Section 3 | A Focus on Water

An energy company contributes to the heartbeat of an economy and a community. It functions as an underpinning of growth, a sustainer of a future. Reducing air emissions and preserving land are two elements of that stewardship. The third is overseeing the use of water resources.

The production of electricity requires water. Converted to steam, it turns a power station's steam turbines, which in turn produce electricity. It's also essential as a cooling agent for power plant equipment.

Nonetheless, water, although it comprises nearly 70 percent of the earth, is finite. The efficient use of water is a key to our company's environmental responsibility. Tampa Electric, TECO Energy's principal subsidiary, has taken steps to help maintain the health of local water quality, a crucial aspect of Florida's identity. The science is complex, but the intent quite simple. We are stewards, because, in Jacques Cousteau's words, "We are all – humans, animals and aquatic creatures alike – in the same boat."

TAMPA ELECTRIC

As the need for clean water rises with West Central Florida's growing population, Tampa Electric has taken steps to help maintain the health of local water quality, a crucial aspect of Florida's identity. A summary of the average water recycling activity for each of Tampa Electric's major generating facilities is provided in the table on the following page.

Tampa Electric is committed to using the smallest amount of water possible to operate its facilities, and recycles large volumes of that water to reduce overall consumption. Water is used at the company's power plants as process water and cooling water.

Water sources for processing and cooling vary from plant to plant, but generally consist of groundwater, storm water, treated effluent (i.e., reused water from sewage treatment plants) or municipal potable water.

Water recycling and beneficial reuse programs in the power stations account for about 283 million gallons daily. Beneficial reuse amounts to 8 million gallons daily at Big Bend, 1.5 million gallons daily at Bayside and 271 million gallons daily at Polk. About 2 million gallons daily of Hillsborough County treated effluent water are recycled to reduce potable water consumption at Big Bend.

Tampa Electric's Bayside and Big Bend facilities are subject to Section 316(b) of the Clean Water Act, which requires that cooling water intake structures have the best technology available to reduce adverse impacts to aquatic organisms. These organisms can become entrapped by screens and other devices, or endure stress in the plant's cooling system.

Water Recycling by Plant

POWER STATION	WATER SOURCE	TOTAL WITHDRAWAL (Million Gallons/Year)	DISCHARGE VOLUME/DESTINATION (Million Gallons/Year)	% RECYCLED
Big Bend	County effluent and potable water	961.5	154.1	84
Bayside	Tampa water system	120.4	18.3	85
Polk	Groundwater	971.4	164	83

Big Bend and Bayside

The Big Bend and Bayside stations also circulate large amounts of saltwater from Tampa Bay through the unit condensers to cool the steam produced by the boilers. However, this water is simply returned to the bay, rather than consumed by these plants, a process known as "once-through cooling."

At Big Bend, the plant drainage system collects and diverts rainwater and water generated by plant wash-downs to the plant recycle water pond. The system consists of ditches, pipes, culverts, sumps and pumps that function together to collect and contain almost all of the rainwater and all the wastewater to recycle it for reuse as process water.

Additionally, as mentioned above, the station is focused on properly managing coal combustion byproducts onsite, while awaiting shipment for beneficial reuse, to reduce their impact on the environment and specifically, the water.

Specifically, actions include:

- New construction, replacement, modification or redesign of existing settling ponds and slag ponds;
- Lining and remediating the gypsum storage area; and
- Storm water improvements to handle a 25-year, 24-hour rainfall without a discharge of storm water from the site.

Scrubber technology at Big Bend requires more than 3 million gallons of water per day, in addition to other water needs throughout the plant. As public and agricultural water resource issues continue to become more restrictive in the Tampa Bay area, Big Bend is striving to be self-sufficient in terms of water needs and usage.

Big Bend Power Station. *The coal-fired Big Bend facility recycles the majority of the water it uses and continually works to minimize the impact of its operations on local water supplies.*

Current power plant design practices usually include the lining of industrial wastewater ponds with an impervious material, such as concrete or high-density polyethylene (HDPE). Tampa Electric is in the process of replacing its unlined settling/recycle water ponds with concrete settling bins and two-lined recycle ponds. The liner system for the recycle ponds will consist of a geosynthetic clay bottom liner overlaid with an HDPE liner, also known as a composite liner system. The lining of the ponds is expected to eliminate potential future impacts to groundwater and surface water and ensure compliance with groundwater and surface water standards.

The new impervious recycle and settling ponds will be constructed in stages, allowing the plant to continue operating without interruptions.

The Big Bend comprehensive study mentioned earlier in this report, identified storm water as an issue needing to be addressed at the site. The results of the study were communicated to the FDEP, and Tampa Electric proposed a redesign of the onsite drainage system to improve the capture and recycling of storm water. The proposal to perform storm water improvements to handle a 25-year, 24-hour rainfall without a discharge of storm water from the site was accepted by FDEP and incorporated into the plant's industrial wastewater permit.

Polk Power Station *A closed-loop cooling system at the Polk facility allows it to treat and recycle water continuously, which reduces overall consumption and lessens the need to discharge water from the site.*

Polk Power Station

The Polk Power Station uses groundwater drawn from deep wells to supply both process and cooling water for the plant. However, the plant uses a closed-loop cooling reservoir that allows the facility to treat and recycle this water continuously to reduce overall consumption, as well as reduce the need to discharge effluent from the site. The plant's design maximizes plant water recycling and reuse, and minimizes groundwater withdrawal and offsite discharges.

Polk's closed-cycle cooling reservoir allows for use of much less cooling water than other cooling technologies, such as cooling towers. Due to the innovative siting of the plant on previously mined lands, Tampa Electric was able to modify existing mine cuts on the site to serve as the plant's cooling reservoir.

The cooling reservoir was designed to allow for capturing large amounts of rainfall during the year. Its design also allows for the predominately closed-cycle operation of the system. Both of these factors greatly reduce the amount of additional groundwater required.

A brine concentration unit handles all of the liquid waste produced by the station. Salt solids are removed and disposed of at a licensed disposal facility, leaving reusable process water.

Water bodies

Wastewater from Tampa Electric's power plants must meet all applicable state and federal water quality standards, which seek to protect the water quality, ecology and wildlife in and near the water bodies that receive the plant discharges.

Three of Tampa Electric's four power generating facilities are required to maintain National Pollutant Discharge Elimination System (NPDES) Discharge Permits and are presently in compliance with all applicable requirements of these permits. The chart below provides more detail about the plants, the water bodies, the protected status and the biodiversity.

Water Bodies Receiving Discharge from Tampa Electric Plants

POWER STATION	WATER BODY	SIZE	PROTECTED STATUS/CRITERIA	BIODIVERSITY
Big Bend	Tampa Bay	400 square miles	Class II Marine Waters/Shellfish Harvesting	200 fish species 40,000 pairs of 25 different species of birds
Bayside	Tampa Bay	400 square miles	Harvesting	200 fish species 40,000 pairs of 25 different species of birds
Polk	Little Payne Creek/ Peace River Watershed	2,188 square miles (Peace River Watershed)	Class III Freshwater/Maintenance of Healthy, Balanced Ecosystem	Assorted plants and animals: cypress, water locust, sweet gum, cabbage palm, live oak, Coreopsis (state wildflower), Florida black bear, white-tailed deer, Florida panther

TECO COAL

Preparation plants at TECO Coal operate on water use demands ranging from as little as 200 gallons per minute (gpm) to as much as 1,200 gpm. A minimal amount of withdrawn water is used in the process of cleaning coal. Ninety-nine percent of all processed water is recycled through impoundments at the company's preparation plants. Withdrawn water replaces water lost to evaporation. In 2006, TECO Coal withdrew 157 million gallons. No water bodies are significantly affected by water withdrawal at any of the company's preparation plant facilities.

There is no direct discharge of process waters to streams. Storm water discharges from coal preparation facilities and mine sites drain into the Upper Cumberland River Basin (Kentucky) and the Big Sandy River Basin (Kentucky and Virginia). Amounts discharged vary in accordance with rainfall amounts.

TECO Coal's goals include a "no net loss" of stream function and aquatic habitat as a result of its operations. The company has a stream mitigation program with projects that include identifying impaired streams, securing property rights, performing stream function assessments, designing improvements, securing permits, constructing the restoration and enhancement areas and monitoring the projects' successes.

The company has 15 projects under development, with three completed, others in permit-pending status, and others awaiting construction or partially constructed.

Left and below: ***Raven Rock Golf Course****. One of the uses for reclaimed land in Kentucky is residential development, complemented by amenities like the 18-hole golf course built by TECO Coal in Jenkins, Kentucky.*

WATER REGULATIONS

The Clean Water Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States. It gives the EPA the authority to implement pollution control programs, such as setting wastewater standards for the industry. The Clean Water Act also continues requirements to set water quality standards for all contaminants in surface waters.

The following sections discuss Tampa Electric's ongoing efforts to comply with the key sections of the Clean Water Act currently affecting the utility industry, while continually looking for new and innovative ways to enhance water quality and reduce sources of water pollution.

Clean Water Act, Section 316(b) (Impingement Mortality and Entrainment)

Section 316(b) of the Clean Water Act requires that cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts to aquatic organisms. The final 316(b) Phase II rule, effective September 7, 2004, imposed significant new federal requirements on existing electric generating units, including Tampa Electric's Bayside and Big Bend stations. At issue are "impingement mortality" and "entrainment" (IM&E).

Impingement is entrapping organisms against screens and other exclusion devices, which sometimes causes injury or death. Entrainment is the passage of organisms through the cooling system and/or pulling them into cooling water systems and the resulting thermal, physical or chemical stresses.

The rule sets technology-based performance standards aimed at minimizing adverse environmental impacts, including reducing IM by 80 to 95 percent, and reducing E by 60 to 90 percent over baseline technologies, as identified by EPA.

The final Phase II rule required the company to submit a Comprehensive Demonstration Study (CDS) concurrent with the submittal of the regularly scheduled NPDES permit renewal (or modification) by January 7, 2008. The CDS had to evaluate the impact of intake structures on the aquatic environment and:

- Provide a determination of whether the facility meets the performance standards, and/or
- Recommend a basis for determining the Best Technology Available for minimizing adverse environmental impact.

The final Phase II rule was remanded in July 2007 by the Second Circuit Court, which made the avenue of compliance with the Clean Water Act Section 316(b) unclear. However, Tampa Electric chose to continue the ongoing CDS studies at Big Bend and Bayside for final report submittal to FDEP in 2009.

At Bayside, IM&E sampling commenced in April 2005, with Tampa Electric being the first utility in Florida to start the process. The CDS will be based significantly on the findings of the IM&E sampling.

Tampa Electric plans to design and construct technologies, operation and/or restoration measures to meet the performance standards. Technologies identified in the preliminary screening for Bayside are continuing: bar racks (IM only); barrier net around intake (IM only); fine-mesh modified traveling screens with an organism handling and return system (IM&E); and behavioral (e.g., light and sound) systems (IM only).

Big Bend's IM&E sampling plan was submitted to FDEP in December 2005. Sampling commenced in March 2006. The CDS will be based significantly on the findings of the IM&E sampling. As part of Unit 4 construction, Tampa Electric installed fine-mesh screens with an organism handling and return system on Units 3 and 4. Tampa Electric believes these units may already meet the performance standards proposed in the Clean Water Act Section 316(b); this will be verified as part of the IM&E sampling plan.

Further, Tampa Electric believes that it will be necessary to implement design and construction technologies, operation and/or restoration measures on Big Bend Units 1 and 2 to meet the originally proposed performance standards. Three technologies were identified in the preliminary screening that will be evaluated further to reduce IM&E at Big Bend: bar racks (IM only); fine-mesh modified traveling screens with an organism handling and return system (IM&E); and behavioral (light and sound) systems (IM only).

Additionally, habitat restoration will be evaluated to determine if and how it can be used to offset IM&E losses. Habitat restoration could be a very viable option to offset IM&E or provide additional credit to meet future performance standards.

***Water testing at Big Bend Power Station**. Environmental improvements related to the installation of selective catalytic reduction, or SCR technology, to reduce NO_x emissions, along with other components of Tampa Electric's $1.2 billion environmental improvement plan, will be beneficial to improving the health of Tampa Bay.*

Clean Water Act, Section 303(d) (Total Maximum Daily Loads)

Under Section 303(d) of the Clean Water Act, states, territories and authorized tribes are required to develop lists of impaired waters. Impaired waters do not meet water quality standards. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop Total Maximum Daily Loads (TMDLs) for these waters.

A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated. The calculation must also account for seasonal variation in water quality.

The Tampa Bay watershed was initially identified as impaired for nutrients (nitrogen), but was eliminated from the impairment list since the EPA and FDEP believe the nutrient impairment will be addressed by the Tampa Bay Estuary Program's Nitrogen Management Consortium (NMC). The NMC is made up of 30 representatives from public entities with permitted discharges to Tampa Bay. The estuary program has implemented a Comprehensive Conservation and Management Plan for Tampa Bay, which focuses on repairing and restoring the bay. Environmental improvements related to Tampa Electric's SCR installation at Big Bend and the repowering of Bayside will be beneficial to Tampa Bay.

Dissolved oxygen at the compliance monitoring station in the Big Bend discharge canal has been occasionally below Florida's water quality standards during the summer months. Tampa Electric entered into an agreement with FDEP to assess the feasibility of operating an aeration system in the discharge canal to increase the dissolved oxygen. The results of this demonstration were inconclusive, and Tampa Electric is currently evaluating the need for further study of this phenomenon, which may be related to natural water conditions. Big Bend is the first once-through cooling power plant in the nation to address this issue.

***Fantasy Island**. Tampa Electric joined the Florida Aquarium and the Tampa Port Authority to restore habitat on a three-acre, man-made spoil island in Hillsborough Bay. Exotic (non-native) plant species were removed, and the island was turned into an education facility, with a dock and science classroom.*