

University of Pittsburgh  
Institute of Politics  
Infrastructure Policy  
Committee

**Infrastructure  
Status and Needs  
in Southwestern  
Pennsylvania:  
A Primer**

Fall 2014

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## Letter from the Infrastructure Policy Committee Co-Chairs

Dear Colleagues,

In Fall 2012, the University of Pittsburgh Institute of Politics released an update on the infrastructure status and needs of Southwestern Pennsylvania. This update built upon the 2009 primer covering the same topic. In similar fashion, this current publication builds upon these documents and contains the latest in infrastructure development and needs as our region grows and develops.

Infrastructure holds a critically important position in our region, whether economically, developmentally, or throughout our lives on a daily basis. As we advance and develop, its importance only grows. It is this growth in importance that leads to concerns within the field of infrastructure. One such concern stems from continued funding challenges, as infrastructure projects within our region become both more numerous and more costly. Additional concerns, as discussed in the last update, are derived from the increased Marcellus Shale development. This development has created continued concerns over water treatment, road maintenance, and so on.

However, the challenge of developing infrastructure that is able to compete both technologically and environmentally in the 21st century is one of unparalleled importance. In our last primer update, intelligent transportation systems (ITS) initiatives within the infrastructure field were discussed as a way for our region to increase its technological capacity and development. We believe that these ITS systems have the potential to allow our infrastructure to operate smarter and more efficiently, all while using less energy and reducing both congestion and the possibility of accidents. In this publication, we further explore current ITS infrastructure initiatives being undertaken locally, and the positive effects they are creating and will continue to create.

As time progresses, and as a variety of new and improved technologies become available, the growth of infrastructure will only increase. However, this growth cannot continue to expand without having harmful consequences for our most prized natural resources. As this development increases, the need for more efficient and sustainable growth must be pursued in order to benefit ourselves, those around us, and our invaluable natural resources. Therefore, green infrastructure development has emerged on the forefront of considerations within the field.

This newly stressed importance on green infrastructure development has encouraged us as a committee to investigate current and proposed initiatives within the region that stress efficiency, environmental considerations, and so on. Within this publication, we have included a variety of currently implemented green infrastructure initiatives. The immense importance being placed on green infrastructure has also prompted the committee to develop a green infrastructure status report, which is expected to be released later this year.

Although our region has implemented a variety of green infrastructure initiatives to date, this is only the tip of the iceberg. Mayor Bill Peduto has plans to confer with a variety of leaders in green design and technology at the Urban Futures Forum in April 2015 to develop a plan for Pittsburgh's continuing emergence as a post-industrial leader known for its waterfront potential and its commitment to sustainability. In addition, a wide variety of federal agencies and organizations have begun to make green infrastructure one of their top priorities, as growth and development continues. These examples, given their broad reach, strengthen the importance of green infrastructure as a leading consideration within the infrastructure industry.

Lastly, this latest update signals a switch that the IOP is making regarding future updates of the Infrastructure Primer. Because the field of infrastructure is ever-changing, with updates occurring daily in each infrastructure sector that the Primer covers, the IOP staff has decided to make the Primer a living document, which will be housed on the IOP's website. The goal is to continually update the Primer as new information or changes become available. To this end, we will be relying on our partners and our readers to help us in this updating process. If you feel that there is information that should be included in the Primer, please do not hesitate to provide us with your feedback. You may submit comments to the Institute of Politics at **412-383-5417** or **iopadmin@pitt.edu**. We hope that you will find this document to be useful. Thank you for your continued interest in the growth, development, and future of Southwestern Pennsylvania.

Sincerely,

**Rep. Paul Costa**

**Col. Bernard Lindstrom**

## Air Transportation

Airports make up the most extensive passenger and freight transportation network in the country. Southwestern Pennsylvania is home to two commercial airports, with general aviation airports in every county. A total of 24 public airports and heliports operate in the 10-county Southwestern Pennsylvania region. All of these serve the general aviation community. These include, but are not limited to, private operators, charters, flying schools, tours, corporate aviation, news, and medical services.

### Key Players

The Allegheny County Airport Authority (ACAA) operates Pittsburgh International Airport and Allegheny County Airport. The Westmoreland County Airport Authority (WCAA) operates the Arnold Palmer Regional Airport and Rostraver Airport. Two of these airports provide scheduled commercial air service:

- Pittsburgh International Airport (PIT) is located in Findlay and Moon townships, Allegheny County. PIT serves more than 8 million passengers a year.
- Arnold Palmer Regional Airport (LBE) is located in Latrobe, Unity Township, Westmoreland County. LBE serves more than 75,000 passengers a year.

Together PIT and LBE connect Western Pennsylvania, northern West Virginia, eastern Ohio, and western Maryland with direct flights to about 40 destinations in North America and Europe as well as connecting flights to hundreds of additional destinations. All of the economic activity at PIT alone supports more than 70,000 jobs and more than \$5 billion in total economic activity. Airlines continue to see growing passenger traffic through PIT.

Arnold Palmer Regional Airport experienced reduced traffic in recent years after it lost major carrier service to large hub airports. However, the regional airport continued to maintain its fixed-base operators, L.J. Aviation and Vee Neal Aviation. These companies kept demand strong even during periods of zero commercial passenger flights. In 2011, the ultralow-cost airline Spirit Airlines started commercial service from Latrobe to Fort Lauderdale and Orlando, Fla., as well as Myrtle Beach, S.C. and most recently added the destination Dallas, TX. With this increase in service and number of passengers, there has been a corresponding increase in the demand for capacity of the terminal, related services and infrastructure, all demanding an increase in infrastructure funding.

### Funding

Major commercial air service airports do not use tax dollars for day-to-day operations. Major airports rely on operating revenues from aviation leases and fees, related services, and concessions. Day-to-day operating costs at smaller airports are often subsidized by their local government.



Public airports depend on significant federal, state, and local investments for meeting capital needs. Federal and state aviation-related fees and taxes generate the revenue for federal and state capital grants to airports. The federal Airport Improvement Program (AIP) distributes federal grant money to public airports directly from FAA and as a block grant through the Pennsylvania Department of Transportation (PennDOT). These grants cover 75 percent of the costs of approved projects for larger commercial service airports and 90 percent for smaller reliever or general aviation airports.

In addition to Federal and State grants, major commercial air service airports rely on passenger fees or passenger facility charges (PFCs), to fund capital budgets. Federally capped at \$4.50, these charges fund major capital projects to ensure sufficient airfield and terminal capacity, safety, and security, and greatly reduce the reliance of major airports on government grants.

Federal grant eligibility is determined, in part, by the number of airport enplanements (the number of passengers boarding an aircraft at an airport):

- Airports with less than 10,000 annual enplanements are eligible for \$150,000.
- Airports with more than 10,000 annual enplanements are eligible for higher levels of funding, based on their share of national enplanements.

The PennDOT Bureau of Aviation administers three grant programs:

- the federal FAA Block Grant Program
- the state Aviation Development Program (ADP), which distributes approximately \$8 million a year from aviation fuel taxes
- the state Budget/Transportation Capital Assistance Program

For fiscal year 2013, Pittsburgh International Airport's annual capital budget is allocated as follows:

- FAA AIP grant funds: \$6.9 million
- PennDOT Bureau of Aviation ADP grant funds: \$800 thousand for airfield pavement work and \$5 million pending for deicing and storm water treatment
- PFC funds: \$1-\$2 million

Additionally, every year ACAA receives approximately \$16 million in PFCs. This agreement with ACAA, which lasts through 2017, enables air carriers to fund PIT's operating expenses through rental charges and landing fees. Of the \$16 million that ACAA receives, PIT uses approximately \$14 - \$15 million on FAA-approved projects that were completed in the past, but were originally financed with Airport bond proceeds. These PFC's are essentially reimbursing PIT for its bond costs, while also reducing the current fees and rents paid by air carriers. This

practice permits the airport to keep a balanced operating budget in the short term, even when airport usage is decreased and allows the airport to remain competitive with other airports.

Arnold Palmer Regional Airport is maintaining its current budget without major problems. The regional airport is gradually expanding from increased revenue while cutting costs with donations and federal surplus programs. Of its \$3 PFC, the airport receives \$2.85. LBE reached approximately 7,000 enplanements last year. If Spirit Airlines expands, that number could double and improve airport eligibility for federal grants, such as the Small Community Air Service Development Program grants.

## Priorities

The Allegheny County Airport Authority's five-year capital improvement plan for 2014-2018 includes over \$213 million of needed capital projects: 193 million at Pittsburgh International and 20 million at Allegheny County Airport. Projects include the major rebuilding of runway, taxiway, and other airfield and roadway pavements, including the upgrade of aircraft deicing pads, and the relocation and extension of taxiways for airfield safety and airport development. Additional projects include major rehabilitation of the infrastructure of the now over 25-year-old terminal buildings and older support buildings, as well as the major refurbishing of the terminal people mover.

The Westmoreland County Airport Authority is actively pursuing expansion of commuter service as part of a larger effort to restore regional service flights through Pittsburgh. Rebuilding the regional hub-and-spoke system means that affordable flights can connect numerous smaller cities with Pittsburgh International Airport. With time, this can encourage major carriers to increase their service to PIT. By planning for the future, regional airports can become even more self-sufficient and sustainable, especially in the face of diminishing state and federal subsidies.

Among its priorities, LBE plans to support the growth and success of its airlines and fixed-base operators.

In its partnership with LBE, Spirit Airlines provides the planes and flight service. The airport is responsible for towing, turning planes, customer service, servicing planes, and marketing. Increased revenues pay for operational costs, expanding airport facilities, and improving infrastructure.

Fixed-base operator L.J. Aviation provides the pilots and scheduling for companies that participate in fractional aircraft ownership. Rather than purchasing their own planes or depending on commercial service, these companies choose to buy into an ownership structure similar to a time-share.

## Challenges and Opportunities

*Funding.* The PIT capital improvement program significantly exceeds anticipated funding. Each year, an additional \$20 million in needed capital projects at PIT are deferred due to insufficient funding. Over time, this leads to rising project costs as those deferred projects, which would have been preventative in nature, now become projects that require immediate attention. Regional service airports face a unique challenge in having to support major airlines. These airlines will not provide service without revenue guarantees from the airports. Public general aviation airports would benefit from increased and less restrictive federal and state grant funding. These airports do not have scheduled commercial air service and obtain grants from aviation-related taxes and fees.

*Price of fuel.* The fluctuating price of fuel continues to be a challenge for airline budget planning. As fuel prices increase, service decreases and may become more expensive, thereby impacting airport revenue.

*Flexible Passenger Facility Charge (PFC).* These funds are an efficient way to pay for airport improvements. Traditionally, airports use these fees to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition. However, airports would prefer more flexibility to adjust the PFC in consultation with their air carriers. Currently, the airport is advocating Congress to increase or entirely eliminate the cap on the PFC rate. This would allow more of the airport's capital costs to be financed with PFCs.

*ACAA Economic Condition and Outlook.* Pittsburgh International Airport provides regional travelers with access to service by a number of airlines that generally offer point-to-point, origin and destination (O&D) passenger service. Since the de-hubbing of US Airways, PIT has successfully transformed its business model from a major hub connecting airport into principally an O&D airport. In 2012, PIT offered 159 daily flights to 37 markets. Enplaned passengers since 2009 have stabilized at just over 4 million per year.

*ACAA Major Initiatives.* Due to recent and anticipated cutbacks in federal and state grant funding and the continuation of the federal \$4.50 cap on PFCs (airfare ticket surcharges) that can be collected, in 2012 the authority issued \$49.4 million in Airport Revenue Bonds for various capital projects. As part of the bond issuance process, the major bond rating agencies reviewed the Authority's credit and issues reports. Standard & Poor's raised the Authority's rating from BBB+ to A- with a stable outlook and Moody's retained its BAA1 rating and raised the Authority's outlook from stable to positive.

*ACAA Long Term Planning.* Future major construction projects include replacement of the parking garage, which is expected to begin in the 10 to 15 year timeframe. Approximately 500

acres of industrial and business park sites have been constructed on airport property. Another 800 acres of developable land is available for future construction. Revenues from the Authority's current and future commercial development projects are expected to increase and help defray operating costs to the airlines and assist in future construction and development.

*ACAA Incentives.* In early 2014, ACAA announced that they were offering to either waive landing fees or to increase market support to airlines willing to start nonstop service to a number of destinations across the United States, Canada, and the Caribbean. Using data from the U.S. Dept. of Transportation, the Allegheny Conference on Community Development, and surveys of business travelers and travel planners, a number of cities were targeted for Pittsburgh to offer nonstop flights to. If an airline is willing to provide nonstop flights at least five times a week to one of the targeted destinations, they will receive a waiver on all landing fees for the first year and a 50 percent reduction the next year. These airlines would also be eligible for \$140,000 in marketing support over two years. Airlines agreeing to this incentive must commit to offer the nonstop service for a minimum of two years.

## **Intelligent Transportation Systems**

The FAA Next Generation Air Transportation System

### ***What is NextGen?***

The Next Generation Air Transportation System (NextGen) aims to transform the current radar-based air traffic control system into a satellite-based system. Through the FAA Modernization and Reform Act of 2012, long-term funding was secured for the FAA, part of which will continue to benefit NextGen.

The initiative plans to generate numerous benefits, including:

- improved aviation safety, capacity, and efficiency
- increased investment in runways, terminals, technology, and other infrastructure
- reduced environmental impact from fuel burn, carbon emissions, and noise pollution

As NextGen has progressed, extensive implementation of its infrastructure and advanced technologies has begun.

### ***Metroplex Areas:***

Metroplex areas employ satellite-based procedures and airspace improvements to reduce fuel consumptions and airspace emissions around metropolitan areas with several airports. As of January 2013, eight active Metroplex areas were in various phases of development.

### ***Automatic Dependent Surveillance-Broadcast***

ADS-B, NextGen's radar successor for tracking aircraft, had been deployed in 500 of 7000 ground stations as of February 2013. Continuing work is being done alongside the industry to determine the best approach for equipping aircraft operators. However, deadlines loom: by

January 1, 2020, all aircraft in designated airspace must be equipped to broadcast their positions to the ADS-B network.

***Wide Area Augmentation System (WAAS):***

Extensive numbers of current general aviation aircraft are equipped with WAAS technology. These WAAS receivers allow for pilots to employ approach procedures using the Localizer Performance with Vertical Guidance (LPV) to altitudes as low as 200 feet before needing runway visibility to land. As of May 2013, the FAA had published 3,123 WAAS LPV approaches. This number is expected to rise to 5,218 by 2016.

Despite initial success in the implementation of NextGen, collaboration with the aviation industry has continued to determine how to best implement NextGen and create new benefits. Options are being assessed to attract additional investment for NextGen's technologies and training. The FAA has also recently accepted the Surface Operations Office's concept of collaborative decision making amongst air traffic controllers, flight crews, air carrier managers, and airports.

By 2020, the benefits of NextGen will be seen industry-wide. Improvements to aviation will reduce delays by 41 percent. In addition, 2020 will see carbon dioxide emissions reduced by 1.6 million metric tons, and fuel consumption reduced by 1.6 billion gallons. All in all, the implementation and improvement of infrastructure should provide an estimated \$38 billion in cumulative benefits to aircraft operators, traveling citizens, and the FAA.

For more information on the NextGen Air Transportation System and its implementation, visit <http://www.faa.gov/nextgen/>.

## Resources

Allegheny County Airport

[www.pitairport.com/AGC\\_background](http://www.pitairport.com/AGC_background)

Allegheny County Airport Authority

[www.flypittsburgh.com/ACAA\\_background](http://www.flypittsburgh.com/ACAA_background)

Arnold Palmer Regional Airport

[www.palmerairport.com](http://www.palmerairport.com)

Federal Aviation Administration

[www.faa.gov](http://www.faa.gov)

PennDOT Bureau of Aviation

[www.dot.state.pa.us/Internet/Bureaus/pdBOA.nsf/AviationHomepage](http://www.dot.state.pa.us/Internet/Bureaus/pdBOA.nsf/AviationHomepage)

Pittsburgh International Airport

[www.flypittsburgh.com](http://www.flypittsburgh.com)

Westmoreland County Airport Authority

[www.palmerairport.com/html/wcaa.html](http://www.palmerairport.com/html/wcaa.html)

## Electricity

Significant state and federal legislation across the country is enabling utilities to control energy costs in order to reduce consumption. Devices such as smart meters will have the ability to regulate energy use by adjusting prices according to the time of day and special circumstances. Additional legislation seeks to limit the amount of power generated and made available to consumers. Other proposals call for more energy generation from renewable resources such as wind and solar. New smart grid technology will allow for more efficient, safer, and environmentally friendly operation of the electric power transmission system.

## Context

Since 1970, the average household demand for electricity has jumped by more than 30 percent. However, aging power lines are overloading, sparking serious safety concerns. Aboveground, power lines are vulnerable to extreme weather conditions. For instance, the 2011 Halloween nor'easter left more than 2 million households without power for nearly a week. Serious blackouts and rolling brownouts will become even more frequent in the future if infrastructure is not adequately maintained and upgraded.

Prior to deregulation of the electric industry in 1999, seven major utilities owned and operated their own electric generation, transmission, and distribution facilities in Pennsylvania:

- West Penn Power
- PPL Corporation
- PECO Energy Company
- Penn Power
- Penelec
- Met-Ed
- Duquesne Light

Since deregulation, transmission lines have fallen under the control of a regional transmission organization (RTO), which controls the flow of electricity from generators in multiple states. The RTO for most utilities in Pennsylvania is PJM, which has more than 1,270 generation sources and 795 member companies. These lines are still owned and maintained by the local utilities, but the utilities need permission to take lines out of service for repairs or upgrades. By consolidating transmission and generation services, utilities seek to provide more cost effective and reliable service. In Pennsylvania, the Public Utility Commission regulates utility profits, electricity reserves, and consumer rates.

Electric utilities have been around for more than a century. Many began as municipal systems that expanded with the trolleys, railroads, and roadways. As Pennsylvania's economy grew, utilities invested in infrastructure such as power plants. Transmission lines connected these plants to substations and distribution circuits serving very specific electric demand fueled by the region's economic growth. In the 1970s, utilities stopped building generating facilities because

of the oil crisis and environmental legislation.

With the recession in the early 1980s and the collapse of the steel industry, electric utilities suddenly generated much more power than they needed and started selling excess power to neighboring utilities and states. Regulations also opened opportunities for nontraditional electric generators and suppliers. Municipalities and industries started using by-products to produce electricity. Major utilities were required to purchase nontraditional power whether it was needed or not.

## Priorities

Pennsylvania's numerous coal reserves fuel much of the electricity generated in the state. At the same time, demand for green power is growing, and wind turbine and solar panel farms continue to build up across the state. However, regardless of the energy source, electricity still must travel through the same aging infrastructure that has limited capacity.

The U.S. Department of Agriculture Rural Development program is exploring opportunities for small-scale renewable energy production. Through this initiative, there are a wide variety of programs and funding available to agricultural producers and rural business owners. Projects aimed at increasing energy efficiency include solar panel and wind turbine installation, the construction of bio-refineries, and the conversion of older heating sources to ones utilizing cleaner technology.

## Challenges and Opportunities

*Legislation.* With growing awareness of the impact of energy use on climate change, an array of state and federal legislation has sought to regulate all aspects of electric utilities, from infrastructure to implementation.

- Pennsylvania's coal industry has gained much attention as a source of electricity generation. Growing demand focuses on finding alternatives and supplementing coal production with wind turbines and solar panel farms.
- Federal renewable electricity standards legislation proposes that utilities provide at least 25 percent of their electricity from renewable resources by 2025. Pennsylvania has implemented a renewable electricity requirement, including a broader mix of qualifying energy sources. The state Alternative Energy Portfolio Standards (AEPS) Act requires that 18 percent of electricity sold to customers be derived from renewable resources by 2020.
- Federal carbon capture and storage (CCS) legislation may require electric distribution companies (EDCs) such as Allegheny Power to help fund CCS projects. Early deployment of this legislation would create a national wires fee on EDCs, not on generators. The fee would be applied to the delivery of electricity generated by fossil fuels. This legislation intends to raise more than \$1 billion for use exclusively on large-scale CCS projects.
- Pennsylvania's Act 129 of 2008 energy efficiency and conservation program required EDCs to reduce electricity consumption by 1 percent by May 31, 2011, and 4 percent in



the highest hours of peak demand by May 31, 2013. The program also requires that every home and business be equipped with a smart meter within 15 years.

EDCs plan to meet the requirements of Act 129 in a number of ways:

- Rebates will encourage consumers to replace older appliances with high-efficiency models.
- Commercial and industrial customers are being offered incentives for retrofits that incorporate energy efficient measures. Examples include instituting sustainable designs, compact fluorescent lights, and remotely managed thermostats, amongst other items.
- Free energy audits and seminars will educate consumers on how to use energy more efficiently, help the environment, and save money.

## **Intelligent Transportation Systems**

U.S. National Smart Grid Initiatives

### ***What is the Smart Grid?***

The Smart Grid is a computerized network of devices that delivers electricity to consumers, made possible through the integration of computer processing technology. These smart devices are able to gather data using sensors and can digitally communicate with the utility company. A key feature for utilities will be the ability to have centralized control of the grid, with the power to remotely adjust and control millions of devices on their networks.

The U.S. Department of Energy (DOE) is leading efforts to modernize the nation's aging electricity delivery system into a "smart grid". The DOE's Office of Electricity Delivery and Energy Reliability has partnered with key stakeholders to identify principal characteristics for the national smart grid system, including the following:

- ability to self-heal from power disturbances
- resilient operation against physical and cyber attack
- power quality that fulfills 21<sup>st</sup>-century needs
- accommodation of all generation and storage options
- innovation of new products, services, and markets
- optimization of assets and efficient operation

The Office of Electricity Delivery and Energy Reliability developed a smart grid primer to explore the challenges and opportunities of implementing the smart grid. For differing versions of the primer, visit [www.energy.gov/oe/smart-grid-primer-smart-grid-books](http://www.energy.gov/oe/smart-grid-primer-smart-grid-books). For background information on the Smart Grid, as well as updates on Smart Grid programs and implementation, visit <https://www.smartgrid.gov/>.

### ***Implementation of the Smart Grid in the Pennsylvania Region***

Currently, Pennsylvania and its surrounding regions are seeing the beginning of Smart Grid implementation. Two particular projects are underway.

#### First Energy Corporation Smart Grid Implementation

As of November 2013, First Energy Corporation announced that they will be spending \$2.8 billion to update four of its utilities in Ohio and Pennsylvania with Smart Grid technology. This four-year project will include installing remote sensors with new power lines and transmission stations. The implementation of this technology will help to spot and limit outages in real time, as well as to quickly mobilize maintenance crews and limit waste. After the completion of this project, First Energy aims to expand Smart Grid technology across Pennsylvania.

#### Harrisburg Smart Grid Project

Funded by the U.S. Department of Energy through the 2009 stimulus bill, PPL Electric Utilities aims to implement Smart Grid technology within the Harrisburg area. This implementation includes improving distribution management by automating distribution circuits, as well as by installing monitoring devices and wireless communications. Overall, this system will:

- reduce the length of outages
- quicken repairs
- better regulate voltage levels
- enable connection of wind, solar, or other renewable energy power sources to the grid
- reduce maintenance costs
- introduce cleaner energy

This implementation of Smart Grid technology will defer the need for additional power generation capacity in the Harrisburg region, primarily as a result of increased and enhanced system reliance.

## Resources

Allegheny Energy

[www.fes.com/content/fes/home/allegheny.html](http://www.fes.com/content/fes/home/allegheny.html)

CONSOL Energy, Inc.

[www.consolenergy.com](http://www.consolenergy.com)

Duquesne Light

[www.duquesnelight.com](http://www.duquesnelight.com)

Pennsylvania Act 129 Energy Efficiency  
and Conservation Program

[www.puc.state.pa.us/electric/Act\\_129\\_info.aspx](http://www.puc.state.pa.us/electric/Act_129_info.aspx)

Pennsylvania Public Utility Commission

[www.puc.state.pa.us](http://www.puc.state.pa.us)

PJM

[www.pjm.com](http://www.pjm.com)

U.S. Department of Agriculture Rural Development

[www.rurdev.usda.gov](http://www.rurdev.usda.gov)

U.S. Department of Energy

[www.energy.gov](http://www.energy.gov)

U.S. Environmental Protection Agency

Renewable Portfolio Standards

[www.epa.gov/chp/state-policy/renewable\\_fs.html](http://www.epa.gov/chp/state-policy/renewable_fs.html)

## Flood Control and Dam Safety

Flooding is a long-standing problem in the region, and with increased population densities, ineffective storm water management is making the problem increasingly hazardous. More thoughtful approaches to development and storm water control can reduce the volume of runoff and provide a potential to reduce risk to population and infrastructure. The Pennsylvania Stormwater Management Act requires counties to adopt watershed-based storm water management plans and requires municipalities to implement ordinances to regulate these plans. Storm water containment effectiveness and regulations vary by municipality, and many communities depend on state flood control projects. Following the collapse of dams in Johnstown in 1889 and Potter County in 1911, Pennsylvania became the first state to enact dam safety legislation. The Pennsylvania Dam Safety and Encroachments Act gave the Department of Environmental Protection (DEP) the authority to regulate dams and other water obstructions.

### Key Players

Pennsylvania has approximately 3,358 dams, 768 of which are categorized as “high hazard” because their failure could result in extensive property damage and loss of life. Southwestern Pennsylvania has 637 dams, 197 of which are high hazard. The DEP Division of Dam Safety is responsible for regulating these dams, which are almost evenly split between public and private ownership. Many are still privately owned, while others are owned by public water authorities and government agencies, including the Pennsylvania Department of Conservation and Natural Resources (DCNR) and the Fish and Boat Commission.

The U.S. Army Corps of Engineers (Corps) built a system of 16 multi-purpose flood control reservoirs and 42 local protection projects in the region. These projects return more than \$20 in flood damage prevention for every \$1 invested. The Corps conducts routine infrastructure inspections every year and in-depth assessments every five years. With this system, the Corps can control the flow of waters in impacted watersheds in response to local conditions. During hurricanes and spring storms, reservoirs can mitigate or prevent major flooding. In periods of low flow, releasing stored water can alleviate drought conditions for the navigation industry. Reservoirs, through low flow augmentation, also help to mitigate environmental pollution from industry. By adjusting the rate of water flow from the reservoirs, the Corps can dilute nonpoint source pollution in our water supply.

### Funding

In 2012, the Commonwealth Financing Authority allocated more than \$48.9 million in flood control grants, and more than \$52.6 million in high hazard unsafe dam grants. Of the \$50 million set aside for high hazard dams, all of it has been spent on rehabilitation. Dam projects receive funding from the state capital budget, DEP Growing Greener grants, and private sources. Pennsylvania Infrastructure Investment Authority (PENNVEST) also considers applications for funding maintenance of public water supply dams. In its 2014 “report card”, the ASCE called for further state legislation for additional funding for rehabilitating Pennsylvania’s dams. It also

recommended the federal government enact the Dam Rehabilitation and Repair Act, a statute the US Congress passed in 2012 to provide states grant assistance for repairing dams.

Both the Corps of Engineers and DEP participate in flood control project restoration after major flooding events. As an example, the Corps usually deals with larger waterways, such as Chartiers Creek after it was devastated by Hurricane Ivan in 2004. The agency can provide federal funding for up to 65 percent of the project's cost. Under Act 167, DEP provides technical assistance and can defray up to 75 percent of the costs for flood control development plans and 75 percent of the costs for planning administration.

Local communities share the costs of flood damage reduction projects and often take over maintenance responsibilities after completion. Some counties shift the cost to individuals who benefit from green flood control projects. While projects can become liabilities in the long term, the Corps offers federal funding to assist with repairs if local owners maintain their dams. Owners also then become eligible for national flood insurance.

### Priorities

DEP maintains 29 flood protection projects in the Ohio River Basin, all of which are considered to be in acceptable condition. However, one project covering nearly two miles of Jacks Run in Greensburg is rapidly deteriorating and slated for major rehabilitation. This is one of nine projects scheduled for construction within the next five years, at a total estimated cost of \$52 million. When sites are damaged by flooding, engineers can restore them to operable condition but cannot do any additional repairs. Debris can only be removed within the footprint of an original project.

DEP estimates that the repair costs for 15 publicly owned high hazard dams include the following:

- one DCNR dam in Greene County funded in the state budget at \$30 million
- eight Fish and Boat Commission dams that are not funded and have an estimated rehabilitation cost of \$52 million
- six municipal dams in the southwest region with an estimated repair cost of \$14 million

While DEP has enforcement power over privately owned dams, no state programs assist with expensive private dam rehabilitation. When a dam is unnecessary, the agency encourages removal for the following reasons:

- Continuous maintenance is expensive, but state funding is available for removal.
- Private owners are responsible for the liabilities posed by high hazard dams.
- Dams can negatively impact the local watershed ecosystem.

## Challenges and Opportunities

*Legacy costs.* Over the years, local industrial activities have impacted water quality and flood control measures.

- The lumber industry harvested trees, reducing the capacity of the soil to absorb water. As a result, more water flows into sewers and floods waterways.
- Abandoned coal mines fill up with water and lead to acid mine drainage, causing dangerous quantities of minerals and toxic metals to enter the environment.

## Local Initiatives

*Northern Allegheny County.* Communities in northern Allegheny County are collaborating to develop new detention ponds for slowing down water runoff into Girty's Run. Low-impact development approaches include the use of rain barrels and rain gardens as well as reducing the number of impervious surfaces.

*Regional Water Management Task Force.* In 2009, the Regional Water Management Task Force, chaired by Dr. Jared Cohon, President Emeritus, Carnegie Mellon University and staffed by the Institute of Politics, released their final report. The report called for the creation of a regional water planning and technical assistance division at the Southwestern Pennsylvania Commission (SPC). After several years of planning and budgeting, SPC launched its Water Resource Center in 2013. The Center is promoting regional collaboration on water topics and will be a leader in facilitating coordination, education and technical assistance to its members. Stormwater management issues will be the initial focus of the Center. The Center is working with all 10 counties in SPC's service area to ensure that they are compliant with Act 167, Pennsylvania's Stormwater Management Act, which requires all counties to prepare and adopt watershed-based stormwater management plans, as well as stormwater ordinances that align with the county plans.

## Resources

American Society of Civil Engineers 2010 Report Card  
for Pennsylvania's Infrastructure—Dams and Levees  
[www.pareportcard.org](http://www.pareportcard.org)

Commonwealth Financing Authority  
[www.newpa.com/find-incentives-apply-for-funding/commonwealth-financing-authority](http://www.newpa.com/find-incentives-apply-for-funding/commonwealth-financing-authority)

Pennsylvania Department of Conservation  
and Natural Resources  
[www.dcnr.state.pa.us](http://www.dcnr.state.pa.us)

Pennsylvania Department of Environmental  
Protection (DEP)  
[www.dep.state.pa.us](http://www.dep.state.pa.us)

Pennsylvania DEP Bureau of Waterways Engineering  
[www.depweb.state.pa.us/portal/server.pt/community/waterways\\_engineering/10499](http://www.depweb.state.pa.us/portal/server.pt/community/waterways_engineering/10499)

Pennsylvania Fish and Boat Commission  
[www.fish.state.pa.us](http://www.fish.state.pa.us)

Pennsylvania Infrastructure Investment Authority  
[www.pennvest.state.pa.us](http://www.pennvest.state.pa.us)

U.S. Army Corps of Engineers Pittsburgh District  
[www.lrp.usace.army.mil](http://www.lrp.usace.army.mil)

## Natural Gas

In Southwestern Pennsylvania, natural gas makes up more than 90 percent of home heating markets and more than 60 percent of water heating markets. Three major natural gas distribution companies operate the region's natural gas infrastructure: Columbia Gas of Pennsylvania, Equitable Gas Company, and Peoples Natural Gas. All three are regulated by the Pennsylvania Public Utility Commission (PUC). Together, these utilities serve hundreds of thousands locally and maintain about 20,000 miles of gas pipeline and several underground storage facilities. Each maintains critical transmission links extending outside the state, throughout the eastern seaboard, and to the Gulf Coast.

## Key Players

Columbia Gas serves approximately 414,000 customers in 26 counties throughout the state. Equitable Gas serves approximately 275,000 customers in Southwestern Pennsylvania, West Virginia, and Kentucky. Peoples Natural Gas serves approximately 360,000 homes and businesses throughout 16 counties in Western Pennsylvania. Distribution companies have seen a steady decline in regional population and commercial industry in recent years.

## Funding

Gas distribution companies are separate from state gas suppliers. According to state law, distribution companies may not make a profit on selling gas. In order to recover the cost of gas, companies submit quarterly filings reflecting these expenditures and PUC compensates them. These companies can only make a profit from operating the pipeline system. Funding to maintain infrastructure comes from ratepayers as well as corporate investors.

To receive an increased return, utilities can file a rate case with PUC. A rate case is an extensive, public, negotiated process requiring a detailed review of company expenses and revenues as well as projected costs for the next 12 months. Interested parties can review rate case filings, ask questions, and negotiate an agreeable settlement with the utility. When settlements are not achieved, the rate case is litigated before the commission. In all cases, PUC must approve any rate change before it can take effect.

Due to the considerable cost of pursuing a rate case, companies seldom make requests for small increases. As a result, rather than gradual increases, rate changes often spike customer charges. And with fluctuating gas prices, companies make no fewer than four rate filings a year. The process can take as long as a year to prepare and complete.

Pennsylvania House Bill 1294 amended Title 66 (Public Utilities) to enable water, wastewater, natural gas, and electric utilities to apply for a distribution system improvement charge (DSIC). This charge provides an alternative rate-making mechanism to encourage timely and predictable cost recovery. To be eligible, companies will be required to file long-term infrastructure



improvement plans with PUC. DSICs encourage companies to accelerate investments in infrastructure, spread the costs out over time, and reduce base rate increase filings.

## Priorities

Upgrading aging pipes in older communities is increasingly important. Pipes slated for replacement may range in age from several decades to more than 100 years old.

Companies are moving to replace the original bare steel, cast iron, wrought iron, and copper pipes with new plastic pipe to ensure pipeline safety and reduce maintenance costs.

## Challenges and Opportunities

*Service line ownership.* In the rest of the state and most of the country, gas utilities own the gas lines connecting street-level main distribution lines with customer households. When a leak occurs in these service lines, the company automatically fixes the problem at no direct charge to the customer. In Western Pennsylvania, however, customers are responsible for these lines. In the event of an incident, gas companies simply turn the gas off and wait for the customer to arrange repair.

The local industry is interested in legislative changes to enable distribution companies to take responsibility for all service lines. PUC and relevant legislative committees still need to formally review the proposal. If enacted, the proposal aims to streamline the pipeline repair process and improve safety.

*Permitting policy.* Municipalities are prohibited from using the permitting process as a means of making a profit, but some have reportedly enacted large increases in permitting fees after learning about gas company repair plans. Permitting policies vary, with some municipalities charging up front. Others impose expensive restoration requirements such as expecting a utility to repave the entire road, even if only one shoulder of a road is dug up.

*Workforce development.* The industry reports some difficulty in securing a qualified workforce, as contractors have expressed concern about whether they can handle the work associated with infrastructure replacement. Labor organizations support the industry request for DSIC authority. They prefer a stable funding source for long-term contracting opportunities rather than the stop-and-start approach fostered by the pattern of periodic rate cases.

*Maintenance coordination.* When a gas company digs along a roadway to do maintenance, it creates an opportunity for water and sewer repairs to happen at the same time. Similarly, restoration work could be coordinated with road paving plans.

## Intelligent Transportation Systems

### GET Gas Pilot Program

#### ***What is the GET Gas pilot program?***

UGI, a natural gas and electricity company, currently delivers power to approximately 660,000 customers throughout Pennsylvania. Overall, UGI is aiming to provide its customers with greater access to natural gas, given that natural gas is one of the cleanest, most abundant, and least expensive energy sources throughout Pennsylvania. But with many consumers unable to obtain natural gas as their energy sources, UGI has instituted its GET Gas pilot program. GET Gas, or the Growth Extension Tariff Gas program, is an innovative pilot program that aims to provide natural gas service to regions currently without natural gas access. This pilot program is available to homeowners and businesses within UGI Utilities gas divisions.

#### ***How does the GET Gas pilot program work?***

UGI's GET Gas pilot program works by making the extension of natural gas lines to property more affordable. In addition, customers are able to pay a monthly surcharge over a ten-year period, as opposed to more substantial up-front contributions. Consumers can also use some of their cost savings to offset the monthly surcharges.

#### ***Who can participate in the GET Gas program?***

A variety of different factors are employed when considering individuals for GET Gas qualification, including:

- proximity to existing gas mains
- housing and business density
- percentage of households and businesses likely to convert to natural gas
- road restoration and permitting fees
- funding available under the pilot program

For more information on UGI's GET Gas Program, visit

**<http://www.ugi.com/portal/page/portal/Promotions/GETGas>**.

## Green Initiatives

### Columbia Gas of Pennsylvania Warmwise Initiative

#### ***What is the WarmWise initiative?***

Through their WarmWise initiative and accompanying programs, Columbia Gas of Pennsylvania aims to reduce energy usage overall. The programs implemented by Columbia Gas work towards this goal by targeting qualifying individuals and by offering information and tips on energy usage. The WarmWise initiative is composed of three programs:

### Energy Efficiency

The Columbia Gas energy efficiency program provides steps and tips to consumers to help them use energy more wisely and save money in their homes. To implement this program, Columbia Gas has offered full copies of their Energy Efficiency Information to interested consumers.

### Audits and Rebates

Columbia Gas has also implemented a program offering free home energy audits to qualifying customers. After the audit is completed, consumers receive an energy-efficiency plan, cost savings estimates, and programmable thermostats. These consumers can also apply for rebates on the installation of the audit-recommended measures.

### Low Income Usage Reduction Program (LIURP)

Through this program, Columbia Gas targets low income consumers with high gas usage. If they qualify, individuals can participate in Warm Choice. Warm Choice is a free weatherization program that provides an energy picture of the individual's home and shows where energy is escaping. These energy escape routes can then be sealed off. Through Warm Choice, consumers are aided in managing energy use and heating costs through reductions in natural gas consumption.

### ***Key benefits of the WarmWise initiative:***

- reduces natural gas usage
- reduces heating costs for consumers
- educates consumers on natural gas usage

For more information about the Columbia Gas of Pennsylvania WarmWise initiative, or any of its programs, visit [\*\*https://www.columbiagaspa.com/ways-to-save.\*\*](https://www.columbiagaspa.com/ways-to-save)

## Resources

Columbia Gas of Pennsylvania

[www.columbiagaspa.com](http://www.columbiagaspa.com)

Equitable Gas Company

[www.equitablegas.com](http://www.equitablegas.com)

Pennsylvania Public Utility Commission

[www.puc.state.pa.us](http://www.puc.state.pa.us)

Peoples Natural Gas

[www.peoples-gas.com](http://www.peoples-gas.com)

## Navigable Waterways

Navigation is an enduring activity. More than 98 percent of the goods produced or consumed in the United States travel by water. The Rivers and Watersheds of our Nation are a key to our nation's economic health and the quality of life for America's citizens.

The Port of Pittsburgh is the nation's second busiest inland port and one of the top 25 national ports in terms of freight tonnage. According to the Port of Pittsburgh, the waterways of Western Pennsylvania support more than 45,000 local jobs and enable the movement of more than \$9 billion worth of goods each year. Locks and dams are the key infrastructure elements that enable all this traffic. These structures require sustained maintenance and investment, but financial limitations undercut these efforts. Deteriorating infrastructure threatens the health of the regional economy as well as the livelihoods of local families and businesses.

## Key Players

The Pittsburgh Port District consists of all 200 miles of commercially navigable waterways in Southwestern Pennsylvania. These waterways extend throughout a 12-county area and include the three major rivers: the Allegheny, the Monongahela, and the Ohio. More than 200 river terminals and barge industry service suppliers are based on these rivers and depend on the safe and stable operation of the Port of Pittsburgh for their economic success. On average, 40 million tons of freight passes through the Port of Pittsburgh each year, 70 percent of which is coal. The economic recession has slowed activity, but growing interest in non-highway based supply chain transportation and global demand for energy is expected to drive up demand for water transportation throughout the Ohio River Basin.

The U.S. Army Corps of Engineers (Corps) is the world's largest public works agency and manages the nation's Inland Marine Transportation System (IMTS) in cooperation with the US Coast Guard (USCG), Maritime Administration (MarAd), the National Weather Service (NWS), and the US Geological Survey (USGS). Among its many responsibilities, the Corps monitors the regional waterways, manages water resources, and addresses water quality issues. The Corps is organized by river basins. The Pittsburgh District manages the river basins of the Upper Ohio River and is one of seven districts in the Great Lakes and Ohio River Division. Pittsburgh District manages 23 locks and dams and 16 major flood control reservoirs that make the river basins navigable. 17 of those locks and dams and 11 of those reservoirs are in Western Pennsylvania. The Pennsylvania locks and dams are on three main rivers:

- Allegheny River: Lock and Dam 2, C.W. Bill Young Lock and Dam, and Locks and Dams 4 through 9
- Monongahela River: Braddock Locks and Dam, Locks and Dams 3 and 4, Maxwell Locks and Dam, Grays Landing Lock and Dam, Point Marion Lock and Dam, Morgantown Lock and Dam, Hildebrand Lock and Dam, and Opekiska Lock and Dam

- Ohio River: Emsworth Locks and Dams, Dashields Locks and Dams, Montgomery Locks and Dam, New Cumberland Locks and Dam, Pike Island Locks and Dam, Hannibal Locks and Dam

The Port of Pittsburgh Commission is the Pennsylvania State government agency responsible for managing the Port of Pittsburgh. The commission serves 11 counties in Southwestern Pennsylvania plus Blair County. The agency promotes economic development, functions as a clearinghouse of information, and connects businesses with the resources they need to make use of the waterways.

## Funding

The waterways receive funding from the discretionary portion of the federal budget. The federal government pays for half the infrastructure construction costs. The Inland Waterways Trust Fund provides the local matching money, generated through a 20 cents/gallon fuel tax on the towing industry, the cost-sharing sponsor. Unfortunately, the trust fund is severely depleted, limiting local contributions and delaying project construction.

In May 2014, Congress passed legislation designed to facilitate projects related to ports, inland waterways and flood control. Historically, Congress passes legislation of this nature every two years, but the U.S. hasn't had a revised federal resource authorization water bill passed since 2007. The Water Resources Reform and Development Act of 2014 (WRRDA14) is designed to speed up projects by setting deadlines and eliminating duplicative processes and unnecessary studies. It also de-authorizes \$12 billion of old water development projects that Congress had previously authorized. President Barack Obama's 2014 fiscal year budget also includes \$110 million in new federal funding for the Pittsburgh District Civil Works Program. The new law includes provisions that will ensure that newly authorized projects won't add to the backlog or sit on the back burner for years. The legislation requires that the U.S. Army Corps completes feasibility studies in three years or less, at a cost of less than \$3 million. The legislation comes at a crucial time for U.S. ports, many of which are looking to expansion opportunities and renovations in anticipation of the widening of the Panama Canal, scheduled to be completed in 2015. American ports want to be able to accommodate larger ships that may come with the Canal's increased capacity.

The Port of Pittsburgh Commission offers a variety of bonds, grants, and loans to fund waterway development. For instance, the commission recently secured funding from the National Clean Diesel Funding Assistance Program. This federal program provides funding for proposals to significantly reduce diesel air pollution and emissions exposure. Local towboat operators have used the funding to convert their fleets to more efficient, cleaner-burning diesel engines.

## Priorities

The Corps of Engineers conducts routine asset management inspections every year and performs more in-depth inspections every three years. Most waterway structures in the region average 60–80 years old with the oldest being 107-years Old. All have a significant backlog of repairs and modifications pending.

*Upper Ohio Study.* The locks and dams at Emsworth, Dashields, and Montgomery are the oldest and smallest on the Ohio River main stem. Structural deficiencies limit the economic opportunities for efficient river transportation, but more than \$2 billion is needed to improve them. The Emsworth Lock and Dam is in the middle of a five-year multimillion dollar emergency repair project to mitigate serious erosion and replace dangerously corroded gates.

*Lower Monongahela River (Lower Mon) Project.* The Corps of Engineers took on the ongoing lower Monongahela River navigation project in order to address issues with lock and dam structures at Braddock, Elizabeth, and Charleroi. Authorized in 1994, the project initially anticipated a 12-year schedule to replace the Braddock dam; replace the Locks at L&D 4, located in Charleroi, Pa.; and remove Locks and Dam 3, located in Elizabeth, Pa. All were classified as “critically near failure”, with the dam at Elizabeth classified as in “active failure”.

Unfortunately, inadequate funding, including constraints of the IWTF, is forcing the Corps to complete the project one component at a time, as funding allows. The corps completed the replacement of the Braddock dam in 2004. Replacement of the Locks at Charleroi is in progress. Removal of Locks and Dam 3 is still on the horizon. The pool between Elizabeth and Charleroi is one of the region’s most important, with jobs at two power plants and the nation’s largest coke works depending on its safe navigation.

In the meantime, taxpayers are paying for the higher costs of drawn-out projects. Mobilizing contractors to work on projects in a piecemeal fashion is expensive. The public and industry loses out on the economic benefits of the project each day the project remains uncompleted. Delays also require expenditure of funds for maintenance and repairs on structures already slated for removal. Inadequate funding has pushed the completion date for the removal of Locks and Dam 3 into 2020, requiring annual staffing and maintenance expenditure at L&D 3 in excess of \$2M each year

*Allegheny River.* The Allegheny sees less traffic than the other rivers because of its smaller locks. Less traffic has led to less investment and any rehabilitation would require up to \$50 million. These structures have long been on a “fix as fail” repair basis but are now managed as “fail and close”. Over the past year, the Corps has eliminated scheduled operating hours on Locks and Dams 6, 7, 8 and 9 on the Allegheny River. There is a study in place to determine if the locks should be permanently closed.

## Challenges and Opportunities

*Funding.* Waterways receive two kinds of funding: Operations and Maintenance (O&M) and Construction General (CG) funding. The O&M funding is at baseline funding levels, but more funding is needed to maintain the system. The Inland Waterways Trust Fund shares the cost of new construction on the waterways 50/50, but the fuel tax which feeds the IWTF is frozen at 1992 levels. As an alternative funding stream, the Inland Waterways User Board proposed an increase to the user fee from 20 cents to 26–29 cents per gallon for the commercial towing industry. The proposal would emphasize completion of projects already in progress in the 20-year capital improvement plan, with priorities on dam safety, condition assessment, and economic return. The plan also shifts lock repairs of less than \$100 million and 100 percent of dam repairs to federal cost.

With the support of more than 120 industry groups, this proposal offers major improvements over the current plan. However, there are complications:

- Even with immediate passage of the plan, the Lower Mon Project would not be completed until 2023.
- Competing legislative agendas make it difficult for this legislation to get sufficient priority to be passed.
- No funding for the Ohio River improvements were included in this plan, as the authorization report will not be completed for at least another year.
- This plan does not address the needs for annual maintenance, which threatens all the locks and dams in the region.

As a result of the budget crunch, the Corps of Engineers has been forced to cut back on vital services and maintenance. The greatest impact has been on the Repair parties and the supporting Repair Fleets. These specialized units were developed to provide 911-level response and recovery service for repairs, emergencies, and natural disasters. Service reductions have led to longer response times, longer time to affect repairs, more temporary “fixes” in lieu of repairs, and more frequent lock/dam closures. Maintenance priorities have shifted from a proactive to a reactive condition-based approach. The focus is now on repairing what is in most dire need and based on how severely its failure will affect the rest of the waterway. The River and extreme weather conditions and emergency repairs now dictate the place and scope of engagement and are not limited by budget constraints or depleted and limited resources.

*Public Interest.* Public officials find it difficult to raise public interest in infrastructure problems that might become catastrophic years from now, but the goal is to raise awareness and funding before they are needed, rather than during an emergency. More residents will become aware of these issues as waterway problems begin impacting the operations of the U.S. Steel Clairton Plant, regional power plants, and other local industries.

*Workforce Development.* The towing industry is concerned with the adequacy of the future



workforce. It faces similar challenges as the trucking industry does. Long periods of out-of-town travel make careers on the river unattractive to many people.

*Intermodal Freight Transportation.* The Port of Pittsburgh is connected to the CSX Corporation Inc. and Norfolk Southern Corp. railroads as well as to four interstate highways. Last-mile connections from highways to other transportation modes can promote waterway investment and develop intermodal networks. Waterways have plenty of available capacity, but the system is failing faster than capital reinvestment. American waterways also are not very high tech compared to European satellite-aided river information systems.

### **Intelligent Transportation Systems**

Based upon the leadership of the Port of Pittsburgh Commission, many of the components necessary to make an Intelligent Transportation System a reality already exist. Among the most significant of these are:

- Water Resources Development Act of 2007 - TITLE III, 17. Section 3178, Upper Ohio River and Tributaries Navigation System New Technology Pilot Program
- LOMA - Lock Operations Management Application software deployed by USACE in 2010
- Wireless Waterways Partnership between USACE and Port of Pittsburgh Commission through Pittsburgh Port Technology Inc., - July 2012

Wireless Waterways in the Port of Pittsburgh

#### ***What are Wireless Waterways?***

The Wireless Waterway project aims to solve the communications problem on the nation's inland waterways. The plan proposes the construction of a reliable waterway communications network that utilizes wireless network technologies, such as Wi-Fi, 3G, WiMAX, and satellite communications. Services will include broadband Internet connection, real-time navigation, cargo tracking, and operation of waterway surveillance devices.

Key stakeholder needs include:

- American waterways operators: voice communication, network coverage, cargo and vessel tracking, equipment monitoring
- Port of Pittsburgh Commission: promoting waterway use
- U.S. Army Corps of Engineers: safety, locking queue, accurate and automatic data collection
- U.S. Coast Guard: safety, security, and environment

#### ***Direct and related benefits:***

- accurate real-time data and network of information
- improved safety, security, and productivity
- prevention of incidents that can cost human lives and millions of dollars

- increased development and intermodal transportation
- local and regional job creation along the waterways
- opportunity for last-mile Internet connections to underserved communities along the waterways

The implementation of wireless waterways, initiated in 2009, has been overseen by PPC and the Army Corps of Engineers. Connxx Pennsylvania has been contracted by PPC to build, operate, and maintain the wireless network. This \$1.3 million contract was funded in part by federal port security grant money and partly by matching funds from PPC. As the implementation continues, the wireless waterway technology will be available to cell phones, tablets, and other wireless devices.

For more information about Wireless Waterways, visit [\*\*www.port.pittsburgh.pa.us/home/index.asp?page=180\*\*](http://www.port.pittsburgh.pa.us/home/index.asp?page=180).

SmartLock Locking System

#### ***What is SmartLock?***

Developed by a PPC and Carnegie Mellon University partnership, SmartLock is an instrumented locking system for inland waterway navigation. This system employs the use of high-precision GPS to aid vessels entering a lock chamber in low-visibility conditions. To do so, SmartLock provides pilots with information about the lock and its surroundings all overlaid on an Electronic Navigation Chart (ENC). The SmartLock system provides numerous benefits, including:

- improved reliability and predictability of inland waterway transportation
- improved safety and efficiency at lock
- reduced accidents at locks, bridges, piers, and passages
- improved locking accuracy

For more information about the SmartLock system, visit [\*\*http://www.port.pittsburgh.pa.us/index.aspx?page=174\*\*](http://www.port.pittsburgh.pa.us/index.aspx?page=174).

For information on other ITS initiatives, visit [\*\*www.heinz.cmu.edu/traffic21/index.aspx\*\*](http://www.heinz.cmu.edu/traffic21/index.aspx).

## Resources

American Society of Civil Engineers 2010 Report Card  
for Pennsylvania's Infrastructure–Navigable Waterways  
[www.pareportcard.org](http://www.pareportcard.org)

Federal Emergency Management Agency  
[www.fema.gov](http://www.fema.gov)

National Weather Service  
[www.weather.gov](http://www.weather.gov)

Pennsylvania Fish and Boat Commission  
[www.fish.state.pa.us](http://www.fish.state.pa.us)

Port of Pittsburgh Commission  
[www.port.pittsburgh.pa.us](http://www.port.pittsburgh.pa.us)

U.S. Army Corps of Engineers Pittsburgh District  
[www.lrp.usace.army.mil](http://www.lrp.usace.army.mil)

U.S. Coast Guard, Pittsburgh Unit  
[homeport.uscg.mil/pittsburgh](http://homeport.uscg.mil/pittsburgh)

U.S. Environmental Protection Agency  
[www.epa.gov](http://www.epa.gov)

U.S. Geological Survey  
[www.usgs.gov](http://www.usgs.gov)

## Public Transit

Ten public agencies deliver transit and paratransit service in Southwestern Pennsylvania. Buses are the most visible part of this public transportation infrastructure, but the system also is supported by garages, maintenance facilities, park-and-ride lots, transit passenger centers, and vehicles that provide additional services. The deterioration of roads and bridges can impact public transportation by forcing route changes and severe delays. As the price of fuel increases, transit ridership also tends to rise. At the same time as demand is growing, there is not enough equipment or money to meet these needs. Agencies also must juggle maintenance needs with the increasing demand for greener infrastructure.

### Key Players

The Port Authority of Allegheny County provides 97 percent of the transit services in Southwestern Pennsylvania. Twenty-five hundred employees operate, maintain, and support bus, light rail, incline, and paratransit services for nearly 230,000 daily riders. After the latest service reductions, the Port Authority experienced an immediate drop in ridership but saw a gradual increase in system productivity. The number of rides per service hour has grown by 15 percent. The agency later expanded its fleet of articulated buses to address overcrowding, as riders from eliminated routes flowed onto remaining buses.

The Westmoreland County Transit Authority (WCTA) provides service throughout Westmoreland County as well as commuter services to Pittsburgh and Johnstown. WCTA owns its buses and contracts with two private operators to provide bus service. It also owns a maintenance facility and a Greensburg transit center. The transit agency is at capacity in terms of vehicles and has experienced a 9 percent increase in ridership between 2010 and 2011.

### Funding

Federal, state, and local sources fund public transit services. On the federal level, support remains unstable without a long-term authorization plan. The two largest federal funding programs are the block grant for transit systems in urbanized areas (Section 5307) and capital funds (Section 5309). State or local agencies must provide 5–20 percent matching funds, which are largely reliant on sales taxes and passenger revenue.

WCTA relies on PennDOT discretionary funds to provide the needed 20 percent match to receive federal funds for capital projects. These local funds are based on the bonding of the Pennsylvania Turnpike and have run out. Due to the lack of Interstate 80 tolling and the subsequent PennDOT fund shortfall, WCTA has frozen operating funds. The agency has been receiving relatively level funding and does not anticipate a funding problem in the short term. However, should the situation fail to improve, it may face issues similar to those currently affecting the larger transit agencies.

## Priorities

### Port Authority

*The North Shore Connector.* The connector is an underground light rail line connecting the Downtown and North Shore neighborhoods of Pittsburgh. The project aims to alleviate congestion between the two areas during sports games and special events. The region received a specially earmarked \$348 million federal transit grant for this project. The line also may serve as a starting point for future rail extensions to the northern suburbs.

*ConnectCard.* Port Authority of Allegheny County is now rolling out ConnectCard, a new smart card fare system that will replace paper transit passes and tickets. With ConnectCard, passes and fare value are loaded onto a reusable plastic card that's more convenient and secure than paper passes or cash. Riders can buy ConnectCards at Port Authority's Downtown Service Center, nearly 50 Giant Eagle locations, and a growing number of other retailers. The system should help to reduce revenue losses from equipment failure and fare evasion. Participating regional transit agencies also may see smoother transitions between services.

*Green technology.* The Port Authority recently purchased 20 additional electric hybrid buses and introduced biodiesel to the existing fleet. The number of articulated buses also grew from 50 to approximately 110.

### Westmoreland County Transit Authority

WCTA aims to maintain current levels of service. The agency is coordinating a study of human service transit that contracts with local taxi companies. Paratransit service may be improved by consolidating paratransit transportation programs under PennDOT and developing common delivery standards across all programs. WCTA also recently purchased two 20-passenger electric hybrid vehicles as its first foray into green transportation technology.

## Challenges and Opportunities

*Funding Crisis.* Act 44 of 2007 revamped the state's approach to transit funding, which has historically been generous but unpredictable. Under this act, public transit received \$953 million in the fiscal year 2007–08. Sources included \$300 million in bonds being repaid from future Pennsylvania Turnpike revenues along with funds from the state sales tax and the Pennsylvania Lottery.

Act 44 funding was distributed for both capital and operating purposes, using formulas based on number of passengers carried, vehicle miles traveled, and vehicle hours operated. The act was intended to stabilize state transit funding but failed due to the lack of progress in both leasing the Pennsylvania Turnpike and tolling I-80.

Factors squeezing the Port Authority include a declining share of state funds (because of growth in central Pennsylvania transit systems) and a declining share of federal rail transit funds (as more

cities have built rail lines) along with labor commitments. Many other metropolitan areas have approved broad local taxes to fund transit, most commonly through a sales tax increase. As a larger public transit agency, the Port Authority also faces growing labor legacy costs. Stock market losses from the recession resulted in a 30 percent decline in pension net asset values. The agency expects to make higher pension contributions to offset the losses.

For fiscal year 2012-13, the Port Authority is facing a \$64 million deficit in its operating budget. The agency also projects a \$45–90 million capital budget deficit for State of Good Repair projects. If no funding solution is developed, the agency will be forced to reduce service by 35 percent, raise fares, and lay off hundreds of employees. Downsizing will eliminate more than 40 routes out of 100 and reduce service on all remaining routes. Many city neighborhoods and suburban communities will lose access to public transit at a time when demand for service continues to grow.

*Workforce Issues.* Agencies find it difficult to attract younger candidates with proper qualifications to work in the public transit sector. Applicants are often older than 30, and many are even at retirement age. Potential employees must pass drug screenings, hold a commercial driver's license, and demonstrate good customer service skills.

## Intelligent Transportation Systems

### Bus Rapid Transit in Pittsburgh

#### ***What is Bus Rapid Transit?***

A cost-effective and flexible public transportation system, bus rapid transit (BRT) utilizes modern technology to create a faster, more reliable bus system. Port Authority of Allegheny County built Pittsburgh's first dedicated busway in 1977. Since then, the Port Authority has been committed to improving public transportation throughout the region.

Currently, the Port Authority is exploring ideas for building a BRT service along the Fifth and Forbes Corridor between the busy Downtown and Oakland neighborhoods. BRT service would feature exclusive bus lanes, traffic signal priority, real-time transit information, off-board fare collection, low-floor buses, and branded vehicles and infrastructure to set BRT routes apart. The Port Authority is a partner in a coalition of more than 30 local stakeholders, including urban planners, community groups, nonprofits, government agencies, businesses, and developers. Led by Sustainable Pittsburgh, Get There PGH is a partnership exploring and promoting BRT opportunities throughout the city.

Predicted major benefits of BRT include:

- economic growth
- improvement in neighborhoods
- safer streets

- cleaner environment
- thriving businesses
- reliable travel
- mobility and accessibility

The possibility of BRT implementation in the Pittsburgh region is currently being discussed by both the coalition and the public. In April 2013, grants from the Rockefeller Foundation were issued to support research, studies, communication, and community outreach on the subject of BRT. In addition, Get There PGH and other organizations have been studying BRT systems in other cities (such as the Healthline in Cleveland and the Metro Rapid in Los Angeles) to gain insight and ideas for Allegheny County.

While Port Authority has not released any official agency applications for mobile devices, a number of developers have created free or paid tools for riders to use in navigating the transit system. The Port Authority provides its route data in open source format to accommodate these developers.

Port Authority of Allegheny County does not license or endorse the following third-party applications and cannot make any guarantees as to the accuracy and reliability of the information presented therein. Below is one example.

Tiramisu Smart Phone Application

#### ***What is Tiramisu?***

In 2011, students at Carnegie Mellon University created a smart phone application named Tiramisu to increase public transportation efficiency in Allegheny County. The app, both free and crowd-sourced, can be used to determine when Port Authority buses will arrive at different stops. Bus riders can enter information into the application about the location and occupancy level of buses they are riding on at that moment. Other individuals can then use that information to see when their bus will arrive. In addition, riders can use the app to determine which stop is next. The Tiramisu application also allows for users to report problems, positive experiences, and suggestions.

#### ***Real Time Transit Tracking***

In 2014 Port Authority began to roll out its real time tracking of the busses and plans to begin real time tracking light rail vehicles in 2015. Each transit vehicle will be equipped with an automated vehicle locator that continually tracks the vehicle and reports its location in real time so riders know when their vehicle will arrive.

With the combination of automated vehicle locators, automated passenger counters and the Connect Card, now being integrated into the fleet, a great deal of data is being collected. Port Authority is beginning to analyze that data to better system optimization and planning.

## Biking through Pittsburgh

### ***What is the Pittsburgh Bike Share Partnership?***

Recently, plans have been developed to introduce a Bike Share program to the City of Pittsburgh in 2015. This bike share program, similar to those in place in Boston, Denver, Minneapolis, the District of Columbia, and many other cities nationwide, has been developed at the hands of an alliance between the City of Pittsburgh, Bike Pittsburgh, and Walnut Capital. Overall, Pittsburgh's Bike Share program will allow for individuals to rent out bikes by either annual or short-term (24 hours) use. This program will be comprised of fifty solar-powered stations and five hundred bicycles city-wide. These bicycles, available for point-to-point trips, will be able to be locked into any of the planned stations throughout Pittsburgh.

Overall, the Pittsburgh Bike Share Partnership has been designed to achieve three main goals:

1. To enhance mobility
2. To promote tourism
3. To provide a healthy way to visit Pittsburgh's diverse neighborhoods

This Bike Share program will also aid the City of Pittsburgh in its attempts to reach Gold Level Bicycle Friendly Status, as designated by the League of American Bicyclists.

### Other Initiatives

Within the City of Pittsburgh, the **Oakland 2025** program is also in the works. This program aims to create a multi-modal network in order to better serve pedestrians, bicyclists, drivers, and transit users. Some of the broad initiatives included within the Oakland 2025 framework include:

- transformation of the Fifth and Forbes corridor into multimodal streets, complete with bike lanes and the deemphasizing of automobile traffic
- a potential Bus Rapid Transit (BRT) system, which would speed travel times between Downtown and Oakland, through limited stops and off-board payment
- creation of "mobility hubs", including car sharing and bicycle and commuter parking at BRT stops

For more information on the Pittsburgh Bike Share Partnership, as well as biking initiatives throughout the city, visit <http://pghbikeshare.org/> and <http://bikepgh.org>.

For more information on the Oakland 2025 program, visit <http://www.utimes.pitt.edu/?p=23363>.



## Resources

American Society of Civil Engineers 2010 Report Card  
for Pennsylvania's Infrastructure-Transit

[www.pareportcard.org](http://www.pareportcard.org)

Federal Transit Administration

[www.fta.dot.gov](http://www.fta.dot.gov)

PennDOT Bureau of Public Transportation

[www.dot.state.pa.us/Internet/Bureaus/pdBPT.nsf/TransHomepage](http://www.dot.state.pa.us/Internet/Bureaus/pdBPT.nsf/TransHomepage)

Port Authority of Allegheny County

[www.portauthority.org](http://www.portauthority.org)

<http://www.connectcard.org/>

<http://realtime.portauthority.org/bustime/home.jsp>

Westmoreland County Transit Authority

[www.westmorelandtransit.com](http://www.westmorelandtransit.com)

## Railways

Historically, rail has served as a very cost-effective freight transportation system. At present, more than 1 billion tons of cargo travel through the state each year by rail. A single train is capable of moving a ton of cargo nearly 500 miles on a single gallon of fuel, making rail three times more fuel efficient than roadway transportation. However, much of the Pennsylvania railroad infrastructure was built more than a century ago.

Today, railroad operations require increasingly expensive maintenance and upgrades to keep up with new safety and engine technologies. At the same time, overall demand has fallen with the decline in manufacturing over the years. However, companies predict that the lower costs of rail will attract more activity as fuel costs increase and highway congestion grows.

## Key Players

The rail system of Southwestern Pennsylvania consists of more than 1,300 miles of track operated by 17 railroad companies, including three large Class I railroads—Norfolk Southern Corp., CSX Corporation Inc., and Canadian National Railway Company. Class I railroads connect to a larger system spanning the eastern and southern United States as well as Canada. While these companies are privately owned, they also function as a rail network by working together to make connections that extend their geographic reach.

In Southwestern Pennsylvania, Norfolk Southern owns more than one-third of the track and runs 70–90 trains a day through the region. The Buffalo & Pittsburgh Railroad owns 194 miles and serves industrial locations, with lines reaching from New Castle into Allegheny and Indiana counties. CSX operates and maintains 2,000 miles of track throughout the state, and its whole network serves 70 ocean, lake, and river ports throughout the country.

The Wheeling & Lake Erie Railway (W&LE) maintains a line from Ohio through Washington County that heads north into suburban Pittsburgh and ends in Fayette County. W&LE moves about 8,000 carloads through the region, mostly coal and steel products. Other short-line railroads also serve industries in the region. Most of these regional and short-line railroads have a backlog of infrastructure projects necessary to bring their lines up to industry standards.

Passenger rail in the region consists of four daily Amtrak trains stopping in Pittsburgh: the Capitol Limited between Washington, D.C., and Chicago, Ill., and the Pennsylvanian to and from New York, N.Y.

## Funding

Many rail projects qualify for federal stimulus funding as being “shovel ready.” Agencies such as the Pennsylvania Department of Transportation (PennDOT) allocate this funding. However, railroad companies independently operate their own infrastructure. As a result, they have trouble sharing project status with PennDOT because they do not have a formal mechanism through which to share project readiness.

Pennsylvania is considered a national leader in rail support in the provision of funding under the Rail Freight Assistance and Rail Technical Assistance programs. These two programs provide \$20 million for rail infrastructure extension and rehabilitation. Funding is allocated on a competitive basis to railroads or railroad-served businesses. The state also awards funds through its capital budget.

## Priorities

Regional railroads are aggressively recruiting businesses to locate along their lines because of rail's many benefits and potential to serve as a crucial supplier for emerging industries. At the same time, countless projects are in need of funding, including bridge replacement, track replacement and installation, and upgrades to communication and signal infrastructure. As demand rises for rail services, completing improvements and maintenance will be critical to ensuring safe and successful operation of the railway system.

## Challenges and Opportunities

*Funding.* The rail industry is responsible for virtually all costs of its infrastructure maintenance. In comparison, the trucking industry receives an infrastructure subsidy from the public provision of highways. Rail development is an expensive and inflexible undertaking. Once you lay track, you can't move it. As such, railroads need a reasonable expectation of ongoing business before committing to major expansion.

*Environmental Benefits.* Rail is more environmentally friendly and energy efficient than road or highway transport. According to the U.S. Environmental Protection Agency (EPA), freight trains emit approximately three times less nitrogen oxide and particulates per ton-mile than highway transportation. A single train can carry the load of more than 280 trucks, taking them off of our nation's overcrowded highways. Rail can reduce annual greenhouse gas emissions by an estimated 12 million tons by shifting just 10 percent of long-haul freight from highways onto railways.

*Right-of-Way.* Possibilities for commuter rail and expanded passenger rail service exist but require collaboration with existing railroads. Passenger rail travels on freight rights-of-way, causing inconvenience to both users. Passenger trains receive preference because they usually travel faster than freight trains. Freight shipments must pull off at sidings, but moving out of the way can be difficult and can delay passenger trips.

*Intermodal Transportation.* Railways are experiencing increased business from the trucking industry. Customers move shipments on rail for long distances and then use trucks for delivery to final destinations. In October 2013, CSX Corporation announced that it had chosen a former Lake Erie & Pittsburgh railyard in McKees Rocks and Stowe Township as the site where a new \$50M intermodal facility will be built. The company is currently finishing the planning, design,

and property acquisition phase for this 65–75 acre property. Construction for the facility, which is estimated to bring approximately 360 jobs during construction and a total of about 40 on-site intermodal workers once operational, is scheduled to begin in 2015. The construction should take approximately two years to complete.

## **Intelligent Transportation Systems**

### National Gateway Project

#### ***What is the National Gateway Project?***

CSX is spearheading the National Gateway project, an \$842 million multistate railway modernization program. The project aims to build a more efficient double-stack cleared rail corridor between mid-Atlantic seaports and Midwest distribution centers. Double-stack clearances allow trains to carry twice the amount of freight on the same number of trains, increasing efficiency and reducing environmental impact.

The National Gateway Project is expected to yield a number of benefits, including:

- an estimated \$35 in public benefits for every dollar of public money invested
- improved transit times between coastal ports and metropolitan centers by 24–48 hours
- reduced highway congestion and transportation emissions
- creation of more than 50,000 jobs

Following the goals of the National Gateway project, CSX has implemented a number of projects in the Ohio and Pennsylvania region.

#### ***Northwest Ohio Terminal Construct Facility***

The Northwest Ohio Terminal Facility is a 185-acre world-class freight distribution hub in Wood County, Ohio, and the nerve center of CSX's intermodal network. This terminal allows for incoming freight trains to be quickly and efficiently redistributed to a network of double-stack trains. The Northwest Ohio facility employs nearly 300 full-time employees, and is one of the most environmentally friendly freight terminals in the country.

#### ***Chambersburg Terminal: Construct Terminal***

The Chambersburg Terminal is an 85-acre facility near Chambersburg, Pennsylvania. This facility allows for shippers to take advantage of intermodal transportation by moving freight containers from train to truck without any direct handling of the freight itself. Overall, the Chambersburg Terminal achieves cost-effective, efficient, and reliable freight transportation by combining long-haul rail efficiency with short-haul truck flexibility.

#### ***Pittsburgh Terminal***

As of December 2009, CSX was working to evaluate possible locations for the Pittsburgh Terminal in collaboration with customers and local authorities. CSX is aiming for this terminal to be a modern intermodal facility that will allow both shippers and local businesses to realize

improved shipping options, reduce highway congestion, and lower transportation emissions.

For more information about the National Gateway project, visit [www.nationalgateway.org](http://www.nationalgateway.org).

## Positive Train Control

### ***What is Positive Train Control?***

Positive Train Control (PTC) is a safety system designed to monitor and control train movements. This system, required in many railroads by the 2008 Railroad Safety Improvement Act, prevents overspeed derailments, train-to-train collisions, and movement through misaligned switches, all while protecting track workers. By gauging upcoming signals, as well as authorities, switches, operating conditions, locomotive position, and speed, the PTC system will automatically warn locomotive engineers of a need for action. In the event that the locomotive engineer should fail to act, the PTC system will engage the locomotive brakes and bring the train to a full stop.

### ***Implementation of Positive Train Control***

The Positive Train Control system is scheduled to be implemented across 76% of the CSXT network. This system will affect 3,600 locomotives, 10,300 wayside devices, and 16,300 miles of track. Although potentially overambitious, an implementation deadline for the PTC system has been set for December 31, 2015. The implementation of PTC is incredibly challenging for a variety of reasons, including interoperability, the widespread scale of changes, unproven technology, heavy supplier reliance, and a compressed technology.

For more information about PTC and CSX, visit <http://www.csx.com/index.cfm/about-csx/projects-and-partnerships/sustainable-infrastructure/positive-train-control/>.

## Resources

Amtrak

[www.amtrak.com](http://www.amtrak.com)

American Society of Civil Engineers 2010 Report Card for Pennsylvania's Infrastructure—Freight Rail

[www.pareportcard.org](http://www.pareportcard.org)

Canadian National Railway Company

[www.cn.ca](http://www.cn.ca)

CSX Corporation Inc

[www.csx.com](http://www.csx.com)

National Gateway

[www.nationalgateway.org](http://www.nationalgateway.org)

Norfolk Southern Corp.

[www.nscorp.com](http://www.nscorp.com)

PennDOT Bureau of Rail Freight, Ports, and Waterways

[www.dot.state.pa.us/Internet/Bureaus/pdBRF.nsf/RailFreightHomepage](http://www.dot.state.pa.us/Internet/Bureaus/pdBRF.nsf/RailFreightHomepage)

Pennsylvania Public Utility Commission

[www.puc.state.pa.us](http://www.puc.state.pa.us)

U.S. Department of Transportation TIGER Grants Program

[www.dot.gov/tiger](http://www.dot.gov/tiger)

Wheeling & Lake Erie Railway

[www.wlerwy.com](http://www.wlerwy.com)

## Roads and Bridges

With one of the highest numbers of developed waterway miles, Pennsylvania is home to more than 22,660 bridges, of which 23 percent are considered structurally deficient, according to the American Society of Civil Engineers. Southwestern Pennsylvania is home to a number of major highways and several thousand miles of roads. The region is virtually eliminating new capacity projects, diverting the funds into critical repairs and maintenance. It is a struggle for state and federal funding to meet the growing needs of aging road and bridge infrastructure. Faced with rising demand, less funding and investment will mean even more tough decisions ahead for both users of the roads and the agencies that maintain them.

### Key Players/Context

The Southwestern Pennsylvania Commission (SPC) is the official metropolitan planning organization serving the 10-county Southwestern Pennsylvania region. SPC directs the use of state and federal transportation and economic development funds in the region. The agency also serves as the local development district and economic development district responsible for establishing regional economic development priorities.

Pennsylvania Department of Transportation (PennDOT) Districts 10-0, 11-0, and 12-0 collectively manage 8,000 miles of roads and 5,300 bridges as well as 300 miles of highway. Of these, more than 1,700 miles of roadway are considered poor and nearly 1,400 bridges are rated structurally deficient.

Counties and municipalities bear responsibility for roadways outside the PennDOT system. Allegheny County, for example, maintains numerous major roadways and bridges that it constructed, including 800 miles of roadway and 520 bridges, nine of which are major river crossings. The City of Pittsburgh owns 186 additional bridges.

Deficient bridges are a pressing problem statewide but particularly in Southwestern Pennsylvania. Bridges in the region are on average eight to 10 years older than the state average. Statewide inspection efforts intensified following two major bridge incidents: the collapse of a 60-ton bridge beam onto Interstate 70 in Washington County (2005) and the Minneapolis bridge collapse in Minnesota (2007).

### Funding

Federal and state funding for roads and bridges is increasingly unstable but is anticipated to continue at current levels. However, state infrastructure needs far outweigh the present level of funding. Historically, maintenance and new construction funding was distributed 80/20. Today, the allocation is closer to 95/5. Highway and bridge funding has flipped from 60/40 to 30/70 to focus on bridges.

At the federal level, legislation provides funding based on a formula, not on actual revenue.

Managed by the Federal Highway Administration, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users is the primary allocator of federal funds to state infrastructure programs. PennDOT has stressed the need for consistent, sustainable funding rather than transient stimulus packages and stopgap measures. Due to the ongoing federal deficit situation, highway and bridge infrastructure maintenance is likely to become more of a state responsibility than a national one.

At the state level, revenue has declined. The liquid fuels tax and Motor License Fund pay for routine maintenance items such as snowplowing, salting, repaving, line painting, pothole patching, and shoulder stabilization as well as for the staff to carry them out. Between 1986 and 2006, vehicle traffic increased by 60 percent and heavy truck traffic by 83 percent. Meanwhile, the prices of asphalt, diesel fuel, and road salt have increased.

At the regional level, highway and bridge projects are funded through the four-year Transportation Improvement Program (TIP). As required by federal legislation, SPC develops and updates TIP every two years. The program serves as the regional blueprint for spending federal and state funding allocations.

On November 25, 2013, Pennsylvania Governor Tom Corbett signed into effect a major transportation bill. This bill, having also passed through the House and the Senate, will provide \$2.3 billion worth of funding to improve highways, bridges, and mass-transit systems statewide. Budgeting of the funding will be as follows: \$1.65 billion will go to improve roads and bridges, while \$480 million will work to enhance mass-transit systems over the span of five years. An additional \$144 million will go towards other widespread improvement projects. The funding, according to the ASCE, is expected to add 50,000 new jobs, while preserving 12,000 already in place. As stated by Governor Corbett upon his signing of the bill, “There is barely a spot in Pennsylvania ... that will not see an improvement because of this legislation”<sup>1</sup>.

However, the passage of this transportation bill does not come without a cost. In order to provide funding for the bill, the people of Pennsylvania will face rising gas prices. To raise the money needed, the bill calls for the removal of the limit on wholesale gas taxes in Pennsylvania. Before the removal of the limit, these taxes were capped at \$1.25 per gallon. In addition, the bill will eliminate the 12 cent-per-gallon retail gas tax. If this price increase is passed on in full to the consumers, gas prices could potentially rise 28 cents over the next five years<sup>2</sup>. Additional funding for the bill will be raised through increasing vehicle registration fees, driver’s license fees, and fines on certain moving violations. Also, individuals who allow their insurance to lapse will now have the option to pay a fine as opposed to accepting the three-month suspension previously in place<sup>2</sup>. However, the bill works to divide cost increases into phases over the course of the next five years in an attempt to reduce the burden on consumers.



Governor Corbett has praised both the Pennsylvania House and Senate for their passage of this transportation bill. After signing the bill, Corbett stated that “Pennsylvania is a state that puts progress ahead of party”<sup>1</sup>. Given the immensity of the bill, the strong bipartisan support is a sign that the state’s highways, bridges, and transit systems are in need of improvements. Through passage of this bill, TIP released a new plan for funding the 10-county region. Including funds from the bill, spending will total \$4.7 billion. The new funding from the state legislature allowed TIP to “add significant projects that were simply unaffordable in the last TIP update,” according to Dan Cessna, PennDOT’s executive for Allegheny, Beaver, and Lawrence counties.<sup>i</sup> While the funding from the state increased, the plan assumes federal funding will stay at its current level, which is by no means assured due to congressional gridlock in Washington, D.C.

TIP’s plan for 2015-18 allows for \$2 billion to be spent on non-interstate highways and bridges — including a \$79 million rehabilitation of Liberty Bridge in downtown Pittsburgh, which is currently considered structurally deficient – \$587 million on interstate highways, and \$1.8 billion on transit. Each figure is a significant increase from TIP’s previous plan, though none exceeds 90 percent. Mr. Cessna acknowledges that there will be much potentially disruptive construction, and plans to allocate funds to effectively coordinate projects.<sup>ii</sup>

## Priorities

In Southwestern Pennsylvania, PennDOT’s top priority is the reduction in the number of structurally deficient bridges. General roadway maintenance includes bridge preservation, seal coating, and microsurfacing to extend asphalt pavement lifetimes. The asset management strategy now focuses on extending pavement life through preservation rather than on pavement smoothness. Microsurfacing can add three to seven years of life to existing pavement. The agency also uses recycled asphalt and is exploring other environmentally friendly practices for recycling pavement.

In addition, PennDOT’s Smart Transportation initiative focuses on streamlined project delivery and system preservation by:

- using facilities through the full design life through improved maintenance techniques and providing the right treatment at the right time
- promoting best fit transportation projects and looking for the most economical solutions to maintain and improve system capacity and operations
- linking planning and the National Environmental Policy Act (NEPA) and emphasizing linking land use and transportation

## Challenges and Opportunities

*Funding Alternatives.* As private investment in new construction becomes more common, new projects may seek alternative financing methods such as public/private partnerships (P3s), transportation development districts, development impact fees, and congestion pricing. Policymakers can provide guidance to the decisions determining how much each party

contributes to a project. Redesigning federal and state processes as well as introducing P3 legislation can promote smarter use of private resources within publicly regulated processes.

However, the marriage of private money and public processes can be challenging. Developers may want to contribute money up front and all at once, but public money is allocated years in advance. Because every public dollar is spoken for, public agencies cannot be the deep pocket for cost overruns. Local interest in economic development often leads to more public contributions than private. At the same time, communities may have to turn to private contributions if public funds dry up.

*Workforce Development.* Despite the recession, PennDOT is having difficulty attracting candidates for some well-paying entry-level positions, such as engineering technicians and construction inspectors. These jobs typically require a high school diploma or two-year degree. At the same time, more applicants are applying to higher technical positions, such as civil engineers.

*Vehicle Miles Traveled.* Rising fuel efficiency and electric vehicles are reducing revenue from per-gallon gas taxes. Shifting from a per-gallon gas tax to a per-mile tax on auto use may be a more reliable revenue generator for the state.

*Regional Development.* To maximize cost-effective infrastructure investments, SPC promotes more compact development patterns in corridors and existing communities. The commission's long-range development plan, the 2040 Plan, recommends several improvements, including the following:

Traffic signal optimization will improve driving experience by reducing delays and congestion but is often hard to achieve. Municipalities own the traffic signals and may lack the incentive or resources to make improvements. Pennsylvania is one of only nine states that have no state ownership or maintenance of traffic signals. As many as 80 percent of the region's 2,600 signalized intersections could be improved with equipment upgrades or retiming. SPC's Regional Traffic Signal Program is working to advance more than \$3 million in traffic signal improvements with municipal partners in 16 corridors throughout the region.

The state may be interested in transferring lightly traveled rural roads to county or municipal management.

Allegheny County has proposed adoption of an approach to road ownership based on functional classification, location, and traffic volumes. The county owns an unusually extensive and discontinuous collection of bridges and roadways. It would like to transfer ownership of its major bridges and up to 80 miles of major roads to PennDOT while acquiring other facilities as appropriate.

Distributing liquid fuels tax funds according to present county ownership of roads and bridges would better address today's needs. At present, allocation is still based on the amount of gas consumption in each county in the years 1928–30.

Thanks to the transportation funding bill that Governor Corbett signed into law in November 2013, the Pennsylvania Turnpike Commission is moving ahead with construction on the second of three phases of the Southern Beltway. Phase two involves extending the toll road from U.S. Route 22 in Robinson, Washington County, to Interstate 79 near the Allegheny/Washington county line, a 12 mile section of road projected to cost \$550M and estimated to be completed in 2019. Officials hope that this section of road will allow motorists access to commercial sites being developed by the Allegheny County Airport Authority, increasing economic opportunities in the area. Phase three, estimated to cost \$700M and not yet scheduled to begin, will extend 12.5 miles from I-79 to the Mon-Fayette Expressway near Finleyville.

*Public opinion.* Users complain when bridges or roadways are closed completely and prefer at least one alternating lane of traffic. However, efficient rehabilitation often requires continuous hours of complete road closure. Scheduling maintenance work on weekends and at night may reduce public impact but increases costs for overtime labor and special lighting. Collaboration among infrastructure sectors can reduce costs and save time by coordinating repair schedules.

*Administrative Cost Saving.* Best practice methods include:

- combining design and build stages on project bids, merging multiple similar bridge projects in a single bid, reducing duplicative inspection oversight
- applying more seal coating instead of paving

Some PennDOT district staff would prefer greater flexibility to use newly developed construction materials. The extensive approval process can hold agencies back from using new technologies for years. State legislation can facilitate alternatives such as the use of design-build and design-build-operate-maintain project contracting.

*PennDOT NextGeneration Initiative.* The initiative is to engage PennDOT's management to undertake a proactive approach to refreshing and advancing the standard business practices and technology that is currently utilized at PennDOT. The initiative will focus on modernizing policies, procedures, specifications, and practices that could potentially save the department money and make it run more effectively. The initiative is relying on collaboration within the department, as well as with industry partners on items that directly impact them. Some of the new technologies and policies being pursued may even help the department be greener.

## Intelligent Transportation Systems

### Smart Traffic Signals

#### ***SPC's Regional Traffic Signal Program Honored with the Governor's Award for Environmental Excellence***

SPC's Regional Traffic Signal Program inaugural cycle of projects was honored with the Governor's Award for Environmental Excellence from the Department of Environmental Protection on April 18, 2012 in Harrisburg, PA. Department of Environmental Protection Secretary Michael Krancer presented the award to SPC staff. The Regional Traffic Signal Program was touted as an excellent, cost effective example of using the latest technology and approaches, along with inter-governmental cooperation at the local, county, regional, and state levels, to improve the quality of life for the citizens of the Commonwealth. Retiming the signals along these corridors, along with targeted equipment upgrades, allowed SPC, PennDOT, and the municipalities to use existing infrastructure to its fullest potential, realizing significant reductions in emissions, fuel use, and delay. The overall benefits of the program can be summarized in the benefit:cost ratio of 90:1 in the program's first year of implementation; for every \$1 of public money invested in the program, the traveling public and surrounding communities realize \$90 of benefits in reduced fuel usage, delay, and emissions.

#### ***Urban Adaptive Traffic Signals***

Early research at Carnegie Mellon University produced a new approach to real-time traffic signal control, designed specifically for urban (grid) settings where there are multiple, conflicting dominant flows that change dynamically through the day. The approach operates in a totally decentralized manner, with intersections computing individual timing plans that optimize their local throughput and then communicating them to their neighbors to achieve coordinated activity (green waves). Its decentralized nature offers inherent advantages with respect to real-time response, incremental deployment and signal network scalability. The approach has been implemented as the Surtrac adaptive signal control system (Scalable Urban TRAffic Control).

In 2012 Surtrac was deployed in the East Liberty neighborhood of Pittsburgh in 9 intersections and in 2013 expanded to 18 intersections. Results showed a 40 percent reduction in wait time and an estimation of 20 percent reduction in vehicle emissions. In 2014 an additional 6 intersections in the adjoining Point Breeze neighborhood and 23 intersections in the adjoining Bloomfield neighborhood will be added to this initial pilot for a large scale demonstration.

## Continuous Road Surface Distress Detection

### ***What is Continuous Road Surface Distress Detection?***

Continuous Road Surface Distress Detection, investigated by Carnegie Mellon University's Christoph Mertz, is a newfound approach to monitoring road quality and distress. Computer vision algorithms, images, and GPS data gathered from smartphones are analyzed and saved in the maintenance department database. Additional data for such databases can be gathered using OBDII or structured light sensors. To gather such data, smartphones or other sensor types are mounted on car windshields. These instruments then gather data as the car drives, transmitting it back to a central computer via WiFi. This information can then be accessed through the database to view road conditions and implement damage control plans.

### ***Why use Continuous Road Surface Distress Detection?***

It is a necessity for maintenance departments to regularly assess road quality for proper maintenance to be conducted. Currently, these condition reports are gathered via yearly inspections or in response to reports from the general public. Especially in a city such as Pittsburgh, where road damage is made worse by poor weather conditions, the chance to have more consistent information would be of immeasurable benefit. Overall benefits of Continuous Road Surface Distress Detection include:

- continuous monitoring, allowing for immediate detection of damages such as rutting and potholes
- the chance to address problem areas before they develop into serious issues

### ***Where is Continuous Road Surface Distress Detection expected to go in the future?***

Although Continuous Road Surface Distress Detection is only in its early phases, its developers have big plans for its future. In the long-term, researchers hope to build a complete system capable of automatically collecting and storing data over long periods of time, obtaining road distress classifications that comply with current practices. This program, at the beginning of its pilot test, is working alongside the City of Pittsburgh to integrate the system into its workflow and evaluate its effectiveness. Developers are very close to a first version of analysis software that will be capable of scoring the road distress.

For more information on Continuous Road Surface Distress Detection, and the work that Carnegie Mellon is doing on it, visit <http://utc.ices.cmu.edu/utc/projectitem.asp?ID=57>.

## Connected Vehicles

### ***What are connected vehicle technologies?***

Connected vehicle technologies, currently being researched by the U.S. Department of Transportation's Research and Innovative Technology Administration, are a series of "applications and policies in order to lay the foundation for a real-world traffic environment in which cars communicate with each other and with nearby infrastructure". More specifically,

these technologies include connected vehicle safety applications that have the potential to increase situational awareness and reduce or eliminate crashes through both vehicle-to-vehicle and vehicle-to-infrastructure data transmission. These applications will support driver advisories and warnings, as well as vehicle and infrastructure controls. With connected vehicle technologies, USDOT believes that up to 82 percent of unimpaired crash scenarios will be addressed.

### ***Where do connected vehicle technologies stand?***

Connected vehicle technologies are currently in the pilot phases. A program conducted by the University of Michigan's Transportation Research Institute, alongside the USDOT, made use of approximately 2,800 vehicles containing dedicated short range communication (DSRC) technology. This Safety Pilot Model Deployment, which ran from mid-2012 until the end of 2013, produced very promising results for the future of connected vehicle technologies. Results from the pilot prompted the National Highway Traffic Safety Administration to indicate in February 2014 that they will move forward with rulemaking to require all vehicles to be equipped with DSRC radios in the future. In addition, the USDOT is running a Connected Vehicle Test Bed program. This program provides a research platform for applications promoting safety, mobility, and the environment in the field of connected vehicles.

Currently 11 intersections in Cranberry Township, Butler County, are equipped with DSRC radios so vehicles can communicate with signals. Also in 2014, 23 intersections in Pittsburgh's Bloomfield area will be equipped with these DSRC radios.

Autonomous Vehicle Research is also being conducted in the region by Carnegie Mellon University's T-SET University Transportation Center. To international acclaim in September 2013, Congressman Bill Shuster, Chairman of the House Transportation and Infrastructure Committee, and PennDOT Secretary Barry Schoch rode 33 miles in a CMU autonomous vehicle from Cranberry Township to the Pittsburgh International Airport navigating signalized intersection, lane changes, mergers highway travel, etc.

Furthermore, in July 2014 Carnegie Mellon completed a "Connected and Autonomous Vehicle 2040 Vision" plan to help PennDOT begin to explore how this new technology will affect the planning, design, and operation of our transportation system in the future. These activities have positioned our region and the state as a leader in Intelligent Transportation Systems as confirmed by the Intelligent Transportation Society of America's decision to hold its 2015 Annual Meeting in Pittsburgh.

### ***What challenges do connected vehicle technologies face?***

Despite promising results in pilot programs, connected vehicle technologies must face some obstacles before they become feasible. These challenges include:

- the complexity of requiring automobile manufacturers to begin including technology that could fundamentally change the basic nature of driving a vehicle

- a resistance from automakers, who believe that connected vehicle technologies will force consumers to face price increases

For more information on connected vehicle technologies, visit

**<http://www.futurestructure.com/news/The-Road-Ahead---Connected-Vehicles-Are-Coming.html?elq=28316e7503284ec0acbce36b23f03de9&elqCampaignId=6208>**.

## **Green Initiatives**

### Permeable Pavements

#### ***What are permeable pavements?***

Permeable pavements are materials that allow for the movement of water and air. This movement makes it possible for the groundwater supply to recharge. Permeable pavements can refer to a wide variety of paving materials, including pervious concrete, porous asphalt, paving stones, bricks, and more. Environmentally, these permeable pavements help manage water runoff and pollutant levels, as well as promote tree development in urban settings.

#### ***Benefits of permeable pavements***

Despite high start-up costs, as well as the cost of tri-annual vacuum sweeping, the use of permeable pavements is expected to yield a wide variety of benefits, including:

- removal of approximately 90% of total suspended solid pollutants
- reduction in 25 year life cycle costs of 40,00-square-foot parking lots by \$85,765
- reduction in damage from freeze-thaw cracking
- reduced braking distance in poor weather conditions
- reduction in volume of road salt required

#### ***Cold weather concerns***

Some concerns still remain regarding the overall safety of permeable pavements in icy winter conditions. Research conducted by the University of New Hampshire suggests that permeable pavements can be especially dangerous during the “first freeze”. In this scenario, where air temperatures drop below freezing before ground temperatures, icy and slippery conditions can result. Despite these concerns, the University of New Hampshire believes that the performance of permeable pavements in cold weather conditions is overall improved compared to that of more traditional paving surfaces. If permeable pavements are to be used in areas with cold weather conditions, it is recommended that they not be used on high speed roadways, and that appropriate signage be used to prevent potential hazards.

For more information about permeable pavements, visit

**<http://www.pagreen4gray.org/pdf/green-infrastructure-examples.pdf>**

**<http://ntl.bts.gov/lib/43000/43500/43570/TSR-2011-permeable-pavements.pdf>** and

**<http://www.wetlandstudies.com/newsletters/2012/April/articles/PerviousPavementInWinter.html>**



## Resources

American Society of Civil Engineers (ASCE)

2010 Report Card for Pennsylvania's Infrastructure—Roads and Bridges

[www.pareportcard.org](http://www.pareportcard.org)

American Society of Civil Engineers (ASCE)

2014 Report Card for Pennsylvania's Infrastructure—Roads and Bridges

[www.pareportcard.org](http://www.pareportcard.org)

ASCE Failure to Act: The Economic Impact

of Current Investment Trends in Surface Transportation and Infrastructure

[www.asce.org/Infrastructure/Report-Card/Surface-Transportation](http://www.asce.org/Infrastructure/Report-Card/Surface-Transportation)

Federal Highway Administration

[www.fhwa.dot.gov/](http://www.fhwa.dot.gov/)

Transportation Funding Advisory Commission

[www.tfac.pa.gov](http://www.tfac.pa.gov)

Pennsylvania Department of Transportation

[www.dot.state.pa.us](http://www.dot.state.pa.us)

Pennsylvania Turnpike Commission

[www.paturnpike.com](http://www.paturnpike.com)

Southwestern Pennsylvania Commission

[www.spcregion.org](http://www.spcregion.org)

U.S. Department of Transportation

[www.dot.gov](http://www.dot.gov)

## Telecommunications

As one of the most competitive infrastructure sectors in Southwestern Pennsylvania, telecommunications has been the target of recent groundbreaking state and federal legislation.

Customer demand for telecommunication products and services has fallen. However, infrastructure development is still expected to expand.

### Context

Telecommunications service is covered by several types of providers:

- incumbent local exchange carriers (ILECs), including Frontier Communications Corporation, Windstream Communications, and North Pittsburgh Systems Inc. (now part of Consolidated Communications)
- competitive local exchange carriers (CLECs), which are mainly resellers of ILEC services, but may also have their own networks for providing services in the region
- wireless service providers and intermodal carriers, which include Comcast, Verizon, and Vonage as well as voice over internet protocol (VoIP) service

Wired and wireless infrastructure areas do not always overlap, and larger providers may operate more than one service company. For instance, Verizon Pennsylvania, Verizon North, and Verizon Wireless are Verizon affiliates operating their own network infrastructures.

The Pennsylvania Public Utility Commission, Pennsylvania Telephone Association, and Broadband Cable Association of Pennsylvania all supervise phone and Internet carriers. Telecommunications utilities are unique in that they must provide a spectrum of services over different modes of infrastructure, including the following:

- residential telephone service
- fiber-to-the-premises voice
- data and video products
- digital subscriber line (DSL)
- wireless Internet
- high-speed, high-capacity data services for businesses

Verizon Pennsylvania and Verizon North provide a wide array of services to hundreds of thousands of customers in the region. Most customers of Verizon are served by a traditional copper network that provides both voice and high-speed Internet service. In recent years, Verizon deployed an advanced fiber optic network to support a suite of services known as FiOS, which includes voice, video, and ultrahigh-speed Internet services. The fiber optic network is typically installed as an overlay on the existing copper network but sometimes may be the sole area network.

### Funding

Telecommunications utilities use operating revenues to fund their network infrastructure. Companies such as Verizon also may issue publicly traded securities for additional revenue.

Planning, budgeting, and tracking expenditures for expanding high-speed Internet service and the FiOS network are not done on a regional basis. At the statewide level, Verizon estimates the cost of activities for the next budget year based on the costs of similar work and the needs of the state.

## Priorities

Verizon cites two events in the past 20 years as the most significant in increasing infrastructure deployment throughout Verizon's Pennsylvania service territory. One is the rollout of FiOS. The other is state legislation originally enacted in 1994 and renewed by Act 183 of 2004, under which Verizon is obligated to make 1.544 Mbps or higher broadband service available to 100 percent of its retail access lines by December 31, 2015. Regional expansion and development is ongoing in order to meet the goal of providing broadband network access to all Pennsylvanians by 2015.

Act 183 also directed the state Department of Community and Economic Development (DCED) to maintain a statewide inventory of broadband deployment. The agency constantly updates and improves its electronic maps with information provided by ILECs, cable companies, and other broadband providers. These maps are available for use by economic development agencies, chambers of commerce, and other interested parties.

In addition, Act 183 created programs to enable effective public/ private partnership (P3) approaches for broadband deployment:

- Broadband Outreach and Aggregation Fund: This ILEC-funded program educates consumers about current broadband availability and the statewide broadband build-out.
- Bona Fide Retail Request program: Under this program, residents can aggregate local broadband demand in order to attract these services to their communities sooner than they might otherwise receive them via Verizon's broadband deployment program.
- Business Attraction and Retention Program (BARP): Through BARP, start-up businesses and businesses looking to relocate in Pennsylvania may utilize DCED's mapping resources to determine where broadband infrastructure exists and obtain advanced services from ILECs.

All three programs focus on identifying and stimulating demand for broadband services. Using these programs and tools, businesses and consumers can help to encourage investment in network infrastructure and identify areas where broadband service is unavailable.

Verizon is finishing the two-decade build-out of its broadband network in the more rural areas of Verizon's Southwestern Pennsylvania service territory. The company is expanding its copper broadband network and continuing its development of FiOS. This network is expected to have a very long life cycle because it is less vulnerable to weather and other environmental factors that increase deterioration over time.

## Challenges and Opportunities

*Regulation.* Statutory changes reducing or eliminating state regulation of incumbent telephone companies would promote competition and infrastructure investment. Large service providers are

hampered by archaic regulations that do not extend to other types of providers such as cable and wireless companies in the market.

*Infrastructure Goals.* Telecommunications success in the region will be measured upon reaching two goals:

- deploying the fiber network to all customers slated to receive it by the end of 2010
- making broadband service available to all customers by the end of 2015

*Incentives.* Tax incentives or exemptions for broadband providers would reduce the overall cost of investment and deployment. In order to support investment, substantial incentives are needed to encourage deployment in unserved or underserved areas. For instance, Montana authorized a 20 percent telephone company license tax credit for accelerated deployment of advanced telecommunications infrastructure improvements.

*Public/Private Partnerships.* P3s could fund more BFRR broadband deployments in rural regions and are well suited for building non-network facilities such as wireless towers. These are less effective if the partnerships seek to own the new facilities. Most service providers want to maintain end-to-end ownership of networks to ensure system integrity and security.

## Resources

Broadband Cable Association of Pennsylvania

[www.pcta.com](http://www.pcta.com)

Federal Communications Commission

[www.fcc.gov](http://www.fcc.gov)

Pennsylvania Telephone Association

[www.patel.org](http://www.patel.org)

Pennsylvania Broadband Initiatives

[www.newpa.com/strengthen-your-community/broadband-initiatives](http://www.newpa.com/strengthen-your-community/broadband-initiatives)

Pennsylvania Public Utility Commission

[www.puc.state.pa.us](http://www.puc.state.pa.us)

Verizon Pennsylvania

[www22.verizon.com/about/community/pa](http://www22.verizon.com/about/community/pa)

## Water and Sewage

Pennsylvania has the most combined sewage overflows in the country. In Southwest Pennsylvania, more than 800 public authorities, municipalities, and private companies make up this fragmented system. The region suffers from numerous water and sewer issues, including severe flooding exacerbated by suburban development, aging infrastructure, widespread abandoned mine drainage, overloaded sewage systems, soils that are unfriendly to on-lot septic systems, and bacterial contamination of rivers and streams.

As a whole, the system has fallen significantly out of compliance with federal laws but lacks the necessary funding to address these concerns. Upgrading it requires billions of dollars in investments, many of which are legally mandated under environmental regulations and consent orders. With tightening budgets, local authorities have been forced to prioritize existing projects and defer much-needed maintenance. Together, these factors have produced one of the most complex infrastructure challenges facing the region today.

### Key Players

The Pennsylvania Infrastructure Investment Authority (PENNVEST) is a state revolving loan and grant program. PENNVEST provides low-cost financial assistance to fund drinking water, wastewater, storm water, and nonpoint source (acid mine drainage, brownfield, green infrastructure, nutrient trading, and on-lot systems) projects.

The Allegheny County Sanitary Authority (ALCOSAN) provides wastewater treatment to 83 communities, serving nearly 900,000 million people in Allegheny County and its neighbors. The authority operates one of the largest wastewater treatment facilities in the Ohio River Valley. In this region, collection and treatment functions are owned separately. As a result, downstream authorities such as ALCOSAN are responsible for treating wastewater coming from tributary collection systems upstream.

In 1997, the U.S. Environmental Protection Agency (EPA) cited more than 50 communities in the ALCOSAN service area for sewage overflows violating the federal Clean Water Act. The main problem is that too much storm water is entering the region's combined sewers when it rains. As little as 0.1 inch of rain can overload the system and cause untreated sewage to overflow into local rivers and creeks. This is problematic because many Allegheny County residents depend on these rivers for drinking water and recreation. After years of negotiations, ALCOSAN signed a consent decree in 2007, requiring an estimated \$4–5 billion in investments to bring the system into compliance with EPA water quality standards and the Clean Water Act.

In response, the Allegheny County Health Department and ALCOSAN created the 3 Rivers Wet Weather (3RWW), initially as a demonstration program. The organization has played a major role in identifying, studying, and addressing sewer-related issues. Its mission is to improve the quality of the county's water resources by helping communities to address the issue of untreated sewage

and storm water overflows.

The Municipal Authority of Westmoreland County (MAWC) is the largest municipal authority in the state. MAWC serves about 125,000 customers in Westmoreland County as well as parts of Allegheny, Armstrong, Indiana, and Fayette counties.

Pennsylvania American Water is the largest investor-owned water utility in the state and a subsidiary of American Water. In its western service area, Pennsylvania American Water provides water service to Allegheny, Butler, Clarion, Fayette, Indiana, Jefferson, Lawrence, McKean, Warren, and Washington counties. It provides wastewater service in Beaver, Clarion, and Washington counties.

U.S. Department of Agriculture (USDA) Rural Development operates offices in Westmoreland and Butler counties. The agency works to improve the economy and quality of life for rural Americans by promoting economic development and supporting public services such as water and sewage projects. Demand for these projects is expected to rise as industrial pollution continues to impact rural water sources. Rural Development's Water and Environmental Programs (WEP) provides loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste, and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Public bodies and non-profit organizations may qualify for assistance. WEP also makes grants to nonprofit organizations to provide technical assistance and training to assist rural communities with their water, wastewater, and solid waste problems.

## Funding

The federal budget does not directly fund local water and sewage projects but may fund agencies, such as EPA, that offer assistance through competitive technical assistance grants. In 2008, Pennsylvania state legislators and voters approved an \$800 million bond issue to invest in water, sewer, dam, and flood control infrastructure. Known as the H2O PA program, these bonds are funded by gambling revenues and administered by the Commonwealth Financing Authority. The H2O program is now closed. Voters later approved an additional \$400 million bond issue to be administered by PENNVEST.

Public drinking water and sewage authorities generally cover costs through user fees, while homeowners are responsible for private wells and septic systems. As a public agency, ALCOSAN also can raise capital funds by selling sewer revenue bonds. 3RWW received its primary program funding from Congressional initiative grants through EPA. Although initiative grants were eliminated in 2007, 3RWW has budgeted this funding through 2015 to support the regional wet weather plan development. Current operational support comes from local foundations. Additional foundation support is provided for special topics such as green infrastructure planning and support. Additional programs are carried out through service authorizations with ALCOSAN in support of municipal wet weather planning. Office support is

provided by the Allegheny County Health Department.

Pennsylvania American Water has no ongoing funding gaps in its operations and pays for system repairs and upgrades in different ways. Capital investment is funded 50 percent through equity and 50 percent through long-term debt. The debt obligations are funded by PENNVEST as well as other sources. With the Public Utility Commission's approval, Pennsylvania American Water has built a distribution system improvement charge (DSIC) into its tariff. Instead of filing frequent base rate increases to pay for improvements, the company uses DSIC to fund replacement of aging pipelines and adjusts the amount quarterly. Several other water companies have adopted similar policies.

USDA has experienced budget cuts nationwide, threatening funding for development programs in rural America. Local offices already have projects stuck in development limbo and maintain waiting lists more than 10 years long.

### Priorities

In 2008, then Governor Edward G. Rendell created the Sustainable Water Infrastructure Task Force, which produced a list of recommendations to improve water infrastructure, including the following:

- better asset management
- full-cost pricing
- water efficiency programs
- watershed management principles
- regionalization

Utilities and other entities in the sector have used these recommendations as a baseline for moving forward on projects to improve system-wide efficiencies.

In addition to its existing programs, PENNVEST initiated a nonpoint source remediation funding program to encourage nonstructural best management practices for water quality improvement. This new program responded in part to the nonstructural alternatives emphasized by the Sustainable Water Infrastructure Task Force. In April 2012, PENNVEST announced the investment of \$115 million in 28 nonpoint source, drinking water, and wastewater projects across the state. In 2014, Southwestern Pennsylvania will receive nearly \$37 million in loan and grant funds for projects in six counties. Funding comes from a combination of state funds, federal grants from EPA and recycled loan repayments from previous funding awards.

ALCOSAN is under a federal court-ordered consent decree to eliminate sanitary sewer overflows and to significantly reduce combined sewer overflows by 2026. The authority organized its 83 municipalities into seven planning basins in order to develop a regional long-term wet weather control plan. Once completed, the plan will represent a comprehensive regional solution to



municipal combined sewer overflows and sanitary sewer overflows. ALCOSAN, EPA, and the U.S. Department of Justice have agreed on the following timeline for implementing the plan:

ALCOSAN submitted their wet weather plan to regulatory agencies in January 2014. EPA completed the review of the ALCOSAN submission in January 2014 and rejected the plan as not meeting water quality goals and as unaffordable.

EPA indicated a willingness to consider a modified approach and schedule provided that the revised plan address the issues of regionalization, municipal flow targets, source flow reduction, and green infrastructure.

Currently, a stakeholder committee, the Sewer Regionalization Implementation Committee, is working to develop the process for transferring the multimunicipal trunk sewers to ALCOSAN for implementation in the Regional Wet Weather Control Plan. Responsibility for the implementation of the wet weather control alternatives developed for these trunk sewers will be included with the transfer to ALCOSAN.

3RWW and ALCOSAN are conducting a green infrastructure and source reduction evaluation to determine where appropriate and cost effective to pursue GI and source reduction within the municipal systems.

3RWW is assisting municipalities with this process and coordination with the regional wet weather plan. The organization acknowledges the difficulties of implementing system-wide regulations and technology upgrades across the 83 separate municipalities within ALCOSAN. This project is exploring green infrastructure and new technology initiatives. Green alternatives include biofiltration systems, porous pavement, green roofs, rain gardens, and water source reduction. These projects reflect a growing emphasis on “green” source water projects as opposed to “gray” sewage projects. In addition, 3RWW offers access to a variety of tools and technologies, including a secure municipal data support site. Municipalities use this tool to organize and share information such as regional mapping and flow monitoring data.

MAWC is constructing a water transmission and storage system in partnership with the Greater Johnstown Water Authority (GJWA). Upon its completion, MAWC will purchase potable water produced by GJWA to supply MAWC customers in the Ligonier Valley. Additionally, the GJWA/MAWC interconnection will facilitate the extension of municipal water service to neighboring municipalities. Likewise, the project will present opportunities to provide emergency interconnection with other municipal water systems.

Pennsylvania American Water develops five-year capital investment plans for plant utility facilities. The capital component includes pipeline replacement and water treatment upgrades such as treatment facilities, pumping stations, and storage tanks. In the past decade, the company has replaced water mains at an average rate of 80 miles per year.

USDA Rural Development and rural municipalities identified water and wastewater systems as their top infrastructure priority. Many rural homes rely on well water and septic systems. In six of the 11 Southwestern Pennsylvania counties, less than half of all households have public sewage. As rural households are often spread out across large distances, public services are more expensive and difficult to implement. As a result, while local officials want to connect rural households in need with public water and sewers, they often find it highly cost prohibitive to do so.

## Challenges and Opportunities

*Federal and State Legislation.* The new WIFIA (Water Infrastructure Finance and Innovation Act) program is part of the Water Resources Reform and Development Act (WRRDA) that was approved by Congress and the President last spring. Specifically, the legislation establishes WIFIA in order to provide credit assistance for drinking water, wastewater, and water resources infrastructure projects. WIFIA is designed to leverage federal funds by attracting substantial private or other non-federal investments to promote increased development of critical water infrastructure and to help speed construction of local projects.

Although WRRDA's primary purpose is to authorize funding for the construction and repair of waterway and port projects across the United States, it also allows Congress to authorize the Army Corps of Engineers to spearhead the development, maintenance, and support of vital US port and waterways infrastructure, as well as supports targeted flood protection and environmental restoration needs.

Consciously building on the increased use of public/private partnerships for the financing, construction, and operation of major surface transportation infrastructure, WRRDA encourages P3s for development of major water infrastructure projects.

Enacted in the late 1990s, DSIC legislation enables water utilities to assess a surcharge on pipe, hydrant, and meter replacements each quarter. The charge supplements earnings for the utilities while smoothing out rate increases for customers. According to PUC, Pennsylvania's DSIC system for water utilities has been held up as a national model, and a number of other states have adopted similar systems.

Since 2008, legislation has been proposed to expand this kind of charge to wastewater systems. A collection system improvement charge (CSIC) has PUC support. The charge would provide wastewater utilities with the financial flexibility to accelerate infrastructure improvements, including projects to address overflows, infiltration, inflow, and similar problems.

*Targeted Grant Funding.* Grant programs often give funding priority to systems under consent orders for noncompliance. Some of these projects could be locally funded through usage rates or low-interest PENNVEST loans. Small systems have smaller rate bases and are unable to fund

significant projects on their own, without causing rate shock. Prioritizing grant eligibility is one way to ensure that all systems can adequately address their infrastructure needs.

*Rightsizing.* Technical and regulatory requirements are challenging for smaller authorities with limited resources. Some authorities have found relief through consolidation or collaboration with larger entities such as MAWC or the Indiana County Municipal Services Authority. Offering incentives to practice this type of consolidation may enhance management efficiency and quality.

*Workforce Development.* The entire water and wastewater industry is facing a shortage of skilled workers due to an aging workforce and retirement. In a survey conducted by the Institute's Regional Water Management Task Force several years ago, more than two-thirds of responding local authorities and municipalities indicated an average employee age of 45 or older. A 2010 study by the Water Research Foundation found that between 30 and 50 percent of industry workers plan to leave their jobs in the next 10 years. The industry needs programs to predict and mitigate significant turnover and critical knowledge loss.

*Public/Private Partnerships.* P3s can provide valuable resources to financially distressed municipalities. For example, larger companies often have greater access to capital markets, both debt and equity. Companies also can take advantage of low-cost financing available through commonwealth entities such as PENNVEST and the Pennsylvania Economic Development Financing Authority. While approximately 85 percent of water systems are municipally owned, the private sector plays a leadership role in the water industry and has a record of bringing much-needed capital, efficiencies, and innovations to municipal partnerships.

*State Tax Structure.* Currently, 4.35 percent of each customer's bill relates solely to capital stock tax, corporate net income tax, and the public utility realty tax. By streamlining its corporate tax structure, the state can make its business environment more favorable to job creation and can help to control water costs.

*Technology and Modernization.* Successful demonstrations of new technologies can later support water and wastewater facilities across the commonwealth. Pennsylvania American Water is implementing an alternative energy demonstration project designed to recover and reuse hydrokinetic energy to power the Oneida Valley Water Treatment Plant in Butler County. The ASCE also recommends that water companies introduce "smart" metering, as older meters have been worn down. New metering systems would bill customers more accurately and would track water usage more efficiently. It will also reduce the funding gap.

*Private Well Regulation.* Pennsylvania does not regulate private well construction. Regulations will become increasingly important as the Marcellus Shale gas industry continues to grow. When private drinking water is contaminated, it is difficult to tell whether the well construction company or nearby gas drilling is responsible for damages.

## Green Initiative

### GTECH's ReClaim Project

#### *What is the ReClaim Project?*

At GTECH Strategies, employees aim to work alongside community members and partners throughout Allegheny County in an attempt to pursue and enact innovative ideas locally. Through their ReClaim Project, the people at GTECH work to transform Pittsburgh's 27,000 vacant lots into parks, rain gardens, or public art. To do so, the ReClaim Project focuses on:

- design and planning
- policy
- community connectedness
- education
- implementation

#### *Local GTECH ReClaim Initiatives*

In both Braddock Hills and Millvale, vacant lots have been converted into rain gardens. These rain gardens, planned and planted through the joint efforts of GTECH and community members, tremendously benefitted the environment by aiding in stormwater management. With the Pittsburgh stormwater system deteriorating, it can be overwhelmed by heavy storms. If this happens, the overflow of the system can result in flooding throughout Allegheny County. These rain gardens capture stormwater runoff, lessening the volumes handled by the stormwater system and decreasing the potential of flooding countywide. In addition, the transformation of these vacant lots beautifies the surrounding neighborhoods.

Key benefits include:

- stormwater management
- reduced flood potential
- transformation of vacant lots into innovative areas
- education of area community members and youth on green infrastructure

For more information about GTECH's approach to innovation, visit

**<http://gtechstrategies.org/our-approach/>**.

For more information about the GTECH ReClaim Project, as well as the completed Millvale and Braddock Hills projects, visit **<http://gtechstrategies.org/our-programs/reclaim/>**.

## Resources

3 Rivers Wet Weather

[www.3riverswetweather.org](http://www.3riverswetweather.org)

Allegheny County Health Department

[www.achd.net](http://www.achd.net)

Allegheny County Sanitary Authority

[www.alcosan.org](http://www.alcosan.org)

American Society of Civil Engineers (ASCE)

2010 Report Card for Pennsylvania's Infrastructure—

Drinking Water, Stormwater, and Wastewater

[www.pareportcard.org](http://www.pareportcard.org)

American Society of Civil Engineers (ASCE)

2014 Report Card for Pennsylvania's Infrastructure—Drinking Water

ASCE Failure to Act: The Economic Impact

of Current Investment Trends in Water

and Wastewater Treatment Infrastructure

[www.asce.org/Infrastructure/Failure-to-Act/Water-and-Wastewater](http://www.asce.org/Infrastructure/Failure-to-Act/Water-and-Wastewater)

American Water Works Association

[www.awwa.org](http://www.awwa.org)

Commonwealth Financing Authority

[www.newpa.com/find-incentives-apply-for-funding/commonwealth-financing-authority](http://www.newpa.com/find-incentives-apply-for-funding/commonwealth-financing-authority)

Municipal Authority of Westmoreland County

[www.mawc.org](http://www.mawc.org)

Pennsylvania American Water

[www.amwater.com/paaw](http://www.amwater.com/paaw)

Pennsylvania Infrastructure and Investment Authority

[www.pennvest.state.pa.us](http://www.pennvest.state.pa.us)

Pennsylvania Public Utility Commission

[www.puc.state.pa.us](http://www.puc.state.pa.us)

Regional Water Management Task Force

[www.iop.pitt.edu/water](http://www.iop.pitt.edu/water)

Sustainable Water Infrastructure Task Force

[www.portal.state.pa.us/portal/server.pt/community/sustainable\\_water\\_infrastructure\\_task\\_force](http://www.portal.state.pa.us/portal/server.pt/community/sustainable_water_infrastructure_task_force)

U.S. Department of Agriculture Rural Development  
[www.rurdev.usda.gov](http://www.rurdev.usda.gov)

U.S. Environmental Protection Agency  
[www.epa.gov](http://www.epa.gov)

## The Impacts of the Marcellus Shale on Infrastructure

The exploration and development of the Marcellus Shale has had a far-reaching impact across most if not all infrastructure sectors. The influx of industry into the region may provide a much-needed economic boost to utilities and businesses that are ready for the challenge but also may provide a slew of complications to already strained infrastructure.

### Permitting

Pennsylvania's Department of Environmental Protection (DEP) is responsible for regulating well permits, wastewater, and earth disturbance activity. It also is responsible for safely regulating Marcellus Shale natural gas reservoirs. Since 1859, at least 350,000 commercial wells have been drilled in Pennsylvania. According to the DEP's Bureau of Oil and Gas, nearly 1,500 unconventional well permits have been issued in 2014 (January 1—June 1). Each well that's drilled affects a part of Pennsylvania's infrastructure, so it is very important to examine how these sectors are handling these impacts and what needs to be in place to continue Marcellus Shale drilling safely and with fewer negative outcomes.

### Water and Sewage

Water is one of the most prominent sectors affected by drilling in the region. Drilling and fracturing a single well typically requires approximately 4 million gallons of water, and companies project operating hundreds of wells in a single year. The chemicals used in "fracking" fluid, acid and gas that are encountered in well bores, diesel fuel, carbon dioxide, benzenes, ethylbenzene, toluene, xylene, surfactants (soaps), polymers (plastics), foaming agents, antiscaling agents, corrosion inhibitors, and toxic biocides, may detrimentally affect natural underground sources of drinking water should they come into contact with them.

A general belief exists that appropriate protections are needed so that gas drilling companies and associated industries act responsibly. In the case of water, drilling companies need to adhere to all federal EPA and DEP regulations. DEP is responsible for the well permitting process and regulates wastewater discharges. The U.S. Army Corps of Engineers monitors regional waterways, and any potential source of wastewater discharge is a concern. In the fall of 2008 and in 2009, the Army Corps of Engineers' water quality monitoring stations on the Monongahela River detected unusually elevated total dissolved solids levels during low flow conditions, potentially due to drilling activities in the area. These elevated levels led to concern among public water utilities that withdrew from the Monongahela River for fear of not meeting drinking water standards.

The Corps also is responsible for 11 upper Ohio River reservoirs in Western Pennsylvania and manages water quality and quantity improvement projects through very sensitive storage and release schedules. If additional water is released into streams and tributaries without careful study, reservoirs may be impacted. The Port of Pittsburgh Commission also has raised concerns

about how the demand for water from the drilling industry might affect navigation during the dry season. While the Marcellus Shale provides opportunities to move significant volumes of sand and water on the waterways, the current waterway infrastructure is suffering from a lack of maintenance and requires major rehabilitation.

Another area of concern is the transparency of the permitting process for water withdrawals. Companies like Pennsylvania American Water rely on regulatory agencies like DEP, the Delaware River Basin Commission, and the Susquehanna River Basin Commission to review permit requests from gas drillers. They also rely on these regulatory agencies to allocate both surface and groundwater sources to all users within the basin. In these instances, Pennsylvania American Water does not have any access to information about the permits during the review. These companies would like to see legislation changed so that there is greater transparency for information sharing with regard to permits.

When Marcellus Shale activities first developed in Southwestern Pennsylvania, a few existing sewage treatment plants took on the fracturing fluid for treatment. Many saw this as an easy source of extra revenue for just a little extra expense in chemicals. Treatment plants soon found that they could not meet effluent limits, and had to report water quality to DEP. The ‘frac fluid’ was later found to contain too many metals for a standard sewage treatment plant to remove. Many rural sewage plants could benefit from the additional revenue stream of treating ‘frac fluid’, but most lack the capability to treat the water without some sort of pretreatment.

## Roadways

Roads and transportation conditions have been impacted by drilling, often because there is a disproportionate impact on locally owned roadways due to well locations and the structural design of the roadways. There has been an increase in drilling companies applying for heavy hauling permits through PennDOT. So far, Districts 3-0 and 12-0 have been the most affected. PennDOT has observed increases in driveway permits (to access new sites), gas line permits (required if pipelines cross state roads), and permits to haul on posted roads (secondary roads with a 10 ton limit). There also has been an increase in staff to check “Marcellus roads” weekly. Non-Marcellus roads are checked irregularly or when a situation calls for it. Anyone who is applying for a permit on a Marcellus road is required to submit a road user plan, which outlines road usage, the type of traffic that will be utilizing the road, a maintenance strategy, and the number of trucks that will use the road. This plan is a preemptive measure to identify whether the roads can meet the permittee’s needs. Additionally, the permittees are required to submit a winter maintenance plan if they are working through the winter. Companies are not permitted to haul on these roads without the aforementioned plan.

A policy modification has been made in response to Marcellus Shale activities in regard to damaged roads. After damage is noticed on a Marcellus road by inspectors, letters are sent out to permittees. The permittees then have five days upon receipt of the notification to repair the road



or their permits may be revoked. The repairs made by companies that damaged roads have saved PennDOT from some basic maintenance and repair expenditures.

Counties and municipalities that own and maintain roads are currently permitted under state law to require owners of overweight vehicles to post bonds to cover the cost of damage they cause. The current bond limit is set at \$12,500 per mile of paved road. Legislation has been introduced to increase the PennDOT bonding requirements (which have not been adjusted since 1978) to cover today's construction costs in order to better protect public roads.

## **Electricity and Natural Gas**

Other industries with obvious connections to Marcellus Shale activities are electricity and natural gas. Increased gas production should create a higher regional demand for pipeline capacity to bring the gas to market. As the market for production grows, there will most likely be upgrades in and expansion of transmission infrastructure.

Shale gas is allowing for growth in gas-fueled electricity generation, but currently there are major delays in stream-crossing permits for gas pipelines. Eliminating general permit air source exemptions will subject thousands of compressors and drill rig engines to new permitting and control requirements. There are concerns from those in the industry that these regulations will slow development and add to operating costs. Aggregations of air emissions sources will subject isolated and rural gas-related facilities to EPA New Source Review and Prevention of Significant Deterioration rules.

On the demand side, electricity utilities may see an influx of demand from gas companies operating in the Marcellus, which has some local electricity companies scrambling to ensure that they are prepared to meet the need. Electricity utilities may see an influx of demand from gas companies operating in the Marcellus. The current electrical grid does not have the capacity to completely fulfill their energy needs, particularly to run the compressor stations. Some areas in which the gas companies operate do not even have electrical service.

## **Railways**

As a result of traffic/volume increases, railway costs have gone up in many areas, especially in Bradford and Susquehanna counties. There also have been material cost increases. Part of the issue is that these sites, which have not been used in years, are experiencing much higher traffic volumes as a result of Marcellus Shale activity.

## **Air Transportation**

Airports have seen modest increases in enplanements due to gas company employees' traveling to Pennsylvania from out of state. The Westmoreland County Airport Authority (WCAA) is currently securing environmental clearances to drill wells at Rostraver Airport, which may have a substantial impact on WCAA's budget in the future. The Federal Aviation Administration is overseeing this clearance process and has required WCAA to provide it with complete

information regarding the possibility of drilling on airport property. In December 2012, the Allegheny County Airport Authority opened bids for the exploration, drilling and production of minerals, namely Marcellus Shale natural gas at PIT, and subsequently in February 2013 executed a 20-year lease with CNX Gas Company LLC. In addition to an upfront bonus payment, the Authority will receive monthly royalty revenue payments once mineral production begins. Net revenues from the natural gas lease are anticipated to be used to reduce airline rates and charges as well as capital expenditures including economic development at the Airport.

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<sup>i</sup> Jon Schmitz, “Transportation plan calls for \$4.7 billion for southwestern Pennsylvania,” in *Pittsburgh Post-Gazette*, June 22, 2014, accessed July 10, 2014, <http://www.post-gazette.com/frontpage/2014/06/23/Plan-calls-for-boost-for-southwestern-Pa-transportation/stories/201406230085>.

<sup>ii</sup> Ibid.