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Frontline BioEnergy Delivers Plant Modules to Stine Seed Farms in Joint Pyrolysis Project

System Operations Will Produce Biochar Soil Amendment and Bio-oil

NEVADA, IA: On June 8th, Frontline BioEnergy delivered the final module of the Stine pyrolysis plant to the project site in Redfield, Iowa. The Stine pyrolysis project, a collaboration between Stine Seed Farms and Frontline BioEnergy, will transform biomass into biochar and bio-oil. Frontline took the project from conception through detailed engineering and fabrication. Work on the 9-module pyrolysis plant took place at Frontline's headquarters in Nevada, Iowa. Stine Seed Farms is currently installing the equipment at their site. Frontline and Stine will partner to commission and start-up the plant during the summer of 2021.

"This project will bolster Iowa's farming industry by creating a value-added market for corn stover and other unused biomass," observed Stine CEO Harry Stine. "This pyrolysis process can convert relatively unused agricultural byproducts into a biochar soil amendment that improves nutrient and moisture utilization in the soil and will allow farmers to realize greater returns on their crops."

Autothermal pyrolysis (ATP) is a process developed and patented by Iowa State University researchers, including Frontline's own Joseph Polin, Ph.D. It can be used to convert agricultural and forest waste into usable products without the combustion required by many conversion facilities.

The pyrolysis plant will produce a multitude of valuable products, including:

- biochar, which will be used as a soil amendment for farmland
- bio-oil, which can be used to produce bio-asphalt or refined to create diesel and jet fuel
- thermal energy, which can be used for process heat or electrical generation

"The ATP technology overcomes the scaling limitations that have plagued most pyrolysis technologies," noted Frontline CEO Jerod Smeenk. "The Stine Seed Farm 50-tpd project is the next step to demonstrate the scalability and operability of this unique process. Frontline is pleased to partner with Stine and ISU on this cutting-edge innovation."

About Frontline BioEnergy

Frontline BioEnergy is a renewable energy project developer and technology provider specializing in the design and construction of biomass pyrolysis and gasification systems. After designing and implementing one of the largest biomass gasifiers in the United States, Frontline BioEnergy has continued to develop its gasification, gas cleaning, and gas conditioning technology. To learn more about Frontline's technology and projects, visit www.frontlinebioenergy.com.

About Stine Seed Farms

Stine Seed Farms is the country's largest independent seed company. Their continual search to improve corn and soybean yields has revolutionized the agricultural industry, greatly expanding the productivity of America's farmland. More information on Stine Seed can be found at www.stinseed.com.

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