Non-Thermal Plasma Reforming of Refractory Tars and Oils Generated by Biomass Gasification

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One of the barriers to commercial implementation of biomass gasification is the treatment refractory tars and oils created in the gasification process. Typical downstream operations such as a combustion turbine, reciprocating engine genset, or biomass to liquids (BTL) catalyst bed all require a tar free gasifier product stream for successful operation. These tars and oils represent lost mass and energy if simply removed from the gasifier product stream. Removal and disposal of tars and oils also produces a hazardous material stream creating both real and regulatory penalties to the gasifier operator.

Ceramatec, as a sub-recipient of a DOE funded research project, will be applying its non-thermal plasma reformer technology to convert refractory tars and oils while still entrained in the gasifier product stream. Preliminary laboratory work indicates that it is possible for the plasma reformer to operate on the gas exiting the gasifier and convert these tars and oils to additional hydrogen and carbon monoxide. This work is being done at Western Research Institute in Laramie, Wyoming under a US Department of Energy award to Emery Energy.

This paper will present an overall process structure of the gasification process and the non-thermal plasma reformer in particular. Operational characteristics and laboratory results related to the reforming of the refractory tars and oils will be presented. The larger pilot sized facility at Laramie will also be described. Data may be available from the larger pilot sized facility in Laramie by the time for the conference and if available will be presented.

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