NOVA SCOTIA ENERGY
R&D CONFERENCE 2014
ENERGY FOR CHANGE

Abstract:

Manoj K. Raut, Dalhousie University
Research Advisor: Prabir Basu
Category: Alternative Energy & Sustainability

Steam Gasification of Torrefied Biomass in Bubbling Fluidized Bed Gasifier

The utilization of renewable energy sources can reduce greenhouse gas emission. It also helps us to be independent on fossil fuel energy. Among all renewable energy sources, woody biomass is easily available and less expensive energy source. Gasification can turn solid biomass into convenient gas that could be used for both energy conversion and chemical production. Torrefaction is a new pretreatment method for biomass that has positive features such as reduced the storage, transportation cost, increased energy density, easier grinding. Torrefaction has special value for Nova Scotia biomass industries, as it can make biomass pellets more attractive to the European market. At this moment it is not known if this pretreatment method could have beneficial effect on steam gasification.

Steam blown gasification of torrefied biomass was investigated in a laboratory scale bubbling fluidized bed gasifier to study their product gas composition as a superior gaseous fuel for energy generation. In this study, poplar wood was pretreated at 250^{o}C and 275^{o}C for 60minutes and later on gasified in a gasifier at 700-850^{o}C. The gasification experiments indicated that torrefied biomass produces higher concentration of hydrogen and lower concentration of carbon dioxide than untreated biomass.

This study showed that torrefaction has major positive effect on syngas yield as well as in reduction in tar production. It was also observed that torrefaction lowered the product gas LHV. Overall combination of torrefaction and gasification of biomass is a promising technology for the future, but it needs further exploration.