VOLUME 20 ✦ ISSUE 5 ✦ SUMMER 2010

ESTUARY NEWS

NEWSLETTER OF THE PARTNERSHIP FOR THE DELAWARE ESTUARY: A NATIONAL ESTUARY PROGRAM

Energy and the Estuary

Jennifer Adkins (left), executive director of the Partnership for the Delaware Estuary, speaks with Michael Freda (right) of EDiS Company about the firm's new solar array. These 231 solar panels now supply up to 14% of the electricity used by numerous tenants, including the PDE.

By Jennifer Adkins, Executive Director, Partnership for the Delaware Estuary

The oil spill in the Gulf of Mexico is a frightening reminder of the risks – to lives, livelihoods, and the environment – taken to secure the energy that powers our society. Among those who now have first-hand experience with these risks are our colleagues in the National Estuary Programs on the Gulf whose work and lives have been transformed by the spill. A catastrophe like this challenges everyone involved to ask, "How can we do better?"

Energy is just one of the many benefits the Delaware River and Bay helps to provide to the people of our region. Every year, thousands of ships traverse the river, many of them carrying petroleum products to refineries along its shores. The Delaware Estuary is home to the second-largest petrochemical refining center in the nation, supported by the largest freshwater port system in the world. Both offer significant benefits to our economy, but not without costs.

The 2004 *Athos I* spill that released 265,000 gallons of heavy crude oil into the Delaware

continued on page 2

In this issue...

Updates

3 Estuary News Turns 20, Wins Award

3 Act Seeks to Provide Funding, Coordination for Basin

3 Committee Recommends Actions to Improve Oil Spill Response in the Delaware River and Bay

3 Sunoco Grants $50K to PDE

Estuary Basics

4 Making Resources "Climate Ready" the Subject of New Report

Tidings

5 "Fracking" Delayed to Ensure Clean Water

7 Electricity Lines: Coming to a Watershed Near You

9 Wind Power and Delaware's Waters

11 Nuclear Power in the Delaware Estuary

Estuary Excursions

13 Ecotourism in the Delaware Valley: Be Daring...Jump the Border

Estuary Events

14 Activities and Events Around the Estuary

Gulf Coast National Estuary Programs:

- Corpus Christie Bay
- Galveston Bay
- Barrataria-Terrebonne
- Mobile Bay
- Tampa Bay
- Sarasota Bay
- Charlotte Harbor

Energy continued from page 1

River was a reminder of both the risks we take and our need to do better. Efforts to learn important lessons from this spill are still underway (see update on page 3).

Every year, billions of gallons of water from the Delaware River and its tributaries are used to cool the power plants that produce electricity for our region. The affordable electricity provided by these plants fuels our economy.

A new nuclear power plant has been proposed on the Delaware River as a way to meet future energy demand without adding greenhouse gas emissions (see article on page 11). But nuclear power has its risks as well. And whether they use coal, natural gas, or nuclear power, central power stations are located on rivers and bays because they require large amounts of water for cooling. While most of the water is returned to the river, intakes can have significant impacts on fish and other aquatic life, killing tens of millions to hundreds of millions of fish in the estuary every year.

In recent years, there have been other proposals for new energy-related development in the Delaware Estuary region, from Marcellus shale drilling in the Schuylkill River watershed and Delaware River Basin beyond (see related story on page 5) to wind farms in the bay and offshore (see related story on page 9).

Opening up the mid-Atlantic to offshore drilling for oil and gas has also been under consideration recently. New energy development is critical to help our country transition to a more secure, sustainable mix of energy for the future. But developing non-polluting sources of energy – like the new solar panels at the Partnership for the Delaware Estuary's headquarters – is especially important to reduce pollution and minimize the impacts of climate change on people and resources (see related story page 4).

Among the energy options proposed for our region, there is one that is rarely in the news but is both affordable and low risk. In fact, it is nearly pollution free, affordable to implement, and can actually save consumers money. It's energy conservation. Whether through changes in behavior (like turning lights off when no one is in the room) or efficiency (like replacing incandescent light bulbs with compact-fluorescent ones), conservation is an excellent investment. The California Public Utilities Commissions credits energy-efficiency standards for buildings and appliances with saving consumers $56 billion from 1978 to 2008, avoiding the need for 15 new power plants. With the right actions, energy conservation could meet a significant portion of the projected energy demand in our country.

None of these energy sources can meet our needs alone in the near future. Finding the right energy balance is the key, and sound assessment and planning for risks is an important part of the process in finding that balance. As we've seen from recent events in the Gulf, this is a huge challenge for complex and technical industries like energy, and neither government nor industry can do it alone. But together we can do better.

There are energy issues everywhere you look in the news today. We hope this issue of *Estuary News* will help readers recognize and understand the connections between energy issues and the Delaware Estuary. ■

MEETINGS CONTACT LIST

Meetings conducted by the Partnership for the Delaware Estuary's implementation and advisory committees occur on a regular basis and are open to the public. For meeting dates and times, please contact the individuals listed below:

Estuary Implementation Committee
Jennifer Adkins, Executive Director (Chair)
(800) 445-4935, ext. 102
jadkins@delawareestuary.org

Monitoring Advisory Committee
Edward Santoro, Monitoring Coordinator
(609) 883-9500, ext. 268
edward.santoro@drbc.state.nj.us

Toxics Advisory Committee
Dr. Thomas Fikslin, Branch Head
(609) 883-9500, ext. 253
thomas.fikslin@drbc.state.nj.us

Fish Consumption Advisory Team
Dr. Thomas Fikslin, Branch Head
(609) 883-9500, ext. 253
thomas.fikslin@drbc.state.nj.us

Science and Technical Advisory Committee
Dr. Danielle Kreeger, Science Director
(800) 445-4935, ext. 104
dkreeger@delawareestuary.org

Delaware Estuary Education Network
Lisa Wool, Program Director
(800) 445-4935, ext. 105
lwool@delawareestuary.org

Polychlorinated Biphenyls Implementation Advisory Committee
Pamela Bush, Esq.
(609) 883-9500, ext. 203
pamela.bush@drbc.state.nj.us

Estuary News Turns 20, Wins Award

The Partnership for the Delaware Estuary is pleased to announce the 20th anniversary of *Estuary News*, and there is reason to celebrate. The newsletter won first place in the "Newsletter, Four-color" category of the Delaware Press Association's 2010 Communications Contest!

The purpose of *Estuary News* is to educate and inform readers about environmental issues affecting the tidal Delaware River watershed. Currently it is mailed and e-mailed to about 22,500 subscribers in the winter and summer. It is also e-mailed to approximately 3,000 readers in the spring and fall.

Please use the form on page 15, or our form online, to subscribe or unsubscribe to *Estuary News* free of charge. To suggest a story or provide your feedback, please contact Shaun Bailey at SBailey@DelawareEstuary.org.

Act Seeks to Provide Funding, Coordination for Basin

The Delaware River Basin Conservation Act of 2010 (H.R. 4698) was introduced in Congress on February 25 and referred to the U.S. House of Representatives' Committee on Natural Resources (Subcommittee on Insular Affairs, Oceans and Wildlife). If passed by Congress, this Act would instruct the U.S. Fish and Wildlife Service to create a coordinated conservation strategy for the Basin, including a $5 million competitive grant program for projects aimed at improving habitat, water quality, and flood control.

The Delaware River and Bay is critical to the lives and livelihoods of millions of people, but it has received only a fraction of the federal funding provided to some other large American estuaries. The Partnership for the Delaware Estuary's Project Registry was created less than a year ago and it already includes almost 100 projects in need of $10.5 million in funding, attesting to the tremendous conservation needs in the region. The Delaware River Basin Conservation Act of 2010 aims to help fill this funding gap in a strategic, coordinated way. For further details, please visit the Northeast-Midwest Institute online at www.NEMW.org, keyword "H.R. 4698."

Environmental leaders, including Jennifer Adkins (left) of the Partnership for the Delaware Estuary, listen to Rep. Michael Castle, R-Del., speak about the Delaware River Basin Conservation Act of 2010 in New Castle, Delaware, following a roundtable discussion on June 7.

Committee Recommends Actions to Improve Oil Spill Response in the Delaware River and Bay

In May, the Delaware River and Bay Oil Spill Advisory Committee completed recommendations for how to improve the prevention of, and response to, oil spills in the Delaware River and Bay. This committee was formed by the U.S. Coast Guard at the direction of Congress after the *Athos I* spilled about 265,000 gallons of heavy crude into the Delaware River in 2004.

Since 2008, Dr. Danielle Kreeger, science director at the Partnership for the Delaware Estuary, has worked as a member of this committee to identify actions that can be taken in an oil-spill situation to better protect and restore the ecosystem of the river and bay. Recommendations were informally approved by the committee at the end of April, but unfortunately these could not be officially approved due to a technicality regarding the committee's official charter. The U.S. Coast Guard is currently seeking reinstatement of the committee's charter so that recommendations can be formally approved.

The Partnership for the Delaware Estuary applauds the efforts of this committee, and it looks forward to implementation of the report's recommendations. The 2004 oil spill in the Delaware River, and this year's oil spill in the Gulf of Mexico, highlights the need for more proactive planning to safeguard against, and repair damages from, oil spills.

Sunoco Grants $50K to PDE

The Partnership for the Delaware Estuary is pleased to announce that Sunoco has made a $50,000 contribution to support its work on climate-change adaptation. This funding will allow us to continue studying the effects that higher temperatures and rising seas might have on natural resources like drinking water, shellfish, and tidal wetlands (see story on page 4), as well as ways to adapt to these changes to protect resources. ■

Making Resources 'Climate Ready' the Subject of New Report

By Dee Ross, Watershed Coordinator, Partnership for the Delaware Estuary, and Priscilla Cole, Science and Policy Fellow, Partnership for the Delaware Estuary

What will climate change look like here in the Delaware Estuary, and how severe will the impacts be? Answering this question is complicated, but coastal communities need to understand the challenges and prepare for what lies ahead.

Credit: J. Gebert, U.S. Army Corps of Engineers, Philadelphia District

This 2001 aerial photograph shows how sea-level rise, caused in part by climate change, has altered the coastline of Cumberland County, New Jersey, since it was originally mapped in 1890.

While many government agencies are focused on finding ways to reduce greenhouse gases and slow climate change (mitigation), others are preparing for the inevitable changes (adaptation). Climate Ready Estuaries is a U.S. Environmental Protection Agency initiative that has experts looking at the estuarine resources most susceptible to climate-change impacts. The goal of the program is to come up with strategies and adaptation recommendations to address the highest-priority areas of vulnerability.

The Partnership for the Delaware Estuary (PDE) was one of the first organizations in the nation selected to begin a Climate Ready Estuaries program. Three important natural resources of the Delaware Estuary were selected for study: drinking water as an example of a water resource for people, tidal wetlands as an important type of habitat, and oysters and freshwater mussels (bivalve shellfish) as an example of living resources. All of these resources are particularly vulnerable to the increased temperature, sea level, and saltier water that is expected with climate change.

The Delaware River Basin provides drinking water to 15.2 million people. These water supplies already face multiple challenges, but sea-level rise will likely increase salt content, potentially requiring expensive actions to ensure safe and adequate public water.

Tidal marshes are protective, sponge-like habitats that buffer inland areas from coastal flooding. They filter polluted water coming off the land, and they provide critical habitat for fish and wildlife. The condition of tidal marshes depends upon factors that will be greatly affected by climate change, including sea level, salt content, temperature, and flooding. Current studies show that we are already losing vast areas of these wetlands, a trend predicted to increase with climate change.

Bivalve shellfish such as oysters and mussels create habitat on the bottom of the bay and in our rivers and streams. They improve water quality by removing pollutants and, in the case of oysters, they produce revenue. For example, the oyster harvest was worth an estimated $19.2 million in 2009 alone. However, some shellfish diseases are more common in saltier, warmer waters, making oysters especially vulnerable to the climate conditions we anticipate. Many freshwater mussels that are already at high risk are even more threatened by increasing temperature and storms.

PDE worked with dozens of partners to examine the issues confronting these three natural resources. Working in a short time frame, the project team relied upon its best scientific judgment and the use of risk-assessment methods to rank various threats, propose solutions, and identify the next steps. The resulting Climate Change and the Delaware Estuary report provides the first road map to how we might respond proactively, slow down losses and take advantage of opportunities.

Can the Delaware Estuary ever be "climate ready?" Mitigation measures taken now, such as reducing vehicle emissions, will make a big difference in 20 to 30 years, but no amount of mitigation will prevent the changes we will face between now and then. This makes it important to develop adaptive measures that will lessen natural-resource losses. Looking at three example resources is a good start, but there are a host of other natural resources and issues that will be affected by climate change, including people and property. The PDE climate-adaptation report is the first of its kind in the Delaware Estuary, and it is an important first step in planning for the challenges that climate change will present.

For updated information or to download the report, please visit us on the Web at www.DelawareEstuary.org/Science_Projects_Climate_Ready.asp. ■

'Fracking' Delayed to Ensure Clean Water

By Carol Collier, Executive Director, Delaware River Basin Commission

Who knew that Texas-style, gas-well drilling would come to the Delaware River Basin? The Marcellus shale formation, the largest known shale deposit in the world, wraps from western Virginia through upper Pennsylvania and lower New York State. Its eastern edge underlies 36% of the Delaware River Basin above the Delaware Water Gap and also includes the headwaters of the Lehigh and Schuylkill rivers.

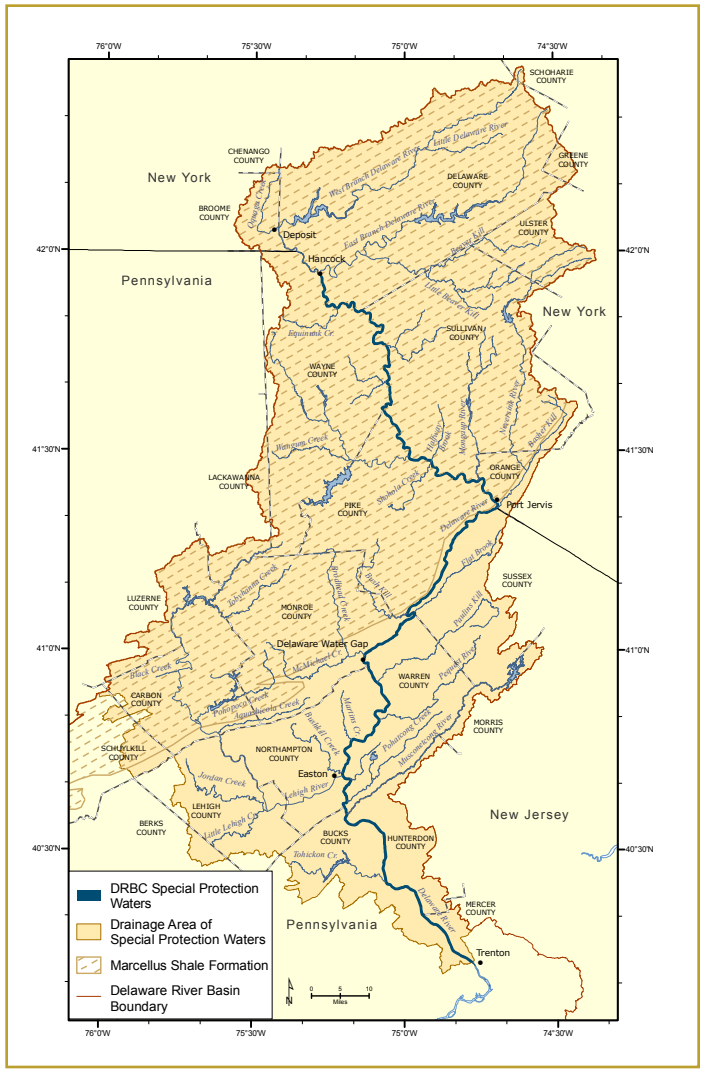
The natural gas trapped in Marcellus shale has value to the nation, states, and local land owners. It is estimated that there are 262 trillion cubic feet (tcf) of recoverable gas, 14 tcf in the basin. Having less of a carbon footprint than oil or coal, natural gas is seen as a "bridge fuel" as we ramp up to using a higher

Shale is rock made of compacted clay, silt, and mud. It exists in distinct, underground layers that split easily into thin sheets or slabs.

percentage of renewable-energy sources. It benefits national security and state budgets. It also can save the family farm because gas-well lease and royalty payments can help land owners avoid having to sell their properties.

However, there will be impacts to local communities and the environment. The collective effects of up to 10,000 wells pose a potentially significant adverse effect on the waters of the basin, including the estuary. To release the gas from the tightly packed shale that is over a mile underground, the driller forces 3 to 5 million gallons of water down a well to fracture or "frack" the shale beds. This water also has additives to facilitate the extraction process. During the time water is in contact with shale that was laid down millions of years ago in deep oceans, it picks up salts (total dissolved solids, or TDS) and naturally occurring radioactive materials (NORMS). The majority of the water remains underground in the shale, but about 20 to 30% returns to the surface. This "flow-back" water must be treated before it is released to our surface waters, but this is not an easy task for

continued on page 6



Credit: David Kovach, Delaware River Basin Commission

The Marcellus shale formation lies beneath 36% of the Delaware River Basin, including the watershed's headwaters. Water from this region is used for drinking water, industrial processes, farm irrigation and more as it flows south to Delaware Bay.

Credit: David Kovach, Delaware River Basin Commission

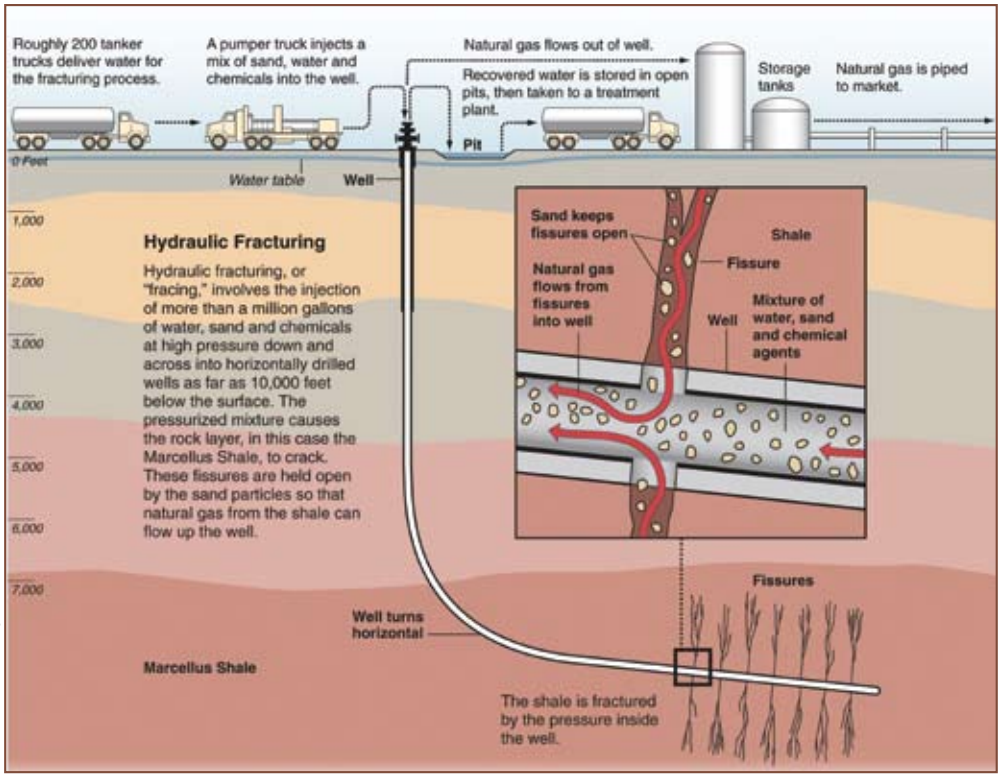
Utility workers extract natural gas from the Marcellus shale formation approximately one-and-a-half miles beneath the Susquehanna River Basin in early 2009.

Fracking continued from page 5

most municipal wastewater treatment plants.

Direct water-resource concerns include (1) the potentially large amount of water consumed in the shale-fracking process, (2) potential on-site spills and their impacts to groundwater and nearby streams, and (3) final treatment of the flow-back water.

There are also impacts to the land which can affect water resources. Each driller will have to clear a five-acre area or more for a pad that can hold six to 10 individual wells. Using a horizontal drilling technique, gas can be obtained from an area reaching approximately one square mile underground from a single pad. Each well pad also requires an access road and pipes that connect to large, interstate transmission pipelines. Over 80 percent of the Delaware River Basin's headwaters area is covered with forests that are critical to the protection and maintenance of water resources. One big concern is the effect of forest fragmentation on our waters (see page 8 for an explanation).



Credit: Al Greenberg/ProPublica

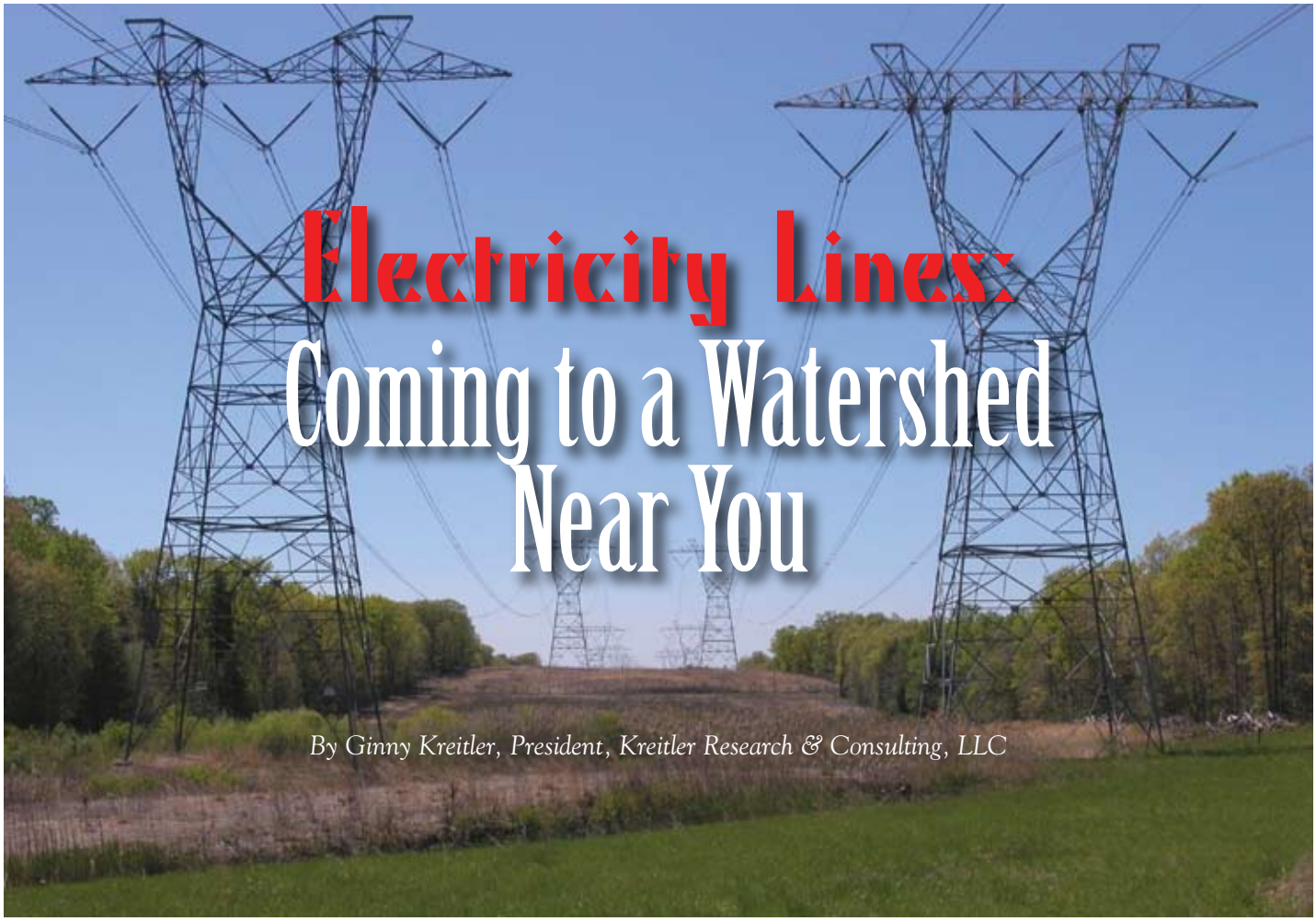
Natural gas well drilling might seem far away to Delaware Estuary residents, but they should still care because downstream environments and water users are affected by upstream actions. The headwater regions where gas-drilling activities would be located is the most sensitive and vulnerable area of any watershed. There are issues of water availability during droughts and impacts to water quality. It is interesting that in the city of Philadelphia's vulnerability assessment of its Delaware River drinking water intakes, the number-one concern was changing land uses 200 miles upstream in the upper basin and the resulting loss of forests.

Both Pennsylvania and New York regulate gas-well drilling activities. Pennsylvania is strengthening its gas-well construction and wastewater regulations. New York conducted a comprehensive analysis of its environmental impact statement of gas-well drilling and plans to release a final statement about environmental impact later this year. No shale fracking is allowed in New York until this is completed.

The Delaware River Basin Commission (DRBC) has also asserted its review over gas-well drilling projects. We regulate water withdrawals and wastewater discharges, as we do for other activities across the basin. We are especially concerned about the impacts of potentially thousands of wells expected in the headwaters region. Over three-quarters of the non-tidal Delaware River has been added to the National Wild and Scenic Rivers System. To support that federal designation, the DRBC has a Special Protection Waters (SPW) program to maintain the existing high water quality of the non-tidal river, which we know from extensive monitoring is better than water quality standards. Because of our SPW "Keep the Clean Water Clean" regulatory program, an Executive Director's Determination was issued in May 2009 declaring that all gas-well drilling activities, except exploratory wells, must be reviewed by DRBC, no matter what the amount of water withdrawal or wastewater discharge.

On May 5, 2010, the DRBC Commissioners unanimously agreed that no natural gas well-pad applications for shales would be considered by the agency until specific regulations are adopted. DRBC hopes to have draft regulations available for public review by the end of this summer. A Supplemental determination was released on June 14 stating that exploratory wells also require Commission approval and would not be reviewed until regulations are in place. There is an exemption for a limited number of wells that had approval from the commonwealth of Pennsylvania as of June 14.

Natural gas well drilling has value to the nation and our region, but we must make sure that it is done smartly so we do not harm the incredible resources of the Delaware River and Estuary. ■



Electricity Lines: Coming to a Watershed Near You

By Ginny Kreitler, President, Kreitler Research & Consulting, LLC

Electric power lines pass through a corridor cut through the forest near Salem, New Jersey.

The topic of the American electric grid, or the network that carries energy from one part of the country to another, has been getting more attention recently. Advocates assert the need for widespread grid expansion to lessen system congestion, avert potential reliability problems, and connect isolated wind farms to distant markets. Opposition focuses on impacts to communities; environmental harm, both on the ground and in greenhouse gas emissions; and issues of who reaps the benefits and who pays for these systems. In some instances, private-property rights heighten tensions further.

For reasons such as these, few interstate transmission projects have been built in our region in recent years. One of the few that is in progress today is the Susquehanna-Roseland line, which will run from northeastern Pennsylvania to northern New Jersey. (see map next page). Where this project crosses through the Delaware Water Gap National Recreation Area, the National Park Service is conducting an Environmental Impact Assessment, examining impacts to flora, fauna, geology, recreational benefits, and more. Elsewhere, regulatory approvals have already been given for the remainder of the route.

Long-distance, linear projects such as transmission lines can be very challenging to site because of impacts to large areas and a wide variety of lands. For the most part, the Susquehanna-Roseland line is sited along a route that is already used for transmission using a lower-voltage line. Although not without impacts, the use of an existing route lessens the degree of fragmentation of habitats and community landscapes compared to the impacts that would result from an entirely new route. Accepted principles for environmentally-sensitive siting emphasize the importance of maximizing the "co-location" of infrastructure projects (for example, along railroads, highways, pipelines or transmission corridors), as well as avoiding ecologically or culturally sensitive lands.

But it is not always possible to co-locate transmission lines in existing rights of way, raising the issue of how to ensure that harm to the environment is minimized during the siting process.

The on-again-off-again MAPP (Mid-Atlantic Power Pathway)

continued on page 8

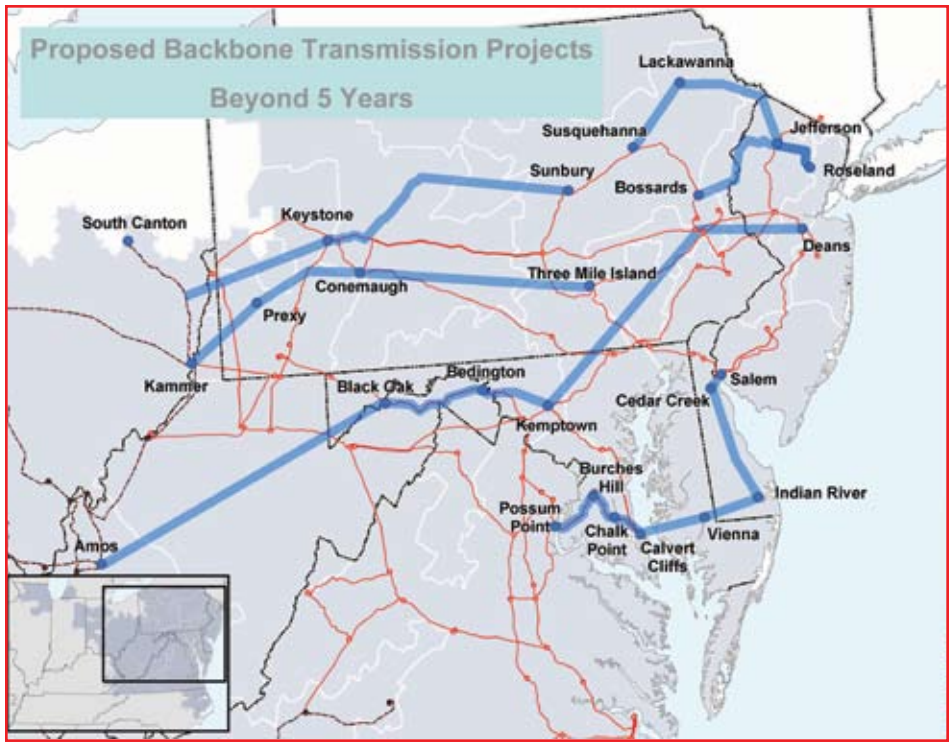
Electricity

continued from page 7

line, which would cross the Chesapeake Bay (see map), is one such case. The proposed route elicited strong objections over impacts to federally- or state-listed species of conservation concern. The route initially proposed across eastern Maryland, which created a footprint through 27 miles of sensitive lands, has now been replaced by a route which puts two-thirds of the transmission line's overland miles at the bottom of the Choptank River. A judgment was made that the buried riverbed transmission line was more acceptable than the overland route through documented critical habitat areas. In addition, the company will work to avoid the majority of oyster beds in the area, and it will be required to offset oyster-bed disturbance where avoidance is not possible. Even so, no final decision has been made.

These types of siting tradeoffs are likely to be at the heart of any new transmission project. And yet, all too often the pursuit of environmentally sensitive siting plays out in late-stage, reactive interactions between the transmission applicant and interested stakeholders. Project concepts are formulated and brought forward for regulatory review with minimal front-end input from state wildlife agencies, impacted communities, or environmental groups. Not surprisingly, this frequently erupts into a contentious, litigious, and costly struggle.

Concerned stakeholders are beginning to change this paradigm. Eleven states in the west, under the mandate of the Western Governors' Association, have been working to undertake environment and lands screening proactively, using the best available data on critical habitat to define avoidance areas at the outset. New efforts are also underway in the eastern United States to similarly advance a Smart from the Start approach to infrastructure planning.



Credit: PJM Interconnection

New electric-line corridors (highlighted in blue) have been proposed for the mid-Atlantic region. This includes one that would pass through the Delaware Estuary and under the Delaware River near Delaware City, Delaware, and Salem, New Jersey.

'Habitat Fragmentation?' Say what?

Fragmentation occurs when land inhabited by plants and animals is broken down into smaller patches. This typically occurs when land is converted from one use to another. For example, a forest becomes fragmented when a highway is built through it. This turns the former forest into two smaller woodlands. Habitat fragmentation is a problem because it:

- **alters an area's climate**
- **degrades an ecosystem's function**
- **disrupts animal migrations**
- **increases access for invasive species and predators**
- **reduces wildlife habitat**

And it's about time. The new 39-state Eastern Interconnection Planning Collaborative will engage utility regulators, transmission planners, and others in the largest transmission-planning effort ever undertaken. Some early study results are already calling for a large web of new long-distance electricity lines, with proposals for projects to interlink sites as far apart as North Dakota and New York. It is essential that our irreplaceable land and water resources be given full consideration in these planning processes. ■

Wind Power and Delaware's Waters

By Meredith Blaydes Lilley, Ph.D. Candidate, and Willett Kempton, Ph.D., Professor of Marine Policy, Center for Carbon-free Power Integration, University of Delaware

Wind power is growing rapidly because it is a clean energy source that is nearly cost-competitive with fossil fuels, the resource is larger than all human energy needs, and the technology is commercial and well-tested. No other clean energy source today has these characteristics, which is why over half of new power generation applications in our region are for wind power. In most of Delaware, like other East Coast states, wind over the land is too weak to be a major energy source; thus, plans for eastern wind power have concentrated on offshore wind.

To build an offshore wind farm, a special installation vessel drives a pile into the ocean bottom, a tower is placed on top of the piling, and the turbine housing and blades are lifted to the top of the tower. A wire is then laid to carry the electricity to shore.

Studies of offshore wind in Europe document environmental impacts. During construction, there are environmental impacts from the noise of pile driving and plowing the thin trench for the wire. During operation, the primary environmental impact is the same as a cell phone tower, radio antenna, or multi-story building: birds collide with it in times of poor visibility. Unlike buildings with glass windows, birds can see wind turbines and usually fly around them, so an offshore wind turbine might cause three bird deaths per year compared with hundreds per year for some buildings. In a few locations, wind turbines have killed bats, sometimes in large numbers – but more information in this area is needed.

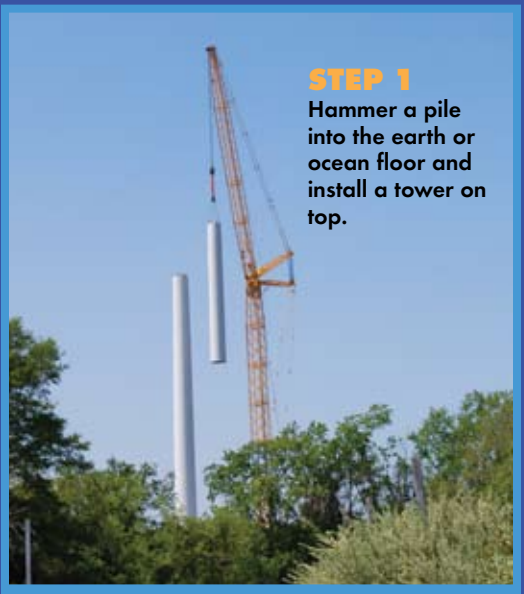
Is offshore wind good or bad for our oceans and estuaries and the creatures that live there?

When examining the environmental impacts of new energy sources, we need to compare different sources of energy side by side. A less thoughtful perspective is to evaluate as if the choice is between wind power versus no new energy at all. In reality, if wind turbines are not built, then other, more environmentally damaging forms of energy will be built, and our current polluting sources will continue to operate longer.

For example, the energy sources that use water during processing – including coal, liquefied natural gas, and even sources not causing air pollution like nuclear and hydropower – all kill aquatic organisms from the physical, thermal, and chemical impacts of large-scale water use. The numbers are staggering. Reports from Public Service Enterprise Group, Connectiv, and previous owners of the Delaware City Refinery have estimated anywhere from tens of millions to hundreds of millions of fish eggs, fish fry (baby fish), and juvenile fish are killed annually in the Delaware River alone. These invisible aquatic impacts add to the effects of air pollution from sources that burn fuels. Air pollution kills wildlife, but no one has

continued on page 10

How a Wind Turbine is Built

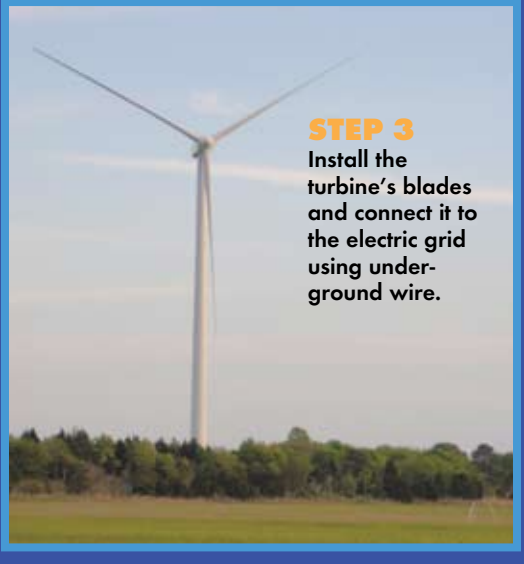


Credit: Tammy Beeson, Copyright: University of Delaware

STEP 1
Hammer a pile into the earth or ocean floor and install a tower on top.

Credit: Tammy Beeson, Copyright: University of Delaware

STEP 2
Install the turbine's housing on top of the tower.



Credit: Lisa Tossey, Copyright: University of Delaware

STEP 3
Install the turbine's blades and connect it to the electric grid using underground wire.

Wind Power continued from page 9

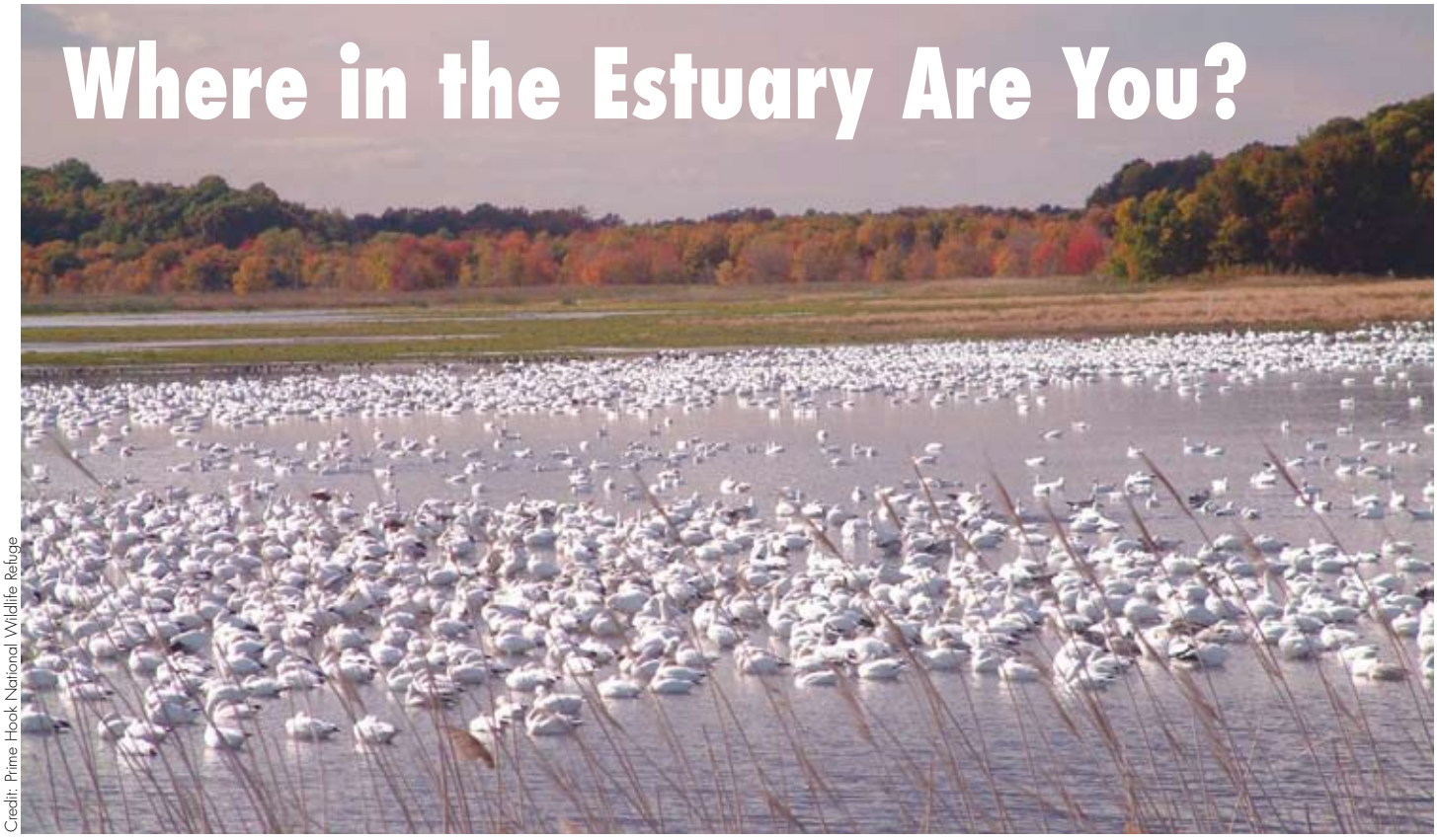
measured precisely how much. Human impacts are better documented. For example, in Delaware alone, the Department of Health and Social Services estimates that 98 people per year are killed by air pollution from power plants, and thousands more suffer chronic, but not fatal, health effects each year.

Lastly, any sensible comparison of environmental impacts from different power sources should consider their effects on climate change and ocean acidification (i.e., increased acidity of the oceans). Based on conservative global warming predictions, scientists estimate that up to 37% of the species they have studied will be "committed to extinction" by 2050. Wind facilities do not contribute to climate change, whereas coal, natural gas, and other fossil fuel sources do. If we don't replace our current energy sources over the next few decades, the world will face substantially amplified climate change effects. Again, right now, in our area of the country, wind is the only large-scale, cost-effective option that doesn't lead to climate change.

In short, wind power development causes a small amount of environmental harm. By displacing other power sources that are far more destructive, however, its net effect is a substantial environmental benefit. Nonetheless, wind developers should seek to avoid, minimize, and offset the impacts that wind power does have.

The state of Delaware has already approved a commercial wind farm about 12 miles off our Atlantic coast from Rehoboth, with construction expected to begin in 2014. The University of Delaware put up a wind turbine at its Lewes campus in June 2010 (pictured on page 9), for research and also to power the campus. (Lewes happens to be one of the few windy places in Delaware, on land that is not protected habitat.) These early efforts can pave the way for improving the technology to be more cost-competitive, and for learning how to reduce wind power's wildlife impacts. The Lewes turbine will also be used in UD's teaching programs – so we can train the next generation for the technologies of the future. ■

Where in the Estuary Are You?



Credit: Prime Hook National Wildlife Refuge

Prime Hook National Wildlife Refuge is located at the southernmost edge of the Delaware Estuary, in Sussex County, Delaware. This 10,000-acre sanctuary is considered one of the best wetland habitats along the Eastern Seaboard. It routinely attracts more than 250 species of birds as they stop to rest and feed during their spring and fall migrations. For this reason, hunting, birdwatching, and nature photography are especially popular here, as are hiking and paddling thanks to five nature trails and 15 miles of stream. Visit in mid-October to see thousands of snow geese and ducks.

Nuclear Power in the Delaware Estuary

By Shaun Bailey, Marketing and Communications Coordinator, Partnership for the Delaware Estuary

Nuclear power plants provide a substantial amount of the energy used in our region. Experts estimate that 6.8 million people now live in the Delaware Estuary's watershed. Altogether, the watershed's five nuclear power plants produce enough electricity to power 5 million homes for these people.

These plants include the two-unit Limerick Generating Station in Limerick, Pennsylvania and the three combined units of Salem and Hope Creek Generating Stations in Lower Alloways Creek Township, New Jersey.

Both reactors at the Limerick plant were built near the Schuylkill River between 1986 and 1990 and use water from both the Schuylkill and Delaware rivers. This plant is owned and operated by Exelon Corporation, which maintains its headquarters in Chicago and a local office in Kennett Square, Pennsylvania.

Hope Creek Generating Station is a single-unit reactor built beside the Delaware River in 1986. It is owned and operated by PSEG Nuclear LLC, a subsidiary of PSEG Power LLC, whose headquarters are in Newark, New Jersey. The adjacent Salem Nuclear Generating Station also neighbors the Delaware River, and it consists of two reactors that began making power in 1977 and 1981. It is co-owned by Exelon Corporation and PSEG, the latter of which operates the station.

How Nuclear Works

Similar to coal-burning power plants, nuclear reactors use minerals mined from the earth – in this case uranium – to heat water into pressurized steam. This steam is used to drive a turbine, and this in turn spins a generator that makes electricity. The key differences between a fossil-fuel plant and a nuclear power plant are the way they boil water and the byproducts they produce.

Nuclear power plants heat water through

continued on page 12

▲ **Hope Creek Generating Station vents a plume of steam across the Delaware River from New Castle, Delaware.**

▶ **Hope Creek Generating Station in Lower Alloways Creek Township, New Jersey**

Credit:PSEG

▼ **Limerick Generating Station in Limerick, Pennsylvania.**

Credit:Exelon Corporation

Nuclear Power continued from page 11

a process called "fission." Fission results when one atom of enriched uranium splits into two pieces due to the introduction of an additional neutron. This causes a large amount of energy to be released in the form of heat and radiation.

Unlike coal-burning power plants, nuclear power does not emit greenhouse gases like carbon dioxide, or other air pollutants for that matter. They do, however, produce spent fuel and other radioactive waste. These remain radioactive for millennia, and they can be hazardous to humans and the environment if released.

Nuclear power plants, like other power plants, require large volumes of water for cooling. Some use closed-loop cooling with cooling towers. Others use once-through cooling without cooling towers, and this is the case for two of the three existing reactors in New Jersey. The amount of water used varies, depending on the size of the plant, the design of each cooling system, and whether they use closed-loop or once-through cooling.

Effects on the Estuary

Each of the nuclear power plants in the Delaware Estuary's watershed uses millions of gallons of water per day for cooling, as well as condensing the steam used to turn the turbine-generator. Most of this river water is returned to its source, but some is lost to evaporation. This is the water vapor "cloud" often seen billowing from the top of cooling towers. Plants with once-through cooling use the most water – 3 billion gallons per day in the case of Salem Nuclear Generating Station. Nearly all of this is returned to the estuary.

Nuclear power plants affect the Estuary in three potentially detrimental ways:

1. Their reliance upon water requires them to be built next to water bodies like the Delaware and Schuylkill rivers. These riverside and wetland areas are critical for wildlife, flood control, and much more.
2. River water is withdrawn in a way that removes and kills hundreds of millions of fish eggs, fish larvae, and juvenile fish per year. This can impact aquatic populations, including the fisheries we rely on for food.
3. Water is discharged into rivers at higher temperatures, potentially resulting in local impacts to plant and aquatic life.

To offset the environmental effects of its Salem plant, PSEG Nuclear has undertaken an ambitious Estuary Enhancement Program. This program has restored or preserved more than 20,000 acres (over 32 square miles) of tidal-marsh and riverine habitats in Delaware and New Jersey since 1994. It has also contributed to our scientific understanding of wetland ecology and restoration in estuarine ecosystems.

Each of the nuclear power plants in the Delaware Estuary's watershed uses millions of gallons of water per day for cooling...

Through an agreement with the Delaware River Basin Commission, Exelon Corporation has been putting funds into the Schuylkill River Restoration Fund since 2006. This money helps to support grants for projects that improve water quality in the Schuylkill River and its tributaries.

New Nuclear in the Delaware Estuary?

PSEG recently filed an "Early Site Permit" application with the U.S. Nuclear Regulatory Commission (NRC) to gain approval for a new nuclear power plant. This would be located near the company's three existing reactors in Salem County, New Jersey, on the banks of the Delaware River. This permit, however, does not authorize construction.

The NRC will take about three years to decide if PSEG has chosen a suitable place upon which to build. If the NRC approves the location, PSEG would then need another NRC license, called a "Combined License," and approvals from Lower Alloways Creek Township, the New Jersey Department of Environmental Protection, the Delaware River Basin Commission and others. This process could take up to seven years, followed by five to six years of construction.

PSEG has not yet decided if it will build a new nuclear power plant. Obtaining an Early Site Permit means the site is suitable for a plant within the next 20 years.

PSEG has not yet estimated the cost of a new nuclear power plant. However, other newly proposed plants in the country have been estimated to cost up to $10 billion or more. Federal loan guarantees may be available to help reduce the cost of borrowing the money necessary to build a new plant. They also lower the overall cost of the plant by reducing the interest charged during construction.

Today there are 104 nuclear power plants across the United States. Altogether, these generate 20% of the nation's electricity. The last time a nuclear power plant was built anywhere in the country was 1996.

To learn more about nuclear power, please visit the NRC online at NRC.gov or the website of the Nuclear Energy Institute, located at NEI.org. You might also consider a visit to the new PSEG Energy and Environmental Resource Center located at 244 Chestnut Street in Salem, New Jersey. The center is open by appointment only. Please call (856) 339-EERC for details. ■

Ecotourism in the Delaware Valley: Be Daring...Jump the Border

By Shaun Bailey,
Marketing and Communications Coordinator,
Partnership for the Delaware Estuary

In May, the South Jersey Tourism Corporation celebrated one year since the launch of ForeverGreenNJ.com. This website lists outdoor destinations and events throughout the five counties bordering southern New Jersey's tidal Delaware River.

This website is helping to promote ecotourism across a large portion of the Delaware Estuary watershed, similar to ecoDelaware.com in Delaware and SchuylkillRiver.org and VisitPhilly.com in southeastern Philadelphia. Individually these sites promote specific places; either a small state or a small portion of a state. But taken together, these websites portray a region that, in time, could rank among the top nature destinations in the nation.

Ecotourism is responsible travel to natural areas that conserves the environment and improves the well being of local people. It includes a wide variety of activities, including camping, hiking, paddling, wildlife watching, and catch-and-release fishing. The important thing is that these pastimes do not have a negative impact on the environment. Instead, the goal is to foster an appreciation for the environment through hands-on experiences.

Similarly, other forms of niche tourism do exist. Related examples include heritage tourism, or travelling to experience a specific culture; "agritourism," or travelling to farms and ranches; and "voluntourism," or travel which includes volunteering for a charitable cause. All are worthwhile, but ecotourism is arguably the most environmentally friendly.

Log on to the websites at right to see the many ecotourism opportunities that await you in the Delaware Valley:

Delaware
ecoDelaware.com

Delmarva Peninsula
DLiteOnline.net

South Jersey
ForeverGreenNJ.com
NJMSC.org/Coastal_Heritage_NJ.html
SJBayshore.org/Events.htm

Southeast Pennsylvania
SchuylkillRiver.org
TidalTrail.org
VisitPhilly.com/Outdoor-Activities ■

ESTUARY EVENTS

Featured on ecoDelaware.com

Big Thursday

August 8, from 9 a.m. to 4 p.m.

North Bowers Beach, DE

Big Thursday began in 1852 to celebrate the end of an oyster-harvesting ban. Oysters, after all, are of one of Delaware Bay's biggest exports. See for yourself at this festival hosted by the Bowers Beach Maritime Museum. You can also dine on blue crabs and barbeque while enjoying entertainment like a parade, Nanticoke Indian demonstration, and both gospel and country music. Call (302) 335-1556 for details.

Creating an Outdoor Classroom

August 11, from 9 a.m. to 4 p.m.

Philadelphia, PA

Pennsylvania teachers can learn to use nature as a classroom at this one-day workshop called Creating an Outdoor Classroom. Participants will discover what it takes to create a rain garden, wildlife habitat, or restoration project on their school's property. To learn more visit the Schuylkill Action Network online at SchuylkillWaters.org. Please call Dee Ross at (800) 445-4935, extension 106, to register by August 2.

Nature's Filter: Plants at the Waters Edge

Until August 13

Philadelphia, PA

Children entering grades three, four, five and six are in store for a special treat this summer. They are invited to the Fairmount Water Works Interpretive Center to see how tiny plants perform a big service by keeping waterways clean. Please call (215) 685-0723 to register for a two-hour program available every Tuesday through Friday. Each group is limited to 40 participants, and one chaperone is required for every 10 kids.

Cohansey RiverFest

August 28, from 10 a.m. to 8 p.m.

Greater Bridgeton, NJ

Celebrate the Cohansey River and all its bounty during the inaugural Cohansey RiverFest. Visitors can bike, boat, and drive among outdoor destinations while taking pit stops for fresh clams, crabs, oysters, ribs, and produce. Many programs and tours will be available, including one on the Atlantic sturgeon – this year's theme. Visit CohanseyRiverFest.org for details, or call (856) 453-8130.

Pennsylvania Coast Day

September 11, from 11 a.m. to 4 p.m.

Philadelphia, PA

Get to the river – better yet, get on the river – during Pennsylvania Coast Day at Penn's Landing. Visitors will have four – count 'em – four opportunities to experience the Delaware River. Limited seats will be available onboard narrated tour boats and New Jersey's official tall ship, the *A.J. Meerwald*. Kayaking lessons and swan-shaped paddleboat rides will also begin at noon inside Penn's Landing Marina. Visit DelawareEstuary.org for details.

Elemental Energy: Art Powered by Nature

Until September 26

Philadelphia, PA

Visit the Schuylkill Center for Environmental Education to see six sculptures powered entirely by nature. Each piece moves or creates sounds using natural sources of energy, like the sun, water or wind. To find them simply explore the Widener, Woodcock, and Grey Fox Loop trails between the hours of 8:30 a.m. and 4:30 p.m. And be sure to check out the Center's green roof while you're there. It, too, helps to conserve energy. Log on to SchuylkillCenter.org for details. ■

Credit: Schuylkill Center for Environmental Education

SAVE THE DATES

Delaware Coast Day
October 3 in Lewes, DE

Experience the Estuary Celebration
October 7 in Camden, NJ

Coast Day NJ
October 10 in Cape May, NJ

Start or Stop Your Subscription

Give a friend a subscription to *Estuary News*

Name_____

Company _____

Address _____

_____

City, State, Zip _____

Telephone_____ E-mail _____

☐ I no longer wish to receive *Estuary News*
☐ Send me *Estuary News* via mail
☐ Send me *Estuary News* via e-mail
☐ Send me *Estuary News* via mail and e-mail

Send to: Partnership for the Delaware Estuary
One Riverwalk Plaza, 110 South Poplar Street, Suite 202
Wilmington, DE 19801

You can also notify us by sending your request to SBailey@DelawareEstuary.org

Partnership for the Delaware Estuary
One Riverwalk Plaza
110 South Poplar Street, Suite 202
Wilmington, DE 19801

ADDRESS SERVICE REQUESTED

Partnership for the Delaware Estuary, One Riverwalk Plaza, 110 South Poplar Street, Suite 202, Wilmington, DE 19801

Partnership for the Delaware Estuary: a National Estuary Program

The Partnership for the Delaware Estuary, Inc., (PDE) is a private, nonprofit organization established in 1996. The PDE leads collaborative and creative efforts to protect and enhance the Delaware Estuary and its tributaries for current and future generations. The PDE is one of 28 National Estuary Programs. To find out how you can become one of our partners, call the PDE at (800) 445-4935 or visit our website at www.DelawareEstuary.org.

Partnership for the Delaware Estuary, Inc.
Jennifer Adkins, Executive Director
Tel: (800) 445-4935 / Fax: (302) 655-4991
E-mail: jadkins@delawareestuary.org

Environmental Protection Agency
Irene Purdy, EPA Region II
Tel: (212) 637-3845 / Fax (212) 637-3889
E-mail: purdy.irene@epa.gov

Ed Ambrogio, EPA, Region III
Tel: (215) 814-2758 / Fax: (215) 814-2301
E-mail: ambrogio.edward@epa.gov

Pennsylvania
Andrew Zemba
Department of Environmental Protection
Tel: (717) 772-5633 / Fax: (717) 783-4690
E-mail: azemba@state.pa.us

Delaware
John Kennel
Department of Natural Resources and Environmental Control
Tel: (302) 739-9255 ext. 109 / Fax: (302) 739-7864
E-mail: john.kennel@state.de.us

New Jersey
Kerry Kirk Pflugh
Department of Environmental Protection
Tel: (609) 663-7242 / Fax (609) 777-1282
E-mail: kerry.pflugh@dep.state.nj.us

Delaware River Basin Commission
Bob Tudor
Tel: (609) 883-9500 ext. 208 / Fax (609) 883-9522
E-mail: robert.tudor@drbc.state.nj.us

Philadelphia Water Department
Howard Neukrug
Tel: (215) 685-6319 / Fax: (215) 685-6207
E-mail: howard.neukrug@phila.gov

Editor
Shaun Bailey, Marketing and Communications Coordinator, Partnership for the Delaware Estuary

Layout & Design
Janet Andrews, LookSmartCreative