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Santee Cooper isn't just in the business of making electricity and water – we're also in the people business. We continuously look for ways to make doing business with us as easy as possible.

Each year, we contract for an independent survey that asks our customers to rate our services. The survey asks customers questions on a number of topics including reliability, power outages and quality, customer care, service, rates, environmental responsibility, and planning for the future.

In Santee Cooper's latest residential customer satisfaction survey, customers scored us well above the national average, with an overall satisfaction score of 97 percent. Nationally, 92.5 percent of residential customers are satisfied with their utility.

We received near-perfect marks from residential customers in power reliability and outage restoration, with 99.7 percent who said their power is reliable, and 98 percent who said they are satisfied that Santee Cooper works to keep power outages to a minimum.

Additionally, 97.6 percent are satisfied that Santee Cooper restores power as quickly as possible when outages occur. Customer service scored well, with 97 percent indicating Santee Cooper responds quickly to customer questions or concerns. Customers also gave us high satisfaction marks for the energy efficiency programs we offer, and for our environmental stewardship.

Our customer service team works constantly to improve the customer experience, and we recently launched new payment options to make bill paying easier. Now, Santee Cooper customers can pay their bills at any participating Western Union Agent location in the United States. That gives our customers 1,300 new locations in South Carolina and 51,000 locations nationwide to make payments.



Many Western Union locations are in grocery stores and convenience stores where customers already shop, making this payment option extremely convenient, even for customers who live out of state some months of the year. Our online and pay-by-phone options are still available, of course, for the customers who have found these most convenient.

Looking ahead, Santee Cooper will continue to strive for excellence in customer service and to find new ways to make doing business with us even easier. Thank you for your business.

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Farewell To Grainger: A Photographic Essay

Nicole A. Aiello

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About the Cover

A view from inside one of Grainger Generating Station's 300-foot stacks two days before demolition shows this unique structure's intricate brickwork. The two stacks were the last of Grainger's structures to be brought to the ground. Photo by Jim Huff



A Photographic Essay of the Last Days of a Landmark Power Station

Farewell to Grainger Generating Station

The coal-fired Grainger Generating Station stood sentry to Conway and the Grand Strand for five decades. It was a quiet watchman of the millions of visitors to the South Carolina coast and the unofficial symbol that vacation was near. For locals and Santee Cooper employees, it was a longtime friend and provider, and the powerhouse that helped bring back the light after Hurricane Hugo.



by Nicole A. Aiello

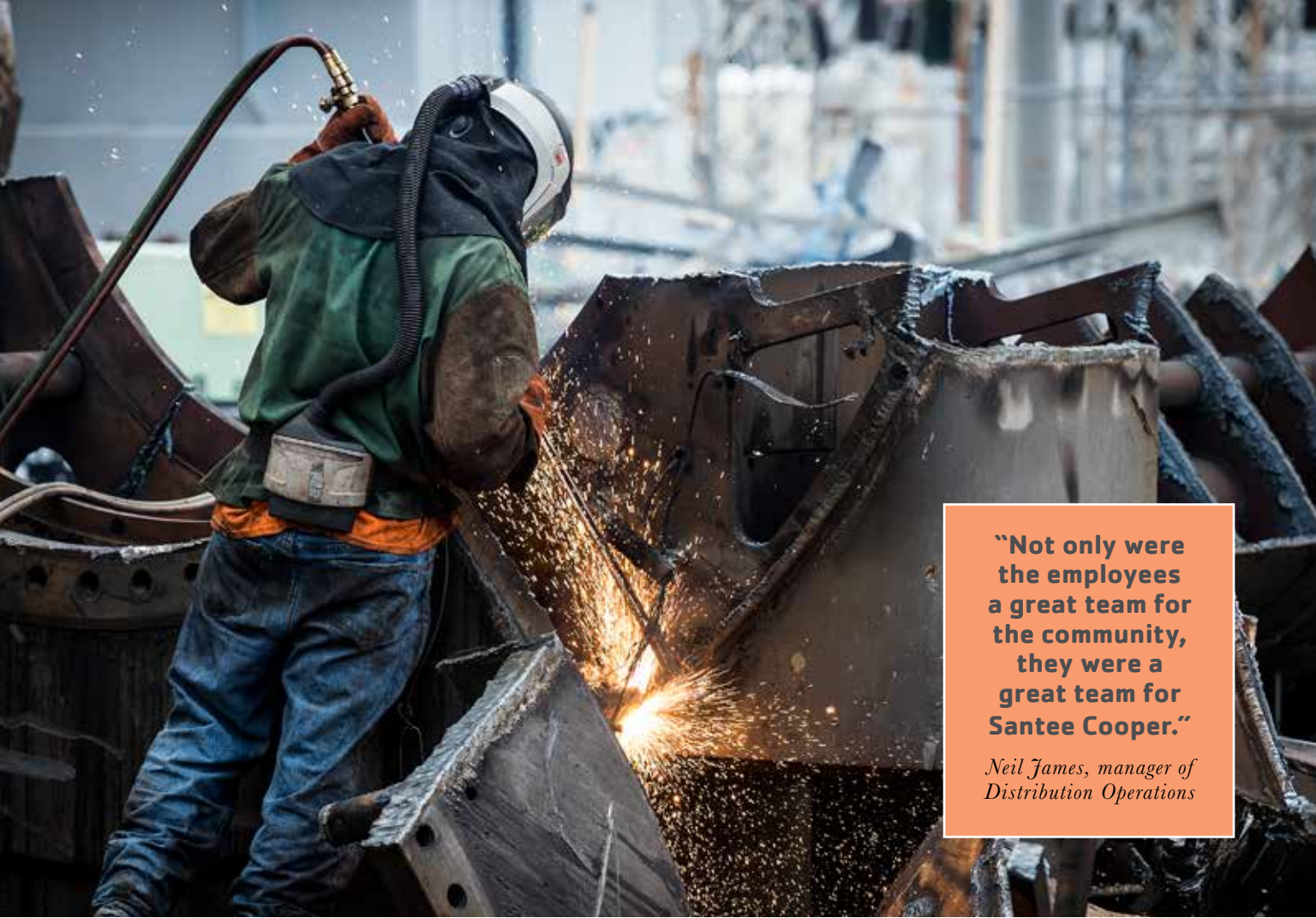
photography by Jim Huff

Grainger Generating Station, as it looked in August 2013.



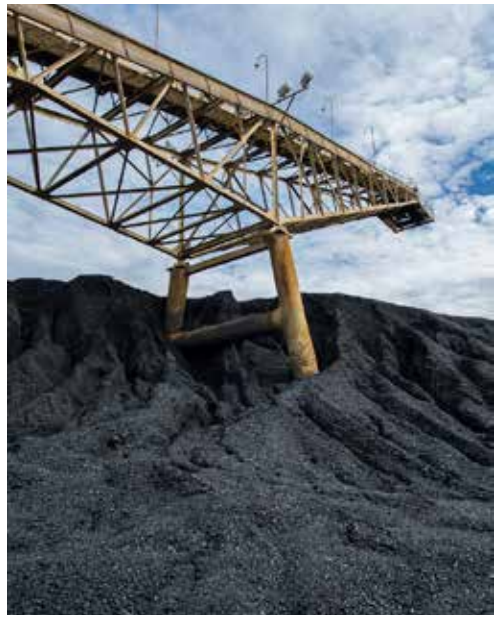
“As Grainger fades away, I’ll take with me all the commitment, care and compassion of the employees. We were truly like a family away from home.”
Ernest Hardwick, manager of Grainger and Jefferies generating stations

A stark comparison can be seen among views of the original turbine floor and architectural features of the main entrance before they were dismantled and the hauntingly beautiful brokenness after demolition began.



“Not only were the employees a great team for the community, they were a great team for Santee Cooper.”
Neil James, manager of Distribution Operations

Demolition included using special dismantling equipment by National Salvage and Service Corp. Strength and hardness of metal on metal is contrasted by the soft, natural beauty surrounding the station. Gauges, pipes, lockers, connections and coal characterized the industrial and industrious station.

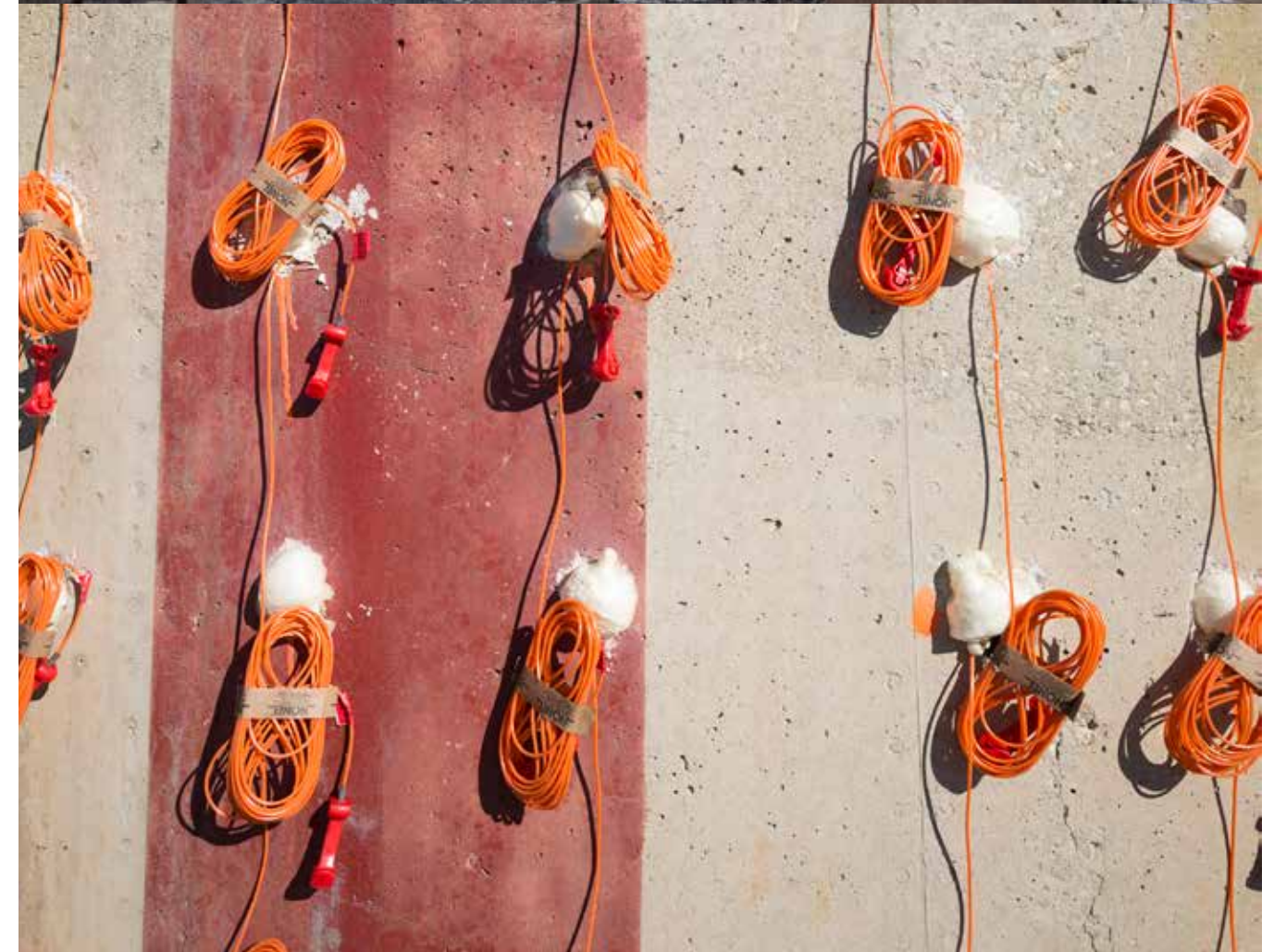


**"I'll miss it and
the people who
worked there
every day."**

*Helen Tindal,
administrative
associate*



Retired from service in 2012 and demolished over the past year, Grainger's last remaining structures, its two iconic stacks, were tumbled to the ground on the cold, rainy Sunday morning of Feb. 7, 2016. A crowd in the hundreds bid adieu as 120 pounds of dynamite brought the 300-foot structures down. In the end, the only things that remained were piles of bricks and memories, and the promise of what may come next.





The Grand Strand's Rich

Musical Legacy Lives On

by Susan Mungo // photography by Jim Hubb

Music and musicians who entertain us make a difference in our lives.

Hearing a song can bring back special memories, ignite emotion, make us jump up and move our feet or magically take us to a different place and time. Music can also evoke change in the atmosphere and region in which it lives. The Grand Strand is no exception. It has been changing and growing because of musical influences for decades.

“The Grand Strand” is a term coined in 1949 to cover the stretch of beaches from Georgetown to Little River on the South Carolina-North Carolina border. From then until Hurricane Hazel hit in October 1954, the area enjoyed a Big Band or East Coast swing sound in clubs and upscale venues like the Ocean Forest Hotel.

As the area began to rebuild and rebound after Hazel, more acts and new sounds began to move in. During this time rhythm and blues, a sound that actually originated in the 1940s, was making some noise in clubs up and down the Strand as entertainers like Otis Redding, the Drifters, James Brown, Count Basie and Ray Charles brought excitement and entertainment to an area already growing in popularity as a vacation destination.

Jim Crow laws and the custom of segregation in public accommodations were still active in the South until 1965, so many of the black entertainers were not welcome to stay in the hotels where they played their music before white audiences.



Judy Collins has been offering music and shag instruction videos to customers for more than 25 years at her shop, Judy's House of Oldies. She also offers the ultimate collection of perfect dance shoes for both men and women to ensure their shag moves are silky smooth.



This page: John Sketers is often referred to as Atlantic Beach's town historian. He has fond memories and signed photographs of musicians who came into a thriving area during the late '50s and early '60s. He also has an endearing smile, which comes to life as he shares stories of dancing at The Beach Club with friends.

At right, clockwise from top: Amateur and experienced shaggers flock to clubs along Main Street (formerly Ocean Drive) several times per year, including Fat Harold's Beach Club and Duck's Night Club. Even the water tower pays tribute to all things "shag" in North Myrtle Beach. Markers along the Shag Walk of Fame honor the people and places that keep Shag alive and well, from personal markers for individuals like Mean Gene "The Dancing Machine," to iconic shag clubs such as OD's Arcade and Lounge, to inductees into the Shaggers Hall of Fame such as Judy Collins.

Atlantic Beach was a small town that flourished during this time because "the Black Pearl" (the area's nickname) was a place where African-Americans could find lodging and places to perform in front of black audiences. One such venue was Sketers' Place, a family owned restaurant and hotel that provided home-cooked meals and rooms to performers. If Sketers' Place was full, Wood's Guest House was just across the street. John Sketers, whose father owned the restaurant and motel, says he remembers entertainers would often end up playing until the sun came up, on the open-air deck of Punk's Patio.



"This era, and the wonderful people and sounds it brought, added life and livelihood to Atlantic Beach," says John Sketers.

As the 1960s marched on, a new sound was catching on that would change not only the Grand Strand but also the state and region. Carolina beach music, a sound that most agree is a mix of rhythm and blues, some East Coast swing and a little jive, began to catch on up and down the Eastern Seaboard.

The sound evokes a feeling of warm ocean breezes and laid-back living, and it brings to mind the feeling of sand in your shoes

as you master your Shag steps on the sand-laden dance floors. A classic beach music tune is 1964's "Under the Boardwalk" by the Drifters. A national hit, it reached No. 4 on Billboard magazine's "Hot 100" list.

"The Shag" is a coastal dance that grew in popularity due to the new beach music sound, recorded and performed by black artists, but enthusiastically embraced by all listeners on vinyl 45 rpm records (singles) or full-length albums (LPs).

Shag dance steps range from intricate, fast footwork, to slow and easy steps and are mastered by the young and old alike. The dance, now the official state dance for

both North and South Carolina, started a movement that is alive and well today and nurtured through multiple shag societies such as the Society of Stranders (SOS). There is also a Beach Shaggers Hall of Fame and numerous championship title holders.

While both Carolinas will eternally claim they are the birthplace of the Shag, Ocean Drive (often referred to as "OD" and a section of North Myrtle Beach) has long been home to a fall, mid-winter and spring migration of shaggers.

This brings big business to the Grand Strand as shaggers flock to beach clubs like The Spanish Galleon, Fat Harold's and Ducks.



It is a culture born from a desire for the sound of ocean waves and a place to showcase dance moves.

On the South Strand, as it's called today, the Pawleys Pavilion has a special place in the hearts of many shaggers. Now long gone, the location is remembered with an annual reunion of Shag enthusiasts who gather at Pawleys Island to remember their favorite Shag spot that saw its heyday in the 1960s.

Today, many serious shaggers often favor special shoes, apparel, jewelry and even artwork. Shops sell Shag specific items to connoisseurs of the fancy footwork, as well

as those vacationing who want to have a bit of sand in their shoes to take back home.

Judy Collins has owned and operated Judy's House of Oldies on Main Street, in North Myrtle Beach, for more than 25 years. She knows more than the retail side of beach music, as she has also been a beach music radio disc jockey for Sunny 106.5. Collins has won Shag dancing contests, helped organize SOS events and is a member of both the South Carolina DJ Hall of Fame and the Shagger's Hall of Fame.

"I've seen beach music provide a livelihood for club owners, musicians and business owners since the late '60s," says Collins

"And it is still alive and well today as thousands come here to enjoy the sounds of the Fantastic Shakers, the Embers, Coastline Band and many others."

The music plays on in North Myrtle Beach and keeps us dancing on, under and all around the boardwalk.



This page, from top left: Special lights, mirrors, a dance floor and music that makes you want to “shake your groove thing” keep customers coming back to 2001 Nightlife.

Backstage treasures at The Carolina Opry include a retiree wall, guitars from an iconic Robert Palmer tribute, cowboy hats, color-coded microphones ready to explode with sound and an elaborate Vegas-style feather headpiece (far right).

The stage has a magical and expectant feel as it awaits the cast.

Exterior of The Bowery, birthplace of country music superstars Alabama.

At right: For years The Attic, now closed, made its home at the former site of the Myrtle Beach Pavilion.



Carolina Beach music bands

will continue to leave their mark on the Grand Strand but as the 1970s and '80s rolled through, groups found themselves competing with something quite different from a jukebox: the disc jockey.

Dance fever hit with the sounds of disco and country in the late 1970s and early '80s, spurred on by music from blockbuster soundtracks like “Saturday Night Fever” and “Urban Cowboy.” Clubs like Tramps, Cowboys, Afterdeck, 2001 and The Beachwagon, just to name a few, popped up from Little River to Georgetown. Most clubs offered raised dance floors, special lighting and everything from an opportunity to Hustle to the Bee Gees under a mirror ball, to the chance to boot scoot your boots off in a line dance as the DJ played your favorite song.

This nonstop music and a seemingly endless dance floor drew large crowds from 18 to 80, providing a boom in the nightlife economy. Many of the clubs have changed hands or styles and now tend to offer a variety of sounds rather than a specific genre. This seems to keep the crowds happy and coming back for more.

The move to DJs in many clubs was not the death of bands by any means. Jimmy Buffet, just getting famous in the mid-1970s, played the Electric Circus and in a surprise appearance, the Rolling Stones played the Myrtle Beach Convention Center in the summer of 1975. But the Grand Strand’s live music scene at its core was essentially about the summer vacation crowds. Smaller venues like Mother Fletchers and The Magic Attic, located right on the beach near The Pavilion on Ocean Boulevard, still had house bands and drew locals and tourists alike to enjoy live music.

In fact, around 1973, four young men in a group known as Wild Country were the house band playing for tips at a legendary club in downtown Myrtle Beach called The Bowery. The band changed its name to Alabama and developed a huge regional following. They played to beach

crowds for seven years before they hit the big time.

Alabama reeled off 21 straight No. 1 hits, and the group says the years they played music just steps away from the Grand Strand’s white sand beaches helped hone their sound: a little bit beach, a little bit Southern rock and a whole lot country.

As Alabama was making a

name for themselves in country music, another trend was about to make a lasting impact in the area. Calvin Gilmore knows a thing or two about the music entertainment industry. As a songwriter, recording artist, entrepreneur and more, he has decades of experience knowing just what appeals to an audience.

In 1986, he started the first variety show on the Grand Strand and called it The Carolina Opry. With that one big idea, Gilmore opened a door that many tried to walk through. After seeing Gilmore’s success, theaters with names such as Alabama, Ronny Milsap, the Gatlin Brothers and Dolly Parton began popping up all over the Grand Strand.



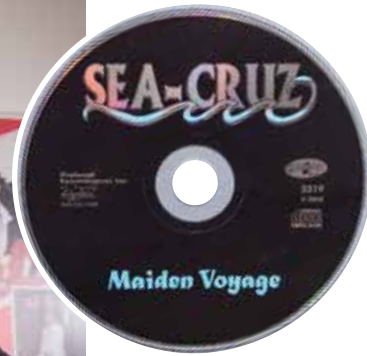
The idea of a main stage, with a musical revue-type presentation where patrons can comfortably sit and be entertained by musicians, vocalists, dancers, comedians

and all types of performers, was untapped potential in the area until Gilmore brought it to life. This particular type of venue helped spur the economy during the off-peak tourism season and that helped the entire area.

Today these variety theaters offer a regular season show, a Christmas show and specialty shows, as well as occasional live performances by visiting musicians. Gilmore’s approach has remained successful for 30 years.

“We never give up on getting better, and we listen to our fans and deliver,” says Gilmore, indeed a pioneer. His impact on the Grand Strand over the last 30 years is immeasurable.





This page: Although he has more awards than wall space to display them, Dino Fair still loves creating new music and playing to live audiences. A true performer in every sense of the word, he has worn everything from an Elvis-themed outfit to harem and bunny costumes to entertain his audiences at venues from clubs and special events to baseball games. He now plays and sings his tunes for those living in and visiting Murrells Inlet.

Murrells Inlet has long been famous

for its seafood. But when the 21st century rolled around, it began to earn a new identity – one that involved music. As busloads of fans were visiting the local musical and dinner theaters up the coast, sounds of guitars strumming and bands singing echoed across the waters. Most Inlet restaurants located along U.S. Highway 17 offer some type of live music.

Dino Fair is a guy who knows a lot about music and the Inlet. He lives there and began playing music at the ripe old age of 3. Currently a member of the band Sea Cruz, he plays each week at Creek Ratz located on the MarshWalk. Fair is a member of the North Carolina Music Hall of Fame, inducted as a member of the Fantastic Shakers. He was also a performer in Dolly Parton’s Dixie Stampede. Although he has officially retired twice, he says the music just will not leave him alone.

“It’s like an itch I have to scratch,” says Fair. The live music, along with salt air breezes and fine to casual dining of the Inlet, seems to scratch an itch for locals and tourists alike.

Generations come and go, and the Grand Strand has changed and adapted along with the music. Today, the beach seems to have every option you can imagine. Indoor concert venues include the House of Blues, which opened its doors in 2008. Outdoor concerts like the Carolina Country Music Fest, entering its second year, will again bring big name country music stars to the beach in June.

You can still dance to the sounds played by a DJ, the jukebox or award-winning bands in beach clubs up and down the Strand. You can sit in the comfort of your seat and take in a variety show or you can enjoy a little music with your dinner along the MarshWalk.

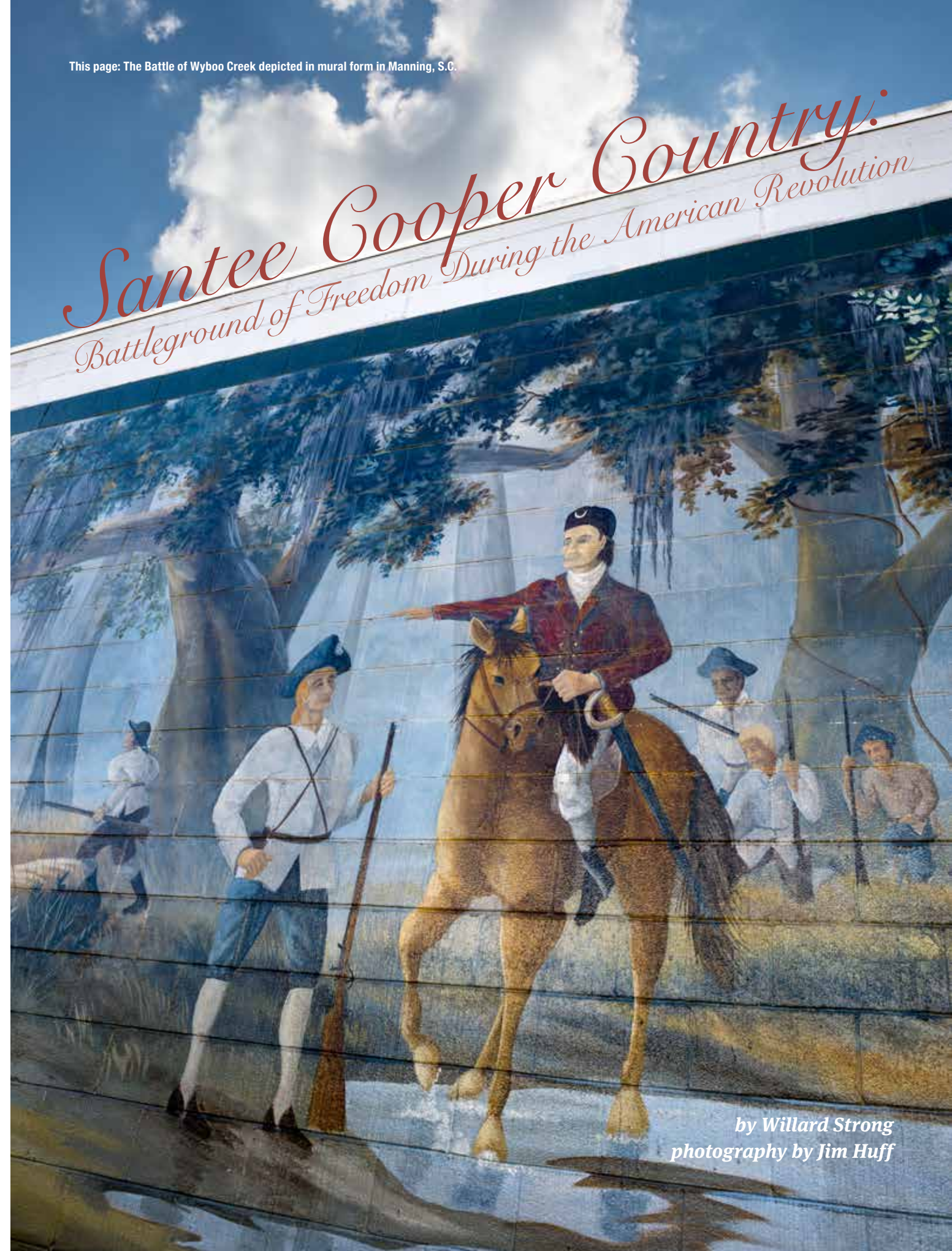
“Our local music entertainment industry has played a very formative role in the evolution of the Grand Strand and its tourism industry,” says Brad Dean, president and CEO of the Myrtle Beach Area Chamber of Commerce. “Today, it offers millions of visitors a family friendly, entertaining reason to make their next vacation a Grand Strand getaway.”

Music is an ever-changing universal language that has had a positive impact on the Grand Strand, providing good times, good music and good memories for many decades and without a doubt, for decades to come.



This page: The Battle of Wyboo Creek depicted in mural form in Manning, S.C.

*Santee Cooper Country:
Battleground of Freedom During the American Revolution*



*by Willard Strong
photography by Jim Huff*

During the American Revolution in Moncks Corner, S.C., there was a wooden bridge crossing what was then Biggin Creek, where Gilligan's at the Dock restaurant now stands on the Tailrace Canal. The bridge crossed over the creek near the Biggin Church ruins and can still be seen today off S.C. Highway 402.

This page:
This Indian mound was Fort Watson in 1781, a British stronghold that was forced to surrender to Patriot forces after a log tower was ingeniously constructed over the mound allowing Patriot sharpshooters the ability to fire inside the compound.

At right:
According to tradition and at least one published source, Brig. Gen. Francis Marion was a vestryman at Biggin Church, located outside Moncks Corner near the Tailrace Canal.

This site was the scene of an April 14, 1780, nighttime British surprise attack against Patriot forces guarding the bridge. Leading the Redcoats, stealthily making their way up the Cooper River, was Lt. Col. Banastre Tarleton and his green-jacketed dragoons, soldiers on horseback. The British and Loyalist forces totaled around 650 men, as opposed to the 500 Patriots camped near Biggin Church.

Sentries guarding the bridge were completely surprised and were quickly forced across the bridge. Twenty Patriots were killed or wounded, and at least 60 men were captured. The British were able to seize for their use 42 wagons, 102 wagon horses and 83 dragoon horses from the engagement.



Santee Cooper Country, the five counties encompassing lakes Marion and Moultrie, is perhaps best known today for lake-centered recreation and fishing and hunting enthusiasts. The area is also well-dotted with sites of Revolutionary War battles (many covered by the lakes) where our ancestors, both white and black, fought hard to claim a way of life we enjoy today. As this narrative shows, the Patriots didn't always win. But in the long war that began in 1775 and ended in 1783, the American partisans eventually prevailed.

"The victory at Moncks Corner gave (British Gen. Sir Henry) Clinton a passage to the country across the Cooper River from Charleston," wrote Henry Lumpkin in his 1981 book, "From Savannah to Yorktown, the American Revolution in the South."

At the time of this battle, Clinton was in Charleston. He had returned with a vengeance following the embarrassing British defeat on June 28, 1776, at the Battle of Sullivan's Island at the half-completed fort (now called

Fort Moultrie) of palmetto logs cut from nearby Dewees Island. News of this improbable American victory, only six days before the Declaration of Independence was signed in Philadelphia, spurred Patriot fervor throughout the colonies, now in the throes of birthing a nation.

Clinton's defeat drove the British from Charleston, and largely from South Carolina, for nearly four years. The American Revolution, which began on April 19, 1775, when British and American forces exchanged fire in Lexington and Concord, Mass., was largely fought in New England and the North for the next two years. By 1780, the war had become somewhat of a stalemate in those locations.

But on May 12, 1780, Maj. Gen. Benjamin Lincoln surrendered Charleston to the British. It was a low point for American independence in the South, in that 5,000 Continental Army troops put down their weapons against the Crown. Historians have consistently stated that the U.S. Army did not endure another defeat of this

magnitude until the First Philippines Campaign during the early dark days of World War II.

The British had subdued, defeated and humiliated the partisan hopes and dreams of a people who had the words of liberty on their lips and in their hearts. Lumpkin summed up the end of 1780 thusly: "This period was the nadir of American military hopes in the South. With no regular organized forces opposing them, the British established chains of forts and outposts in Georgia and South Carolina from the coast to the foothills, an interlocking, mutually supporting network of garrisoned strong points to control and pacify the vast territory.

"At this time, with Savannah and Charleston in British hands, the two main American armies in the area captured or routed, and the Loyalists rallying to the royal standard, the great Southern partisans took the field..."

Lumpkin is referring to four men, including two South Carolinians: Francis Marion and Thomas Sumter.



Eutaw Springs

Living History Days at Camp Bob Cooper

Keeping the tradition of the Swamp Fox and the Revolution alive in Santee Cooper Country are retirees George and Carole Summers, who live on Lake Marion near Manning.

They founded the Swamp Fox Murals Trail Society, public art of battle scenes that graces the sides of buildings in Manning, Summerton, Paxville and Turbeville. They also founded the annual Francis Marion Symposium, a gathering of academics and Francis Marion devotees. It is held each fall in Manning.

To keep history alive to young people, the couple has organized the Francis Marion Living History Days held in February at Camp Bob Cooper. The camp is leased by Santee Cooper to Clemson University. Go to www.swampfoxtrail.com to learn more.

At right: This Patriot re-enactor at the Francis Marion Living History Days showed school children how to start a fire for cooking and heat during Colonial times.



Rise of the Swamp Fox and the Gamecock

At the onset of the Revolution, the 43-year-old Francis Marion lived at Pond Bluff, a modest estate near present day Eutaw Springs. He was an experienced militia man, having fought in two Cherokee Wars in 1759 and 1761. His commanding officer was Capt. William Moultrie, later a general, and the man for whom Fort Moultrie and Lake Moultrie are named. Both Marion and Moultrie were present at the June 28, 1776, Battle of Sullivan's Island, often referred to now as the Battle of Fort Moultrie.

Marion, born in Berkeley County near Cordesville, is credited with being the father of modern guerilla warfare, swift but short hit and run attacks, and then retreating into the swamps he knew so well. The Brig. Gen. Marion was a cautious but effective partisan fighter, fielding an army that came and went with the planting seasons and need for battle. His theater of operations was primarily present day Berkeley, Clarendon, Orangeburg and Sumter counties, and the Pee Dee section of South Carolina.

Sumter was an entirely different soldier than the "Swamp Fox." His approach to fighting the British was consistently simple: "Attack, attack, attack." This bold approach unnecessarily put his men in peril, but to Sumter's credit, he put himself personally in harm's way as much as his men. It was a miracle he was never captured. He endured a serious wound that might have proved fatal to a lesser man.

His theater of operations was similar to Marion's, although the Gamecock ventured farther north with his forces. Sumter, who was born near Charlottesville, Va., lent his surname at Fort Sumter, where the Civil War began in April 1861. He ran a store near Eutaw Springs and for a time lived only about five miles from Marion's home. He lived to the ripe old age of 97, dying at Stateburg in Sumter County, the area known at the "High Hills of the Santee." Sumter was the last surviving American general of the Revolution. Like Marion, Sumter was a militia man before venturing South to seek his fortune along the Santee River.



*Francis Marion's Grave
Pineville, S.C.*

Skirmishes and Battles In Santee Cooper Country, 1780–1781

The bridge across the Santee River on U.S. Highway 17-A was the scene of a battle when it was **Lenud's Ferry**, just north of Jamestown. On May 6, 1780, Tarleton, still the hard charger, had the element of surprise again in his favor when his force of 150 defeated and scattered Col. Anthony White's cavalry and Lt. Col. William Washington's contingent of 350. Between 20 and 30 Patriots were killed or wounded, and another 67 were captured along with 100 horses.

Located on the Santee River north of today's Eutawville, the **Battle of Nelson's Ferry** (or Great Savannah) occurred on Aug. 25, 1780. Brig. Gen. Francis Marion was camped at the ferry and got word that Patriot prisoners captured at Camden were camping at Great Savannah, Sumter's home. Twenty-four British soldiers perished as a result of Marion's attack. Marion became frustrated because the liberated partisans, all Marylanders, declined to join the Swamp Fox. They journeyed on to Charleston to become British prisoners of war.

On March 6, 1781, the **Battle of Wyboo Swamp** was the first of a series of engagements, called the Bridges Campaign, between Francis Marion and British Col. John Watson, whose base of operations was the Indian mound at the edge of the Santee River near Summerton. It was then called Fort Watson, and today is the site of the Santee National Wildlife Refuge.

At this battle, about 250 Patriots fought off at least 400 British cavalry, foot soldiers and artillery in a delaying action around the quarter-mile wide wooden causeway traversing Wyboo Creek, about nine miles south of present-day Manning. The creek drained into the Santee River prior to the building of the lakes. Three British soldiers and six Americans were killed.

"One of Marion's men, Gavin James, personally killed three Tory dragoons on the causeway," says local historian George Summers. "He shot one and then bayoneted two from his horse."

The **Battle of Fort Watson** (April 15–23, 1781) was a frustrating siege for the Americans, but it ended in a Patriot victory. Francis Marion teamed up with

Col. Henry "Light Horse Harry" Lee, a Virginian and the father of Civil War Gen. Robert E. Lee. The British forces numbered about 115, the Patriot contingent 350. The Americans won this battle because of ingenuity of Maj. Hezekiah Maham, one of Marion's men. He suggested building a log tower by felling nearby trees, so the Patriot sharpshooters could climb up and fire from inside the tower. This was done and instead of being slaughtered, Lt. James McKay surrendered the fort. There were two American deaths and none for the British.

The **Battle of Fort Motte** was another siege and another Patriot victory, occurring from May 8–12, 1781, at a British fort that was the mansion home of Rebecca Brewton Motte. Her home, located near the confluence of the Congaree and Wateree rivers (below this forms the Santee River), was occupied by about 150 British soldiers commanded by Lt. Daniel McPherson. The defense structure included a ditch, earthworks and stockade. The Americans carried the day when Marion and "Light Horse Harry" Lee received permission from Mrs. Motte to set her home afire. The redcoats surrendered, and the fire was put out. There were no Patriot casualties, but three British soldiers died.

Occurring on Sept. 8, 1781, the **Battle of Eutaw Springs** was a huge engagement and the last major Revolutionary War battle in the Carolinas. It ended in a draw, although the British abandoned the field. American Gen. Nathanael Green's army won the battle's initial phase, but the British regrouped under Lt. Col. Alexander Stuart. American forces totaled 2,200, with the British fielding 2,000. It was one of the bloodiest battles of the entire war. About 250 Patriots were killed and 367 were wounded. The number of British killed totaled 85, with 297 wounded, and the Americans captured 430 redcoats. After this battle, the British were never able to muster such a large force against Patriot forces.

Two minor battles near Moncks Corner ended 1782 and essentially the Revolution in Santee Cooper Country. The first was the **Battle of Fair Lawn** on Aug. 28. The **Battle of Wadboo** the following day was Francis Marion's last engagement of the war and a defeat.



Brig. Gen. Francis Marion

Thus ended the battle days of the Swamp Fox, whom Lumpkin describes as, "... unquestionably the most distinguished of the partisan leaders on either side of the Revolutionary War."

UNDERSTANDING THE ELECTRIC POWER GRID

The sun sets on a Santee Cooper right of way, where transmission poles carry large amounts of power over great distances.

Inset: A replica of Thomas Edison's original carbon-filament incandescent bulb, which was first patented in 1880.

BY KEVIN F. LANGSTON
PHOTOGRAPHY BY JIM HUFF

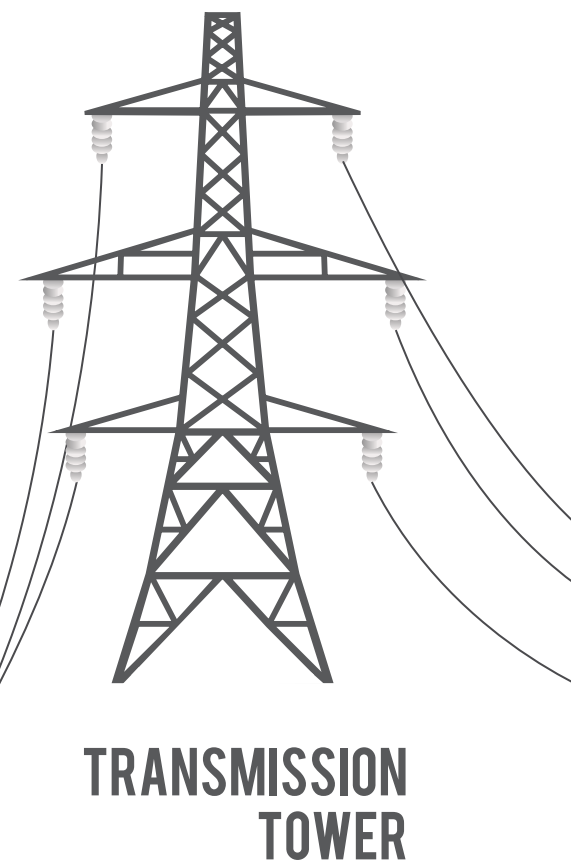
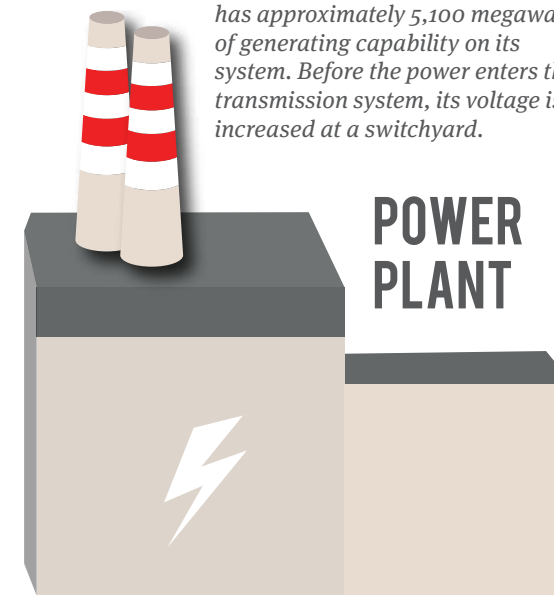


A POWERFUL JOURNEY

Ever wonder how electricity arrives at its end destination? Here's how.

Step One: Generation

Power is produced at an electric generating station. Santee Cooper has approximately 5,100 megawatts of generating capability on its system. Before the power enters the transmission system, its voltage is increased at a switchyard.



TRANSMISSION TOWER

Step Two: Transmission

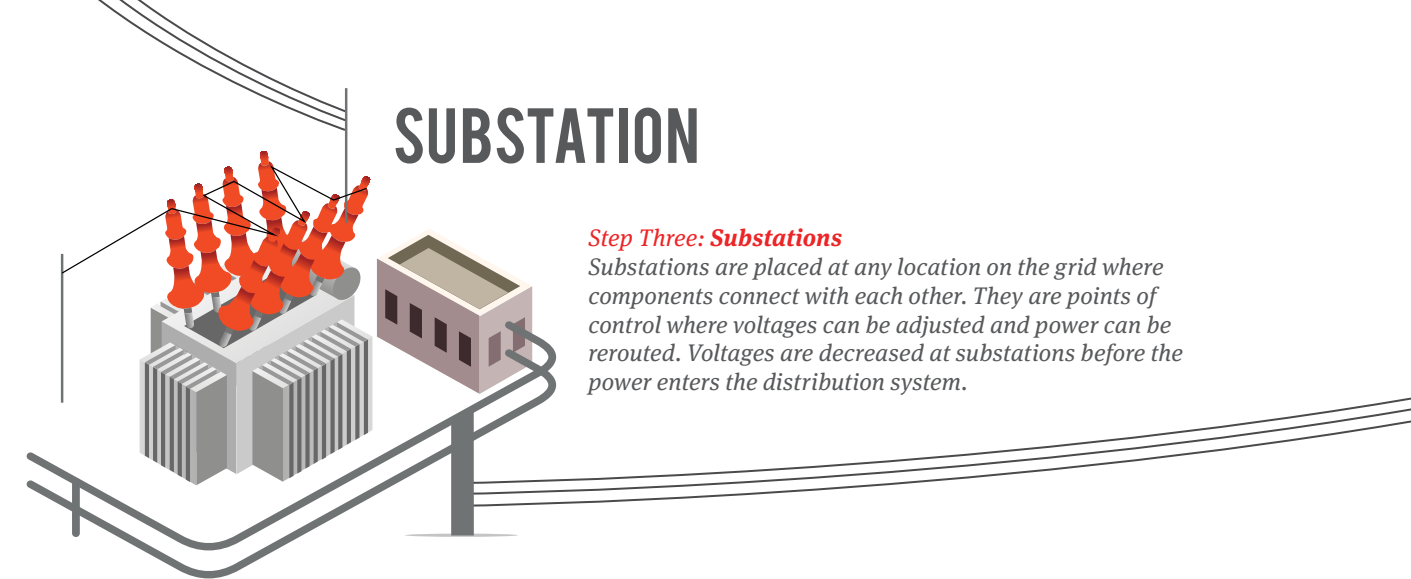
The transmission system carries large amounts of power over great distances. Santee Cooper maintains over 5,000 miles of transmission lines, which have voltages of 230 kilovolts, 115 kV, 69 kV and 34 kV.

The U.S. electric grid is the network that connects electricity producers and consumers through a system of generation, transmission and distribution lines and facilities. It begins at a power plant and ends at your home or business.

According to the U.S. Energy Information Administration, the grid includes more than 300,000 miles of transmission and distribution lines and more than 7,200 power plants and generating facilities, each with at least 1 megawatt (MW) of generating capacity.

Santee Cooper's grid is comprised of more than 7,800 miles of lines and 150 substations that must handle more than 5,000 MW of generation capacity flowing from power plants as large as the 2,370-MW Cross Generating Station and as small as the 311-kilowatt Grand Strand Solar Station.

The grid is a marvel of engineering that enables our way of life, from powering industry and business, to charging your smartphone, tablet, or electric vehicle.



SUBSTATION

Step Three: Substations

Substations are placed at any location on the grid where components connect with each other. They are points of control where voltages can be adjusted and power can be rerouted. Voltages are decreased at substations before the power enters the distribution system.

Yesterday

The grid has come a long way since Thomas Edison introduced the first commercial power grid in 1882. Back then, electric utilities were isolated from one another, and many used low-voltage, direct current (DC) connections to transport their electricity to customers.

While Edison favored DC, Nikola Tesla championed alternating current (AC), which could be converted to different voltages using a transformer and therefore travel greater distances. AC would become the industry standard by the start of the 20th century and has been crucial for Santee Cooper's ability to serve its retail customers.

"Santee Cooper's retail service area is concentrated in parts of Horry, Georgetown and Berkeley counties," says Vicky Budreau, manager of transmission operations. "We have 174,023 retail customers, and most of them are in the Grand Strand area. But our largest power plants are in rural parts of Berkeley, Fairfield, Georgetown and even Anderson counties. Without alternating current, we couldn't push the power from those generating stations over the many miles of lines to reach our retail customers."

Today

Transmission lines owned by an individual utility like Santee Cooper are no longer used

exclusively by that utility. Santee Cooper operates its own electric grid throughout South Carolina, but it's also connected to the grids of neighboring utilities: South Carolina Electric & Gas Co., Duke Energy Carolinas, Duke Energy Progress, Southern Company and the Southeastern Power Administration. This expanded and interconnected grid requires close coordination and cooperation.

"We're responsible for maintaining our own grid just like SCE&G and Duke are responsible for their grids," Budreau says. "It's in our best interest and the interest of our interconnected neighbors to ensure the health, resiliency and integrity of our grid."

Santee Cooper and other utilities must comply with mandatory reliability standards, which are enforced by the North American Electric Reliability Corp. and regulated by the Federal Energy Regulatory Commission. In 2015, Santee Cooper maintained a transmission reliability factor of 99.9959 percent and a distribution reliability factor of 99.9956.

"What this means is that Santee Cooper's transmission delivery points averaged just 21 minutes without service in 2015, and distribution customers averaged 23 minutes without service," Budreau says.

At left: This weathered steel pole carries 230 kV of electricity as part of Santee Cooper's transmission system.

Inset: A view of a turbine from Santee Cooper's 2,370-MW Cross Generating Station

At right:
This 230-kV circuit breaker is one of many critical components of Santee Cooper's substations. Circuit breakers are designed to protect the grid from a fault.

Inset:
Technician A Rob Talbert is part of Santee Cooper's substation maintenance unit, which maintains the integrity of these critical electric power grid components.

Generating Electricity

Quick physics lesson: Electricity is the movement of electrons through a material. Power plants typically produce electricity using magnetic conduction, which occurs when a large number of conductive wires are spun around inside a magnetic field.

These days, power plants are distinguished by the type of fuel they use to generate electricity.

Those fuels are mostly coal, natural gas and low-grade uranium, but the use of renewable resources like wind and solar is expanding. In 2015, Santee Cooper generated approximately 48 percent of its electricity from coal, 23 percent from natural gas, 9 percent from nuclear and 2 percent from renewables and hydro.

With fossil-fueled or nuclear-powered generating stations, electricity is produced using heat to convert water into steam. That highly pressurized steam then travels to the blades of a turbine. As that steam hits the blades, the turbine begins to turn. Giant wire coils inside the generator also begin to turn, which creates an electromagnetic field that forces electrons to move and start the flow of electricity. Some natural gas plants do not use steam. Instead, the gas is ignited and burned, and the heat creates the pressure that turns the turbine.

"Electricity is generated and used in real time, so that supply and demand must always remain in balance," says Tom Abrams, vice president of planning and power supply. "Santee Cooper must be able to generate as much power as is needed at any given time to respond to our customers' needs. The grid simply accommodates the flow."

Moving Electricity

Santee Cooper's transmission system is a high-voltage network of infrastructure that enables the movement of large amounts of electricity over long distances; think of it as the grid's interstate highway system. Our transmission system spans more than 5,000 miles of lines and includes voltages of 230 kilovolts (kV), 115 kV, 69 kV and 34 kV.

"As a general rule, higher voltages are used for moving power longer distances or for moving larger quantities of power," Abrams says.

Before that high-voltage electricity can be used at your home or business, it passes through a substation. A substation is placed at any location on the grid where one component connects with another (i.e. between transmission and distribution lines, from one transmission line to another, or between transmission lines and groups of customers). The Santee Cooper grid includes 105 transmission substations and 54 distribution substations.

"Substations are these points of control where we can adjust the voltage levels up or down, or disconnect or reconnect portions of the grid for improved reliability," Budreau says. "They also contain equipment that meters the flow of electricity, protects the grid and provides information about traffic on the grid."

DISTRIBUTION POLES

Step Four: Distribution

The distribution system represents the last stop from the power plant to the customer. The voltages are lower to allow for the safe, local delivery of electricity. Santee Cooper maintains over 2,800 miles of distribution lines of 34 kV and 12 kV, and more than 50 percent are underground.





At left: Distribution line technicians A Reggie Davis and Wesley Hill prepare to do maintenance on distribution lines.

Inset: Distribution line technician A, Gary Thompson, digs a trench to feed an underground line to a customer's home.

Substations can also connect Santee Cooper's grid to larger industrial and municipal customers or to the electric cooperatives that distribute Santee Cooper's power to its member owners.

manually are now automatically executed in seconds. The grid will continue to change as new technologies emerge and more renewable-energy resources are integrated."

If transmission lines are the interstate highways of the grid, distribution lines are the state roads. They represent the final stop from the power plant to the customer.

Each evolution, like smart-grid technology and distributed generation, presents its own set of opportunities and challenges for utilities like Santee Cooper.

"Santee Cooper's grid has more than 2,800 miles of distribution lines, and more than 50 percent are underground," says Diane Bell, manager of distribution planning and technical operations. "Distribution voltages are 34 kV and 12 kV, which are reduced at substations to allow for safe local delivery of power. These voltages are further reduced by transformers before the power reaches a customer's home or business. These are the can-like cylinders you see at the top of a power pole for overhead lines or those green boxes for underground lines."

"Smart grids eventually can help utilities detect a power outage instantly, speeding up restoration. It can also help consumers learn more about their personal energy use and how they can conserve energy," Bell says.

As more customers add renewable-energy systems to their homes and businesses, Bell says the grid will also need to adapt to allow the two-way flow of electricity on a distribution system that wasn't designed for such a purpose.

The typical U.S. household uses 120 volts, although electric clothes dryers, HVAC systems and water heaters require 240 volts.

"Utilities will also need to adjust for the intermittent nature of renewable energy while still serving those customers whose renewable systems aren't meeting all of their electric needs," she says.

Tomorrow

"The U.S. electric grid might be over 100 years old, but it has evolved along the way," Abrams says. "Processes that were once performed

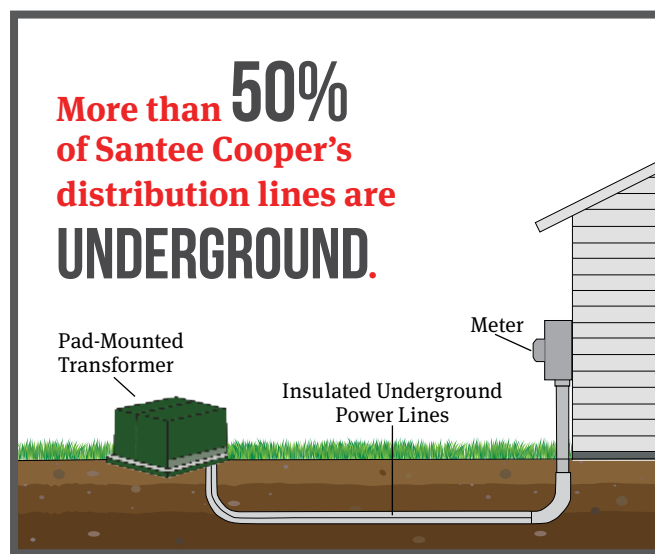
As technology continues to enhance the grid's overall performance, it's also made its safety and security paramount.

RETAIL



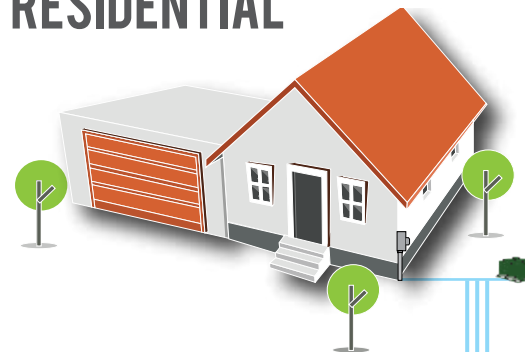
Step Five: Consumers

Just before the electricity reaches your home or business, the voltage is lowered a final time by a transformer (either atop of a pole or inside an insulated box) to 120/240 volts to power lights and appliances. Santee Cooper serves more than 174,000 retail customers, primarily in Berkeley, Georgetown and Horry counties.



More than 50% of Santee Cooper's distribution lines are UNDERGROUND.

RESIDENTIAL



"Protecting the grid from physical and cybersecurity attacks has become a central priority for Santee Cooper and other utilities," Abrams says.

The grid has seen several evolutions over the years, but it's fundamentally the same system that enables Santee Cooper to fulfill its mission of improving the quality of life for the people of South Carolina.

Santee Cooper Launches Community and Rooftop Solar Programs

Solar Share is state's first community solar program

On March 21, the Santee Cooper Board of Directors approved South Carolina's first community solar project and new rebates for its community and rooftop solar programs. All programs launched April 1, and are designed to help customers invest in solar power and cut their electric bills over the life of the program.

Solar Share, the first community solar project available for subscription in South Carolina, offers Santee Cooper customers the opportunity to purchase the output from a share of the Colleton Solar Farm and receive a rebate for subscriptions of up to 4 kilowatts. Customers will receive a credit on their monthly Santee Cooper electric bill reflecting their share of solar energy produced each month at the solar farm, which is owned and operated by TIG Sun Energy and provides solar power under contract to Santee Cooper.

The purchase price for 2016 is \$1.88 per watt, offset by a \$1 per watt rebate, for a net cost to customers of \$880 for a 1-kW subscription. Subscriptions are available through 2018 or until 1 MW is subscribed, with purchase price and rebate amount evaluated each year as the solar panels age.

Solar Share addresses inherent limitations to rooftop solar. Because customers are purchasing output from a shared solar farm, Solar Share expands benefits of solar power ownership to apartment and condominium renters and owners, people who live in subdivisions with covenants that prohibit rooftop solar panels, and to people whose roofs are not properly angled or are shaded.

"Santee Cooper has been the state's leader in solar power for a decade, and we are pleased to open yet another chapter with South Carolina's first community solar program," said Lonnie Carter, Santee Cooper president and CEO.

"Our rooftop and community solar programs and related incentives bring the benefits of solar power to all of our customers, whether they own a roof or not."

The Santee Cooper board also increased rebates for customers who install solar panels on their own roofs and set the April 1 launch for Santee Cooper Solar Home and Santee Cooper Solar Business. Under these residential and commercial rooftop solar programs, Santee Cooper will rebate \$1.30 per watt, up to 4 kW. That rebate totals \$5,200 for a 4-kW system.

Community and rooftop solar customers will be charged a monthly standby fee to ensure they are covering their portion of fixed costs to provide them electricity, so that those fixed costs are not shifted to other customers. They will also receive an energy credit of about 3.8 cents per kilowatt-hour for any excess solar power produced that is put back on the grid. The first 500 residential rooftop customers to sign up will receive an additional 3-cents per kWh credit for excess electricity through 2018, which is also the term for which rebates will be available.

Santee Cooper anticipates the solar panels customers install will last for 20 years, and the residential and commercial rooftop incentives are designed to help customers recover their purchase costs in about 12 1/2 years, depending on installed capacity, energy use and other variables. The Colleton Solar Farm is already two years old, and so the Solar Share investments made in 2016 will be for 18 years, with incentives designed so that customers could recover their purchase costs in about 10 years, depending on subscription size, energy use and other variables.

For more information on Santee Cooper Solar Share, visit www.santeecoopersolar.com.

Photo by Jim Huff

Santee Cooper Continues to Exceed National Average in Customer Satisfaction

Nearly perfect marks in power reliability and outage restoration kept Santee Cooper's latest residential customer satisfaction score well above the national average, with an overall satisfaction score of 97 percent, according to an independent study conducted in October by Market Search. Nationally, 92.5 percent of customers are satisfied with their electric utility.

Beyond overall satisfaction, the study looks at 10 other factors including power quality, customer care, service, rates, environmental responsibility and planning for the future.

Some of Santee Cooper's highest ratings from customers were in the areas of reliability and responsiveness. The survey showed 99.7 percent of customers feel their power is reliable and 98 percent are satisfied that Santee Cooper works to keep power outages at a minimum.

Santee Cooper Board Approves 2016 Series A Refunding Bond Sale

The Santee Cooper Board of Directors approved the sale of \$543,745,000 in revenue obligation bonds on Jan. 8, with proceeds designated to refinance a portion of the utility's existing debt.

The refunding produced approximately \$78 million in net present value savings.

Celebrate The Season Raises More Than \$153,000 for local charities

Celebrate The Season, Santee Cooper's holiday lights driving tour, raised \$153,848.85 during its 2015 run for charities serving Berkeley County and the tri-county area. The month-long holiday festival has raised more than \$562,000 since debuting in 2011. The totals include sponsorships, gate returns and proceeds from vendor sales and the Tinsel Trot holiday fun run.

Santee Cooper is title sponsor and organizer for Celebrate The Season and the Tinsel Trot running event, which are held annually at the utility's Moncks Corner headquarters and its adjacent Old Santee Canal Park. Berkeley Electric Cooperative is Celebrate The Season's presenting sponsor.

Santee Cooper distributed \$87,360.52 in donations from the 2015 Celebrate The Season proceeds to the Coastal Community Foundation's Giving Back to Berkeley Fund. An additional donation of \$15,000 was made to the Berkeley County Museum and Heritage Center.

Along with Berkeley Electric Cooperative, major sponsors Berkeley County, Goodwill Industries, and Home Telecom each received \$4,647 to give to charities of their choosing: the American Cancer Society, the Cypress Gardens Arts Foundation, the Palmetto Warrior Connection, and the Home Community Fund. In addition and included in the total of over \$153,000, 14 non-profit vendors raised \$32,900.33 for the charities of their choice.



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