Piedmont Green Power Starts Up In Georgia
Piedmont Green Power
New Generation

By Jay Donnell

BARNESVILLE, Ga.

In 2005 Rolcast Energy was formed to develop biomass power projects. The company’s first project was in North Carolina where it converted a 35 MW coal plant to a biomass plant. In 2010, Rolcast helped its parent company, Atlantic Power, acquire a 38 MW biomass-fired facility in Michigan, which Rolcast now manages. Those plants were built more than 20 years ago. When it comes to new plants, Rolcast Energy thinks on a larger scale.

In April 2010 Rolcast Energy selected Zachry Industrial, Inc. to build a 53.5 MW plant in Barnesville, called Piedmont Green Power. Zachry was responsible for all aspects of engineering, procurement and construction. The project cost approximately $210 million to complete. Rolcast Energy’s parent company, Atlantic Power, provided the project’s equity and a syndicate of project finance banks provided the debt. Piedmont is the first greenfield development project of its kind in the state of Georgia.

The project achieved its first major milestone in 2009 when Rolcast Energy and Georgia Power executed a 20-year power purchase agreement. Georgia Power is Southern Company’s largest subsidiary and utilizes 100% of the facility’s output.

In the middle of April of this year, Piedmont Green Power took delivery of the facility from Zachry Industrial and declared commercial operation. Atlantic owns the facility while Rolcast Energy manages the asset. The facility is using in excess of 500,000 tons of forestry and urban wood residue annually and it will generate enough electricity for approximately 40,000 homes in cooperation with Georgia Power. The location of the plant was of the utmost importance to Managing
Director John Campbell,

“We knew we needed a site with great road access that didn’t impinge on the local community and that had good transmission access, and we have a Georgia Power 115 KV (transmission) line adjacent to the site,” Campbell says. “We knew we needed to keep the plant around 50 MW to make the development a bit easier with respect to permitting.”

Campbell adds that even before the infrastructure considerations, it was imperative to pinpoint a location with a community that would be supportive of the project and that had strong leadership. “In order to get a project like this done, all of the stakeholders need to want to make it happen—from Georgia Power to the Public Service Commission to the city and its leadership.”

Specifically, the project evolved from the PSC’s integrated resource planning, which it carries out every three years, and during which the PSC looked at Georgia Power’s 20-year projection of its demand needs, and the need for additional capacity emerged, especially renewable capacity.

Atlantic Power, a public company located in Boston, which owns several renewable energy projects in North America, owns 60% of Rollcast Energy and they were instrumental in getting the project financed. Investors are confident there won’t be any shortage of wood in the state of Georgia. “There aren’t many places in Georgia that don’t have an abundance of wood for a biomass plant,” Campbell says. “More is being grown than being harvested.”

The biomass plant created about 300 jobs during the construction period and now has 22-24 people working during normal day-to-day operations. The plant subcontracts operations and maintenance to Delta Power Services, which is owned by Babcock & Wilcox and which provides essential training.

Rollcast’s Dave Klutz, vice president of engineering, with 40 years of experience in renewable energy technologies, was among those instrumental in the evolution and startup of the facility.
Raw Materials

Matt Jones is the raw materials manager for Piedmont and he wants to have a solid mixture of urban wood waste and forest residue, but it will take some time before he can get the results he desires. “Our goal is to be more than 50/50 urban waste, but it’s going through a learning curve, you can’t have the plastic or the blue paint on the pallets,” Jones says, referring to the urban wood he’s currently procuring from eight collection centers toward Atlanta. “It’s a learning curve; it’s not going to happen overnight.”

The plant freely mixes incoming urban waste and forest residue, hardwood and pine, in the wood yard without complications.

Jones and Rolcast are also buying bark residue, as well as purchasing wood residue from several small pallet mills, in addition to procuring chips from probably two dozen logging contractors.

Rolcast hired Wolf Material Handling Systems to “turn-key” most of the wood handling and preparation. Wolf’s scope of supply begins with the incoming truck scales and through to the top of the fuel feed bins at the boiler, to the tune of 4,000 lineal feet of belt on the roughly 2,000 ft. of conveyor length.

Loaded trucks come onto Cardinal scales and proceed to two adjacent Airflex drive-through truck dumping stations, which means trucks don’t have to back up as is often seen and which streamlines truck throughput. The plant requires three to four truckloads of material an hour. The empty truck goes through an out-bound scale for re-weighing.

The trucks dump wood material into two large bins and wood proceeds through magnetic separators, which may pull oversized metal such as wire rope, barbed wire and banding straps. Wood material continues into a West Salem Model 72-24 disc screen that processes 500 green tons per hour of pre-ground wood and bark, screening at a 3 in. and minus product. Anything that’s over 3 in. goes through a Model 5472B vertical swing hammer hog to process up to 125 green tons per hour of the oversized wood and bark rejected by the disc screen.

The wood goes out to the Wolf Material automated stacker/reclaimer system and is spread down the pile for a better blend. If one truck’s residue is wet, for example, spreading the material provides for a more homogeneous mix. When the blended wood goes into the boiler there’s a more consistent burn. Basically the wood shouldn’t sit in the yard for more than 45 days.

The radial reclaimer pulls the wood in as the boiler needs it and it goes on the fuel conveyors up to three bins in front of the boiler. Vice President-Asset Management Dave Dunbar believes Piedmont’s system is extremely efficient. “We’re always overflowing those bins, keeping them full, and the excess goes back to the pile so we always want those bins full; there’s eight minutes of storage in those bins,” Dunbar says. In case the reclaimer arm and supply arms need to be moved, an auxiliary fuel reclaiming method using a front-end loader keeps the wood moving.

“It’s the latest class of automated wood fuel handling,” Dunbar says. “Wolf Material Handling Systems did a good job and has worked well with us.” Fuel handling uses an Allen-Bradley (Rockwell Automation) controller.

Jones says they’ve had 50,000 tons under the reclaim line, and he speculates that 35,000 tons is a good working number. Their target is approximately 25 days of stockpiled and working fuel.

The plant tries not to run its belt conveyors too fast. In a power plant with coal the conveyors run at much higher speeds, but that isn’t applicable with biomass because the material is lighter and less dense.

Biomass Energy

EPI (now owned by Outotec) supplied the boiler island, from fuel feed to the stack. The plant operates a fluidized bed boiler, which Dunbar notes naturally produces low nitrogen oxide (NOx) emissions because it has a low firing temperature, but they also have a non-selective catalytic reduction of nitrogen oxide through
ammonia injection. “You inject it at the right temperature and it reduces NOx even further to meet our permit limit which is 249 tons per year of NOx,” he says.

An economizer makes the boiler more efficient, and an air heater heats up the incoming air using waste gas so it can drive off the moisture of the wood faster, and from there it goes to a Dustex baghouse or fabric filter, which produces a very clean gas and then up the stack.

Dunbar emphasizes they do several things with regard to emissions, starting with having complete combustion and thus not making much carbon monoxide or sending many particulates over from the boiler. The fluidized bed is like a thermal flywheel, he explains. A bed of sand is several feet in depth and underneath it are little nozzles through which air shoots up at high pressure. When they start up the unit they use biodiesel oil that heats up the sand particles to 1500°F, so that provides a place for the wood as it’s put in the furnace. There’s so much heat there that it quickly drives the moisture out of the wood as it continues combustion in and just above the fluidized sand bed.

“We want to make sure that bed is within 100 degrees all the way around so that all the tubes and the distribution are producing equal steam,” Dunbar says.

Dunbar adds they selected a BFBC in part because it has better emissions typically than a stoker and can take a wider range of moisture content of the fuel.

A Siemens SST-600 steam turbine generator system is run at 1400 PSI, 900°F. “This is more efficient than most biomass plants, which run at a lower pressure and lower temperature,” Dunbar says. The parasitic load on the plant is about 9%, or approximately 5 MW used internally.

Other suppliers include Air Techniques for the CEM (continuous emissions monitoring) system; SPX condenser, feedwater heaters and cooling tower; Emerson plant distributed control system (DCS); ABB generator step-up (GSU); Cummins Power emergency generator; Siemens water treatment.

Environmental

The ash residue is also recycled. Ash handling was supplied by Austin Mac. Ash comes from several discharge points and goes into a silo, and currently most of it goes to one large farmer. The calcium carbonate ratio is right for land applications. Farmers say it works better than lime.

Another environmental edge to Piedmont Green Power is that it’s located adjacent the city’s wastewater treatment plant. Piedmont takes the treated effluent water and uses it as a cooling medium. “After we’ve done it goes back to the intake side of the plant and is re-treated and comes back to us. So we’re recycling treated water as well. We’re not using well water or river water.” Campbell says.

Jones says the plant is set up to run 48 weeks of the year, with two weeks of downtime in the spring and fall in preparation for the big peaks in summer and winter. More than 100 workers will be at the plant during those outages.

Rollcast Energy is planning to build a carbon-copy plant at LaGrange, Georgia in Troup County, which may become the primary destination for urban wood waste given its location nearer the interstate and the ample number of landfills between it and Atlanta. (LaGrange is about 60 miles due west of Barnesville.) In 2012, it signed a 20-year PPA with Georgia Power.

Campbell believes that biomass has many benefits that other forms of renewable energy don’t have. “It’s important to note that this type of plant provides dependable baseload power,” Campbell says. “Georgia Power doesn’t have to support biomass like it does solar and wind. When the sun stops shining or the wind stops blowing, they’ve got to have something else on standby to replace that power and relieve the stress on the transmission grid. The net of it is that biomass power is much higher quality electricity and at a lower cost, particularly when you consider the extra expense to support the up and down nature of solar and wind.”

Campbell says that as is the case with most plant startups, they’ve had to tweak the system here and there and they’ve reached the post-startup stage now where everything is smoothing out. He says the plant’s “availability and capacity factors have been outstanding.”

Plant control room