor, and don't burn trash!

PM2.5 - ANNUAL WEIGHTED MEAN BERKS, PA

PM2.5 Annual NAAQS - 12.0 ug/m3
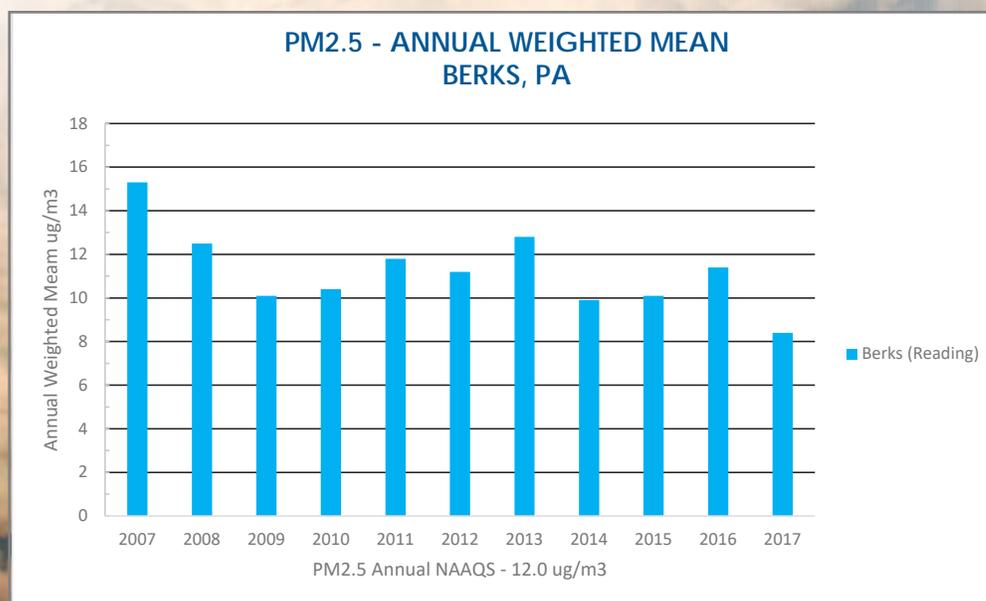
Air Indicator Five
LOCALIZED AIR POLLUTION

This indicator tracks local air pollution impacts associated with traffic congestion and seasonal and periodic air pollution associated with wood stoves, outdoor hydronic heaters, and trash burning in "burn barrels." Because pollution from automobiles contribute significantly to air quality problems, it is important to consider the impacts on traffic congestion associated with land development decisions.

Households have become increasingly dependent on the automobile for youth recreation, transportation to schools, shopping and many other things that only a few decades ago were within walking distance. In addition, Berks County has recognized the challenges traffic congestion represent, particularly with commuters and truck traffic along the north-south Route 222 corridor north of Reading to Lehigh County and along the 422 corridor during rush hour.

Other localized air pollution concerns include open burning (e.g., burn barrels), older wood stoves, and the use of wood "hydronic heaters." Education to discourage open burning and to promote the use of clean burning stoves and heaters can help improve local air pollution caused by these activities. .

Because of the contribution of localized air pollution to our air quality, this indicator is being assigned a Thumbs Neutral to reflect the continuing work that needs to be done to address traffic congestion and air pollution at the local level.

Traffic congestion and trash burning continue to challenge air quality in some areas of the County.

What the data tells us
Traffic continues to increase in Berks County as shown by the Energy Indicator 1 (vehicle miles travelled) because the County's population is increasing. Although highway projects are underway that may alleviate some of the congestion (e.g., roundabouts on Route 222) the increasing traffic levels on the County's aging highway infrastructure remains a challenge.

How do we make things better
- Drive less.
- Ride a bike.
- Educate your neighbors and township officials about the hazards of trash burning.
- Have your children walk to school. If they can't safely bring it up with your school district and local municipality. Also, check out www.penndot.gov/travelinpa/safety/schoolresourcesandprograms/saferoutestoschool

DID YOU KNOW?

- A mature leafy tree produces as much oxygen in a season as 10 people inhale in a year
- You can see the forecast for air quality in your neighborhood at airnow.gov
- One gas powered lawn mower run for an hour puts out about the same amount of smog-forming emissions as 40 new automobiles run for an hour.
- Trees help clean the air! 100 mature trees can remove 24 tons of carbon dioxide and 261 pounds of air pollutants from the air.

There are many ways to reduce waste and recycle more.

Waste

The Berks County Solid Waste Authority (SWA) is responsible for the development and implementation of the County Solid Waste Management Plan that details what we do with all of the "trash" and other waste that we generate.

The SW plan tackles a number of important goals:

1. ensures adequate disposal capacity for county-generated waste for a period of ten years;
2. evaluates the county's recycling program and achieves the statewide goal of 35% recycling;
3. develops and administers collection programs for special wastes; and
4. provides assistance to municipalities.

The most recent Berks County Solid Waste Management Plan was approved by the Pennsylvania Department of Environmental Protection (PADEP) in October 2014 and is required to be revised every 10 years. It projects that Berks County will achieve a 40% recycling rate by 2024.

As part of the Berks Nature State of the Environment report, we use the following indicators to evaluate the County's ability to manage its waste:

- Waste Generated in Berks County
- Waste Disposed of in Berks County
- Electronic Recycling Rate
- Special Waste Collections
- Overall Recycling Rate

Waste Indicator One

WASTE GENERATED IN BERKS COUNTY

As homeowners, when we think of wastes, we may first think of the "garbage" that we put out for pick-up once a week or so. In fact, there are many categories of waste that needs to be disposed of in a proper manner and your domestic garbage is just one of these categories.

The graphic below depicts the different types of wastes collected in Berks County over the past decade:

• Municipal waste refers to the garbage that we generate at home
• Residual wastes refer to non-hazardous industrial wastes
• Sewage sludge describes the dried solids that remain after sewage is processed at a wastewater treatment plant
• Infectious wastes come from medical facilities, which require specialized handling and disposal because of their health risk.
• Construction debris originates from demolition and building sites
• Waste to Energy (WTE) Ash is created from the combustion of coal and other fuels
• Asbestos-containing materials include waste from pipe insulation, certain floor tiles, transite shingles, and some asphalt roofing shingles

As you can see the SWA waste plan covers much more than trucks of municipal garbage dumping at the landfill.

There is no evidence that Berks County is attempting to reduce the amount of waste it generates.

What the data tells us

As the graph below illustrates, the bulk of Berks County's waste is from municipal and residual sources. The data shows that the amount of waste generated fluctuates with economic conditions. While Berks County's population has grown from 389,000 in 2004 to more than 415,000 today, the waste generated per person remains about the same. Unfortunately, there does not appear to be any evidence that Berks County is making any significant effort to reduce the waste it generates.

How do we make things better

Better, in the case of waste generation, means generating less waste. When and where you can, try your best to create less waste. In addition to producing less, recycle as much of the waste as you can. If you stay aware of the special recycling programs sponsored by the SWA and others, you can even recycle special-category wastes like pharmaceuticals, computer equipment, tires, used oil, paint cans, and other things you probably should not dump in your regular garbage can.

WASTE GENERATED IN BERKS COUNTY

Legend: ■ Municipal ■ Residual ■ Sewage Sludge ■ Processed Medical ■ Construction ■ WTE Ash Residue ■ Asbestos
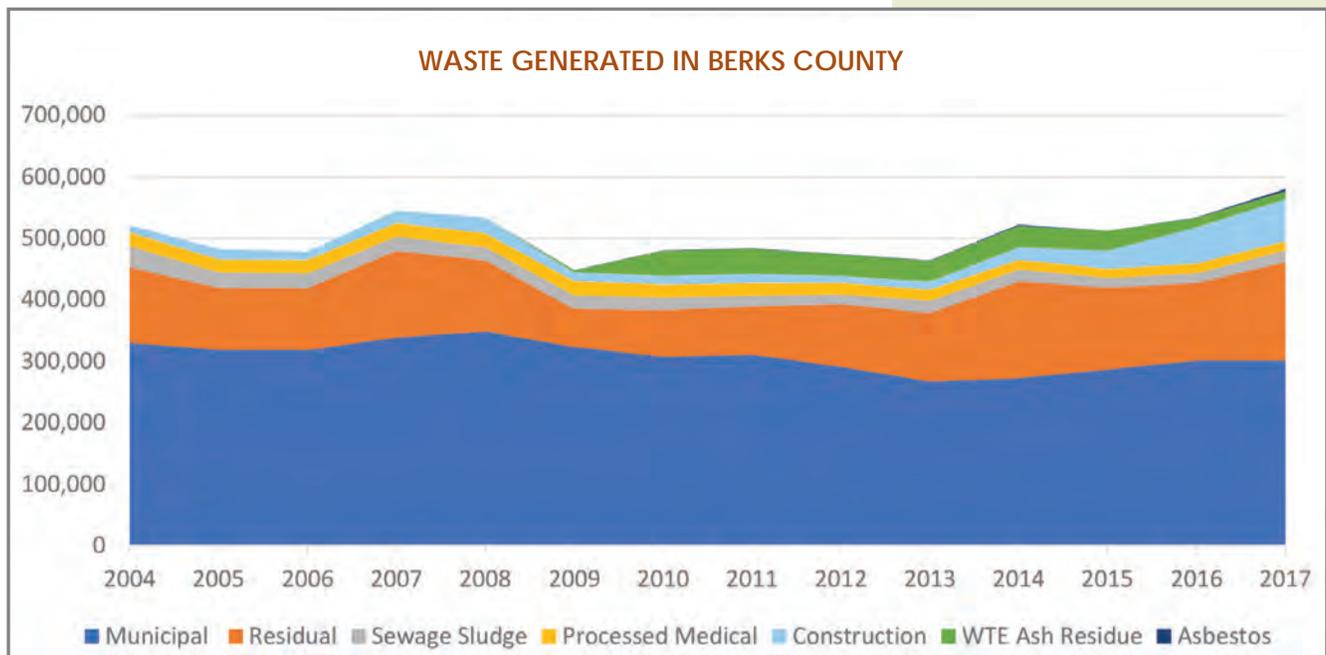
Composting

Composting is a natural process that breaks down organic material into a rich, organic fertilizer. By composting, you can reduce the amount of garbage you send to the landfill, grow healthier plants, and save money. It is easy to do at home.

What you need

A wide variety of composters can be purchased for backyard use or you can make on your own. While each may vary in price, style and function, all are designed to help you compost more efficiently. The compost crock at left can collect vegetable and fruit peelings and coffee grounds in your kitchen before adding them to your compost pile. Check with your local home improvement store or nursery for bins.

Waste Indicator Two
WASTE DISPOSED OF IN BERKS COUNTY

Most solid waste generated in the United States is disposed of in landfills, which require a lot of open space. Large cities and municipalities without their own landfill must often truck wastes long distances, sometimes crossing state lines, to landfills with available capacity.

Landfill owners charge a "tipping fee" for each ton of waste they accept. In addition to their tipping fees, landfill owners in Pennsylvania also collect State mandated fees that are returned to the State, as well as host fees that generates revenue for the municipality and in some cases the County, that hosts the solid waste facility. Lower tipping fees will sometimes create an incentive for communities and waste haulers to transport their waste long distances to find the most affordable place to dispose of their wastes.

Berks County, because of its available landfill capacity and its proximity to communities with large populations that generate large volumes of solid waste, imports a lot of other people's waste.

The amount of waste disposed of in Berks County is increasing after declining for several years.

What the data tells us

As the graphic below illustrates, almost 80 percent of the waste buried in Berks County comes from outside of the county and more than 27 percent of it comes from outside of Pennsylvania.

SOURCES OF WASTE DISPOSED IN BERKS COUNTY

Legend:
- Generated in Berks County
- Imported from Other PA Counties
- Imported from Other States
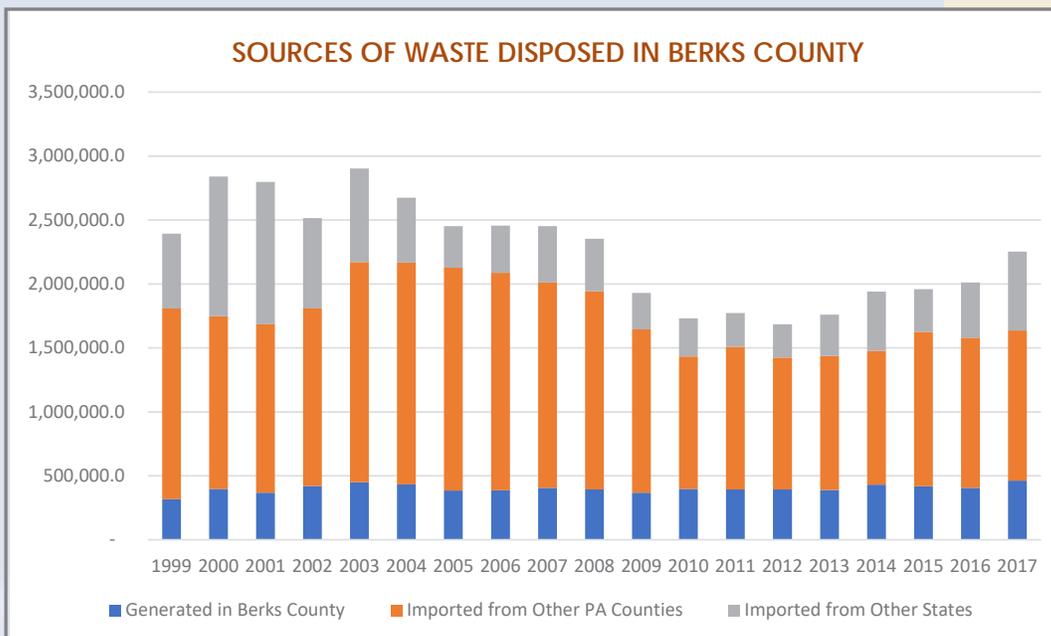
How do we make things better

Berks County residents have direct control over the amount of waste represented by the blue bar, which represents the waste generated and disposed of here in Berks County. Berks residents can reduce the wastes they generate by reducing the number of disposable (i.e., throw-away) items they buy and use and by recycling those materials that are accepted in their existing municipal or county recycling programs. It may not seem like much, but small changes in waste generation from lots of residents can add up to substantial reductions in the overall waste stream for the County. If your municipality hosts a landfill, find out what the local tipping fees are spent on. Is there a reinvestment in the environment for water quality?

ELECTRONIC RECYCLING

Modern electronic devices – televisions, computers, cell phones, and more – can make life easier, more efficient, and more convenient. Unfortunately, these same electronic devices are hazardous if not disposed of properly. They frequently contain toxic substances such as lead, mercury, cadmium and chromium. They may also contain other heavy metals and potentially toxic chemical flame retardants. It is important to recycle them properly.

In addition, the same devices can also contain small quantities of precious metals like gold and silver. While no one device has significant quantities, large collections of recycled electronics contain more gold and silver than the mines where gold and silver are typically collected.

Properly recycling your electronic devices means that the precious metals can be recovered and used to make new electronics. They can even be used to make recycled-content jewelry.

Berks County residents can recycle their electronic waste at the Berks County Solid Waste Authority (SWA) recycling center located at 1316 Hilltop Road in Leesport. The center accepts electronics on Tuesdays, Thursdays, and Saturdays from 8:00 AM to Noon, but check the SWA website at www.co.berks.pa.us/swa to verify the hours beforehand.

NUMBER OF RESIDENTS RECYCLING THEIR ELECTRONICS

POUNDS OF ELECTRONICS COLLECTED
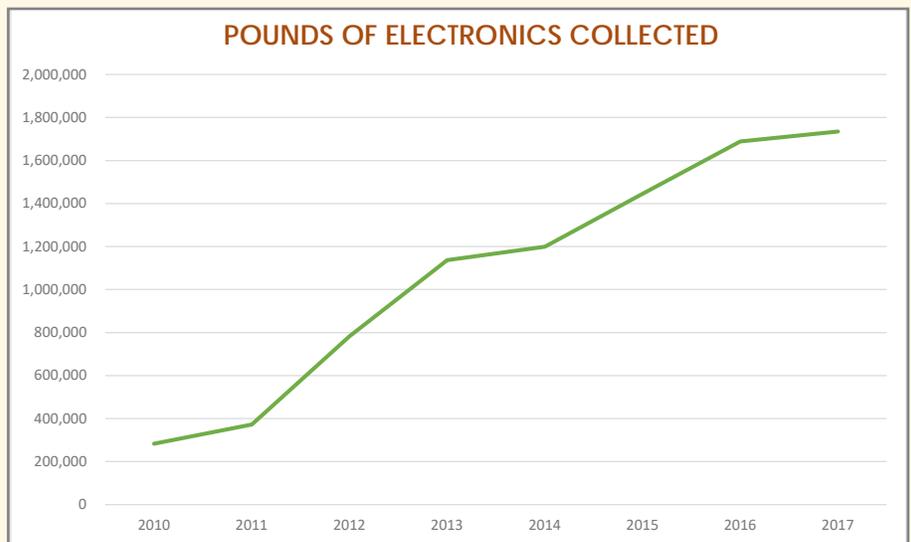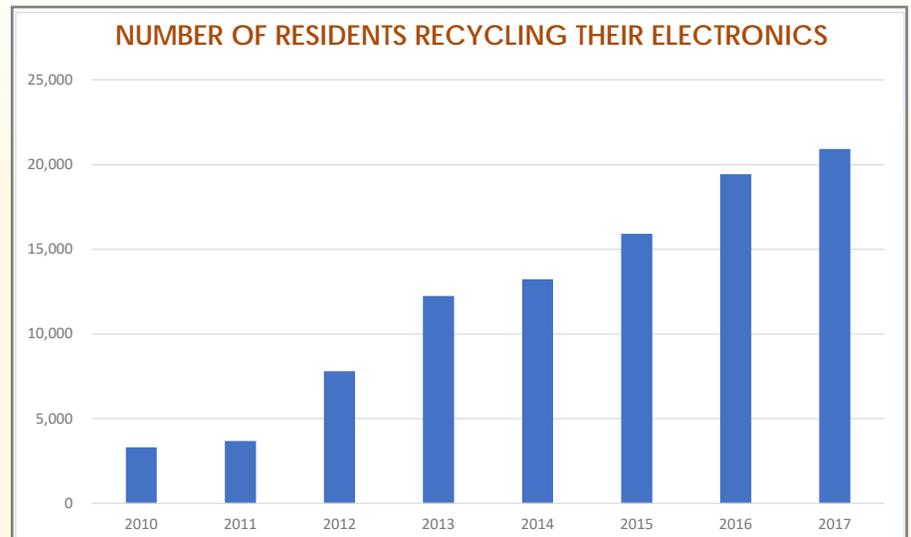
The volume of waste electronics collected and the number of people recycling their electronic products are both increasing nicely.

What the data tells us

As the graph and table below illustrate, more than 20,000 Berks County residents stopped by the recycling center in 2017 and recycled almost 1.8 million pounds of electronics. These numbers have grown significantly since the recycling center first started collecting waste electronics.

How do we make things better

Keep up the great work! Make sure that your friends and neighbors know that they can recycle their waste electronics.

If you want to make an even bigger difference, try making your electronic products last just a little longer before recycling them. Use that phone, laptop, or tablet computer for another year before upgrading. Your wallet and our environment will thank you.

Waste Indicator Four
SPECIAL WASTE COLLECTIONS

In addition to collecting electronic waste, the Berks County SWA recycling center in Leesport collects tires for recycling for a small fee. The SWA also holds a spring and fall hazardous waste (paint, oil, cleaning solvents, etc.) and shredding event for sensitive paper documents that are then recycled.

These materials are too dangerous, too bulky, or too sensitive to be collected in other ways, they are collected in other locations as part of special waste collection programs. Pay attention to local newspaper and social media announcements.

The SWA through special collections was also the first to accept pharmaceuticals for proper disposal, although beginning in early 2013 those responsibilities are being handled by many local police departments as part of the Berks County Pharmaceutical Drop Box Initiative Program. (See additional information on the next page.)

How do we make things better

Be aware of Berks County's special waste collections—what they accept and when and where special collection events are scheduled. Visit www.co.berks.pa.us/swa for a complete schedule. If possible, hold special collection wastes until the scheduled collection times rather than putting these items in the municipal waste stream (i.e., your garbage can). This may mean setting aside a little space in your garage or shed to hold these recyclables until the seasonal collection, but the effort is small compared to the overall benefits of these special waste collections.

POUNDS OF SPECIAL WASTES RECYCLED

Hazardous Waste — Paper Shredding — Tires
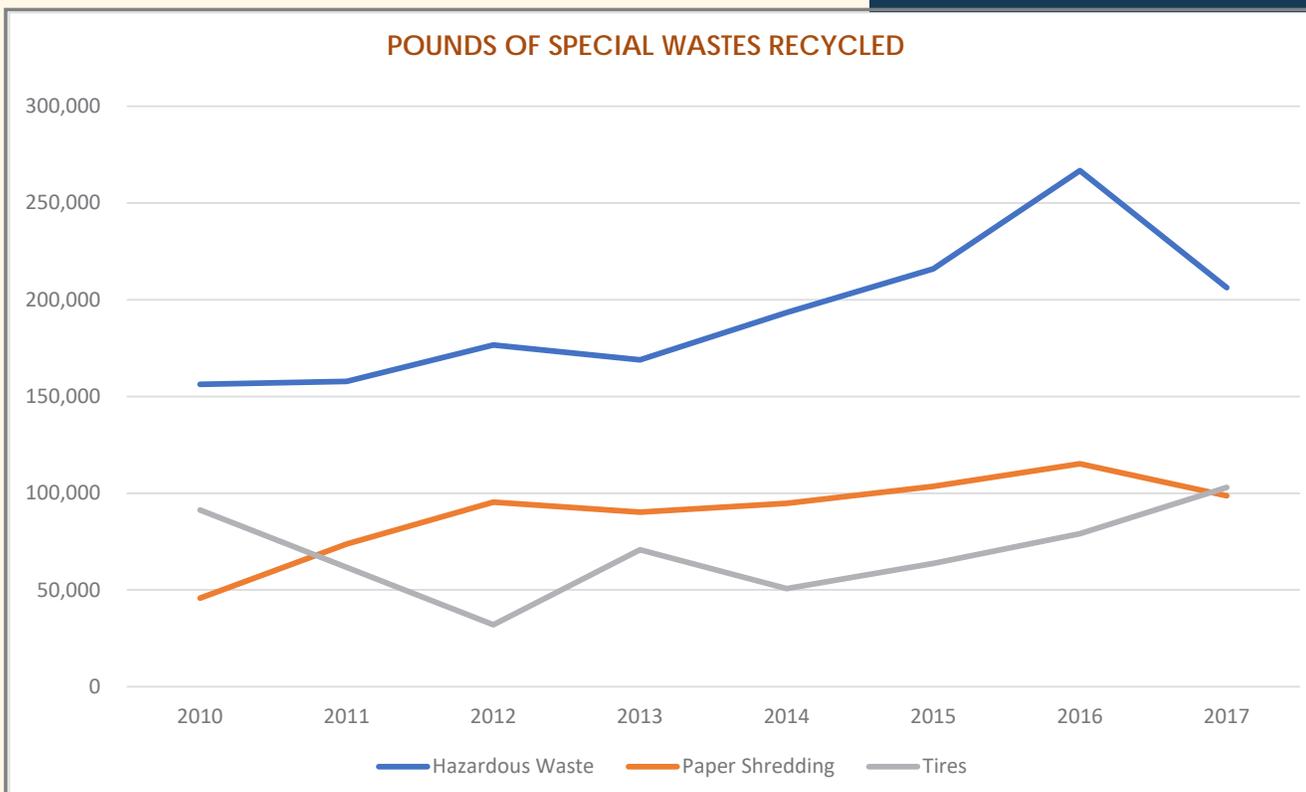
As these special waste collection programs become better known, more people are participating.

What the data tells us

The Special Waste Collections program implemented by the Berks County Solid Waste Authority has been very effective in collecting hazardous wastes, used tires and sensitive paper documents for shredding from residents and businesses. to vary because, unlike garbage or rubbish, these are not wastes that are regularly generated (i.e., the number of residents participating continue to increase as well as the amounts of material collected).

STORIES FROM THE COMMUNITY
PHARMACEUTICAL WASTE

Unused and expired medications, known as pharmaceutical waste, can be dangerous. They are a significant human health and environmental risk. Medications that are improperly disposed of can be consumed accidentally by children, abused by drug addicts seeking to get high, or sold illegally by drug dealers. They can also cause additional harm if they enter the local waterways.

DO NOT FLUSH UNUSED MEDICATIONS DOWN THE TOILET OR IN YOUR GARBAGE DISPOSAL. People used to think flushing unused medications was the safest disposal option. It turns out, however, that the medications end up in local waterways because the sewage treatment plants are not equipped to remove medications from the water.

All major waterways in the United States now carry trace amounts of medicines that were improperly flushed down toilets or garbage disposals. While there are typically only trace amounts of medications discovered, in some cases, the concentrations are sufficient enough to cause deformities in the reproductive organs of frogs and fish and genetic mutations in fish, amphibians and insects.

All pharmaceutical waste in Berks County should be properly disposed of through the Berks County Pharmaceutical Drop Box Initiative. The initiative was launched in early 2013 as a cooperative effort between the Berks County District Attorney's Office, the Council on Chemical Abuse (COCA), and the Berks County Solid Waste Authority.

Pharmaceutical Drop Box Locations

The drop boxes (locations below) resemble post office mailboxes and are securely locked to prevent theft. The medications are collected regularly, inventoried, and safely incinerated.

Organization	Location	Pounds Collected in 2014
Amity Twp. Police Department	2004 Weavertown Road, Douglassville	255
Bally Police Department	425 Chestnut Street, Bally	48
Berks County Coroner's Office	1047 MacArthur Road, Suite 200, Reading	375
Berks County Detectives -		
Berks County AG Center	1238 Welfare Road, Leesport	155
Bern Twp. Police Department	1069 Old Bernville Road, Bern Twp.	156
Birdsboro Police Department	200 East Main Street, Birdsboro	57
Boyertown Police Department	100 S. Washington Street, Boyertown	20
Brecknock Twp. Police Department	889 Alleghenyville Road, Mohnton	18
Caernarvon Twp. Police Department	3307 Main Street, Morgantown	177
Central Berks Regional Police Department	2147 Perkiomen Avenue, Mt. Penn	65
Cumru Twp. Police Department	1775 Welsh Road, Mohnton	
Douglass Township Police Department	1068 Douglass Drive, Boyertown	
Exeter Twp. Police Department	4975 DeMoss Road, Exeter	1148
Fleetwood Police Department	110 West Arch Street, Fleetwood	354
Hamburg Police Department	61 North Third Street, Hamburg	
Kutztown Police Department	45 Railroad Street, Kutztown	208
Laureldale Police Department	3406 Kutztown Road, Reading	
Muhlenberg Twp. Police Department	5401 Leesport Avenue, Muhlenberg	
Penn State University Berks Campus	Perkins Student Center	
Reading Police Department	815 Washington Street, Reading	108
Robesonia Borough Hall	75 South Brooke Street, Robesonia	
Shillington Police Department	999 E. Broad Street, Shillington	69
Sinking Spring Police Department	3940 Penn Avenue, Sinking Spring	179
Spring Twp. Police Department	2800 Shillington Road, Sinking Spring	764
Tilden Township Police Department	870 Hex Highway, Hamburg	1
Tulpehocken Twp. Police Department	22 Rehrersburg Road, Rehrersburg	36
West Reading Police Department	500 Chestnut Street, West Reading	57
Western Berks Regional Police Department	100 N. Reber Street, Wernersville	113
Wyomissing Police Department	22 Reading Boulevard, Wyomissing	140
		4503

Waste Indicator Five
RECYCLING RATE

The Berks County Solid Waste Authority (SWA) manages recycling operations at the full-time recycling center on Hilltop Road in Bern Township. Residents of any municipality in the County with more than 5,000 residents with a population density of more than 300 people per square mile are required to have access to curbside recycling, which means they can place their recyclable materials at the curb outside of their house on certain days of the month for recycling. Everyone in the County has drop-off recycling locations within a short drive.

Despite the widespread access to recycling, many residents still do not make an effort to recycle.

The SWA adopted a recycling plan, approved by the Pennsylvania Department of Environmental Protection in October 2014, to achieve a 40% recycling rate across Berks County by 2024. Achieving this goal will require everyone's active participation.

The recycling percentage for Berks County has fallen below 30%, well below the state-wide goal of 35% and even further below Berks County's goal of 40%.

What the data tells us
The County recycling rate has again fallen below 30%, which is below the statewide goal of 35% and well below Berks County's goal of 40%, including only Act 101 materials listed in this report.

How do we make things better

This is not rocket science! Make sure you know what items can be recycled, set up containers in your house or business to store recyclables for recycling, and know the municipal schedule for pick-ups (if that system is in place) or the location of other recycling centers throughout the County. Make sure your recycling is clean so it doesn't contaminate other recycling. Information on recycling can be found at the SWA website at: www.co.berks.pa.us/swa.

BERKS COUNTY RECYCLING PERCENTAGE
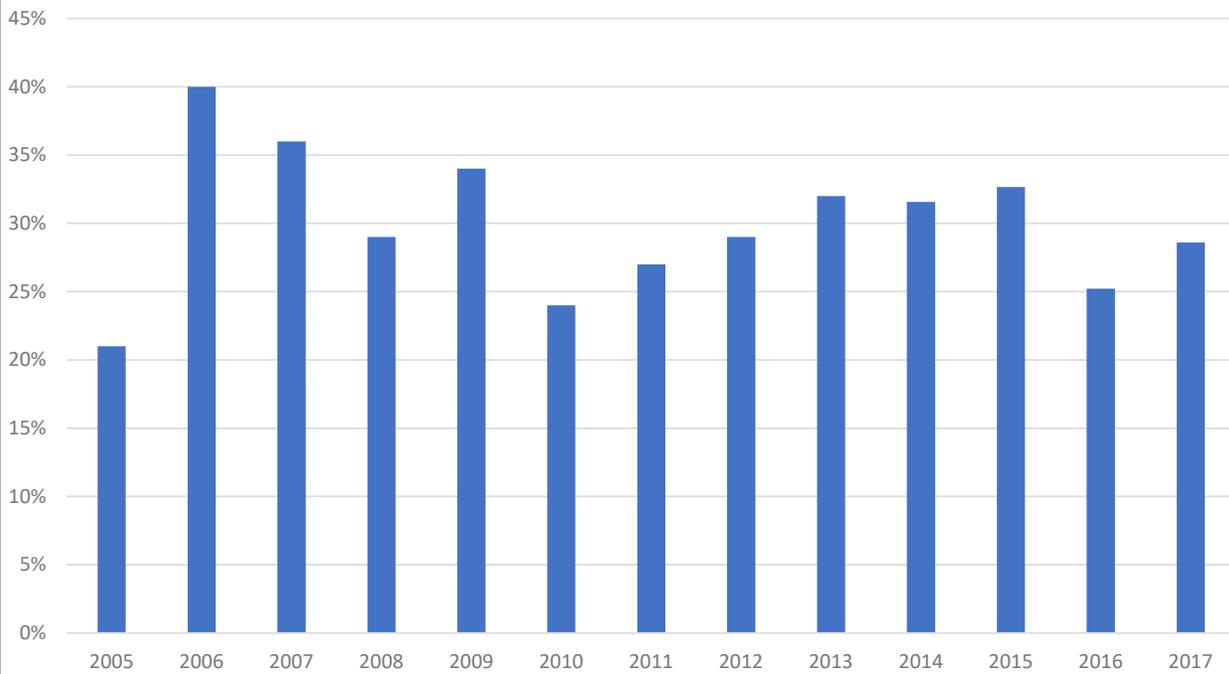
RECYCLING BY MUNICIPALITY

Municipality	Curbside Recycle	Dropoff Recyle	Organic Waste Collection
Albany Township- 610-756-6452	No	No	No
Alsace Township-610-929-5324	No	Yes	No
Amity Township- 610-689-6000	Yes	No	Yes
Bally Borough- 610-845-2351	No	No	No
Bechtelsville Borough- 610-367-8100	No	No	No
Bern Township- 610-926-2267	Yes	Yes	Yes
Bernville Borough - 484-769-8594	Yes	No	Yes
Bethel Township - 610-459-1529	No	No	No
Birdsboro Borough- 610-582-6030	Yes	No	Yes
Boyertown Borough-610-369-3028	No	No	No
Brecknock Township- 717.445.6683	No	Yes	No
Caernarvon Township- 610 286 1010	No	No	No
Centerport Borough- 610-916-5832	No	No	No
Centre Township- 610.926.8833	No	No	Yes
Colebrookdale Borough- 610-369-1362	Yes	No	Yes
Cumru Township- (610) 777-1343	Yes	Yes	Yes
District Township- 610-845-7595	No	No	No
Douglass Township - 610-367-8500	No	No	No
Earl Township 610-367-9673	No	Yes	No
Exeter Township- 610-779-5660	Yes	Yes	Yes
Fleetwood Borough- 610-944-8220	No	No	No
Greenwich Township- 610.756.6707	No	No	No
Hamburg Borough- (610) 562-7821	Yes	No	Yes
Heidelberg Township - 610-693-3197	Yes	No	No
Hereford Township- 610-845-2929	No	Yes	No
Jefferson Township - (610) 488-7047	No	No	No
Kenhorst Borough- 610.777.7327	Yes	No	Yes
Kutztown Borough- 610-683-6131	Yes	No	Yes
Laureldale Borough- 610.929.8700	Yes	No	Yes
Leesport Borough- 610-916-3055	Yes	No	Yes
Lenhartsville Borough- 610-376-1531	No	No	No
Longswamp Township - 610 682-7388	No	No	No
Lower Alsace Township- 610-779-6400	No	Yes	No
Lower Heidelberg Township- 610-678-3393	Yes	No	Yes
Lyons Borough- 610-682-4730	No	No	No
Maidencreek Township- 610-926-4920	Yes	No	Yes
Marion Township 610-589-5312.	Yes	No	No
Maxatawny Township- (610) 683-6518	Yes	No	Yes
Mohnton Borough (610) 775-0660	Yes	Yes	Yes
Mount Penn Borough- 610-779-5151	Yes	No	Yes
Muhlenberg Township- 610-929-4727	Yes	No	Yes
New Morgan Borough- 610-286-9666.	No	No	No
North Heidelberg Township - (610) 488-1619	No	Yes	No
Oley Township -610-987-3423	No	Yes	No
Ontelaunee Township - 610 926 4240	No	Yes	No
Penn Township- 610 488-1160	No	No	No
Perry Township 610-562-2133	No	No	No
Pike Township 610-987-6023	No	No	No
Reading City1-877-727-3234	Yes	No	Yes
Richmond Township 610.944.0348	No	No	No
Robeson Township 610-582-4636	No	Yes	No
Robesonia Borough (610)693-3474	Yes	No	Yes
Rockland Township (610) 682-6311	No	No	No
Ruscombmanor Township 610-944-7242	No	No	No
Shillington Borough 610-655-4911	Yes	No	Yes
Shoemakersville Borough 610-562-8030	Yes	No	Yes
Sinking Spring Borough (610) 678-4903	Yes	No	Yes
South Heidelberg Township 610-678-9652	Yes	No	Yes
Spring Township 610.678.5393	Yes	No	Yes

Municipality	Curbside Recycle	Dropoff Recyle	Organic Waste Collection
St. Lawrence Borough 610-779-1430	Yes		Yes
Tilden Township 610-562-5490	No	No	No
Topton Borough 610 - 682 - 2541	Yes	No	Yes
Tulpehocken Township 717-933-5747.	No	No	No
Union Township 610-582-3769	No	Yes	No
Upper Bern Township 610-488-1191	No	No	No
Upper Tulpehocken Township (610)488-7170	No	Yes	No
Washington Township (610) 845-7760	No	Yes	No
Wernersville Borough 610-678-1486	Yes	No	Yes
West Reading Borough 610-374-8273	Yes	No	Yes
Windsor Township 610-562-3769	No	No	No
Womelsdorf Borough 610-589-4725	Yes	No	Yes
Wyomissing Borough 610-376-7481	Yes	No	Yes

* Please note: All Berks County residents have access to the Berks County Recycling Center, 1316 Hilltop Road, Leesport.

Does My Recycling End Up in the Landfill?

Some people refuse to recycle because they believe that "it all ends up in the landfill anyway." Is it true? Do recyclable materials really end up in the landfill?

Unfortunately, it does happen in rare circumstances. Recycling is a business. The recyclable aluminum cans, newspaper, copy paper, glass, and plastic are collected, sorted, and sold for a profit. In some economic conditions, when the price for the recyclable materials falls well below the cost for disposing of them in landfills or markets are unavailable, collection programs may change and certain materials may no longer be accept causing those recyclable materials to end up in the landfill. This happens when there are not enough manufacturers buying the recyclable materials to make new products.

What Can You Do?

While you have little control over the national and global economic policies that affect recycling markets, there are things that you can control:

- **Buy recycled-content products. Look for products that are made from recyclable materials.** Every time you buy recycled-content paper at the office supply store, for example, you are creating markets for the paper that you recycle at home or work. Buying products made from recycled paper, glass, and plastic helps ensure that those materials do not end up in a landfill. You can even buy gold and silver jewelry made by recycling those precious metals from old electronics.
- **Rinse out those glass and plastic containers before you recycle them.** Rinsing out the containers helps avoid odors in your recycling bin at home. They also help avoid odors at the recycling facilities, and prevents contamination of all recycled materials..
- **Make sure that you only recycle materials that are actually recyclable.** When people mix trash with their recyclables, it increases the cost of recycling, decreases the value of the recyclable materials, and makes it more expensive to make new products out of the recycled materials. As a result, some of those materials might end up in a landfill instead of in new products. Be sure to know what you can put in the recycling bin and what you should put in the trash. Most recycling programs, for example, do not accept pizza boxes, but far too many people toss them in their recycling bins.
- **Please do not put recyclables in plastic bags for recycling collection.** This is considered contamination and causes problems with the sorting lines.
- **If your municipality doesn't offer curbside recycling, do your research and select a waste hauler who will.**

ACT 101 – JULY 1988 PENNSYLVANIA'S "MUNICIPAL WASTE PLANNING, RECYCLING AND WASTE REDUCTION ACT"

Purpose of the Law

Act 101 mandates recycling in Pennsylvania`s larger municipalities, requires counties to develop municipal waste management plans, and provides for grants to offset expenses. The goals of the Act are to reduce Pennsylvania`s municipal waste generation; recycle at least 35% of waste generated; procure and use recycled and recyclable materials in state governmental agencies; and educate the public as to the benefits of recycling and waste reduction.

Recycling

Municipalities with populations of at least 10,000 had to implement curbside recycling programs by September 26, 1990. Municipalities with populations between 5,000 and 10,000 and more than 300 persons per square mile had to implement curbside programs by September 26, 1991. All disposal facilities are required to provide recycling drop-off centers. Mandated municipalities are required to collect at least 3 of the following materials: clear glass; colored glass; plastics; aluminum; steel and bimetallic cans; high grade office paper; corrugated paper and newsprint. Commercial, municipal and institutional establishments within a mandated municipality are required to recycle aluminum, high-grade office paper and corrugated paper in addition to other materials chosen by the municipality.

Land

In the 19th century, the noted American humorist Mark Twain advised, "Buy land, they're not making it any-more." Certainly, land acquisition and development has been a driving force in American life. By the 20th century, scientists began recognizing the environmental damage that humanity can do to the land if we fail to take proper care of it. Scientists now have a much better understanding of the devastating impacts of poor land use management including topsoil losses, adverse effects of persistent pesticides on human and wildlife health, wide-scale filling of wetland habitats and contamination to small and large waterways, reductions in plant and animal diversity, changes in rainfall runoff patterns, and a host of other environmental changes related to imprudent land use up to and including climate change.

In the early years of the 21st century, society began emphasizing more sustainable uses for our land—uses that allow us to continue benefiting from the land while preserving the quality, useful properties, and aesthetic beauty. Sustainable land use means preserving and enhancing an area's beneficial features for future generations.

Berks County is fortunate to have abundant natural resources: forested ridges, numerous streams and rivers, fertile topsoil, and abundant rainfall. Agriculture was, and remains, a dominant influence in the County. The industrial operations that fueled the growth of Reading and its surroundings have declined over the past few decades, while the commercial, professional, and retail sectors have been growing. Each has different impacts on land use.

The indicators selected by Berks Nature to describe the state of land within Berks County relate directly to its heritage—its fertile farmlands—and to factors associated with the sustainability of land use choices. The preservation of agricultural lands and forest tracts has been accelerated by conservation easement and tax relief programs, while the many municipalities that make up the County continue to increase their cooperative efforts in planning and zoning.

Indicators we used for land are:
- Protected Land
- Tree Cover
- Impervious Cover
- Multi-Municipal Cooperation
- Outdoor Recreation Areas

Land Indicator One
PROTECTED LAND

Thousands of acres in Berks County are protected through a combination of institutional ownership and land protection programs. Conservation easements are a popular and effective way to protect a piece of land. It is a legal agreement between a landowner and an institution such as Berks Nature that permanently limits uses of the land to protect its conservation values.

In Berks County, there are two primary institutions that work with landowners to develop easements -- the County of Berks Agricultural Land Preservation Program and Berks Nature. The County of Berks Agricultural Land Preservation Program protects quality agricultural land, while Berks Nature protects woodland, open space, agriculture, trails, and more. Other land is also protected by Federal, State, or County government ownership and preservation.

Legend:
- **County of Berks Agricultural Land Preservation Program** (Agricultural, Woodland, Other)
- **Berks Nature** (Agricultural, Woodland, Open Space, Trail Right of Way)
- **Under Government Ownership** (Agricultural, Forest, Other)
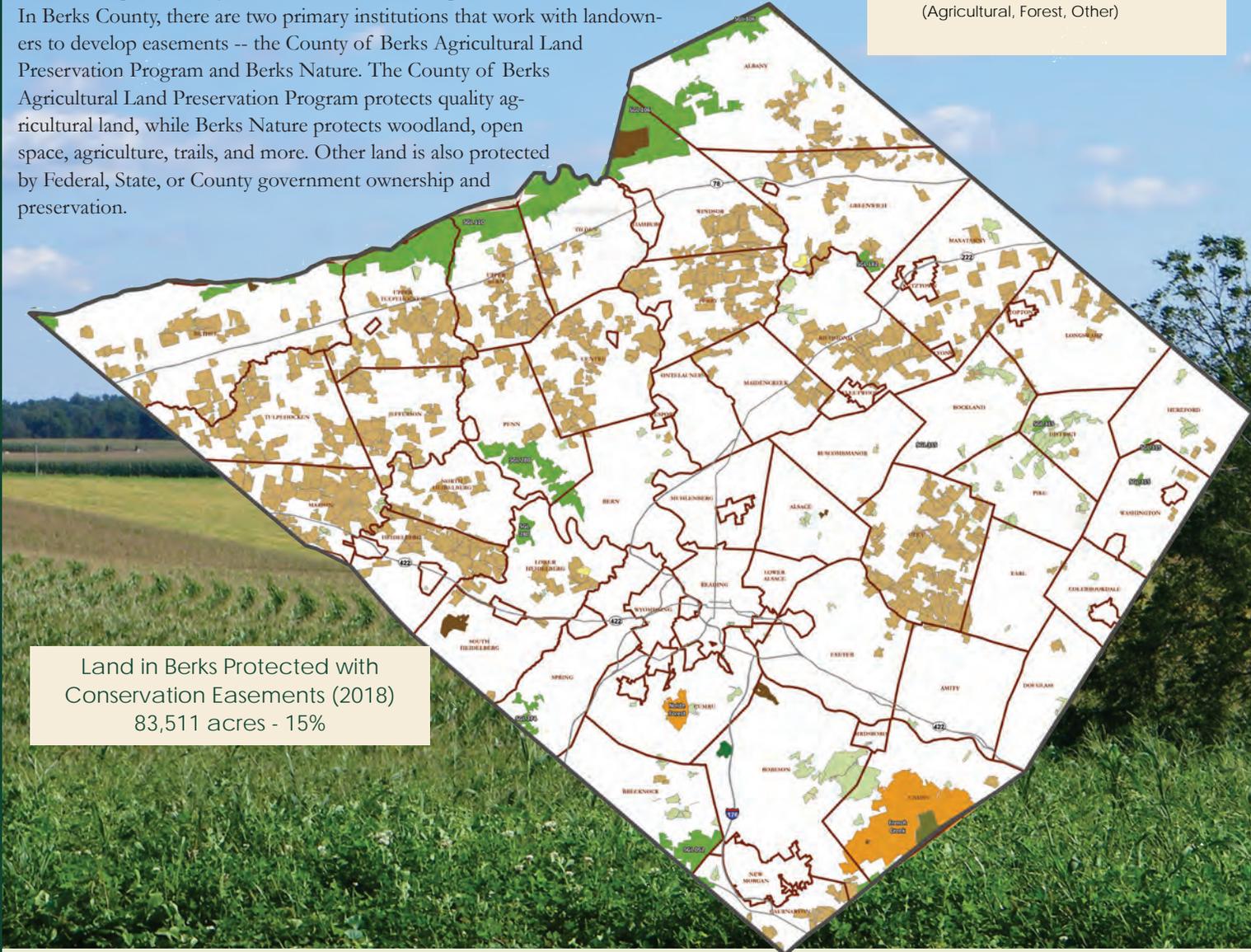
Land in Berks Protected with Conservation Easements (2018)
83,511 acres - 15%

What if I want to protect MY LAND?

There are several options available for you and Berks Nature is available to help guide you through this important decision-making process. If you have agricultural land visit the Berks County website (www.co.berks.pa.us) and search for the "Agricultural Conservation Easement (ACE) Program." The ACE program (formerly known as the Berks County Agricultural Land Preservation Program) places Berks County third in the nation for acres of protected land.

If you have woodland, open space, farmland or general questions about land protection please visit the Berks Nature website (www.berksnature.org). Berks Nature is a resource for you and will answer any questions you have about land preservation.

The Berks County ACE Program and Berks Nature are separate institutions but communicate often to guide landowners through the land protection process.

15% of Berks County lands are permanently protected with conservation easements, but more work with landowners is needed to meet the goal of at least 27.5% for agricultural preservation.

What the data tells us

A considerable portion of the 554,605 acres of land in Berks County is under government ownership or subject to private conservation easement agreements that preserve the natural value of these lands. Such land protection measures effectively relieve ecologically sensitive lands from private development pressures. The demand for land protection programs remains high in Berks County. Landowners should continue to pursue land protection in order to sustain our rich agricultural heritage and to protect our natural resources.

2013 EXISTING LAND USE COVERAGE

Pie chart values: 1.2%, 4.9%, 11.4%, 4.6%, 1.8%, 2.0%, 1.6%, 36.4%, 27.6%, 8.5%

Legend: Residential Low · Residential High · Commercial · Industrial · Institutional · Agriculture · Recreation · Open Space · Transportation · Water
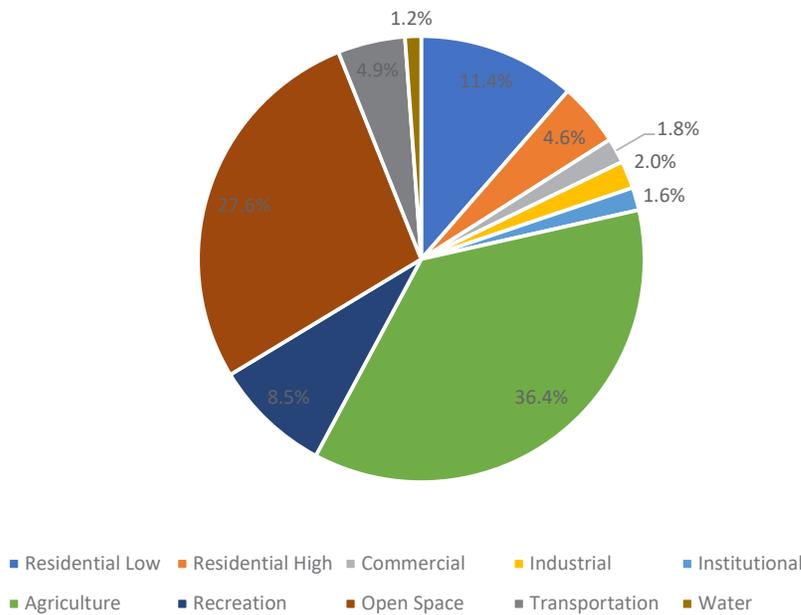
How do we make things better

The June 2018 draft of the Berks County Vision 2030 Comprehensive Plan, which identifies current and proposes policies for future land use, identifies 27.5% (152,332 acres) of the total County land area for Agricultural Preservation, which is a 1.8% drop from the 162,199 acres proposed in the 2020 comprehensive plan. Landowners (whether you own 20 acres or 400 acres) should learn about the options available to help conserve and protect their land. There are a variety of programs available in our community. Berks Nature can advise you on options for your land and provide you with the information and facts you need to make this important decision for you and your family. If you don't own land, you can help make things better by sharing this information with friends, neighbors, or relatives that may be interested in protecting land for future generations.

HOW DO YOU GREEN YOUR GARDEN AND LANDSCAPING?

All of us can help improve our local Berks County landscape by being more conscious about our own gardening and landscaping practices at home and work. The tips below identify just a few ways.

Reduce the Amount of Lawn You Maintain

Grass lawns are a significant contributor to suburban flooding because grass lawns cannot absorb heavy rainfalls. They act more like concrete than like a natural landscape. In fact, a typical lawn can only absorb about 10% of the rainfall that is absorbed by an equal amount of forest land.

Some people in Berks County also pay significant amount of money to water their lawns. According to national estimates, 30% to 60% of urban fresh water is used to water lawns. It is expensive and wasteful since much of the water is not actually absorbed by the lawn.

Lawns also contribute to overcrowded landfills. Approximately 20% of municipal solid waste is yard waste and much of it ends up in landfills.

In addition, 67 million pounds of synthetic pesticides are used annually in the United States to keep lawns looking "healthy." Many of these pesticides are misused and end up in our water supplies where they can harm human health.

Lawns are also expensive to maintain. The US Environmental Protection Agency reports that a meadow or wetland costs approximately $150 a year per acre to maintain, while the same amount of lawn costs $1,000 per year per acre to maintain.

Try these alternatives in part of your lawn:
- Install a pond or a water garden to collect rainwater and create a wildlife habitat
- Create a rock garden
- Plant more native trees or shrubs
- Increase the size of mulched flower beds
- Plant a vegetable garden
- Allow part of your lawn to "go natural."

Reduce lawn mowing for cleaner air

According to the Environmental Protection Agency, a gas-powered push lawn mower emits as much pollution per hour as 11 cars. A riding lawn mower emits as much pollution as 34 cars. This pollution is in the form of carbon dioxide, a greenhouse gas, and volatile organic compounds, which contribute to ozone formation. You can improve air quality by making these mowing changes:
- Mowing on cooler days or in the evening.
- Upgrading equipment to more efficient gas engines, electric engines or manual tools.
- Pouring gas smoothly with a funnel to avoid spilling.
- Tightening gas caps completely.

Use Native Plants Throughout Your Landscaping

Native plants are the trees, shrubs, flowers, grasses, ferns and other plants that have evolved in a particular area (such as southeast Pennsylvania) over thousands of years. Over this long period of time, the plants have adapted to the particular growing conditions present here, including temperature, rainfall, winds, soils, slopes and wildlife.

Using native plants in your garden can be environmentally beneficial while saving you time and money:
- Native plants are beautiful, providing an entirely new palate of plants to a traditional landscape.
- They are well-adapted to local conditions, which means that they require little maintenance once established. They eliminate or significantly reduce the need for fertilizers, pesticides, water and maintenance equipment. They also often attract beneficial insects, which prey upon pests, decreasing the need for pesticides.
- Most native species are perennial, or self-seeding biennial plants. This means you don't have to purchase and plant them each year; they return without any additional cost.
- Using native plants promotes biodiversity. Planting a small meadow that once was lawn replaces one plant species with many, increasing the opportunities for beneficial wildlife and insects to live.
- Native plants reduce air pollution and energy consumption, improve water quality and reduce soil erosion. Using native vegetation, unlike cultivated landscapes, does not require the use of lawn maintenance equipment, a major contributor to air pollution. They improve water quality by filtering contaminated stormwater and they reduce soil erosion by stabilizing soils with their deep root systems.
- Native plants maintain our natural heritage and our community's character. What would Berks County look like without its majestic oaks and familiar meadow plants?
- Native plants attract song birds and pollinators such as butterflies, native bees, and honey bees. Visit The Nature Place lobby to see a live observation honey beehive to learn more about pollinators!

The Pennsylvania Department of Conservation & Natural Resources maintains a native plant reference list. Visit www.dcnr.pa.gov/conservation/wildplants/landscapingwithnativeplants to learn what types of plants to buy for your new native garden!

Land Indicator Two
TREE COVER

The state called Penn's Woods (i.e., Pennsylvania) has relatively large tracts of forested land. It supports substantial populations of mature deciduous (broadleaf) and significant numbers of coniferous (evergreen) trees. The ecological values of forested lands are well documented; forest cover stabilizes the soil, reduces erosion from heavy rainfall, provides habitat for many plant and animal species, produces useful and renewable resources (wood products), and takes up carbon dioxide and produces oxygen. In addition, the aesthetic value of woodlands and forests is undeniable; just walking from an open field into a cool, shady woodland tract on a hot summer's day is one of life's true pleasures.

Greenways are an important feature of our forests in Berks County. A greenway is a corridor of open space that can vary greatly in scale and purpose from a narrow ribbon of green that runs through urban, suburban, and rural areas to a wide open corridor that incorporates diverse natural, cultural, and scenic features. These corridors are critical connections for wildlife movement and habitat. Greenway corridors protect natural, cultural, and scenic resources, provide recreational benefits, enhance the natural beauty and the quality of life in neighborhoods and communities, and stimulate economic development opportunities.

Forested lands make up the largest land-cover category in Berks County, but there are increasing threats to the quality of the remaining forests

Bernville, Boyertown, Reading, Robesonia, and Wyomissing have earned the designation of "Tree City USA" from the Arbor Day Foundation. To qualify for this designation, a municipality must have a Shade Tree Commission or Department, a Shade Tree Ordinance, a Community Forestry Program, and an Arbor Day observance. Learn more about Tree City USA at www.arborday.org.

Total acres of tree cover:
236,014 acres or 42.6%

- ▇ DECIDUOUS FOREST
- ▇ EVERGREEN FOREST
- ▇ FORESTED WETLAND
- ▇ MIXED DECIDUOUS AND EVERGREEN FOREST
- ▇ DESIGNATED "TREE CITY" MUNICIPALITY

How do we make things better

Did you know an acre of trees absorbs enough CO2 over one year to remove the amount of CO2 produced by driving 26,000 miles in a car? If your property includes forested areas, try to keep some or all of those areas intact; if your property lacks trees, consider planting trees where they are compatible with property use. Select trees appropriate for the regional climate and local soil and moisture regimes. Clusters or groups of trees provide habitat for more woodland species than rows of individual trees; consider this if you are clearing trees from your property. Berks Nature staff can advise you on selecting attractive, appropriate tree species for planting.

What the data tells us

Although it may not be obvious, forested lands make up the largest land-cover category in Berks County (236,014 acres or 42.6%). The largest unbroken tracts are on Kittatinny Ridge (also known locally as Blue Mountain) on the northern border of Berks County, but substantial forested lands are also scattered throughout the southeastern section that includes French Creek State Park. In fact, "Hopewell Big Woods," which is the forested area around French Creek State Park straddling the Berks and Chester County border is touted as "the largest area of unbroken forest between New York City and Washington DC. It is being increasingly recognized as an important natural and recreational area in the mid-Atlantic region.

Large continuous forests are important because they support more of the original plants and animals from a region. Unfortunately, there are a number of increasing threats to Berks County forests. We are seeing an increase a high housing density in forested areas, which is fragmenting forest lands. Smaller, fragmented forests are more susceptible to invasive plant species, disease, and insects. In Berks County, we are already seeing the impacts of disease, climate change, and invasive insects such as the emerald ash borer, hemlock wooly adelgid, gypsy moth, and spotted lanternfly.

Learn what YOU can do to help control the Spotted Lanternfly at extension.psu.edu/spotted-lanternfly
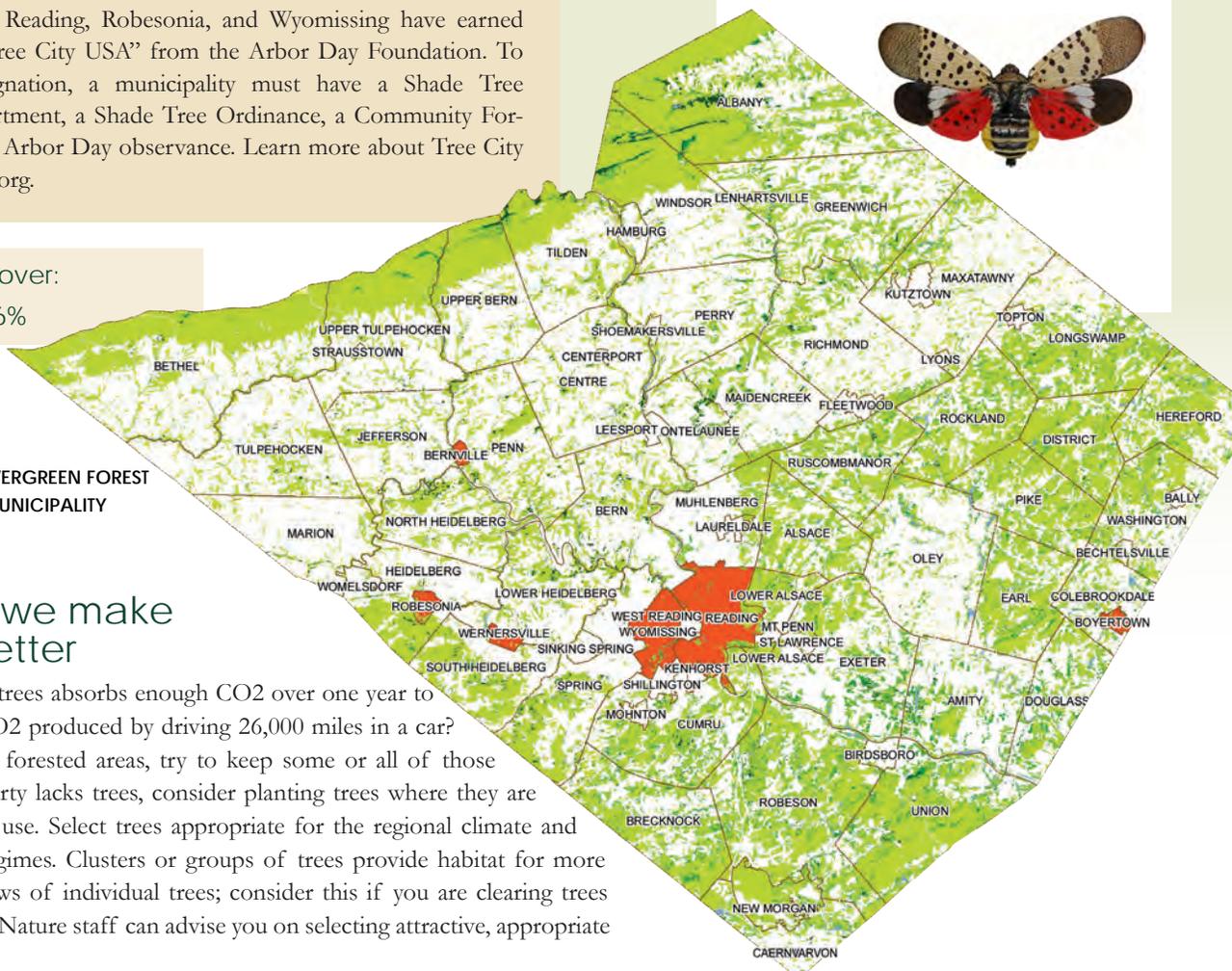
Land Indicator Three
IMPERVIOUS COVER

Impervious surfaces are areas that prevent water from being absorbed into the ground when it rains. They include roadways, driveways, parking lots, buildings, and other areas where natural movement of rainwater into the soil is partially or completely blocked. This reduces the amount of rainfall that recharges groundwater resources and increases surface runoff to streams and rivers. Increased surface runoff increases the potential for erosion and flooding. It also carries more soil particles, nutrients, and contaminants into the streams and rivers receiving this runoff, commonly referred to as "non-point source pollution." These changes in the natural distribution of rainfall into surface water and groundwater compartments can be offset in part by proper stormwater management designs that promote infiltration, detain or slow surface runoff, or recycle runoff into irrigation systems. Reducing the amount of impervious surfaces is an obvious first step.

THE 10% "RULE"
Studies evaluating the degree of impervious cover in watersheds have found that most stream health indicators decline when watershed impervious cover exceeds 10 percent (Schueler and Holland, 2000).

PERCENT OF BERKS COUNTY WITH IMPERVIOUS COVER
12.5%

More than 12% of the land in Berks County is classified as impervious cover.

What the data tells us
The densest areas of impervious cover are, as expected, in urban areas and along major roadways. Although Berks County is not considered highly developed, more than 10 percent of the land is considered impervious.

How do we make things better
Permeable surfaces (e.g., pavers, porous asphalt) can be used for driveways, parking areas, and other flat areas traditionally paved with asphalt or concrete. The permeable surfaces allow some infiltration of stormwater, reducing the volumes and rates of stormwater runoff into streams and rivers immediately after storms. Consider a permeable surface for renovations or new construction. Also, collect stormwater runoff in rain gardens and rain barrels to help increase groundwater recharge.

Pervious pavement demonstration by the Berks County Conservation District

Establish a rain garden!
Do you have a small yard and still wonder how you can make a difference? Homeowners in many parts of the country are catching on to rain gardens – landscaped areas planted with wildflowers and other native vegetation that soak up rain water, mainly from the roof of a house or other building. The rain garden fills with a few inches of water after a storm and the water slowly filters into the ground rather than running off to a storm drain. Compared to a conventional patch of lawn, a rain garden allows about 30% more water to soak into the ground.

Why are rain gardens important?
As cities and suburbs grow and replace forests and agricultural land, increased stormwater runoff from impervious surfaces becomes a problem. Stormwater runoff from developed areas increases flooding; carries pollutants from streets, parking lots and even lawns into local streams and lakes; and leads to costly municipal improvements in stormwater treatment structures. By reducing stormwater runoff, rain gardens can be a valuable part of changing these trends. While an individual rain garden may seem like a small thing, collectively they produce substantial neighborhood and community environmental benefits. Rain gardens work for us in several ways by protecting water, recharging groundwater, and providing valuable habitat for Berks County wildlife!

Land Indicator Four
MULTI-MUNICIPAL COOPERATION

Municipal master plans, zoning plans, and sensitive area plans establish classification systems, regulations, and criteria for land development within a particular municipality. These plans represent the municipality's sense of how land should be used and how development should proceed in various sections of the municipality. Given the number of municipalities generating their own master plans, zoning plans, and other plans for particular categories of land, conflicts or discontinuities in land use commonly occur. This is particularly challenging at municipal boundaries, where, for example, one municipality's commercial zone might border another municipality's rural residential zone.

These conflicts can be reduced in number and severity when municipalities work together to coordinate land use plans. The Berks County Planning Commission promotes the development of Joint Comprehensive Plans and Joint Zoning Ordinances among municipalities to coordinate land-use planning.

Municipalities with Joint Planning

- Bally, Bechtelsville (1994)
- Boyertown, Colebrookdale, Pike (2005)
- Centre, Centerport (1997)
- Eastern Berks (2015)
- Exeter, Amity, St Lawrence (2005)
- Fleetwood, Maidencreek, Richmond (2011)
- Governor Mifflin (2017)
- Greenwich, Lenhartsville (2009)
- Hereford, Washington (2018)
- Leesport, Ontelaunee, Perry (1996)
- Lower Alsace, Mount Penn (2006)
- Northern Berks (2005)
- Oley, Alsace, Ruscombmanor (2009)
- Penn, Bernville, Jefferson (2008)
- Southern Berks (2004)
- Southwestern Berks (2011)
- Suburban Berks West (2003)
- Western Berks (2000)

Participation is high in joint comprehensive planning, zoning, and special planning.

What the data tells us

Berks County is clearly moving in the direction of joint planning and zoning among its constituent municipalities, addressing both general and specific land uses. These joint efforts are ultimately beneficial to the residents of the County - development can be directed into areas with the capacity to accommodate such land-use changes, while sensitive areas that cross municipal boundaries can be preserved.

How do we make things better

Municipalities that have not yet developed agreements and arrangements for joint planning and/or zoning with their neighbors should consider the pros and cons of creating such agreements. Berks County residents should be aware that the decisions made by planning commissions and zoning boards have long-term effects on the development of lands in their communities and should participate in such planning efforts when possible. Meetings where planning and zoning decisions are voted upon are open to the public. Visit the county's planning website at www.co.berks.pa.us/planning.

Municipalities with Joint Zoning

- North Heidelberg, Heidelberg, Womelsdorf, and Robesonia
- Lower Heidelberg, South Heidelberg, and Wernersville
- Bally and Bechtelsville
- Boyertown, Colebrookdale, and Pike
- Lower Alsace and Mount Penn

Land Indicator Five
OUTDOOR RECREATION AREAS

According to the Outdoor Industry Association, outdoor recreation generates $29.1 billion in consumer spending in Pennsylvania. It also creates $1.9 billion in state and local tax revenue, $8.6 billion in wages and salaries, and 251,000 Pennsylvania jobs.

These benefits depend heavily on establishing and maintaining outdoor recreation areas that people want to visit. It requires clean rivers and streams, well maintained trails, and gorgeous scenery people want to see.

Luckily, Berks County has an abundance of these resources, including Blue Marsh Lake, Hawk Mountain Sanctuary, the Schuylkill River Trail, Neversink Mountain Preserve, Mount Penn, the Horseshoe Trail, Appalachian Trail, the 12 parks maintained by Berks County Park & Recreation Department, and the 15,854 acres of active and passive recreational areas managed by local municipalities.

Berks County has 55,478 acres of public park and recreation facilities, which includes federal, state, county, and municipal lands. There are approximately 17,000 additional acres of private recreation facilities such as sports clubs, scout camps, and golf courses. There are also 517 miles of trails.

Is it enough?
According to the National Park and Recreation Association (NRPA), at a minimum, municipalities should provide 6.25 to 10.5 acres of open space/recreational opportunities per 1,000 people. This local, close-to-home space should include a number of different park types -- mini-parks, neighborhood parks and community parks. NRPA also suggests an additional 15 to 20 acres per 1,000 people in regional natural resource areas.

As part of the last full analysis, Berks County averaged 8 acres of local close-to-home recreation space per 1,000 people. However, at a municipal level 62% of the 73 municipalities in Berks were deficient for providing recreational facilities to their residents - 16 of them provide no recreational facilities at all.

Did you Know? Camping contributes $47 million to the Berks economy annually; Wildlife watching contributes $84 million to the Berks economy annually; Biking contributes $63 million to the Berks economy annually; and finally, Trails were ranked #1 as most important in satisfying household recreational needs in Berks County.

What the data tells us
Despite the vast inventory of public resources in Berks, aside from Blue Marsh lake, much of the federal and state land is located along the periphery of the county. In some cases municipal recreation land is not evenly distributed among its neighborhoods making accessibility problematic for many Berks County residents. Currently, only 39% of Berks County residents live within a quarter-mile of a public park or recreation area. More connections, promotion and regional planning are necessary to provide open space and recreational opportunities to the Berks County residents that meet the national standard.

About 7% (38,440 acres) of Berks is classified as parkland and recreational facilities. More connections, promotion and regional planning are necessary.

BRONZE LEVEL
The International Mountain Biking Association (IMBA) has awarded Reading, PA the Bronze Level Ride Center Status. This gives us recognition for large-scale mountain bike facilities that offer something for every rider.

Planning for Future Parks

Bethel, Marion and Tulpehocken Townships are hiring a consultant to create a joint Greenway Park and Recreation Plan. They received a grant from the Pennsylvania Department of Conservation and Natural Resources and recently hired a consultant for the project.

Interest in Outdoor Recreation

The most frequent reasons for people getting outdoors, according to the Outdoor Foundation's 2018 Outdoor Participation Report, are:

Get exercise	64%
Be with family and friends	56%
Keep physically fit	50%
Observe scenic beauty	48%
Be close to nature	47%
Enjoy the sounds and smells of nature	46%
Get away from the usual demands	41%
Be with people who enjoy the same things I do	33%
Experience excitement and adventure	32%
Experience solitude	25%
Develop my skills and abilities	20%
Be with people who share my values	20%
Gain a sense of accomplishment	19%
Because it is cool	17%
Gain a sense of self-confidence	16%
Talk to new and varied people	9%
Other	4%

MOST POPULAR OUTDOOR ACTIVITIES

Bar chart comparing Ages 6+ and Ages 18-24 across activities: Jogging (19%, 31%), Hiking (15%, 18%), Camping (14%, 15%), Fishing (17%, 15%), Biking (16%, 15%).

Legend: ■ Ages 6+ ■ Ages 18-24
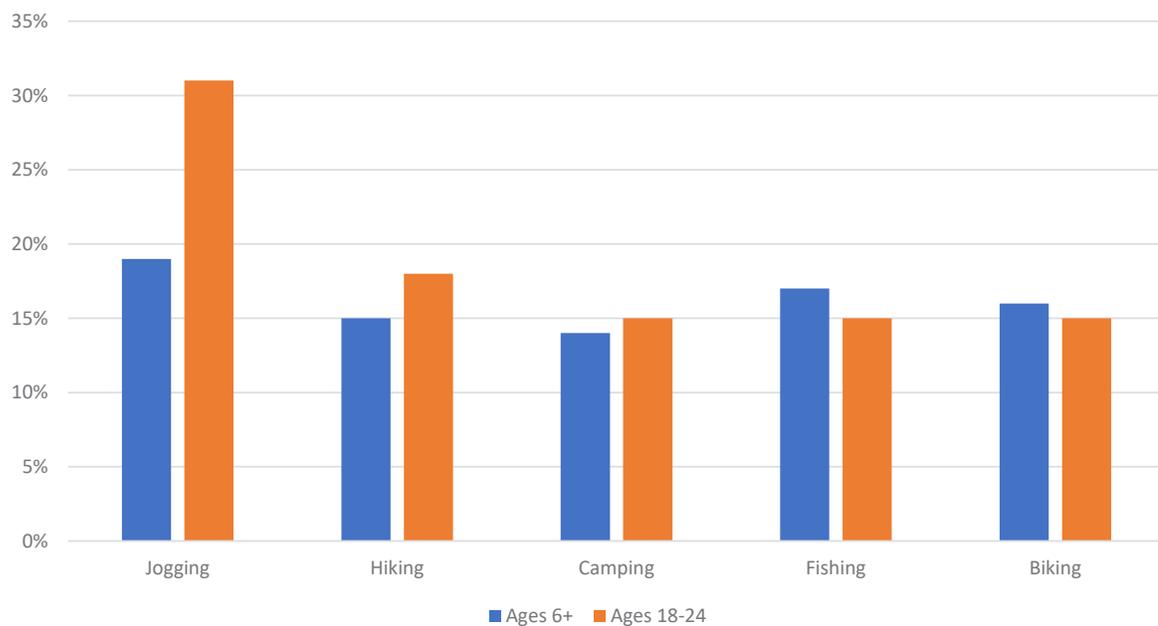
Berks County Recreation Areas

The Commonwealth of Pennsylvania is the largest owner of recreation land in Berks County with 43% of the total. The pie chart below identifies the types of owners and percentages of Berks County recreation facilities owned by each.

BERKS COUNTY RECREATION FACILITIES BY TYPE - 2017

School 2%
County 2%
Private 9%
Federal 10%
Non-Profit 11%
State 43%
Municipal 23%
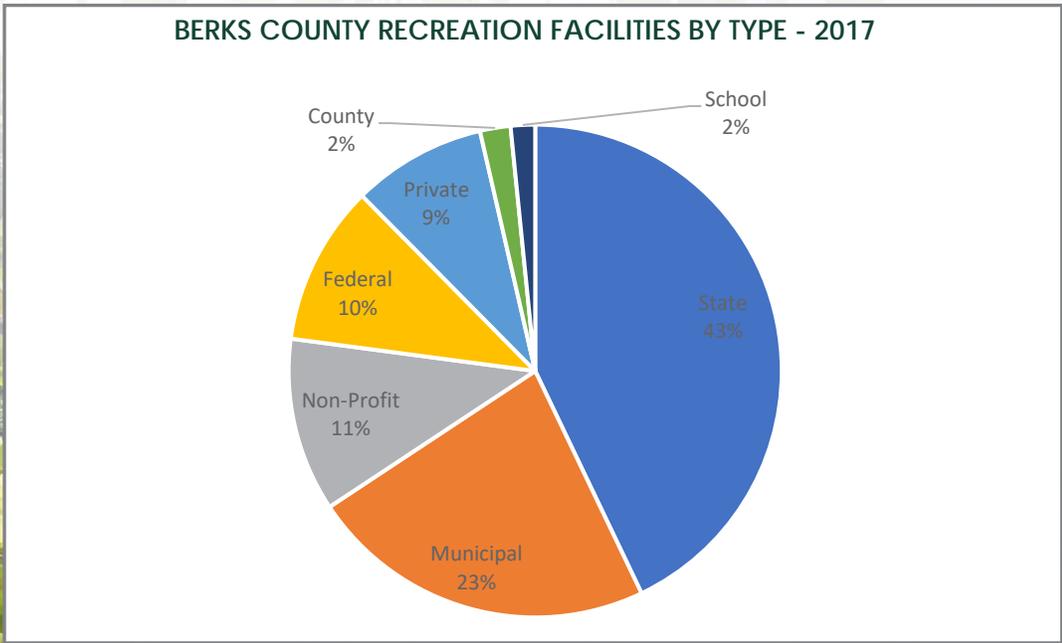
Largest Berks County Recreation Facilities by Owner Type - 2017

Ownership	Facility	Acres
State	French Creek State Park	6,292
Federal	Blue Marsh Lake	5,360
Municipal	Lake Ontelaunee	3,304
Non-Profit	Hawk Mountain Sanctuary	1,624
School	Schuylkill Valley Education Complex	1,169
County	Antietem Lake Park	650
Private	Maple Grove Raceway	450

How do we make things better?

Use the open space and recreational resources that exist in Berks. Help promote these public resources and volunteer to help maintain them. This will help allow the governments and organizations that manage these resources to devote more time and energy to planning for future parks and greenway connections. Local governments, agencies, and non-profit organizations need to think across boundaries to utilize and promote greenways and recreation regionally.

Hiking Across Berks County

There are more than 500 miles of hiking trails throughout Berks County. Several online resources provides maps and additional trail information. Check out:

* Berks Nature -- berksnature.org/trails
* All Trails – alltrails.com and search "Berks County trails"
* Berks County Visitor's Bureau -- visitpaamericana.com/see-and-do/hiking-trails

STORIES FROM THE COMMUNITY
WHAT ARE LANDOWNERS DOING TO GO GREEN?

There are more than 72,000 acres of Berks County agricultural land protected under Pennsylvania's Agricultural Conservation Easement (ACE) Program. Another 11,955 acres are protected under additional conservation easements. Each acre protected began when a concerned landowner decided that their land was worth permanently preserving.

Christopher and Michelle Smith of Robeson Township are typical of the hundreds of landowners who have decided to place their land in a conservation easement program.

With almost 25 acres of open fields and marshland bordering both the Schuylkill River and Route 724, the Smiths recognized that their land was valuable to both wildlife and developers. After careful consideration, they decided to preserve their land for the wildlife.

Working closely with Larry Lloyd at Berks Nature, the Smiths documented the unique features of their property, the wildlife that call it home, and their long-term desires for the property. The result was a three-part conservation easement:

- Approximately 5 acres containing the house and a barn on which the Smiths or future property owners can add additional buildings if needed
- Approximately 10 acres of permanently preserved meadow
- Approximately 10 acres of permanently preserved marshland

Their decision means that the wildlife with whom the Smiths have shared the property for years will have a permanent home, including:

- Red-eared slider turtles
- Barn swallows
- Screech owls
- Bald eagles
- Osprey
- Kestrels
- Muskrats
- Mink
- Four or five species of frogs
- Fox
- Tons of bees and other beneficial insects

When asked what advice he would offer others interested in preserving their land, Christopher Smith's response was simple, "Just do it."

High Conservation Value

Adopted in December of 2007, The Berks County Greenway, Park and Recreation Plan is an official element of *Berks Vision 2020: A Comprehensive Plan for the County of Berks*. The Plan sets specific goals for the direction Berks County should take to provide future open space, greenways, and recreation for its citizens. The Plan also provides recommendations for the identification, protection, and preservation of the County's historic sites and districts.

During the County planning and modeling process The three most important and largest, ecological areas identified for Berks County are the **Hopewell Big Woods**, **Oley Hills**, and the **Kittatinny Ridge**. These three areas contained more of the identified highest valued conservation areas for ecological habitat preservation than anywhere else within the County.

✴ Important Bird Area (IBA)
as designated by
Audubon PA

Kittatinny Ridge ✴

Maidencreek Watershed/
Lake Ontelaunee ✴

Little Manatawny/
Earl Poole Sanctuary

Oley Hills and Reading
prong of PA Highlands

Perkiomen
Uplands

Blue Marsh
Lake ✴

South Mountain

Spring Hills/
Horseshoe Trail

Nolde Forest

Brecknock Heights/
Horseshoe Trail Greenway

Glen Morgan
Lake ✴

Trout Run

Hay Creek ✴

Hopewell Big Woods

Conservation Value Rank

- 🟥 High
- 🟧
- 🟧
- 🟨 Medium
- 🟩
- 🟦 Low

The Hopewell Big Woods area is the last large unbroken forested area in South Eastern Pennsylvania, encompassing nearly 73,000 acres. It is home to the French Creek State Park and the Historic Hopewell Furnace national heritage site and is part of the Schuylkill Highlands Conservation Landscape.

Lake Ontelaunee is a 1,082-acre reservoir owned by the City of Reading. The lake was created in 1926 by the damming of Maiden Creek to extend and improve the water supply to the city. In addition, the lake provides a venue for hunters, fishermen, and hikers. It is a designated "important bird area" by Audubon Pennsylvania.

Blue Marsh Lake is an US Army Corps of Engineers project, adopted as part of the Flood Control Act of 1962 and provides for multiple purpose development for water supply, flood control, and recreation. The summer or recreation pool where the lake is generally maintained from April through September covers 1,150 acres, runs 8 miles long, and has 35 miles of shoreline. It is a designated "important bird area" by Audubon Pennsylvania.

The Oley Hills contains beautiful scenic vistas, five state designated exceptional value streams, significant woodlands, varying geology, and a rich assortment of cultural and historical resources and is the significant part of the PA Highlands.

Neversink Mountain, a Berks Nature preserve, is home to an abundance of flora and fauna and is managed for both people and wildlife. During your visit of nearly 900 acres of wildlife and trails, you may encounter deer, turkeys, a variety of birds, small mammals, amphibians – and Neversink Mountain is known for a diverse population of butterflies and moths.

South Mountain is a name applied to features in the mountain range extending south and south west from the Lehigh Valley to the Lebanon Valley regions of Pennsylvania. The southern prong of this feature extends west along U.S. Route 422 and the southeastern border of Berks County, most notably in the Wernersville, Denver areas. The southernmost peaks were at one time home to many exclusive sanitariums and resorts.

The Kittatinny Ridge (also known as Blue Mountain) is a long mountain ridge that winds 185 miles through eastern and central Pennsylvania, to the Maryland line. The Ridge is a globally-significant fall migration flyway used annually by tens of thousands of raptors and vultures and millions of songbirds, and has been designated by Audubon Pennsylvania, as the largest of the state's "Important Bird Areas." Home to the Appalachian Trail and Hawk Mountain Sanctuary, the many rock outcroppings along the ridge also make it an excellent place to hike and watch migrating hawks, eagles and vultures.

10 Years of State of the Environment

Year 1 – "Join the Conversation" 2009
- Started Eco-Camp to provide outdoor experiences for children
- 3000 SOTE reports distributed to 73 municipalities and each of the 19 school districts in Berks
- Meetings with experts and stakeholders to prioritize indicators

Year 2 – "Take the Challenge" 2010
- Challenged school districts, colleges and universities to improve recycling
- Smart Growth conversations
- Municipal Networking for Conservation event series began
- Created Berks Watershed Restoration Fund to support our on the ground work

Year 3 – "The Business of Nature" 2011
- Sponsored recycled Piggy Banks to encourage saving money by going green
- Announced Angelica lease discussions with City of Reading
- Scot Case Business of Nature presentation
- Greater Reading Trails promoted as important quality of life feature in Berks
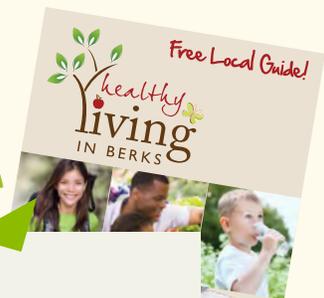
Year 4 – "Healthy Living in Berks" 2012
- Environmental Exploration Center opens at Angelica
- Sponsored Apples & Healthy Living walking sticks as give aways
- GLOBEY makes his debut as the newest Berks County mascot!
- Berks County Medical Society endorses Healthy Living in Berks and 10,000 distributed in Reading Health Network.
- Berks County MS4 Steering Committee was formalized to help address stormwater education for municipalities in Berks
- Trails, parks, natural resources, farmers markets, gardening all promoted to Berks residents to encourage healthier lifestyles

Year 5 – "5-Year Report Card" 2013
- Discussed indicators that are going well, areas that haven't changed and areas that need help
- Ken Finch speaks on benefits and need of Nature Play (inspired much of the thoughtful design of The Nature Place)
- Middle Schuylkill planning begins as part of the Delaware River Watershed Initiative
- Berks County Water & Sewer Association established by partners

Year 6 – "Seasons of Change" 2014
- Water quality improvements increase as part of the Delaware River Watershed Initiative
- Capital campaign begins for The Nature Place, our future home
- Lara Fowler, PhD from Penn State presents on Climate Change
- Sponsored thermometers as give aways
- GLOBE partnership begins in Berks
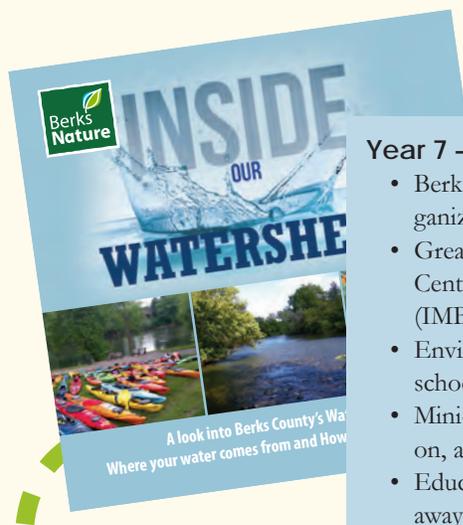
Year 7 – "Inside our Watersheds" 2015

- Berks Nature emerges as newly re-branded conservation organization
- Greater Reading Trails recognized as Bronze Level Ride Center by the International Mountain Biking Association (IMBA)
- Enviroscapes purchased and made available for free to all school teachers through the BCIU
- Mini-Enviroscapes utilized for all attendees to learn hands-on, and then used for classroom visits
- Educational Watershed playing cards sponsored as give aways
- Inside your Watershed Maps published and distributed to every school in Berks County
- Reached 2000+ students with water focused educational programs
- Dr. Gerald Kauffman, Director Water Resources Center at University of Delaware speaks about Delaware River Watershed

Year 8 – "Stories of Sustainability" 2016

- Guests shared what they do to live more sustainably
- Reached 2500+ students with our educational programs
- Started Berks Nature Ambassador program to support our work
- Scot Case presents on Local Sustainability Issues
- Groundbreaking takes place for The Nature Place

Year 9 – "Be a Good Neighbor" 2017

- The Nature Place opened to the public!
- Guests shared what they do to be a good neighbor
- Berks County Conservation District highlights Spotted Lanternfly issues
- Attendees receive milkweed seeds and gloves as giveaway to make a difference
- Olivia Boulard inspirational video as speaker
- Reached 2800+ students with our educational programs
- Master Watershed Steward Program started in Berks County through the Penn State Cooperative Extension.

Year 10 – "10 Year Anniversary" 2018

- Reached 4500+ children & adults with educational programs
- Scot Case presents on Year 10 SOTE Data
- Scheduling year 11 summits to revisit our 25 environmental indicators in 2019
- 550,000 pounds of Nitrogen and 305,000 pounds of Phosphorus are captured and removed from our water supplies annually as a result of our best management practices installed on farms. These nutrients, in large quantities, are detrimental to water quality.
- With our partners, we improved over 8,000 acres of agricultural land covering 140 different farms!
- Over the past 10 years we have planted more than 7,500 large native trees with the help of volunteers and partners.

Where do we go from here?

While we have made progress and some of the indicators in this report are moving in the right direction, there is still work to do to continue to improve the environment in Berks County. Nature is essential to our quality of life, and defines our community. Maintaining key recreational and natural assets translates into maintaining an important segment of our local economy.

Ultimately, the State of the Environment needs to be an ongoing community conversation about setting goals, changing behaviors and thinking of new ways to do things that help conserve the resources that sustain our lives. Berks Nature encourages you to:

- Implement one or more of the actionable items contained within this report.
- Participate in our State of the Environment sessions to help establish priorities for our community to focus on over the next decade.

- Share this report with family, friends, students, colleagues, municipalities and neighbors!
- Consider ways your place of business or organization might be able to collaborate with Berks Nature and other conservation organizations to move our indicators in a positive direction.
- Celebrate the progress and good work that has been occurring in our community to inspire more positive change.
- Be part of the ongoing conversation! Join us on Facebook, Instagram or at www.berksnature.org to share issues of concern, positive stories and more!
- Become a dues paying member of Berks Nature to support the State of the Environment and other conservation programs in our community! Join online at www.berksnature.org.

Become a Member Today!

If you live here, work here, play here, or grew up here…become a member today!
Spread your support and encourage your friends, families, co-workers, employees, and businesses to do the same. It is a minimal commitment that impacts everyone in Berks County. Your tax-deductible contributions stay in Berks County.

As a 501(c)(3) non-profit organization, we lead conservation efforts through contributions from our memberships. We do not receive regular funding from a national organization, the government, or tax dollars to run our programs. Your contribution benefits your Berks County.

Join now at www.berksnature.org.

Your donation to Berks Nature impacts life now and for generations to come.

The Nature Place is open to the public Tuesdays – Fridays 10AM-3PM and Saturdays 10AM-4PM.
Visit to learn more about your local environment today!