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Advanced Technologies Provide New Insights for Assisting Energy from Waste (EfW) Boiler Combustion Monitoring, Operations and Maintenance.

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1 Abstract

This paper focuses on recent advancements in the areas of imaging technology and flue gas temperature measurement which are providing new insights for plant engineers into combustion conditions and operation in Energy-from-Waste (EfW) facilities. The paper describes how Covanta Energy, an operator of over 30 EfW facilities and Enertechnix, a manufacturer of advanced combustion products and services, are developing new technologies in these following areas:

Infra-red (IR) imaging using a mobile camera to provide active viewing of the boiler and combustion conditions
Digital recording of images of slagging, waste stream movement, and refractory inspection
Online inspection in back pass convection areas with a video camera that extends up to 20 feet into boiler.
Furnace Exit Gas Temperature (FEGT) measurement integrating proven acoustic pyrometer technology to replace inherently inaccurate contact temperature methods such as thermocouples.

The paper examines how each of these technologies is being introduced into EfW facilities operated by Covanta Energy.

Actual results are used to evaluate the potential these new methods have for improving combustion, reducing maintenance costs and providing plant operators with useful tools for operating EfW facilities. Video images of the furnace and convection sections will be provided and discussed.

FEGT data from comparative technologies is presented. The data is interpreted in order to compare the accuracy of the acoustic pyrometer measurement against other methods. Potential and determined benefits are presented and outlined. The paper attempts to provide a framework to help facilities understand the importance and impact of accurate FEGT measurement in the combustion process.

2 Company Backgrounds

2.1 Covanta

Covanta is the largest operator of Energy from Waste (EfW) facilities in the United States. Covanta's 34 EfW plants are located across the four corners of the country from Massachusetts to Florida, to Hawaii to Oregon, with over 90 heat recovery boilers processing 15 million tons of MSW a year. Covanta also has established EfW operating relationships in Europe and China.

On the road to becoming the largest EfW operator, in 2005, Covanta acquired and merged with another large EfW company, American Refuel. The six Ref-Fuel plants process almost 40% of the total waste delivered to Covanta.

The combined knowledge and focus on growth of the two companies created substantial business opportunities and an increase in research and development. With 11 combustion technologies and numerous emissions control technologies in the new Covanta, better insight into stoker/boiler/APC operation was sought out in order to achieve company goals. A survey of the state-of-the-art instrumentation technology led to the line of equipment offered by Enertechnix. The Covanta/Enertechnix relationship quickly developed into a mutually beneficial one in order to customize existing instrumentation offered by Enertechnix and develop new instrumentation based on Covanta's needs and EfW needs in general.

The instruments and their uses described in this paper represent existing technologies used in a new way as well as new technologies. Together, they have demonstrated significant potential to help Covanta achieve new goals for combustion optimization and emissions reduction.

2.2 Enertechnix

Enertechnix is a technology company that provides products and services for a wide range of industries, and commercial markets. Since 1995, the company has engineered and deployed process sensor solutions for measuring gas temperatures for boilers, mid-IR imaging systems for visual monitoring in high temperature, particle-laden environments and offers a full