TARGET: ZERO FOSSIL FUELS

Right from the nurseries where it plants and nurtures seeds and young trees, all the way to the trucks that deliver its final products, Södra Cell is eliminating fossil fuels wherever they may occur. This ongoing ambition is driven by its strong sustainability target to reduce CO_2. Södra is aiming for fossil-fuel free production by 2020 and fossil-fuel free transport by 2030.

The Södra group is also having a major push to reduce the amount of energy it uses and also another sustainability target to reduce electricity consumption by 10% across the board by 2025. The company is already a major supplier of green electricity to the Swedish national grid as well as an important supplier of district heating; last year, it supplied 335 GWh of electricity – equivalent to the annual consumption of 130,000 electric cars – and provided 414 GWh district heating, enough to warm 25,000 homes through Sweden's very cold winters.

All these achievements, of course, mean that there is a healthy amount of ongoing investment at Södra Cell's three mills, Mörrum, Värö and Mönsterås. The mills are all located in southern Sweden and produce a combined total of 1.6 million tonnes of market pulp annually.

MÖRRUM – A SPECIALTY MILL

Södra Cell's Mörrum can be considered a specialty mill in the world of pulp – in addition to producing some 300,000 tonnes per year of high-quality softwood market pulp, it also produces 170,000 tonnes per year of dissolving pulp for the production of textiles. It has two separate lines at the mill, with Line 1 producing dissolving pulp from hardwood and Line 2 producing the softwood pulp. The mill is perfectly located at the delta of the Mörrum River close to both soft and hardwood raw material, as well as close to the Port of Karlshamn where its pulp is shipped to customers around the world.

Among the latest investments at the mill was the installation of a new evaporation plant from ANDRITZ, which is part of the mill's long-term goal to increase pulp production capacity at the site to 500,000 tonnes annually.

HANNA BJÖRKMAN
Team Manager
Energy and Recovery
Södra Cell Mörrum

"I have to say that we really were impressed with the help we received from the ANDRITZ process experts who went through every possible scenario with us before the connection to the new evaporation plant was made."

Södra Cell is one of those far-sighted northern European pulp producers that is constantly looking for ways to become fossil-fuel free and to make high-grade products in the most environmentally sound ways possible. ANDRITZ recently aided Södra Cell towards its sustainability target by supplying the latest in evaporation plant technology to its Mörrum mill in southern Sweden.

"After we converted Line 1 to dissolving pulp in 2012, we noticed a lot of bottlenecks at the mill, and we began gradually solving them in a step-by-step fashion," says Jan-Olof Karlsson, Head of Technology, Södra Cell Mörrum. "We started with wood processing, as that was causing us obvious quality issues, and then moved swiftly onto the brown stock washing system, which was very old and worn and badly in need of replacement. After these two bottlenecks were solved, we could see pretty clearly that the evaporation plant would be the next part of the process that needed serious attention."

Hanna Björkman, Team Manager, Energy and Recovery at Södra Cell Mörrum, continues, "We were using two old evaporation lines and they were in a poor state, leaking, and very noisy. As we are very close to urban areas near this mill, this was not a good situation. The old system was also very unreliable, and we were losing a lot of production due to problems with chemicals in the process – we often had to shut the lines for cleaning.

"But the main problem with the old evaporation plant was the amount of energy it used. Of course, the evaporation plant is one of the most energy consuming parts of a mill anyway, but when you are working with some technology from the 70s, it made the economics even more worrisome."

A new evaporation plant had been talked about at Mörrum for a very long time, more than two decades. Karlsson says, "The fact is replacing an evaporation plant isn't an easy decision; it's a big event to realize, and a major investment. We had actually been discussing a new plant for a long time but the main problem was where to put it. We were even thinking we might build on the old one, perhaps retrofit with new technology."

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FOR FURTHER INFORMATION SEE PAGE 2

The new 7-effect high dry solids evaporation plant replaces existing evaporation lines and significantly enhances energy efficiency at the Mörrum mill

Södra Cell's team worked on a pre-study for one and a half years with its own technology experts as well as suppliers and outside consultants. The final board decision came in 2016 to go ahead with the new plant.

"We chose ANDRITZ to supply the evaporation plant at Mörrum for a variety of reasons," says Karlsson. "We looked into all areas with all suppliers, technically, financially, of course, but also organizationally. It was really important to us how a supplier would run the project from their side.

"It was clear quite early that there was big support from ANDRITZ as a company for taking on this project, and it seems they really wanted to work with us. It even seemed that there was an element of prestige in working with Södra Cell Mörrum. We liked that approach."

"PUT THE CAT ON THE TABLE"

The contract to supply a new evaporation plant was signed in March 2016 and the scope from ANDRITZ included an integrated tank farm, integrated stripping plant, and a liquid methanol plant. The 7-effect high dry solids plant was supplied to enhance energy efficiency at the mill, as well produce 46.5 MW of district heat to the surrounding municipalities. The plant was also to enable usable side streams of bio-sludge and tall oil, as well as produce very clean condensates for reuse at the mill.

Due to a lot of experience with recent projects with various results, Södra Cell decided to form a steering committee comprising senior management from both Mörrum and ANDRITZ. One of the main areas of focus was the importance of communication during the project. The steering committee gave the project teams the responsibility to come up with a solid plan that would enable clear lines of communication, as well as a way of creating mutually-adhered-to goals. After a period 'behind closed doors', where all the project members were in attendance, a list of 'Project Norms' was created for all the key people involved in the evaporation plant project.

The list included nine different elements: Safety First; Respect the Time Schedule; Direct Communication; Respect Rules; Respect Each Other; Transparency; Be on Time and Prepared; Everyone is Responsible for the Whole Project.

"The Finnish have a great expression, 'put the cat on the table', which basically means 'let's talk about the real issues here'," says Karlsson. "This is exactly the sentiment and atmosphere we wanted to create, as communication is key to the successful execution of such projects. The key evaporation project members all signed the list of nine Project Norms and it proved to be a very successful tool as the project commenced."

Mari Räsänen, Senior Project Manager, ANDRITZ, who was responsible for the Mörrum project, says, "Södra Cell had a really interesting way to kick off this project; we all met each other around a table and got to know each other on a personal basis. It made for open lines of communication right from the start, and the Project Norms list was often referred to whenever the project encountered some challenges."

JUST-IN-TIME

This project at Mörrum was a major challenge, as there there were significant logistics involved due to the sheer number of process parts as well as the construction

JAN-OLOF KARLSSON
Head of Technology
Södra Cell Mörrum

"The fact is replacing an evaporation plant isn't an easy decision; it's a big event to realize, and a major investment."

(Left to Right) Mari Räsänen, Senior Project Manager, ANDRITZ, Hanna Björkman, Team Manager, Energy and Recovery, Södra Cell Mörrum and Magnus Lundström, Project Manager, Södra Cell Mörrum

of the building. Magnus Lundström, Project Manager, Södra Cell Mörrum says, "In some way we had two projects going on here; we had the process and machinery project with ANDRITZ, as well as the building project. It is always a challenge when you build something new at a mill."

One year after the contract signing, the first equipment began arriving from ANDRITZ, starting with the steel for the erection. "After the steel we started bring in the 7-effects, three of which came from Spain and the rest from Finland," says Räsänen. "This was an exciting time, as the effects were very large and had to come by sea and through some very tight channels."

When equipment arrived, due to space constraints at the mill, the project had to commence in a well ordered just-in-time fashion to make sure the work could proceed according to schedule. Any delays had to be communicated immediately so that any impact could be taken into account. "This is where the steering committee really came into its own," says Räsänen. "We really felt that we could approach any members of the committee immediately if there was a problem and we could solve it together."

On the November 27, 2017, the new evaporation plant was ready for commissioning and start-up. To keep ahead of the project in terms of the new skills required, the mill invested in a simulator so the operators could familiarize themselves with the new evaporation plant's processes and operation. "This made for a very good start," says Björkman. "We were able to train the process operators but also we were able to go through all the logic and programming sequences in pretty much a real environment."

SWITCH-OVER IN JUST FOUR HOURS

After all the building and erecting, connecting of numerous pipes, the electrification and commissioning of pumps and ancillary equipment, the whole switch-over from the old plant to the new resulted in the mill being without an evaporation plant for only four hours. "We were prepared for a much bigger and longer drama," says Björkman. "But it went really smoothly, which tells us a lot about how well the preparations went."

"I have to say that we were really impressed with the help we received from the ANDRITZ process experts who went through every possible scenario with us before the connection to the new evaporation plant was made."

So what difference has the new plant made at the mill? Björkman concludes, "Well, we now don't have an evaporation plant that hinders the rest of the mill; we have an energy surplus and, of course, the working and living environment in and around the mill has improved a lot. This capacity and energy efficiency has enabled us to increase the supply and delivery of district heating to three local towns and villages around the mill.

"I'm really glad we didn't do a retrofit; that would not have brought us to where we are today!"

Clearly, the new evaporation plant at Mörrum is another major step towards Södra Cell's high-bar setting of its sustainability goals.

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FACTS & FIGURES:

Production Softwood/Hardwood:	470 kAdt/a 60%/40%
Pulp raw material:	Spruce, Birch, Aspen, Beech
Number of thermal effects:	7
Evaporation capacity:	700 t/h
Weak liquor dry solids / temperature:	15% / 88°C
Firing liquor dry solids:	78% excluding ash
Steam economy (excl. District Heat):	5.3
Warm water temperature:	50°C
Stripping capacity:	360 t/h (B+C-condensate)
MeOH in A+stripped condensate / share:	<60 mg/l / 100%

FEATURES:
Production 46.5 MW of District Heat side streams
(bio sludge and tall oil waste streams)

SUB-SYSTEMS:
Integrated stripping for all C- and B-condensate MeOH liquefaction