Numerical Modeling of Pollution Formation in WTE Reactors using CFD
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**Background**

*Limited WTE gas phase pollution modeling exists in the WTE industry*
*Emissions reductions are usually based on field observations with little consultation of numerical models*
*Modeling usually separates bed solid phase combustion and gas phase reactions*
*Limited modeling of coupled solid/gas phase modeling exists*
*Current modeling has limited capability in predicting Nox formation, a very important waste product*

![Figure 1: Covanta WTE Emissions vs. EPA MACT Limit %](image)

*With ever increasing emissions standards as well as the increase in WTE energy generation around the world, understanding of pollution formation in operational systems is necessary to improve existing and new WTE systems.*

**Research Plan for Modeling**

*Utilize existing WTE geometry and data of pollutants emitted*  
*Leverage CFD to predict pollution formation*

![Figure 2: Schematic of WTE Plant](image)

*Calibrate CFD model to measured data in order to ensure accuracy of modeling*

*Develop reaction mechanism based on known inputs to data-match Nox, Particulate, CO, CO2, and SO2 emissions*

\[ C_{x}H_{y}O_{z} \cdot xH_{2}O + \text{air} \]

*Once modeled and predicted values agree, alternate geometries and configurations will be studied in order to provide greater emissions reductions in the future*