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ClearSign Commences Testing of Commercial-Scale Solid-Fuel Test Platform

SEATTLE, WA -- (MARKETWIRE) -- 02/12/13 -- ClearSign Combustion Corporation (NASDAQ: CLIR) today announced the delivery and first-fire of a new, commercial-scale solid fuel test platform. Capable of firing at a rate of over 1.2 million Btu/h per square foot, this continuous-feed furnace will expand the company's development and testing capabilities to include biomass fuels such as wood pellets and chips (biomass), solid waste and various types of coal at a scale that will enable the company to demonstrate the effectiveness of ECC™ technology to prospective partners and customers.

In addition to coal, the most widely used solid fuel, solid fuels also include biomass, tire derived fuel and municipal solid waste (MSW), often referred to as waste or opportunity fuels.

According to ClearSign CEO, Rick Rutkowski, solid fuels present a range of unique challenges for combustion and emissions control systems.

"They typically produce multiple types of emissions including particulate matter (PM) and ultrafine particulate matter (PM 2.5), carbon monoxide (CO), as well as Oxides of Nitrogen (NOx) and Sulfur (SOx)," explained Rutkowski. "Because of this, most solid fuel combustion facilities will require multiple emissions control systems. Currently available systems use, almost exclusively, after-treatment or post-combustion techniques to trap or remove pollutants once they have been formed rather than to suppress the formation of the pollutants. They are expensive to buy and install and often impose substantial operating costs including the use of consumables and/or significant energy.

"We believe that our ECC technology may enable a much more cost effective and energy efficient alternative. Our experiments suggest that it may be possible to dramatically reduce or even eliminate the formation of multiple types of pollutants at the flame source, through enhanced control of flame chemistry, flame shape and temperature," said Rutkowski. "If pollutants can be eliminated or even significantly reduced in this way, it would obviate or substantially lessen the need for costly post-combustion emissions control systems. We believe the potential for savings is enormous."

Solid fuel combustion systems range from smaller commercial wood pellet furnaces, through industrial scale spreader-stoker systems used in a variety of industries, all the way

to massive multi-story coal-fired power generators operated by large electric utilities.

"There is a great commonality of interest when it comes to solid fuels," Rutkowski adds. "We are actively in discussions with manufacturers, operators and installers of all of these types of systems as well as with two of the world's leading centers of excellence for solid fuel combustion. We are talking with large utilities and also seeing interest from major forest products companies as well as coal producers, and freight haulers."

Rutkowski estimates that there are roughly a few thousand industrial scale solid fuel systems in the US, burning mostly wood waste and municipal solid waste, but they are expensive systems that will be facing significant new regulatory challenges with the introduction of new EPA regulations such as MACT (Maximum Achievable Control Technology) and MATS (Mercury and Air Toxics Standards) regulations, with rapidly approaching effectiveness dates in the next 18 months to 2 years. Moreover, there are nearly half a million systems of this same type burning coal in China. Indeed, he says, coal fuels their entire economy. They are feeling the cost in other ways as we recently saw reported in the news when Beijing was literally forced to shut down because of poor air quality.

Joe Colannino, ClearSign's Chief Technology Officer points out that the complex chemical makeup of solid fuels is compounded because both their physical and chemical composition are not only diverse but extremely variable. The chemistry of one type or rank of coal will be very different from another, but waste fuels vary even more and can include a range of materials in pieces that are also non-uniform in size and shape.

"As if that isn't complex enough," Colannino says, "fuel also tends not to be deposited very uniformly on the moving grate in a stoker, which further adds to the problem."

According to Colannino ClearSign has previously demonstrated at a smaller scale, a number of features using ECC technology with a variety of types of solid fuels including biomass, coal and tire-derived-fuel (TDF).

"We've shown dramatic reductions of particulate matter, CO, and total hydrocarbons. We have also used shaped electrodes to shape and shorten flames at a larger scale. These experiments were also done using methane and propane, and repeated with a low momentum flame type similar to those found in many industrial solid fuel combustion systems. As importantly, we have conducted numerous experiments, also using natural gas and propane, in which flame speed appears to be dramatically increased. We believe that this ability to increase flame speed may prove to be very important for solid fuel combustion, because solid fuels actually burn in two phases with the gases from organic compounds burning at a much faster rate than the solid 'char' component of the fuel."

"Our goal over the next several quarters," he continued, "is to replicate, demonstrate and quantify the full range of these effects in our new solid-fuel system at an industrial-scale using a variety of solid fuels including biomass and other waste fuels as well as coal."

According to the company, the new test platform is a continuously-fed stationary grate furnace with heat release flux capacity of up to 1MMBtu/ft² grate area. It is under-air fired to resemble those found throughout the world in many coal, biomass, and MSW systems. The furnace is even equipped with overfire air ports to accurately simulate typical legacy NO_x control for large-scale units. Colannino says that this attention to detail should enable his team to replicate the performance of existing units as a baseline and to quantify the significant improvement that they are aiming for with ECC technology.

The company says that it plans to test a number of parameters using state of the art analytical equipment, including continuous emissions monitoring for NO_x, CO, O₂, and CO₂, as well as for total hydrocarbons, particulate matter, and SO₂.

For more information on ClearSign including the new solid-fuel test platform, please visit us on the web at www.clearsign.com

About ClearSign Combustion Corporation

ClearSign Combustion Corporation designs and develops technologies that aim to improve key performance characteristics of combustion systems including energy efficiency, emissions control, fuel flexibility and overall cost effectiveness. Our Electrodynamic Combustion Control™ (ECC™) platform technology improves control of flame shape and heat transfer and optimizes the complex chemical reactions that occur during combustion in order to minimize harmful emissions. For more information about the Company, please visit www.clearsign.com

Cautionary note on forward-looking statements

This press release includes forward-looking information and statements within the meaning of the Private Securities Litigation Reform Act of 1995 and the provisions of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Except for historical information contained in this release, statements in this release may constitute forward-looking statements regarding our assumptions, projections, expectations, targets, intentions or beliefs about future events that are based on management's belief, as well as assumptions made by, and information currently available to, management. While we believe that our expectations are based upon reasonable assumptions, there can be no assurances that our goals and strategy will be realized. Numerous factors, including risks and uncertainties, may affect our actual results and may cause results to differ materially from those expressed in forward-looking statements made by us or on our behalf. Some of these factors include the acceptance of existing and future products, the impact of competitive products and pricing, general business and economic conditions, and other factors detailed in our Quarterly Report on Form 10-Q and other periodic reports filed with the SEC. We specifically disclaim any obligation to update or revise any forward-looking statement whether as a result of new information, future developments or otherwise.

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