



# The Environmental Synopsis

A Monthly Update from the Joint Legislative Air and Water Pollution Control and Conservation Committee

DECEMBER 2015



## The Chairman's Corner

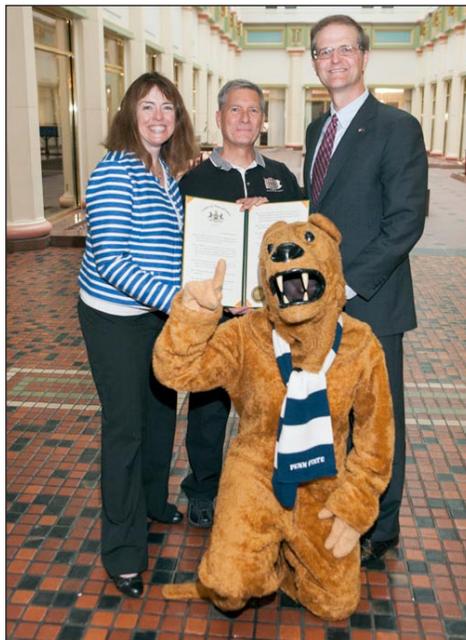
**Senator Scott E. Hutchinson,  
Chairman**

If you own a small business, you know that even a modest savings on your

utility bill can mean a big boost to your bottom line. The fact is that many business owners are looking to become more energy efficient, but simply don't know where to start. Fortunately, for the last 50 years, the Penn State Technical Assistance Program, or PennTAP, has been pairing technical advisors with companies based in Pennsylvania to find innovative ways to conserve energy, reduce pollution and make their businesses more competitive.

Founded in 1965, PennTAP provides no-cost technical assistance to businesses across Pennsylvania. The program is a long-standing partnership between the federal government, state government and Penn State University, and represents one of the first technical assistance partnerships of its kind. Since its founding, PennTAP has concentrated its efforts on small-to-medium sized firms, many of which lack the resources or technical expertise to identify efficiency opportunities in-house.

PennTAP's work has greatly expanded over the last 50 years, as both the marketplace and technology have evolved. The original mission was to provide



technical expertise to business owners looking to become more energy efficient. With the advent of the Internet and e-commerce, PennTAP began to offer IT consulting to assist firms in leveraging their technology capabilities. Today, the organization also provides product development and commercialization consulting to help business owners develop innovative product lines and processes.

*For 50 years, PennTAP has been helping Pennsylvania businesses save money and maintain a competitive advantage by improving their energy efficiency, often for little to no cost*

What I would like to highlight this month are the services provided through

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## Notes from the Director

Tony M. Guerrieri, Executive Director

Pollution of our air, water, and land has been studied for decades, prompting laws to protect public health and the environment. A large portion of the government regulation of our environment comes from the use of harmful chemicals in common consumer products and plastics.

Chemicals are all around us – in the air we breathe, the water we drink, the food we eat, and the products that fill our homes, schools and workplaces. While some of these substances are considered harmless, other chemicals still in widespread use are known to be hazardous to both our health and the environment.

Sources of potential exposure vary with our individual day-to-day experiences. Have you ever wondered which chemicals you are personally exposed to in your everyday life? How do you figure out exactly what chemicals we encounter in our daily routines? Until recently, it was almost impossible to measure your personal exposure to those invisible compounds. However, a new fashion accessory that doubles as a passive monitoring device has come on the market to fill that need.

MyExposome ([www.myexposome.com](http://www.myexposome.com)) is a start-up company based in Pennsylvania and Oregon that focuses on innovative technologies for monitoring

individual environmental exposure with passive monitoring devices. The company has designed a new patent-pending technology, originally developed at Oregon State University (OSU), which answers critical questions about the chemicals in your environment.

The devices are surprisingly simple: waterproof silicone black wristbands, such as the ones worn in support of various charitable causes or as fitness bracelets, are specially prepared to act as a sponge to absorb hundreds of different chemicals in our environment – the air, water, and even our personal care products.

*MyExposome is a black silicone wristband that allows users to monitor the types of chemical compounds they are exposed to throughout their normal, everyday routine*

To extract the pollutants, MyExposome uses state-of-the-art technology to analyze the wristband and determine if you were exposed to any chemicals. The users send the wristbands to MyExposome where they are soaked and shaken in a mix of solvents, pulling chemical compounds into a liquid that can be scientifically tested.

Researchers screen for over 1,400 different chemical compounds that may accumulate in the bands. MyExposome has published a full list of detectable compounds which include: volatile organic compounds (VOCs); endocrine disrupting compounds (EDCs); polychlorinated biphenyls (PCBs); pesticides and combustion byproducts.

These chemicals have hazardous properties such as toxicity (ability to harm life), and in some cases persistence (being slow to degrade) and bioaccumulation (building up in the food chain). Therefore, the routine exposure of people to these chemicals potentially poses a serious health threat.

In a small pilot screening of 28 people conducted by MyExposome, the company found only 57 chemicals out of more than 84,000 manufactured in the U.S. Almost everyone was exposed to at least one flame retardant and one pesticide. If the pattern holds across a bigger population and only a relatively small number of chemicals get wide exposure, that data could be used to know which chemicals to test most heavily – and which to potentially replace, if they pose safety issues.

The wristbands, however, will not detect some particulate matter and cannot detect certain metals, like lead and chromium, or gases like carbon monoxide. The band also does not monitor the chemicals we often eat, although if it's something excreted by the pores, MyExposome will pick it up. For example, if you drink a lot of coffee, the wristband's report will show some levels of caffeine.

The wristbands are a big step up from stationary air monitors, which only capture a snapshot in time and may not be located near human activity. Measuring individuals' exposures usually means monitors worn in backpacks, which are cumbersome and difficult to use.

The catch is that getting your own personal analysis of chemical exposure is quite expensive: \$995 to wear the non-intrusive wristband for a week and have MyExposome analyze your chemical load. Like most new technology, the company hopes the price of the wristband monitors will decrease over time.



## Research Briefs

Each month, the committee's staff researches and prepares a number of "briefs" on several topics relevant to the committee's mission. Often these briefs include references to reports and further research on the topics so that readers may pursue issues on their own. Please note that the information and opinions expressed in the Research Brief articles do not necessarily represent the opinions or positions of the Joint Legislative Air and Water Pollution Control and Conservation Committee, nor those of the Pennsylvania General Assembly.

### Report Shows Rural Road and Bridge Deficiencies

**Tony M. Guerrieri**  
Executive Director

A survey of road and safety conditions of the nation's rural roads has revealed that Pennsylvania holds the highest percentage of structurally deficient bridges in the country. The findings were part of a report prepared by TRIP (The Road Information Program), a national nonprofit organization that researches, evaluates and distributes economic and technical data on surface transportation issues.

The TRIP report, *Rural Connections: Challenges and Opportunities in America's Heartland*, contains a state-by-state survey of rural roads and bridges throughout the country. Nationwide, according to the report, 19 percent of the nation's residents live in rural areas – approximately 61 million people – and depend on those roads and bridges for transportation.

Many bridges were erected between the 1950s and 1970s because they were relatively cheap and easy to build. Now they have exceeded their design life expectancy, but are still carrying traffic – often more cars and trucks than they were originally expected to handle.

The report found that the national average of rural bridges which are structurally deficient to be 11 percent. Pennsylvania led the nation in this category with 25 percent (3,624) of its 14,693 rural bridges being deemed structurally deficient. Fourteen percent

(2,012) of Pennsylvania's rural bridges were deemed functionally obsolete.

A structurally deficient bridge is one that engineers have determined needs maintenance work. A functionally obsolete bridge may have no structural problems, but is built using outmoded designs.

The report also found Pennsylvania was lacking in safe road conditions. Eighteen percent of the pavement on major rural roads in Pennsylvania were rated as poor, coming in at number 20 on the report's list of America's worst rural roads. But the report of road conditions was divided in its overall assessment of Pennsylvania's rural roads. Its survey rated 37 percent of the pavement on Pennsylvania's rural roads as "good" with another 45 percent listed as "mediocre and fair."

***Pennsylvania leads the nation in the percentage of structurally deficient bridges in rural areas, coming in at 25 percent when compared to the national average of only 11 percent***

The TRIP report also noted the fatality rates on Pennsylvania's rural roads is significantly higher than fatality rates on all other roads throughout the state. Rural roads in Pennsylvania accounted for 2.23 traffic deaths per 100 million vehicle miles of travel, compared with 1.22 deaths per 100 million vehicle miles of



travel on all other roads. In 2013, 562 of the state's 1,208 traffic fatalities occurred on rural roads – almost 47 percent.

One of the main reasons for road problems in Pennsylvania should come as no surprise, either, given the terrain difficulties that make building and maintaining roads and bridges so challenging. But there are new problems as well, according to the report. Some of the road deterioration is due to increased traffic from the development of new oil and gas fields, causing additional heavy-weight traffic on roads not constructed to withstand that type of traffic. Rural roads are critical to support Pennsylvania's agricultural industry, such as getting crops to market, as well as for tourism.

The report concludes that the U.S. must adopt transportation policies that will improve transportation connectivity, safety and conditions to support the quality of life and enhance economic productivity in rural areas. To accomplish this, the report recommends modernizing and extending key routes to accommodate personal and commercial travel, implementing needed roadway safety improvements, improving public transit access to rural areas, and adequately

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funding the preservation and maintenance of rural transportation assets.

The report is based on data compiled from national sources including the Federal Highway Administration, the National Highway Traffic Safety Association, the National Cooperative Highway Research Program, the U.S. Department of Agriculture and the U.S. Census Bureau, among other sources.

The report is available on TRIP's web site ([URL: http://www.tripnet.org/docs/Rural\\_Roads\\_TRIP\\_Report\\_May\\_2015.pdf](http://www.tripnet.org/docs/Rural_Roads_TRIP_Report_May_2015.pdf)) for those interested in more information.

## Exploiting the American South for Biofuels

Coleen P. Engvall  
Research Analyst

While solar and wind power tend to dominate the stage for alternative power sources, biomass fuels are starting to gain more attention as well. The category of biomass is a broad one. Ideally, it would consist mostly of waste products, such as crop residue and unusable forest litter. These materials are then burned in electricity generating plants. While this practice releases carbon dioxide, the natural decomposition of unused

plant material makes the process “carbon neutral,” at least in theory. Many governments encourage the use of biofuels as a way of reducing carbon emissions and meeting climate change goals.

Although the aforementioned theory appears valid, the ideal biofuel – waste products of other industries – are not always used. In some facilities, wood pellets are produced for biomass fuel and research has come out recently that points out that some of these pellets are made from whole trees, harvested for that very purpose. Despite the origin of these pellets, they still qualify as biofuel and are still eligible for alternative fuel incentives.

Proponents of the practice say, even when whole trees rather than scrap wood are harvested for biomass, it is still renewable as the trees will eventually be replaced. Thus, a forest which is being responsibly managed will reclaim the carbon.

A report released by the Natural Resources Defense Council (NRDC) argues that harvesting unprotected forests for biomass fuel is not without consequences. The report, released in October, is entitled *In the U.S. Southeast, Natural Forests are being Felled to Send Fuel Overseas*. The report presents concerns that the carbon offsets will come too late, and will seriously harm the region's

biodiversity, water quality and carbon sequestration abilities in the meantime.

The report begins by pointing out that wood pellet factories are becoming prominent in the southeast, many of them harvesting bot-

tomland hardwood forests in order to sell them as biomass in Europe and specifically the United Kingdom. These bottomland forests are not well regulated, nor protected, and have already been threatened by agriculture, urbanization and other human activity. In fact, only 10 percent of these forests are fully protected from commercial logging.

*The Natural Resources Defense Council raises concerns that allowing forests to be harvested for biomass fuel is environmentally damaging and that government incentives are only worsening the problem*

The researchers stress that this region of the U.S. is home to unique ecosystems and many endangered organisms. Some of these plants and animals are found nowhere else in the world and depend on the health of the bottomland forests. And they are not the only ones. Human health and industry also benefit. Specifically, these forests filter and purify water, some of which is then treated to be used as drinking water. The researchers for the NRDC adds that other studies have valued this water quality service at millions of dollars.

Flood waters are also slowed and absorbed. In one case, a forest was seen to be able to store 60 days' worth of floodwater. After being drained and filled, this number was reduced to 12 days. To compensate, costly infrastructure projects and remedies have to be installed.

Despite all of these concerns, however, the heart of the debate is the carbon sequestration abilities of these forests. The European Union offers incentives to power companies to produce electricity with biofuels, such as wood pellets.



These incentives have created a large demand that is not being met with waste materials alone. In the report, they detail the number of pellet facilities in the South currently, and those that have been planned.

The researchers predict that the number will only grow, putting a greater strain on the surrounding forests. Forests which are harvested, especially unprotected forests, have less ability to store carbon than older forests. Additionally, it takes years for the forest to put the carbon weight back on. Many policies that target carbon emissions are meant to offset greenhouse gases on a yearly basis, which leads the researchers to suggest that harvesting forests should not qualify under these policies.

The report recommends rethinking the incentives and regulations of plants that use biomass fuels. The researchers recognize that biomass fuels which are true waste products are a low-carbon option. However, allowing the biomass to be anything from waste to specifically-harvested trees opens the door for exploitation.

To read the full report, go to: <http://www.nrdc.org/energy/files/southeast-biomass-exports-report.pdf>.

## Report Weighs Risky Business of Climate Change

Tony M. Guerrieri  
Executive Director

The U.S. economy faces losses that may run into the hundreds of billions of dollars this century, as the changing climate erodes coasts and threatens agriculture. While projections for rising seas are not new, a report by a bipartisan group of political and financial leaders quantifies the potential economic damage of climate change.

The report from the Risky Business Project provides a comprehensive assess-

ment of the economic impacts of climate change across sectors and by region of the country. The report, *Risky Business: The Economic Risks of Climate Change in the United States*, outlines climate change as a risk issue and calls for a comprehensive response, but makes no specific recommendations.

Focusing on the clearest and most economically significant risks – damage to coastal property and infrastructure from rising sea levels and increased storm surge, climate-driven changes in agricultural production and energy demand, and the impact of higher temperatures on labor productivity and public health, the report argues that the current pathway, commonly referred to as “business as usual,” is not a viable option.

For example, within the next 15 years, higher sea levels combined with storm surge will likely increase the average annual cost of coastal storms along the Eastern Seaboard and Gulf of Mexico by \$2 billion to \$3.5 billion, the report says. Adding in potential changes in hurricane activity, the likely increase in average annual losses grows to up to \$7.3 billion, bringing the total annual price tag for hurricanes and other coastal storms to \$35 billion.

*Over the next 15 years, disruptive activity associated with climate change could result in an economic loss of over \$7 billion for the Gulf Coast and Eastern Seaboard*

According to the report, on the current pathway, by 2050, between \$66 and \$106 billion worth of existing coastal property will likely be below sea level nationwide, with \$238 billion to \$507 billion worth of property below sea level by 2100.



Higher temperatures will bring serious challenges to the farming industry, particularly in certain regions. Without adaptation, some Midwestern and Southern counties could see a decline in yields of more than 10 percent over the next five to 25 years if they continue to sow corn, wheat, soy and cotton. There is a 1-in-20 chance of yield losses more than 20 percent.

As extreme heat spreads across the middle of the country by the end of the century, some states in the Southeast, lower Great Plains, and Midwest risk up to a 50 percent to 70 percent loss in average annual crop yields (corn, soy, cotton and wheat) unless they take measures to adapt.

Greenhouse gas-driven changes in temperature will likely necessitate the construction of up to 95 gigawatts of new power generation capacity over the next 5 to 25 years – the equivalent of roughly 200 average coal or natural gas-fired power plants. That will cost residential and commercial ratepayers up to \$12 billion per year.

Over the long term, there will be many more days with uncomfortable and dangerous temperatures. By the middle of this century, the report says, the average American will likely see 27 to 50 days over 95 degrees Fahrenheit each year – two to three times the average annual number of 95 degree days seen over the past 30 years. By the end of this century, this number will likely reach 45 to 96 days, reaching 95 degrees each year on average.

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But as with sea level rise, which will most affect the Southeast and Atlantic coasts, these national averages mask regional extremes, with the Southwest, Southeast and upper Midwest likely to see several months of 95 degree days each year.

Labor productivity of outdoor workers, such as those working in construction, utility maintenance, landscaping, and agriculture, could be reduced by as much as 3 percent, particularly in the Southeast. For context, labor productivity across the entire U.S. labor force declined about 1.5 percent during the famous “productivity slowdown” of the 1970s.

The Risky Business Project is a bipartisan coalition of financial leaders that includes three former federal Treasury Secretaries (Hank Paulson, Robert Rubin and George Schultz). The report, *Risky Business: The Economic Risks of Climate Change in the United States*, is available at: [http://riskybusiness.org/uploads/files/RiskyBusiness\\_Report\\_WEB\\_09\\_08\\_14.pdf](http://riskybusiness.org/uploads/files/RiskyBusiness_Report_WEB_09_08_14.pdf).

## The Energy Potential of Human Waste

**Coleen P. Engvall**  
Research Analyst

Extracting burnable fuel from human excrement isn't the most attractive idea, unless you consider how much value is being flushed every day. According to a new study released last month, the value of extracting benefit from this unsavory resource can be more than 300 million dollars for some economies. While this might still seem unapproachable, many do not realize that we already use human waste for a variety of applications. The nutrients found in the waste are already used to increase crop yield in a regulated, safe way.

Researchers from the United Nations University decided to look into other possible

applications for human waste. They published their findings in a report entitled *Valuing Human Waste as an Energy Resource*. The report details the economic and environmental benefits as well as the challenges to implementing these applications.

Beyond amending soil, certain countries already harvest biogas from waste treatment facilities. The biogas is 60 percent methane and can be burned, and in some places, this is already happening. The other, and less utilized, method is to convert the waste into a substance with properties similar to coal or charcoal. The researchers argue that by exploring all of the options, these sources can provide energy security and sanitation solutions.

*The researchers at the United Nations University argue that utilizing human waste for energy not only improves energy security, but it can offset deforestation and improve public health*

Human waste is being created every day, whether we find a use for it or not. Most developed countries look at it as a nuisance, requiring expensive infrastructure to treat and dispose of it safely. In countries without the means to fund these facilities, it can become more than just a nuisance. Without plumbing or other methods of disposal, human waste can become a major public health concern. Untreated sewage infiltrating ground and surface water can be catastrophic, both for humans and the environment.

For both developed and less developed countries, energy is a concern. For wealthier countries, like the United States, finding low-carbon energy solutions is an important challenge. For others, a reliable domestic energy source is

the focus. The researchers say that human waste derived solutions are a plausible option for both of these perspectives. The report notes that in terms of how much power is produced, biogas alone could power 138 million homes. Worldwide, the value of human waste is estimated at over 9 billion dollars.

Currently, trees are being felled and fossil fuels burned in order to meet these energy needs. The report argues that if we use these waste derived alternatives, the result would be comparable to the concept of biomass fuels. Biomass fuels are waste products that are burned to create electricity. The difference between these and fossil fuels is that they are being produced, like human waste, already. Therefore their decay will produce carbon emissions, whether we burn them or not, making them a low-carbon or even carbon-neutral alternative. The researchers argue that the same incentives could apply to human waste, as this would be an alternative to harvesting trees for power.

There are still challenges to working with this resource. The most obvious one is what they describe as an “ick” factor, or the fear that the fuel will be dirty or unsanitary. The researchers state that this is mostly a problem of public perception, and more studies and public demonstrations of the safety should be conducted.

The second challenge is the cost of implementing the technology. As with other renewable sources, the researchers say it will pay for itself in a fairly short time. However, as this is relatively new concept, it could be seen as high-risk and incur high interest rates for loans. In response to this challenge, the report states that incentives and investments should be developed, both legal and institutional.

For more information, or to read the full report, go to: <http://inweh.unu.edu/vast-energy-value-human-waste/>.

# This Month in Conservation History

## Exploring the evolution of environmental stewardship

### 25 Years Ago

In December of 1990, the dusky seaside sparrow was officially declared extinct by the U.S. Fish and Wildlife Service. The rare songbird was limited in both population and range, confined to the natural salt marshes of the Florida coast. Despite unsuccessful efforts to save the population through crossbreeding, only five specimen remained by 1981, with the last known sighting occurring in July of 1990.



### 50 Years Ago

The Pennsylvania Department of Health debuted an interesting new tool for combatting water pollution in the Commonwealth, according to a December 1965 article in the Huntingdon Daily News. The Division of Sanitary Engineering began chartering four-person, single-engine planes to conduct fly over missions above Pennsylvania's waterways. The planes allowed the department to cover more ground than by boat, using portable tape recorders and maps to record sightings of water pollution.



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## Committee Chronicles *A review of memorable committee events*

On Monday, November 16, the committee hosted an Environmental Issues Forum featuring the Pennsylvania Sustainable Forestry Initiative, a nonprofit organization dedicated to promoting sustainable forestry practices throughout the Commonwealth. Program Manager Chuck Coup discussed some of PA SFI's most popular initiatives, including their Professional Timber Harvester training program, which has trained over 7,000 loggers since its inception.



Chuck Coup (pictured above) provided a comprehensive overview of PA SFI's operations, including special initiatives taking place this year as part of their 20th anniversary celebration. The organization recently set a Guinness World Record by planting over 200,000 trees in one hour using 1,100 volunteers throughout the U.S. and Canada.



Committee chairman, Senator Scott Hutchinson (pictured at left, left side), presents Chuck Coup, program manager for the Pennsylvania Sustainable Forestry Initiative, with an official copy of Senate Resolution 144, which designated June 5, 2015, as Pennsylvania Sustainable Forestry Initiative Day.



## JOINT LEGISLATIVE CONSERVATION COMMITTEE

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## The Chairman's Corner

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PennTAP's energy, environment and work health team. With the assistance of expertly-trained staff and Penn State students, business owners receive advice on how to maximize energy efficiency and improve environmental performance. These services have proven especially popular, as energy and environmental services encompass more than 30 percent of PennTAP's total workload.

The organization offers several distinct forms of energy and environmental assistance. The Pollution Prevention and Energy Efficiency program (P2/E2), focuses on helping manufacturers reduce waste, decrease greenhouse gas emissions, and improve overall energy efficiency. PennTAP's experts meet with firms interested in the program to conduct site assessments and utility bill analyses to identify potential opportunities within the facility. These services allow firms to pursue grants used to upgrade infrastructure, such as with new lighting or HVAC systems.

The Economy, Energy and Environmental (E3) program shares the same goals as the P2/E2 service: helping business save money by conserving energy and minimizing pollution. The difference is that the E3 program is aimed at improving production operations, rather than building infrastructure. Many of the E3 upgrades involve using more energy efficient manufacturing tools and equipment.

Capitalizing on global trends, PennTAP is also assisting firms in implementing ISO 5001 best practices, the worldwide standard for energy management. Based on a model of continuous improvement, ISO 5001 provides businesses with a reliable framework for routinely managing and improving energy performance. PennTAP's staff hold numerous training certifications related to the ISO 5001 program, and they have helped guide

over a dozen manufacturers through the implementation process.

The newest service provided through PennTAP is its Building Construction Technology Extension Program (BCTEP), which seeks to increase energy efficiency in commercial, institutional and industrial building operations. The program is currently in the pilot phase, but PennTAP is trying to establish a nationwide curriculum that can be used in building operations, regardless of building type, climate, or size.

Given these diverse services, it can be difficult to imagine the total impact of PennTAP's work; however, the results speak for themselves. In 2013 alone, the energy and environment team worked on 84 technical assistance cases, contributing to an air emissions reduction of over 7,000 tons, and a 2.4 million gallon reduction in wastewater. Firms participating in the program realized a total energy use reduction of over 47 million BTUs, and over \$1.8 million in energy savings.

If you are looking for businesses who have realized success from PennTAP's services, you can find an example in almost every corner of the state. From local manufacturers like Kurtz Brothers in Clearfield, to national firms like Allentown-based Mack Trucks, PennTAP is helping businesses thrive in Pennsylvania by teaching them how to minimize energy consumption.

PennTAP's services have truly been invaluable over the years, both to businesses within my district and across the Commonwealth. That is why I introduced a resolution in the Senate earlier this year recognizing the organization's 50th anniversary. The resolution coincided with a ceremony in the Capitol East Wing Rotunda, where representatives from PennTAP showcased some of their accomplishments over the last five decades.

For more information on PennTAP, the services they provide, and the 50th anniversary celebration, visit their website at <http://penntap.psu.edu>.



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