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Biomass Burner Dries Grain Faster, Cheaper

BioDryAir from Triple Green Products burns biomass to reduce grain-drying costs by up to 80 percent over natural gas or propane. Hot, dry clean air is piped into a conventional drier; no heat exchanger is needed. Even better for Canadian readers of FARM SHOW, a government program currently covers half the cost of BioDryAir systems.

"The Agricultural Clean Technology Act (ACT) can be used for a new energy-efficient grain dryer or for retrofitting an existing dryer with an energy-efficient system like BioDryAir," says Lyall Wiebe, Triple Green.

While a similar program is not available in the U.S., the carbon-neutral BioDryAir systems may impact farm income as carbon

markets develop. However, the ROI with the systems should be enough for most farmers to consider the burners.

"The typical ROI on a system is between two and five years, but we've had systems pay for themselves in one year," says Wiebe. "As gas prices climb, the ROI improves."

Unlike propane combustion that creates water vapor as the propane burns, biomass combustion in the BioDryAir system produces only dry heat. This enhanced efficiency creates a rapid ROI when switching from propane.

BioDryAir systems can produce from 5 to 30 million Btu depending on the unit's size. For even larger heat output, they can be stacked as needed, explains Wiebe.

One of the attractive features of the BioDryAir systems is that they can be installed as a parallel heat source on an existing dryer. The operator simply switches the hot air input from the gas-fired burner to the biomass system or back as needed.

"If a customer runs out of biomass fuel near the end of the drying season, they can easily switch back to a gas-fired burner," says Wiebe.

The BioDryAir system was adapted to grain dryers from technology in use for more than 20 years in the aggregate industry and municipal heating systems. Wiebe says installation prices vary by size, location and various other factors.

"We use under-the-fire and over-the-fire air flows to burn the biomass plus all the released gasses," explains Wiebe. "The dual burns at 1,800 degrees and leaves no smoke or particulates in the hot air."

The complete burn is effective with all types of biomass, from wood chips and

pellets to corn stover, oat hulls and even highly acidic materials. "We have systems burning very acidic miscanthus grass and chicken litter, and they've been doing it for years," says Wiebe.

The stoker system/burn chamber is designed for longevity and efficiency. The burn chamber is 1/4-in. steel lined with 6 in. of insulation, which is in turn lined with 6 in. of refractory material designed to withstand the high temperatures. The stoker is a rotating chain bed composed of 1/5-in. thick, 2-in. wide and 6-in. long steel links. It provides 1/8-in. gaps for the under-the-fire air to be forced up and through the burning biomass. Material is pushed onto the chain bed by a multi-screw system.

"We have district heating systems that have run for 20 years and shut down for maintenance for only one day a year," says Wiebe. "A farmer using the same basic system for a few weeks a year should be able to pass it down to his children and grandchildren."

In fact, the heating system should outlast multiple drying systems. Installed on an existing dryer, it can replace an outdated gas-fueled heating system.

"Grain dryers have to meet certain standards to operate, and at some point, they no longer pass inspection," says Wiebe. "Our system can be used with a dryer that no longer meets gas-fired inspection criteria."

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Ground-Level Chainsaw Clears Brush Fast

The Path-Maker makes brush removal fast and easy. The ground-level bar is fitted with a standard chainsaw chain. It is designed to get next to the ground without digging in.

"I did lawn care for about 10 yrs. and saw numerous times where people wanted to clear an acre or two of land, but keep big pine trees," says Zach Russell, Path-Maker. "There was no way to get a Bushhog in, and other trimmers on the market left stubs."

Russell found himself going in afterward to clip them off by hand. When they were 2-in. dia. or bigger, they were too big for a hand lopper or even a weed whip with a blade. At the same time, using a chainsaw was a pain.

"I wanted an easy way to clear the brush and take care of the stubs in one pass," says Russell.

Working with his dad Mark, a mechanical engineer, they came up with the Path-Maker. The 22-in. wide machine with its 20-in. cutting width can get in between close trees while taking a comfortable swath of brush at any one time.

The standard version has a heavy-duty riveted bar. The "Pro" version has a solid 4140 heat-treated chromoly steel bar. Both share a common design, with the bottom of the bar at dirt level while the cutting teeth are slightly up.

"We built it to handle a fair amount of dirt without dulling the chain," says Russell. "We have lots of fire ant nests that are piled halfway up the stems, but we haven't noticed substantial dulling even after 8 to 9 hrs. of cutting."

He notes that brush tends to be of such small dia. that even a dull chain cuts well. "We are usually cutting brush with many wispy stems," says Russell. "It's not like cutting down a 14-in. dia. tree trunk. However, the sharper the chain, the faster it will cut."



Path-Maker has a 20-in. cutting width and cuts at ground level, making it much easier to use than a chainsaw.

The units are recommended for trunks no larger than 4 1/4 in. The bar has a chain holder to prevent chain from being flung off. The controls on the handlebar include a safety stop that must be pressed to engage the throttle. The brush cutter is designed to ensure the operator remains well out of range of the cutting bar.

The standard version of the Path-Maker T-VRA is priced at \$899, while the Path-Maker Pro T-VRA is priced at \$1,299.

"Both current versions are gas-powered," says Powell. "We hope to add a battery-powered version in the first quarter of 2022."

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Battery-Powered Snow Machine

Luke Risch's battery-powered snow machine is a snowmobile track powered by an electric golf cart motor. It was a low-cost alternative to similar, commercially available units.

"I worked on it for a couple of months before taking it out in 8 in. of snow," says Risch. "It went really well."

Risch heard about FARM SHOW from his late friend and co-worker, Bud Schultz. "He used to be a dairy farmer, but we worked together in a machining shop for about 5 yrs.," says Risch. "He would bring in FARM SHOW issues and books, and we would spend our lunchtime looking them over."

To build his snow machine, Risch repurposed a variety of parts from an older Polaris snowmobile.

"I used the aluminum suspension frame, drive sprockets, track and several shafts, bearings and bearing holders," says Risch. "The motor and drive were from a 36-volt golf cart."

Risch flipped the conventional snowmobile design around, putting the track out front with the motor at the rear. The operator rides on a sled pulled behind.

He drilled holes in an aluminum plate to match the motor mount bolts, leaving an opening for the driveshaft. It was then welded to the aluminum frame. The three 12-volt batteries ride inside the track frame, providing needed weight for traction.

He machined a hexagonal shaft to a round shape for a jackshaft connecting the motor's drive to the track drive sprockets.

"One of the biggest challenges was to get the right combination of sprockets to reduce rpm's," says Risch. "I had to play with a couple of different sprocket sizes to get the speed right."

Risch found the optimum speed for the articulated snow machine was 5 to 7 mph. He had it up to 10 to 15 mph at one point.

"That was too fast to steer it," he recalls. "I had to slow it down, which also gave it



Risch's snow machine is custom-built with parts from a snowmobile, the drive from an electric golf cart, and an Otter Ice Sled.

more torque."

The handlebars of the rig were fabricated from 2-in. schedule 40 aluminum pipe that pivots on the aluminum frame. The pipes culminate in an aluminum box between the handgrips. It houses a voltage meter and an on/off switch. A twist grip throttle is wired to the motor through a 36-volt controller.

Steering is a matter of leveraging the operator's weight in the sled against the handlebars. Articulation is provided by a 2-way, greaseable swivel that he machined. It's bolted to aluminum side panels he fabricated to cover the track and motor.

"The hitch can swivel over, under and side to side as well," says Risch.

With the batteries and other components, the snow machine weighs in at about 275 lbs. "If the load in the sled is heavier, the machine will spin a little on ice," says Risch.

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