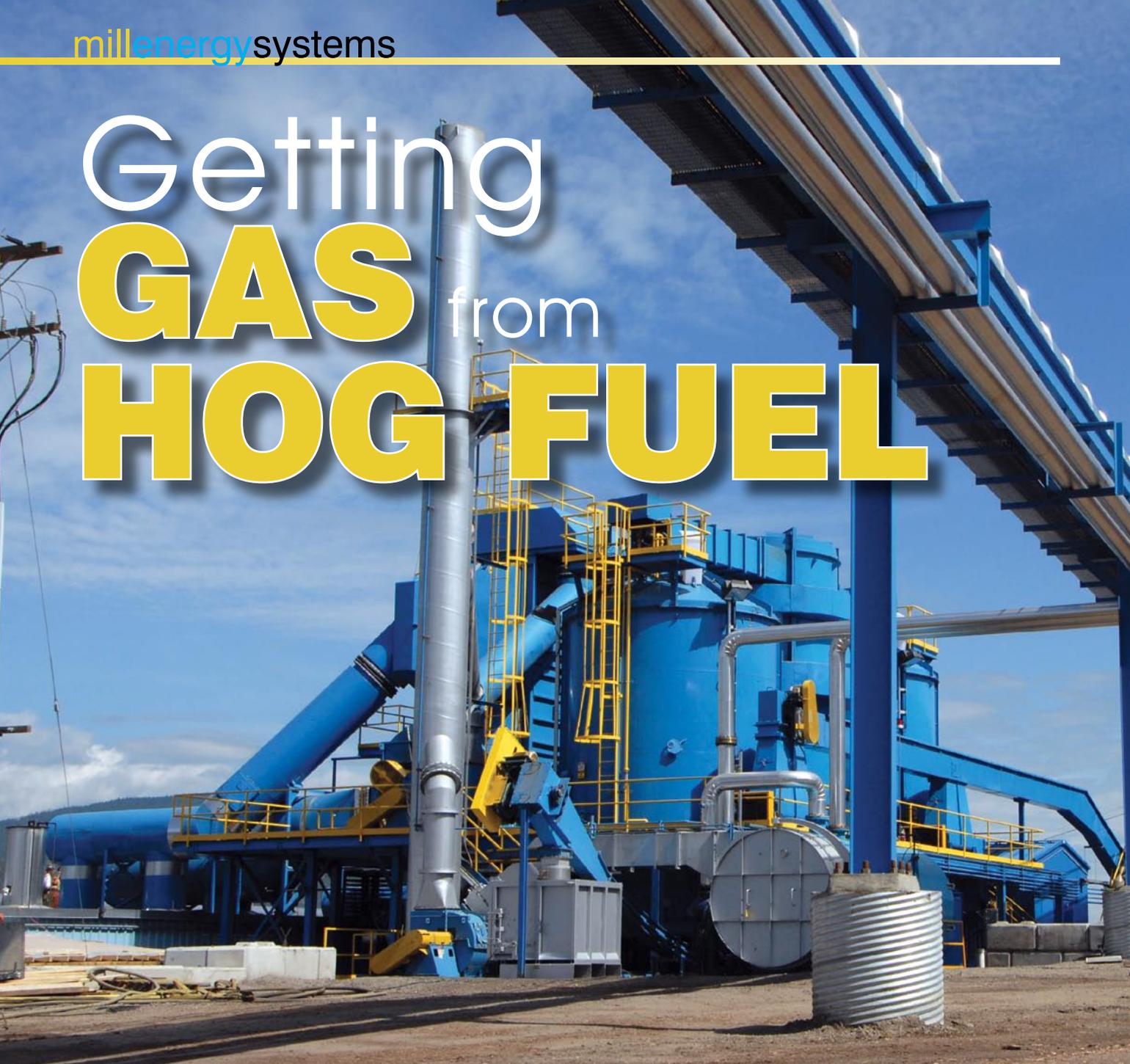


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Getting GAS from HOG FUEL



A new energy system that produces synthetic gas made from hog fuel that Tolko Industries Inc has installed at its Heffley Creek, BC, plywood and veneer mill is expected to save the company about \$1.5 million in annual fuel costs. The system at the veneer mill—located north of Kamloops in the BC Interior—is the first commercial project by Nexterra Energy Corp. The company, which develops and manufactures advanced gasification systems, received financial support from both the BC and federal governments to fine-tune its process to the point where it is now offering it to the Canadian forest industry.

Nexterra chief executive officer Jonathan Rhone says a typical gasification project built by the company will cost in the range of \$5 million to \$10 million, with an expected capital payback in two to four years.

Because the cost of natural gas has increased by over 400

per cent in recent years, energy has become a significant manufacturing cost for Tolko, spurring the company to consider alternative fuel sources that will help reduce their costs. Jim Baskerville, Tolko's regional manager for veneer and plywood, says that with the amount of hog fuel being generated by the Heffley Creek mill, "It quickly became evident that we could be self-sufficient in terms of displacing our natural gas demand."

The company investigated various hog fuel burning technologies, but selected Nexterra's technology for two reasons. "The Nexterra system was the most able in terms of just plugging it into our existing facility, and at the same time it's a very simple system," says Baskerville. Secondly, the gasification plant is fully automated. So it did not require the hiring of dedicated staff to look after the facility. An added bonus from Nexterra's system was reduced air emissions.

However, what really sold Tolko on Nexterra's gasification

A new energy system producing synthetic gas from hog fuel—recently installed at Tolko's Heffley Creek plywood and veneer mill in British Columbia—is expected to deliver annual savings of \$1.5 million, and is getting a lot of interest from other forest companies.

By Tony Kryzanowski



power generation. It is a starved air process that uses heat to convert carbon-containing fuel into syngas.

It is a clean burning gas that can be used as a substitute for natural gas, fuel oil or propane to produce process heat, steam, hot water and/or electricity using conventional energy recovery equipment. The technology offered by Nexterra is not new, having originally been developed in the United States, using wood residuals from hardwood species as a feedstock.

Rhone believes that as a major energy consumer and producer of wood residuals, the forest industry is a prime target for this technology. Nexterra estimates that the North American forest industry spends between \$8 and \$9 billion on natural gas and fuel oil annually.

"Industries that consume a lot of fuel for their manufacturing processes have all been hurt by rising natural gas costs," he says. "The forest industry is very vulnerable to high fuel prices because it uses energy to dry veneer, produce hot water, kiln dry lumber, and produce steam in paper mills." Rhone adds that there is strong demand for a simple, industrially robust, clean alternative fuel solution for these applications.

In addition to the rising cost of natural gas, there is also the volatility factor—the price can fluctuate by up to 30 per cent from one month to the next. That uncertainty makes planning difficult.

The Heffley Creek gasification system will convert 25,000 tonnes per year of green hog fuel produced at the mill into syngas. The syngas is then burned to generate 40 gigajoules per hour of heat. The system will displace about 235,000 gigajoules per year of natural gas that the mill previously used to heat water for log conditioning and veneer drying. The mill produces about 205 million square feet of structural grade plywood based on 3/8-inch thickness annually.

The recently completed first phase of the Heffley Creek installation will displace approximately 40 per cent of the natural gas being consumed. The second phase will convert the balance of the mill. Baskerville says Tolko is very satisfied with the system's performance. The company opted for a two-phase approach so that it could evaluate how reliably the gasification system would operate. "There was no doubt early on in the process that it would deliver sufficient heat," says Baskerville. "It was necessary to determine if it could do so in a manner that fit our operating requirements."

Rhone says the Nexterra gasification system is flexible and does not require white wood chips, which have both a higher heat and economic value. "Our system likes bark," he says, "and bark tends to be the lower value residual that's available."



A conveyor delivers wood residue fuel to the gasification plant at the Tolko mill (left, above). The project received a "thumb's up" from Nexterra president and CEO Jonathan Rhone (left) and Jim Baskerville, Tolko regional manager for veneer and plywood.

technology was that the company built a full scale, local pilot plant in advance of any commitment from Tolko. This provided the plywood mill with an opportunity to test the use of hog fuel with different amounts of moisture, simulate various operating conditions, and test how well the system functioned at different times of the year. "So all of the risk was pretty much mitigated before we even signed the contract," says Baskerville.

The principles of gasification have been well known for over 200 years. For example, synthetic gas or "syngas" from coal was used extensively in the 1800s as fuel for urban lighting and

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Nexterra's system can process material that is up to three inches in diameter, and it can have as much as 55 per cent moisture content. Fluctuating moisture content has no impact on gasification performance.

The minimum amount of generated wood residue required—for a project to make economic sense—will vary depending on how the forest company intends to use the syngas. The first step is to conduct a preliminary business case and to establish the technical criteria that will meet the company's needs. If the business case looks promising, the next step is for Nexterra to enter into a project development agreement with the customer. This process takes a detailed look at different equipment configurations.

"We have other projects where we have signed project development agreements," says Rhone, "and we're working toward getting those projects finalized and contracted. We're extremely busy right now."

One project Nexterra is working on is as a result of an agreement it has signed with Weyerhaeuser's Kamloops Cellulose Fiber mill and the Pulp and Paper Research Institute of Canada (Paprican) to verify the application of the company's gasification technology to provide fuel for pulp mill lime kilns.

Bill Adams, manufacturing services manager at Weyerhaeuser, says installing a gasification system has the potential to reduce greenhouse gas emissions at the Kamloops mill by 25,000 tonnes per year. The 63.3 gigajoule per hour gasification system would displace the equivalent amount of natural gas needed to heat 4,000 residential homes.

Baskerville says Tolko is watching this project very closely because the company operates a pulp mill in The Pas, Manitoba, and this technology has the potential to deliver an even more substantial payback when used to heat lime kilns. However, applying the technology for lime kilns is more challenging as the gasification system must not only have the ability to generate heat, but also a flame that is as close as possible to a natural gas flame.

The Heffley Creek gasification system will convert 25,000 tonnes per year of green hog fuel produced at the mill into syngas.

"We're trying to provide a suite of applications that covers different types of forestry operations," says Rhone, "so that they can install micro syngas plants right inside company fences and basically allow them to produce their own gas."

As with the Weyerhaeuser pulp mill, the Heffley Creek plywood mill project also delivers a significant environmental dividend.

The gasification system installation will lower the mill's greenhouse gas emissions by 12,000 tonnes per year and will improve local air quality.

It is designed to consume and eliminate the volatile organic compound (VOC) emissions produced by one veneer dryer at the mill.

Since it is a cleaner burning fuel, emission control equipment such as bag houses, multicones and electrostatic precipitators won't be required in most jurisdictions, resulting in less capital investment and reduced operating costs for Tolko.

Furthermore, heat exchangers are not subject to fouling as is the case of conventional combustion systems, and the syngas can be transported from the gasification plant to any area within the production facility where the gas is needed. The system can also be "turned down" to operate at as low as 20 per cent of design capacity, and set in dormant mode where it can be shut down for up to 48 hours and then ramped up to full capacity within 10 to 15 minutes. This is an important feature for businesses that do not operate 24/7.

In addition to competition from conventional combustion technology providers, Nexterra also faces growing competition from European gasification technology providers. "They tend to be in more of a development stage," says Rhone. "We feel that we have an advantage in terms of being early to market with our technology. The company has grown from start-up to 24 full-time employees."

Rhone describes interest among other forestry companies in the Heffley Creek installation as "off the charts."

"We've been running tours of senior people from many forest companies across North America and from Europe. The level of interest is tremendous. Many of the major forest products companies are considering gasification solutions."

Baskerville says Tolko will study the economic benefits of installing additional Nexterra gasification systems in its other facilities where it makes economic sense. In addition to the company's pulp mill, he says another prime target is sawmills with drying kilns in northern locales where the company has not already invested in hog fuel burning systems.

