

Texas entrepreneur hopes to turn mesquite into power

February 5 2010, By Chris Vaughn

Randy Hill lives amid the fossil fuels of America, a place where natural gas and crude oil made millionaires and the landscape is dotted with pump jacks. But Hill, who lives outside Abilene in West Texas, is spending much of his time nowadays talking about an unusual power source: wood chips.

The owner of a firm that manufactures trailers that dry agricultural products, Hill has turned his moneymaking attention from peanuts to timber waste, believing that the same process that revolutionized the peanut industry could do the same for biomass within the alternative energy industry.

Burning biomass for [electricity generation](#), even in places as treeless as West Texas, is possible to Hill, who can't help but notice millions of acres of Texas ranchland covered with mesquite.

"For entrepreneurs, renewable energy is the greatest opportunity in years," Hill said. "It's an absolute hotbed for development."

A graduate of Abilene Christian University, Hill, 42, is a natural entrepreneur, a fast talker who can make even the agriculture industry and drying trailers sound like the most fascinating topic in the world.

In the last year, he has traversed the country meeting with university professors, power plant managers and industry experts in an effort to understand the biomass industry, find out its weaknesses and pitch his

solutions to reduce waste and increase efficiency.

At least 110 [power plants](#) in the U.S. burn biomass, a tiny fraction of the electricity generation compared with coal, natural gas or nuclear. Texas has only a handful of biomass plants -- the closest is a 3-megawatt plant in Marshall. They are far more common in logging-heavy areas of the Pacific Northwest, Upper Midwest and New England.

Hill's home area of West Texas is growing as a source of wind power, but there's room for other sources, he said. "Wind is only going to be an auxiliary source of power," he said. "It will never be a primary energy source. We will always need other sources of power."

Texas Tech University professor Michael Farmer, an expert in environmental and land management in the College of Agricultural and Natural Resources, said Hill "has got a neat idea" to use mesquite to power plants and generate electricity.

"It's an interesting idea because mesquite is an agricultural waste product, in that it's a nuisance for landowners," Farmer said. "Even if you couldn't get it to pencil out because the cost to harvest it would be more than its energy value, it might put it over the top because the negative effects of mesquite on the land have a value too."

The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy spends millions of dollars a year researching and funding projects on using biomass for alternative fuels, such as ethanol and biodiesel. But using biomass to generate electricity has only recently attracted much attention.

Beginning in the mid-1990s, Hill's company -- APT Advanced Trailer & Equipment -- started selling specially made trailers to the peanut industry in West Texas so farmers could dry their product faster.

The trailers, which are the same basic frame as an 18-wheeler would carry, have a dryer that shoots heat under the floor and dramatically reduces the time needed to get the right moisture mix in peanuts.

It wasn't long before he was building hundreds of trailers a year for farmers in West Texas and the Southeast. Because most of his market is in the Southeast, his manufacturing facility is in Georgia.

"It was hard for us to look at other uses besides peanuts because we were so busy," he said.

But about two years ago, as demand for the trailers began to lessen, Hill started investigating other possibilities for his drying trailers. Biomass is where his attention landed.

"I knew it would work," Hill said. "I just didn't know how long it would take and at what temperature to achieve the maximum efficiency."

Using biomass is not always the most efficient process, although most experts say it is far more environmentally friendly and cheaper than coal or natural gas. Burning wood, for instance, does release pollutants but not nearly as many as burning coal. Burning biomass also reduces the amount of material that has to go to a landfill.

Tons and tons of wood scrap are needed on hand for a boiler or power plant. The transportation to move it from place to place is more expensive than the loads of scrap the trucks are carrying. In the winter, the wood is stacked in the cold and wet of Idaho or New Hampshire until it is needed, which means it absorbs a great deal of moisture. Wood with a high moisture content burns inefficiently, meaning more is needed and more carbon dioxide is released into the atmosphere. That's where Hill believes his trailers work.

He persuaded the University of Idaho, which uses a wood-burning plant to provide heat and air-conditioning to its campus, to try the trailers.

Darin Saul, the sustainability director for the university, said his preliminary results demonstrated that using the trailers to reduce moisture by just 20 percent doubled the amount of energy the plant produced. It took about two days to dry the wood to its optimum moisture content, Saul said.

"The trial was quite promising, and we are interested in moving ahead to the next step in the feasibility analysis before actually installing a system," Saul said. "The potential benefits are that the drying system will increase the amount of usable energy from burning wood, saving fuel and reducing greenhouse gas emissions associated with our operation."

But using natural gas or propane to power a dryer costs money, and that starts to defeat the purpose of using them in the first place.

"If a load of biomass is worth \$1,000, you can't afford to spend \$400 drying it," Hill said.

So he landed on another idea: Use the excess heat from a power plant's exhaust to dry the wood chips, which is what the University of Idaho did.

"You're recycling the free heat to create the product that in turns goes back into the plant," Hill said.

Other universities are quickly jumping into Hill's research.

North Carolina State University has applied for a grant from the U.S. Department of Energy to use the biomass for its campus power plants, and Hill has offered the free use of trailers for Iowa State University officials to see whether the same process works to dry "corn stover," the

leaves and stalks left after harvest.

Hill has also met with Farmer and others from Texas Tech about researching whether mesquite could be dried similarly and used to power a plant in Texas.

"There is a huge opportunity for mesquite in Texas -- huge," Hill said. "Just think of the implications from a ranch management standpoint. Think of the impact on the water table in West Texas because mesquite sucks a ton of water."

Farmer said he thinks the trailers might even be better drying grasses and agricultural stubble from crops such as wheat, all of which have a higher moisture content than wood.

Using the trailers to dry a product while simultaneously delivering it to a power plant where it's ready for immediate consumption would be a significant development in making renewable energy able to meet peak electricity demand, he said.

"One of the reasons we don't have a plant dedicated to it yet is that most places have set up bioelectricity production as an afterthought," he said. "Can we think of this as a separate economic activity and try to run a power plant that meets peak hours? Very few renewable [energy sources](#) meet peak electricity demands. Wind isn't doing it, at least right now."

Developing more biomass power plants would not eliminate the need for coal-fire plants, but it might mean that "lots of little sources" using [biomass](#) might mean the coal plants wouldn't necessarily need to expand, he said.

"The long-term environmental impact of that alone is quite substantial," he said.

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