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*Co-gasification of DDGS and Biomass for Hydrothermal Hydrogen Gas Production*

**Abstract.**

Technology options for hydrogen gas production are currently very expensive and highly dependent on fossil resources. This project proposal is designed to utilize a large quantity of corn co-product, dried distillers' grains with solubles (DDGS), and the largest quantity of biomass residue in the U.S., corn stover, for hydrogen gas production. This approach will provide an important and sustainable opportunity to increase profitability of these materials. Co-gasification of DDGS with biomass could increase the gasification performance of DDGS while increasing the value of both materials for hydrogen gas production.

In this novel approach, DDGS and corn stover will be dissolved in pressurized hot water (subcritical water) and then the dissolved fraction will be catalytically gasified by aqueous-phase reforming (APR) technology as a hydrothermal gasification process in *batch and continuous* systems. Temperature, reaction time, and DDGS/corn stover ratio will be optimized to maximize hydrogen yield in a batch APR system. Then, the optimized condition will be adapted to a continuous APR system that will be developed in the proposed project.

Performing gasification in mild conditions and the use of low value feedstocks will provide significant reduction in hydrogen production cost. Hydrogen produced from this project can be used not only for many industrial applications, but also for fuel cell systems for power generation. This will provide an opportunity to add significant value to both DDGS and corn stover and improve Nebraska's economy.