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Efficiency NB's industrial program is designed to help accelerate industry investments. By using energy-reducing practices and new equipment that will lower energy intensity, it will allow industry members to better manage their energy costs in the long term while improving their competitiveness. For more information on Efficiency NB visit www.energycnb.ca.

Twin Rivers Paper Company Inc. (formerly Fraser Papers) of Edmundston, NB received financial incentives totalling almost \$61,000 to install new pumps with variable speed drives. Annual savings are estimated to be more than \$100,000, with an overall payback period of less than two years and GHG reduction of 1470 tonnes.

"Energy efficiency is a critical part of our business and is essential to the viability of any pulp mill in the country."

—Michelle Mazerolle

For more information about Twin Rivers' energy-efficiency improvements, contact:

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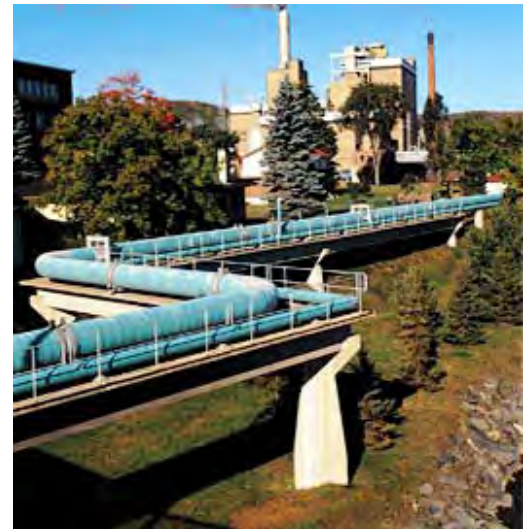
<http://www.twinriverspaper.com/>

Variable speed drives cut energy use at Twin Rivers pulp mill

Twin Rivers' Edmundston pulp mill produces bleached softwood sulphite pulp and groundwood pulp for the manufacture of specialized packaging and publishing papers at its Madawaska paper mill. It has a production capacity of 370,000 tons per year and employs approximately 360 people.

Twin Rivers has a long history of environmental performance. Between 2006 and 2008, for example, the company's aggressive energy reduction program cut greenhouse gas (GHG) emissions by 53%. All of its pulp and paper operations are certified to ISO14001 standards, and environmental data, such as energy and water use and GHG emissions, are systematically tracked.

With even greater energy efficiency in mind, Twin Rivers installed variable speed drives (VSD) on five of the Edmundston mill's pumps. This case study focuses on the VSD projects and outlines some of the other energy initiatives that Twin Rivers has undertaken.



Efficiency NB & Twin Rivers

Efficiency NB (ENB) first approached Twin Rivers about two years ago and gave a presentation to the company's senior managers and other staff involved in energy management.

"I was then invited to one of ENB's presentations that explained the types of projects that would qualify for funding," says Michelle Mazerolle, one of the mill's two electrical engineers. "They told us what they were looking for in terms of detailed feasibility studies as well as for measurement and verification plans. They really opened the door for us."



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In early 2009, Twin Rivers' senior management approved three VSD projects and the company received approximately \$60,900 in funding through Efficiency NB's special, one-time Implementation Stimulus Fund.

Variable speed, definite savings

Over the years, water conservation projects at the mill, combined with the closure of a paperboard machine and the part-time operation of its groundwood mill, reduced fresh water demand. But even with the decreased demand, the mill's three river pumps were needlessly pumping excess water, which then overflowed back into the St. John River.

At least two other pumps were also operating at higher than required volumes with control valves only open between 30-40%.

The relationship between a pump's speed and its energy requirement is known as the cube law, because the need for power increases with the cube of the speed. This means that a small increase in pump speed requires a lot more power, but also that a modest speed reduction can give significant energy savings. Using a drive, a pump running at half speed consumes only 1/8 of the power compared to one running at full speed.

Twin Rivers decided to investigate how variable speed drives could lower the electrical demand required to operate its pumps. VSDs are a relatively inexpensive way to accurately control the speed and power that is applied to an electric motor. By adjusting the speed of a motor, less energy is wasted, and costs are reduced.

New pumps with VSDs were installed to replace three river water pumps, one groundwood pulp pump and one acid condensate wash pump. Detailed feasibility studies showed that purchasing and installing the new equipment would cost about \$192,000 but would cut energy use by about 1,820 MWh, or about \$105,600 each year, providing an overall payback period of less than two years.

Left to right: Jeannot Levesque and Jacques Martin installed the acid condensate wash pump VSD. Daniel Couturier and Michel Plourde installed the three river water pumps. Photos courtesy of Twin Rivers.





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Before undertaking the feasibility studies, Mazerolle first canvassed her coworkers for input. “I asked them if they were aware of specific applications where we were pumping against closed valves,” she explains. “I’m not an expert in pumps, so they helped me pick the most promising ones.”

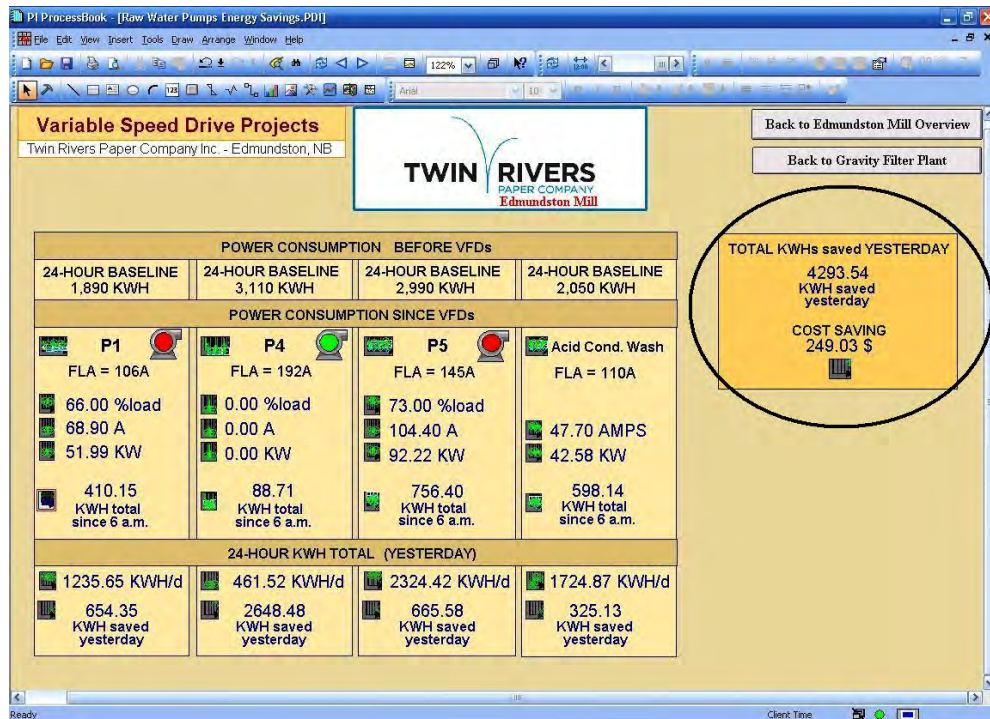
Once the best applications were determined, Mazerolle analyzed the total electrical consumption of each of the five pumps to establish a baseline. Research into VSD manufacturers, the approval of upper management, and an application to ENB for project funding followed.

All but one of the new pumps with VSD were installed in March 2009 and installation and construction was completed within two weeks. Commissioning of the three river water pumps was done in late April during a scheduled maintenance shut down; the groundwood pulp pump has not yet been received from the manufacturer.

Measuring the savings

All of the statistical information from the new equipment is connected to Twin Rivers’ PI system, a data management program that is integrated with the company’s control network. “I can monitor, in real time, the speed and power consumption of each pumping system and determine the power consumption per day, per week or per year and see any problems right away,” says Mazerolle. “Since the PI system is connected to the mill-wide network, the information is also available to all staff.”

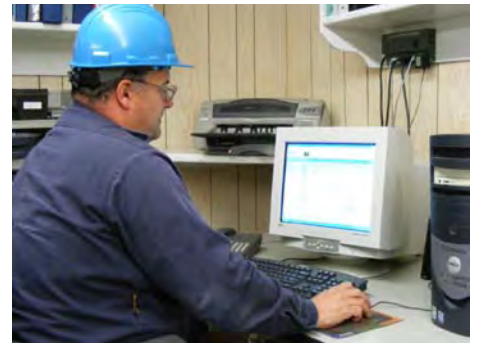
Pictured is a screen capture of the daily energy savings from the VSD projects.
Graphic courtesy of Twin Rivers.





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Other than basic maintenance, Mazerolle says that no new or ongoing resources are needed to run the new equipment. “The technology isn’t new and we use VSD in many other applications in the mill,” she says. “But, the drives we chose for this project are from a different manufacturer than we usually use so I will be offering some training to operators to troubleshoot any problems.”



Pictured at right: Instrumentation technician, Serge Ringuette programmed the lever controllers that control the VSDs.

Challenges and benefits

Mazerolle says that construction, installation and commissioning of the new equipment were straightforward. “The only real challenge we faced—other than the fact that I still don’t have one of the pumps—was that we had to add four electricians to our existing crew to do the construction work,” she says.

The financial benefits, on the other hand, are already apparent. As mentioned earlier, the feasibility studies showed that the new equipment could save the company about \$105,600 in annual energy costs. Data collected since the work was done show that the savings could be much higher.

“We only have data for the three river pumps but the preliminary results show that our savings will be about 35% greater than what we expected,” says Mazerolle, explaining that the higher savings can be attributed to the fact that she was conservative in her estimates of the amount of water flowing back into the river.

Mazerolle also notes that she has received many positive comments about the project. “Buy-in will grow even more once people see the actual savings,” she says. “I’m trending those savings day-by-day and it’ll help justify investing more in VSDs.”

Advice to other industries

Mazerolle admits that installing energy-efficient equipment can sometimes be hard to justify, but says that establishing a firm baseline is the best way to win over senior managers in charge of the purse strings.

“Having that baseline was key because if someone questioned the estimated savings, it was something I had spent a lot of time measuring and could prove,” she says. “It’s not easy to estimate the savings and that could be why industry isn’t running towards VSDs as quickly as they should. But VSDs are not only a great investment to save energy, they give you more efficient control over your operations. They’re also not as expensive as they used to be and there’s a lot of manufacturing competition out there. In fact, when word got out that we were looking for drive manufacturers, suppliers were calling me!”



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She also recommends that New Brunswick industries take advantage of ENB's programs. "Any company looking to reduce energy use should contact ENB. They have everything to gain."

Other energy-saving initiatives

Twin Rivers' energy management program has reduced fossil fuel use, cut GHG emissions and saved the company thousands of dollars in energy costs.

A 38MW cogeneration facility, for example, uses biomass as fuel and produces both electricity and steam, providing 88% of the energy needs for the Edmundston mill's pumping operations.

The mill closed one oil-fired boiler, and a second now operates with a minimal amount of fossil fuel. Mazerolle reports that as a result, in the first four months of 2010 the mill used about 1.5 million fewer litres of oil compared to previous years.

Biosolids produced from the biological and secondary treatment of the mill's effluent are diverted from landfill and sent for composting. In association with a local company, the mill also initiated a program to use wood ash in a composting operation and, in 2009 about 29,000 tonnes of solid residues were being beneficially used.

Twin Rivers' energy champion

Any industry seeking to reduce energy use inevitably needs an "energy champion," someone who advocates for energy efficiency and displays leadership through activities such as planning, auditing, facility and energy management.

Michelle Mazerolle is undoubtedly Twin Rivers' energy champion, but is quick to point out the collaborative nature of the VSD projects.



"I was looking for applications that were working against closed valves at full speed or pumping in a circle, so I spoke first with the operators, the process engineers and the managers about which areas looked the most promising," she says. "I also went to my mechanical engineers to seek their input—they gave me about a dozen ideas—and they helped me narrow it down to the three that we studied."

She also credits upper management for backing the project. "They hired the extra electricians and relieved me of my day-to-day duties so that I could work on this as a priority," she says.

Mazerolle (pictured at left) received her B.A. in electrical engineering from the University of New Brunswick in Fredericton and joined Twin Rivers 14 years ago.



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"I take care of capital projects, day-to-day electrical maintenance, detailed engineering for electrical and controls projects and plan the work...even the labour to do the project," she says. "I'm one of two electrical engineers who work here so we split the tasks. I get called if there's a problem in the pulp, he gets called about steam or boiler parts."

What's next?

Mazerolle says that based on the success they've had and what they've learned about the impact variable speed drives can have on the energy consumption from pumps, they intend to look for more opportunities with the mill.

"Once I get more time, I want to go back to my departments and talk to the operators about the other ideas that didn't make it in this phase and see if we can install more VSDs in the mill," she says.