

U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy

# Determining the Impact of MSW as a Feedstock Blending Agent on Pretreatment Efficacy, Hydrolysate Production and Convertibility

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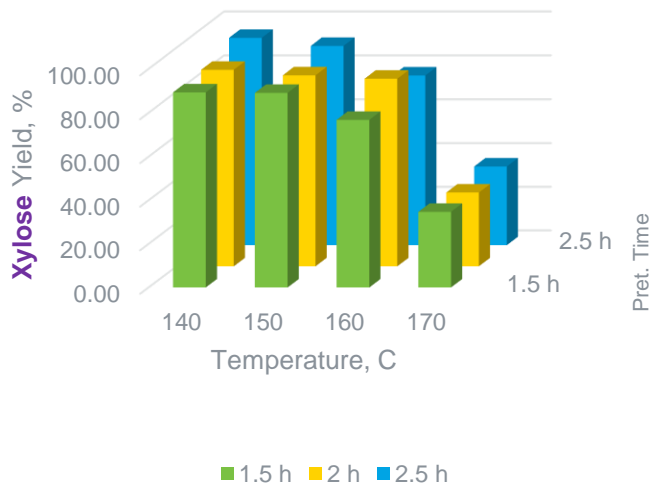
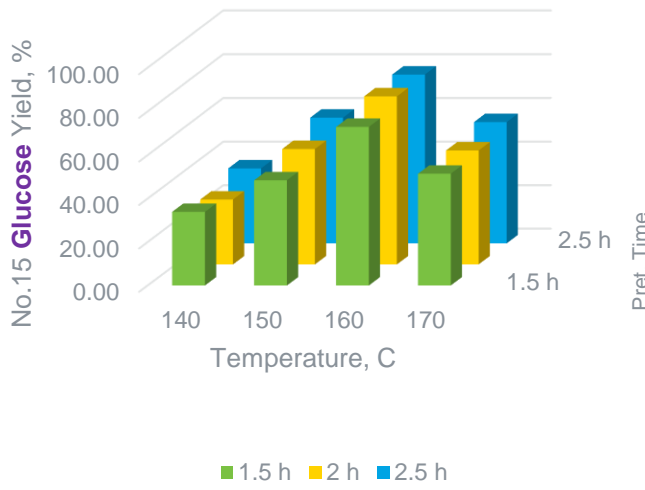
December 21, 2015



# Summary –Key findings

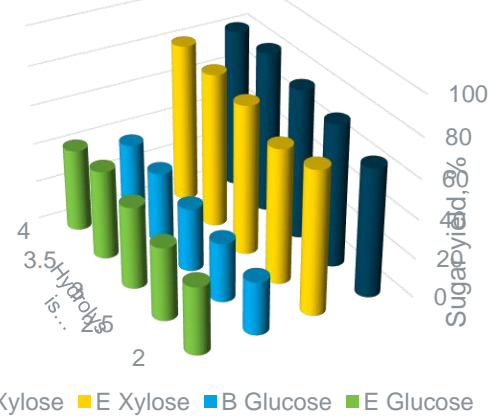
- **Developed an integrated process for ionic liquid (IL) based deconstruction technologies**
- **Screened 16 MSW blends provided by INL using the 10mL tube reactor and identified the most promising blend (CS/MSW 4:1) for scaling up test based on the sugar yields as well as the feedstock cost**
- **Successfully demonstrated 600-fold (10mL to 6L) scale up of MSW/CS blends IL acidolysis**
- **Optimized conditions in the tube reactor at SNL cannot be applied directly to the 10L Parr vessels due to the different reactor configurations**
- **The scale up attempt and process integration will leverage the opportunity towards a cost-effective sugar/lignin production technology**
- **FY16&17 effort is to use enzymatic hydrolysis instead of acidolysis using renewable ILs and MSW blends that meet BETO cost targets**

# Sugar yields with Acidolysis at small scale

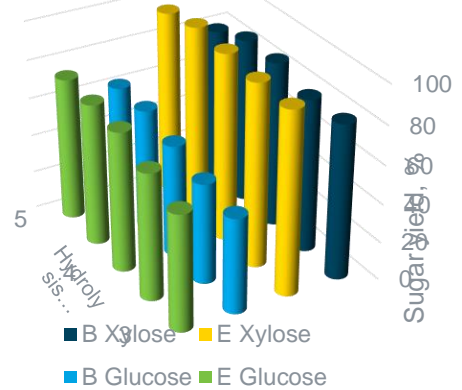


Switchgrass : MSW paper mix (80:20) (2015 new blend); Ionic liquid: [C<sub>2</sub>C<sub>1</sub>im]Cl

Pretreatment at 140 °C

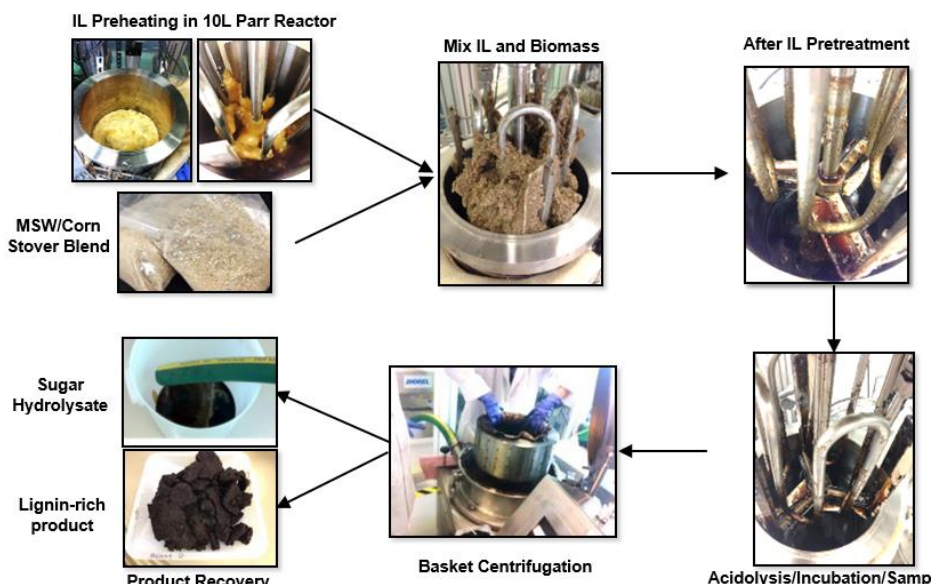
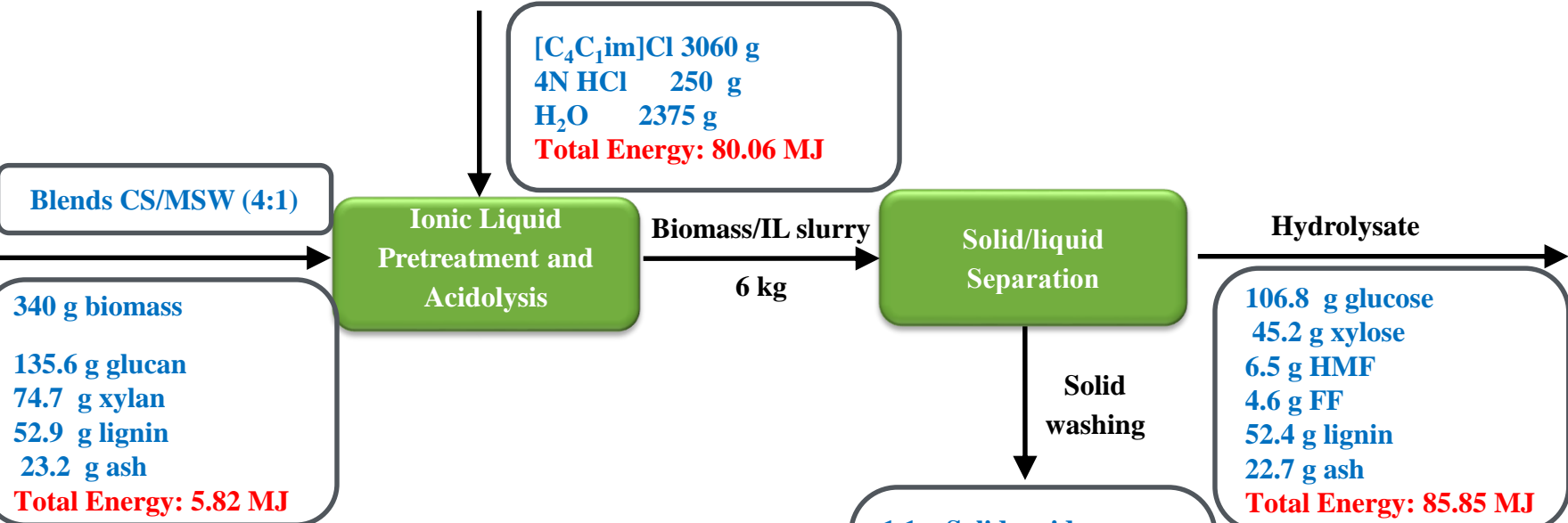


Pretreatment at 160 °C



Corn stover : MSW paper mix (80:20) (2014) Ionic liquid B:[C<sub>4</sub>C<sub>1</sub>im]Cl, Ionic liquid E:[C<sub>2</sub>C<sub>1</sub>im]Cl

# Performance metrics for 10 L Parr run @ ABPDU



Glucose yield in hydrolysate = 71%  
 Xylose yield in hydrolysate = 53%  
 Overall glucose balance = 81%  
 Overall xylose balance = 67%  
 Overall lignin recovery from solid stream = 1%