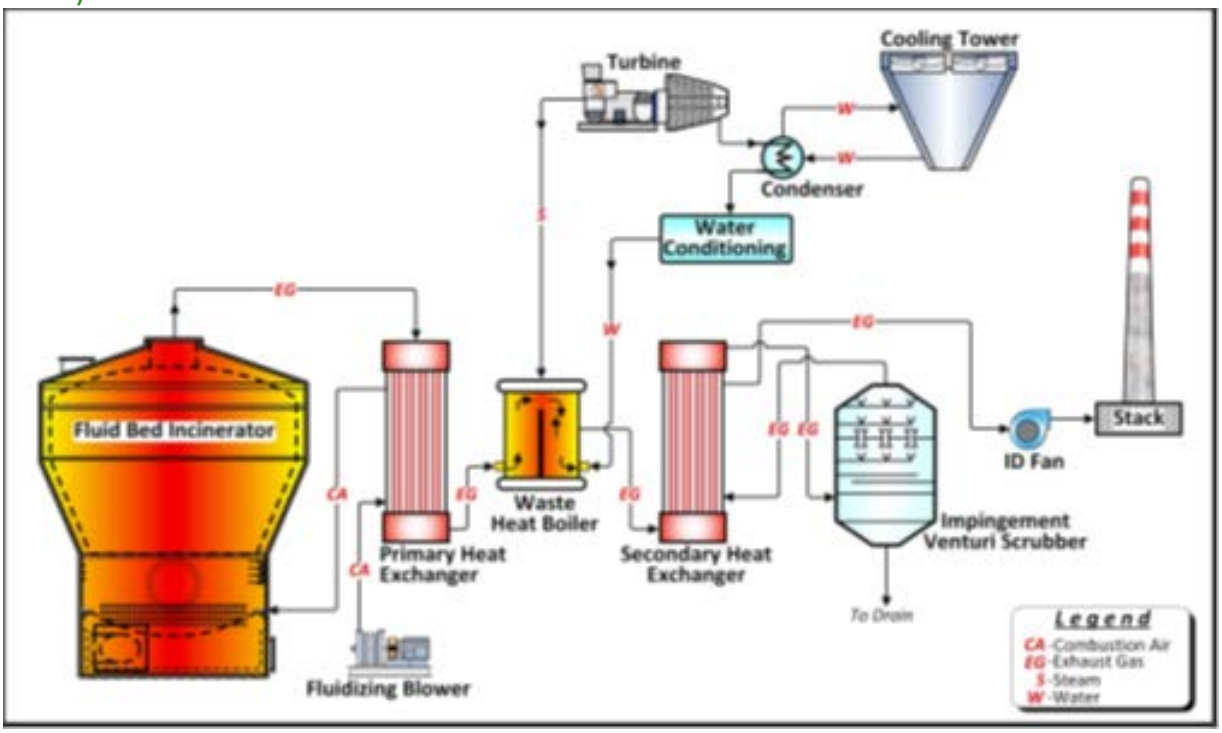
Executive **Summary**

A sustainable power option that's better than coal?

Energy Recovery from Thermal Oxidation of Wastewater Solids: State-of-Science Review (ENER13T14)



A typical fluidized bed incinerator exhaust gas system with energy recovery equipment.

The Central Issue

Many water resource recovery facilities (WRRFs) use thermal oxidation, also called incineration, to manage solids produced by the wastewater treatment process. Trends in anaerobic digestion, such as co-digestion of fats, oils, and grease (FOG) or imported organic wastes to increase energy production, raise the question of whether similar enhancement of energy recovery could be accomplished for thermal oxidation with the co-combustion of similar alternative feedstocks.

Context and Background

Treatment of wastewater solids by thermal oxidation has been used to achieve volume and mass reduction. It is now gaining increased interest as WRRFs strive to attain energy neutrality. Understanding energy recovery from solids through thermal oxidation is an important factor in determining how WRRFs can reduce operating costs and achieve sustainability objectives. This state-of-science review evaluated the potential for energy and heat recovery from the thermal oxidation of wastewater solids. It also compared the value of energy recovered from wastewater solids by thermal oxidation with that from coal based on a triple bottom line (TBL) approach, and estimated the quantity of renewable energy available from thermal oxidation of wastewater solids and residuals from domestic wastewater and associated feedstocks (e.g., fats, oils, and grease).

Findings and Conclusions

The state-of-science review of thermal oxidation of wastewater solids demonstrated that the potential for additional energy recovery could make a substantial contribution to increased renewable energy production; that this process is sustainable when compared with fossil fuel power generation; and that existing and emerging technologies provide reliable, effective, and flexible systems for implementing energy recovery.

Management and Policy Implications

The TBL analysis indicated that power produced from energy recovered from thermal oxidation of wastewater solids is more sustainable than electricity generated at a coal-fired power plant. Four case studies provide valuable information on energy recovery facility experience regarding decision making, costs, performance, energy savings, and barriers encountered and overcome.

Related WE&RF Research

Project Title	Research Focus
Identification of Barriers to Energy Efficiency and Solutions to Promote These Practices (ENER7C13)	Informs the wastewater sector about the barriers and impediments to energy efficiency and recovery projects and provides solutions to help direct policy makers' actions to further better energy management in the domestic wastewater service sector.
Assessing the Benefits and Costs of Anaerobic Digester CHP Projects in New York State (ENER7C13e)	Presents the results of interviews with wastewater utility staff to document factors that drive biogas energy projects forward and those that hold them back. Report documents the unique, local nature of biogas project decisions, and notes opportunities to increase consistency and accuracy in financial decision making. It suggests approaches for increasing the value of biogas and for maximizing cost savings through pursuit of favorable agreements with electric power providers.
WaterWatts: A Modern Look at Wastewater Power Metering Data (ENER15C15)	Investigates the effectiveness of real-world wastewater equipment and control systems in responding to fluctuations in influent flows, organic loads, and nutrient loads. Provides an approach to evaluate facility energy response to process loading relative to other U.S. treatment facilities and provides energy comparisons at the process level for varying treatment unit processes for use in benchmarking target energy performance.

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