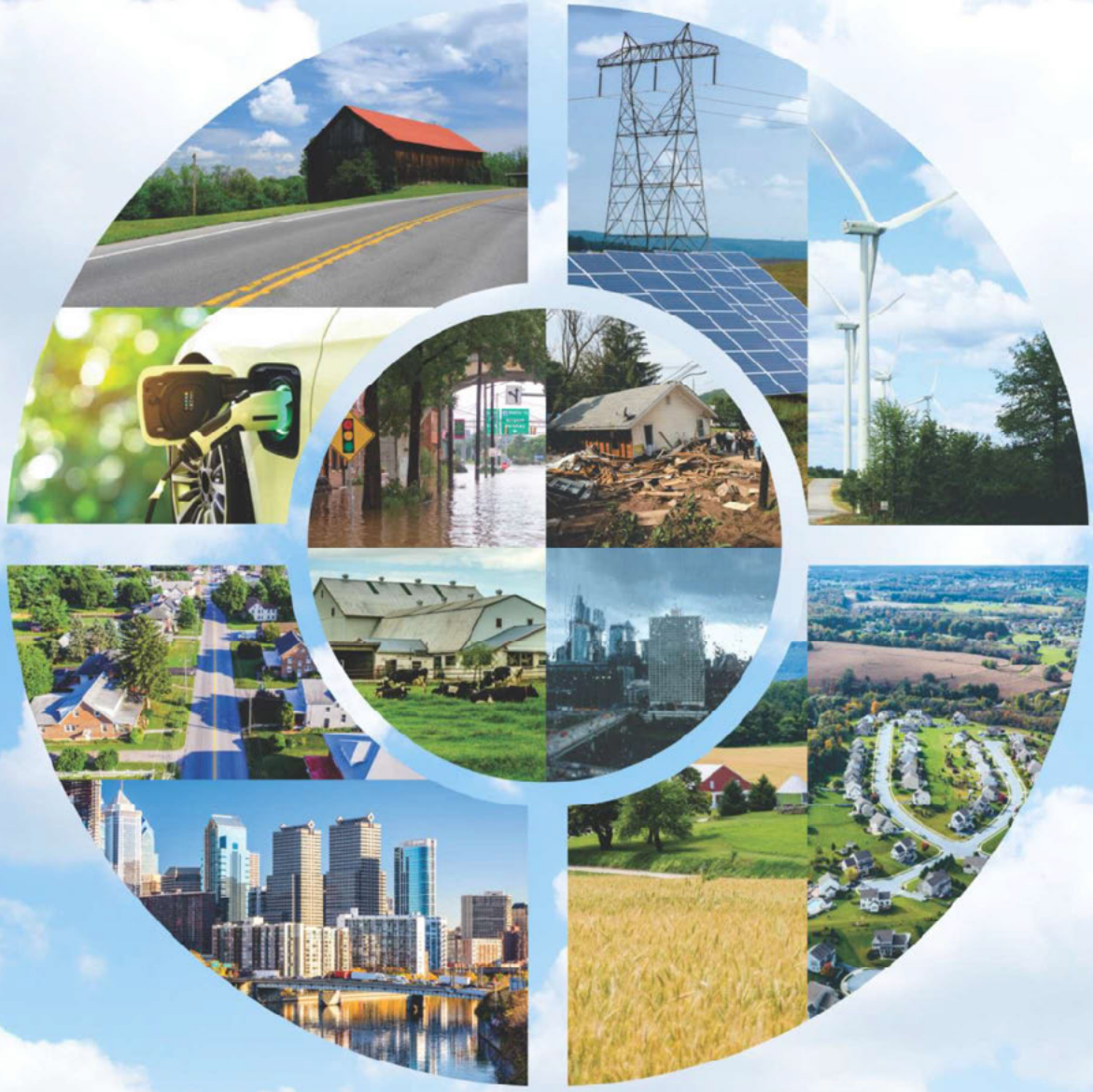
Pennsylvania Climate Action Plan

Strategies and actions to reduce and adapt to climate change

2018



pennsylvania
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Acknowledgements and Disclaimer

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This report was prepared in response to the Pennsylvania Climate Change Act (Act 70 of 2008), which requires the DEP to develop an inventory of greenhouse gases (GHG) and administer a Climate Change Advisory Committee (CCAC), a voluntary registry of GHG emissions, and a Climate Change Action Plan. Revisions to the Action Plan are required every three years. The Pennsylvania CCAC provided input and feedback to the DEP and ICF for the preparation of this Plan. The CCAC is composed of 18 members plus 3 ”ex Officio members.”

This 2018 Climate Action Plan Update is the fourth iteration of the Pennsylvania Climate Action Plan and builds on the work the commonwealth has already done. Different than years past, this 2018 Update offers a plan that more comprehensively addresses the changing climate in Pennsylvania by focusing on both the impacts of climate change (adapting to the impacts of climate change) and the prevention or slowing of human-caused climate change (reducing greenhouse gas emissions that cause climate change).

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Water Resources

Pennsylvania's surface water resources comprise nearly 2.5 trillion gallons of water with around 86,000 miles of rivers and streams that flow through the state, more than 4,000 lakes, reservoirs and ponds, and 120 miles of coastal waters (Penn State Agriculture and Environment Center 2017). Thirty times more water lies below the surface in groundwater aquifers that rely on 40-plus inches of precipitation a year to be replenished (Abdalla and Blunk 2007). The commonwealth depends on these resources for drinking water, water for agriculture and industry, habitat for aquatic species, and recreational activities.

Pennsylvania's water resources are already subject to high demand from several user groups, such as thermoelectric power generators (70%), industrial and mining operations (13.6%), domestic and commercial customers (16%), and agricultural users (0.4%). The total withdrawal of surface and ground water in the state is around 10 billion gallons per day (Abdalla and Blunk 2007).

Many users in Pennsylvania, especially farmers and rural residents, depend on private wells for their water supply; for them, groundwater is the only option. More than one million private wells serve about 3.5 million people, about one quarter of the total population, and about 20,000 new wells are drilled each year in Pennsylvania (Swistock et al. 2009). Only Michigan has a larger population served by private wells. Studies have documented various water contaminants in private water systems, finding that 15-50 percent of private water systems fail at least one safe drinking water standard (Swistock et al. 2009). Contamination of groundwater wells can occur from failing septic systems, manure and fertilizer applications, oil and natural gas drilling, mining, or other land uses.

Climate Change Impacts

The expected impacts of climate change on water resources in Pennsylvania (Shortle et al. 2015) include:

- Increased saltwater intrusion due to rising sea levels, especially in the Delaware Estuary. This can alter habitats.
- Decreased water quality due to runoff from extreme precipitation events, urbanization, and increasing water temperature. This could result in higher water treatment costs.
- Reduced groundwater aquifer recharge, when precipitations occurs in more extreme events and a greater fraction runs off rather than infiltrating.
- Increased flood potential due to more extreme precipitation, and associated infrastructure impacts.
- Amplified risks to water resources associated with decreased snowpack, decreased water quality, urban flooding, and irrigation. This could result in higher water supply costs.

Opportunities to Reduce Emissions and Adapt to Climate Change

In the Water sector, DEP has identified two main strategies to reduce emissions and adapt to climate impacts:

- **Use stormwater best management practices**
- **Promote integrated water resources management and water conservation**

Each strategy description below includes leadership, citizen, and business actions that support the strategy; a summary of strategy benefits and costs; and key performance indicators.

These Water strategies do not include actions that the team quantitatively analyzed.

Use Stormwater Best Management Practices

With changing precipitation patterns, stormwater management is critical for reducing the likelihood and impact of floods.

Leadership Actions

State and local leadership can develop and enforce new policy requirements, revise existing policies, and provide incentives for improving stormwater management. These actions can include the following:

- Explore ways to incorporate PA DEP's *Stormwater Best Management Practices Manual* as standard operating procedure.
- Provide incentives for the installation and use of gray water and rainwater harvesting and consider existing international guidelines for increased reclaimed, recycled, and gray water use for non-potable applications (e.g., irrigation, toilet flushing).
- Revise stormwater regulations to accommodate increases in precipitation and run-off.
- Promote green infrastructure by instituting laws, regulations, and local ordinances requiring implementation of green infrastructure with new development or substantial redevelopment and revising the State Revolving Fund (SRF) state ranking criteria to require a thorough analysis and maximization of the use of green infrastructure, where appropriate. Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water. (EPA, 2014).
- Reduce impervious surfaces by requiring installation of permeable surfaces, buffers, and vegetated filters for all transportation-related projects; developing and enforcing a stormwater retention standard for new development and redevelopment; and/or implementing a fee for impervious surfaces.
- Promote, preserve, and manage natural features that treat, infiltrate, and hold runoff, such as riparian zones, estuaries, wetlands, floodplains, forests, and related landscapes.

Strategy Benefits and Costs

Climate Resilience Benefits & Costs

The climate resilience benefits of improved stormwater management include:

- Reduced flooding due to extreme precipitation events.
- Reduced heat island effect—which are exacerbated by higher temperatures—and associated health and air quality impacts.
- Protection of groundwater resources that are being depleted, particularly due to seasonal precipitation changes and reduced infiltration due to development.
- Reduced contamination of runoff, protecting the health of citizens and wildlife.

Environmental Benefits & Costs

In addition to the environmental benefits identified above, stormwater best management practices can capture carbon dioxide from the air and improve air quality through the use of green infrastructure. Green infrastructure solutions are low-impact, often no-regrets options that mimic natural systems. Primarily, green infrastructure can improve water quality, mitigate flooding, and build habitat.

Additionally, green infrastructure provides emission reduction benefits from reduced carbon dioxide emissions, carbon sequestration, reductions in water treatment and pumping energy requirements, and reductions in energy use due to cooling qualities of green roofs.

Economic Benefits & Costs

Additional modeling would be needed to quantify economic benefits, but improved stormwater management reduces the frequency and severity of urban flooding, which can result in significant economic benefits. Studies have shown that green infrastructure helps avoid capital costs for gray infrastructure, with a lower marginal cost (EPA 2014). Also, improved stormwater management will reduce the amount of runoff diverted to wastewater treatment plants, thereby reducing treatment costs.

Key Performance Indicators

Example indicators that Pennsylvania could use to measure progress toward this strategy include:

- Investment in green infrastructure
- Area of impervious vs. permeable surface
- Total annual runoff
- Water quality (pH, phosphorous, nitrates, turbidity, conductivity, fecal coliform)
- Gallons of stormwater entering combined sewer systems
- Value of reduced flood damage

What You Can Do to Promote Stormwater Best Management Practices

Pennsylvania citizens can support this strategy by taking the following actions:

- Reduce impervious surfaces on your property.
- Install a rain barrel, rain garden, or other means to capture and use rainwater from roofs, driveways, and sidewalks.
- Plant vegetation on your property to slow and absorb runoff.

What Businesses Can Do to Promote Stormwater Best Management Practices

Pennsylvania businesses can support this strategy by taking the following actions:

- Maximize retention and ground infiltration of stormwater on-site at existing developed sites.
- Use bushes, mulch, rain gardens, permeable hardscape, or curb cuts in parking lot islands or in the areas between sidewalks and the roadway.
- Establish urban forests or plant street trees to reduce stormwater volume and pollutants.
- Develop erosion control and stormwater management plans for all construction sites.

Promote Integrated Water Resources Management and Water Conservation

Integrated water resources management involves coordinated development and management of water, land, and other resources to maximize economic and social well-being without compromising the environment. Pennsylvania can take a holistic approach to protecting water resources from the impacts of climate change, through planning and practices such as managing water quality, quantity, and use.

Leadership Actions

To implement informed water management policies and practices, leaders can:

- Support additional research on climate change impacts on water supply and basin hydrology, including with hydrologic models to project changes in surface runoff and groundwater.
- Assess the impact of climate change on critical water supply and wastewater infrastructure, and encourage the development of facility-specific adaptation plans.
- Include climate change projections and modeling results in water supply and water quality planning to enhance reliability, improve quality, and improve instream flows and fish passage.

Strategy Benefits and Costs

Climate Resilience Benefits & Costs

The climate resilience benefits of integrated water resource management include:

- Ensured long-term reliability of water supplies for drinking, agriculture, and other uses in the commonwealth.
- Improved water quality that could be degraded due to runoff from extreme precipitation events, resulting in reduced health risks of water-borne diseases and reduced environmental contamination.

Environmental Benefits & Costs

The climate resilience benefits associated with this strategy are also environmental benefits. Additionally, better water conservation practices often go hand-in-hand with energy conservation, sometimes leading to reduced environmental impacts from reduced energy usage.

Economic Benefits & Costs

Water conservation and efficiency is inexpensive compared to developing new water supplies, and treatment and distribution operations. For example, using a metering program allowed a utility in Gallitzin, Pennsylvania to identify leaks and initiate a leak repair program. Within four years of implementing the program, the city was saving $5,000 annually in chemical costs and $20,000 on power costs, which was significant for a system with approximately 1,000 connections (EPA 2002). Additionally, demand management can lower the operating and maintenance costs such as pumping and chemical costs for utilities (EPA 2016a).

This strategy will also reduce residential and commercial water bills. Just by fixing leaks, homeowners could save 10 percent of their water bill (EPA 2018b).

Key Performance Indicators

Example indicators that Pennsylvania could use to measure progress toward this strategy include:

- Average/median gross water demand
- Water demand by sector
- Infrastructure Leakage Index rating
- Water savings from measure implementation
- Percentage per capita water demand reduction achieved

What You Can Do to Promote Integrated Water Resources Management and Water Conservation

Pennsylvania citizens can support this strategy by taking the following actions:

- Reduce household indoor water use by using water-efficient showerheads, faucets, and appliances (see EPA's WaterSense program for more information, available at https://www.epa.gov/watersense).
- Reduce outdoor water use, including by:
  - Plant native plants and drought-tolerant plants that don't require watering
  - Installing drip irrigation systems.
  - Setting sprinklers to keep the water on the landscape and off the pavement.
  - Managing sprinkler schedules to save water and money, updating schedules to align with the seasons.
  - Avoiding watering in the middle of the day when the sun will evaporate much of the water.
  - Contacting your local water utility to find out how much and when you should be watering outdoor plants.
- Set your pool water level several inches below the edge of the pool and plug the overflow line when the pool is in use or when adding water to avoid water loss from splashing.
- Use rain barrels or cisterns to harvest rainwater for irrigation and other outdoor water uses.

- Reuse household wastewater, called gray water, from bathroom sinks, showers, bathtubs, and clothes washers for landscape irrigation. Implement gray water reuse systems to divert water to a storage tank for outdoor watering use.
- Capture runoff on your property with rain gardens.

What Businesses Can Do to Promote Integrated Water Resources Management and Water Conservation

Pennsylvania businesses can support this strategy by taking the following actions:

- Install water-efficient technologies and better water-saving practices, such as toilets, faucets, laundry equipment, commercial ice machines, combination ovens, steam cookers, steam kettles, wok stoves, dipper wells, pre-rinse spray valves, food disposals, commercial dishwashers, and wash-down sprayers.
- Use non-potable water sources or reclaimed water for non-potable uses (e.g., industrial cooling, landscape irrigation) with adequate public health safeguards.
- Increase water recycling in industrial processes.
- Install smart water meters that allow different rates to be charged when overall system demand is higher.
- Monitor water use and educate facility staff, building occupants, employees, and visitors about water use and water management.
- Ensure that your facilities have leak detection and repairs performed regularly.
- Use soil moisture sensors that water plants based on their needs by measuring the amount of moisture in the soil and tailoring the irrigation schedule accordingly.
- Use rainfall shutoff devices and rain sensors to decrease water waste by turning off the sprinklers in rainy weather.
- Use natural or constructed means (e.g., green roofs, rain barrels, cisterns) to harvest rainwater.

In addition, **water utilities** can play a role by taking the following actions:

- Assess the vulnerability of water systems (e.g., pipes, culverts, treatment plants) to extreme events and more intense precipitation.
- Consider rate structures based on water usage to encourage conservation.