

Highlights to Date



- **Separation Technology**
- **Glycol Production**
- **Bleached Market Pulp from Seed Alfalfa**
- **Unbleached Market Pulp from Wheat Straw**
- **Fluff Pulp**
- **Feasibility for Columbia County Biorefinery**
- **Working with Columbia County for location**

Separation Technology



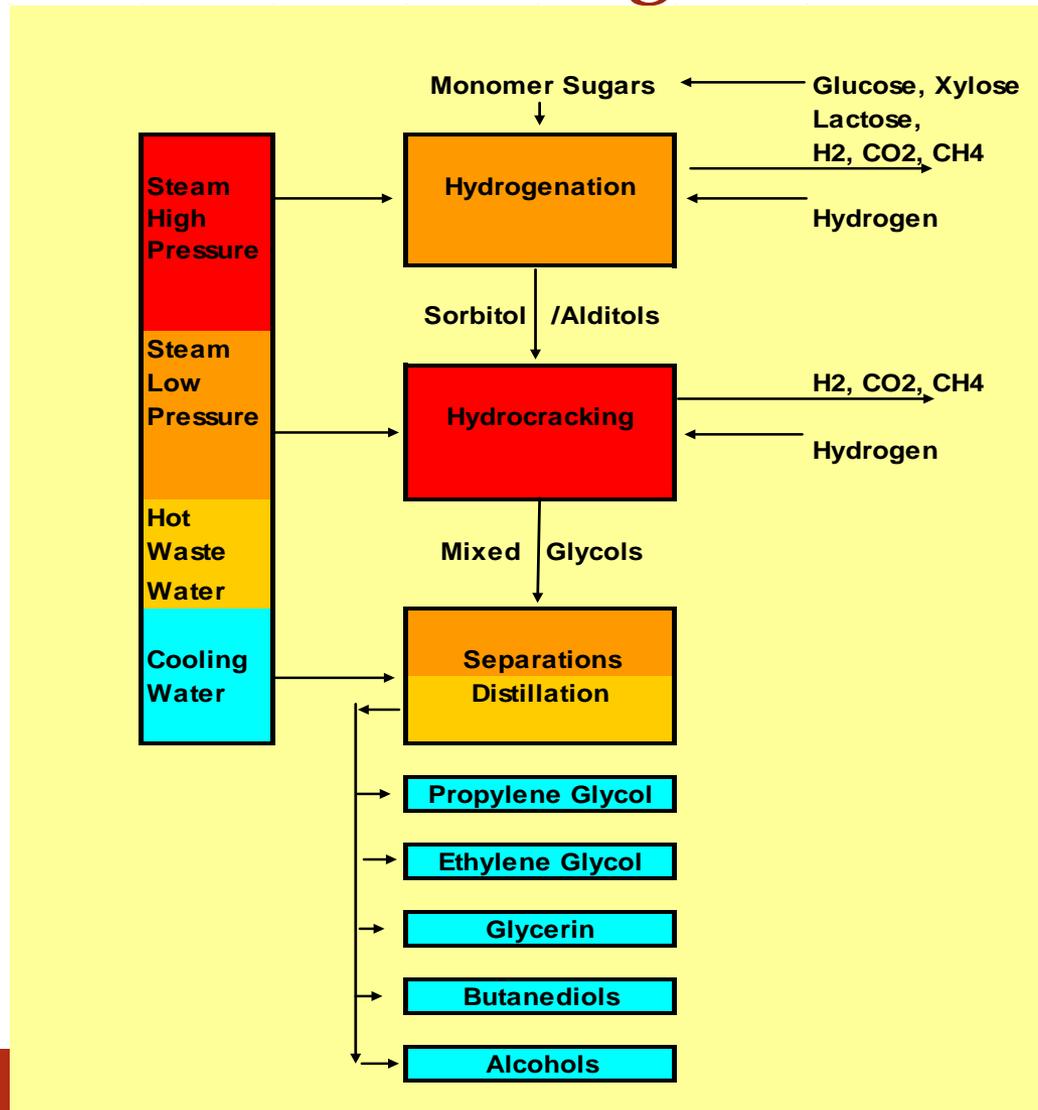
- **VSEP optimization**
- **Critical for Pulpmill/Biorefinery**
- **Condensation of Lignin stream**
- **Separation of Hemicellulose stream**

Glycol Production



- Working with IPCI and VSEP
- Separated Hemicellulose from Wheat Straw Liquor
- Hemicellulose Hydrolyzed to Sugars
- Hydrogenation to Mixed Glycol Stream

Five and Six Carbon Sugar to Glycol Block Flow Diagram



Production of Seed Alfalfa Market Pulp



- Bleaching Trials with ECF and TCF bleaching
- TCF Optimum Brightness of 68
 - O2-Q-E-P-P-PAA
- ECF Optimum Brightness of 90
 - D-Eop-D-P
- Produced 50 pounds of 80 brightness
 - D-Eop-P

Market Pulp Production



- **Produced 50 Pounds of Wheat Straw Market Pulp**
 - 20 pounds of unbleached pulp for prospective customers
 - 20 pounds of semi-bleached pulp for newsprint
 - 10 pounds of ECF bleached pulp for customers

Fluff Production



- **Straw Pulp for Fluff Pulp**
- **Utilization of Wheat, Alfalfa, and other sources**
- **Developed Alternative Pulping Chemistry**
- **Increased demand for Fluff Pulp**
 - **Green Options**
 - **Customers demanding “Green” Personal Products**

Feasibility for Columbia County Biorefinery



- 200 Ton per day pulp mill
- 5 Grades of Pulp to be produced
- 300 Tons per day straw needed
- 10,000 Tons per year Seed Alfalfa
- 30 Tons per day lignin
- 30 tons per day hemicellulose

Feasibility for Columbia County Biorefinery



- Working with Columbia County and Walla Walla County Wheat Farmers for straw availability
- The mill will take all available seed alfalfa straw
- MOU in place for Sugars
- Two customers for lignin
- 60 to 75 jobs created

Possible Site of Mill



- Site outside of Starbuck
- Rail Siding on Property
- Possible Barge Loading Facility across the street
- Close to raw material