

ClearSign Demonstrates State-of-the-Art Emissions Control Performance at Industrial Scale of 5mmBtu/h

Duplex™ burner technology achieves unprecedented reduction in NOx and CO emissions coupled with unique cost saving features.

SEATTLE, May 1, 2014 /PRNewswire/ -- [ClearSign Combustion Corporation](#) (NASDAQ: CLIR), an emerging leader in combustion and emissions control technology for industrial, commercial and utility markets, has demonstrated the capabilities of its [Duplex™ burner architecture](#) at a scale that directly addresses applications across several significant segments of the industrial combustion market.

"This is an extraordinary achievement, and without question one of the most significant milestones thus far in the company's history," declared Rick Rutkowski, ClearSign's CEO. "We can now say with complete confidence that our technology can operate at the scale required for a range of industrial applications while still delivering the same outstanding performance that we have seen in our earlier demonstrations at smaller scale."

Operating at a heat release of 5mmBtu/h and temperatures above 1,600F, ClearSign's Duplex burner successfully limited nitrogen oxide (NOx) emissions from natural gas to less than 5 parts per million (ppm) and carbon monoxide (CO) to near-zero levels. This was accomplished with less than 3% oxygen (O2) in the stack, and without the use of any external flue gas recirculation, unlike existing Low NOx or UltraLow NOx burners which typically require increased levels of one or both. The demonstration was conducted in a natural draft furnace in an up-fired configuration typical of refinery heaters.

"There is a large market for Low NOx and Ultra-low NOx burners for process heaters that typically range in size from 1 to 15mmBtu/h," Rutkowski added. "We have targeted the 5mmBtu/h scale as the jumping-off point for commercialization for our technologies because it represents a sweet spot in the market where we can deliver major savings to high value processes such as refinery operations, and we can also gain share in markets that offer significant volume potential such as the industrial package boiler segment. We expect to continue to rapidly scale the technology this year in conjunction with partners and customers to address significant opportunities for systems used in oil field operations and to broaden the scope of our addressable market."

The company says that they are in active negotiations with both prospective commercial partners and customers in each of these segments and that the level of new interest also continues to grow dramatically. Rutkowski believes that the "full-scale" demonstration may prove to be a catalyst for further acceleration in market interest.

"Since reporting our groundbreaking results over the last several quarters, interest in our technology from prospective partners and customers has grown steadily," Rutkowski said. "We are developing and exploring several very significant market opportunities with the goal of having systems operating at commercial sites this year. This latest achievement sets the stage for us, along with our partners, to pursue these opportunities even more aggressively. I believe that because of the significant advantages that our technology offers in some very large markets, the growth opportunity is compelling."

According to ClearSign Chief Technology Officer Joe Colannino, ClearSign's stated mission has been to develop technologies and products that will set new standards for both environmental performance and cost effectiveness. "Given that, historically, success in reducing NOx has come at the expense of increased operating costs, that is not an easy challenge. But the Duplex technology promises to deliver a winning combination of unmatched performance along with significant savings in plant operations. This is not just a major advancement for ClearSign but also for the state of the art in NOx control technology."

"Until now," Colannino explained, "achieving low NOx emissions implied compromises in flame shape, increased use of external flue gas recirculation, (FGR) or high levels of excess air, to name a few. Such strategies can impose significant penalties in energy efficiency and/or process throughput that are ultimately expressed in higher operating costs. Higher internal flue gas flow rates associated with FGR also tend to shift heat from the radiant to the convection zone, resulting in unit de-rating, overworked convection sections, or even redesign. The longer flames of low-NOx burners can cause additional stress or even failure in the radiant section. What is so powerful about Duplex technology is that it not only achieves low single-digit NOx emissions with virtually no CO, but also simultaneously eliminates the traditional compromises associated with other low NOx strategies."

"In short, this combination of desirable features including ultra-low NOx, short flame length, and improved radiant profile has never been achieved before in an Ultra-low NOx burner. This is a major achievement that I believe portends a new paradigm."

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 Duplex™ Burner Architecture and Electrodynamic Combustion Control™ (ECC™) platform technologies improve control of flame shape and heat transfer and optimize 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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For further information: Media, Kimberly Setliff, Antenna Group for ClearSign, +1 415-977-1942, clearsign@antennagroup.com; or Investor Relations, +1 206-673-4848, investors@clearsign.com

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