

Why I Am Optimistic About The Future Of The U.S. Bioeconomy

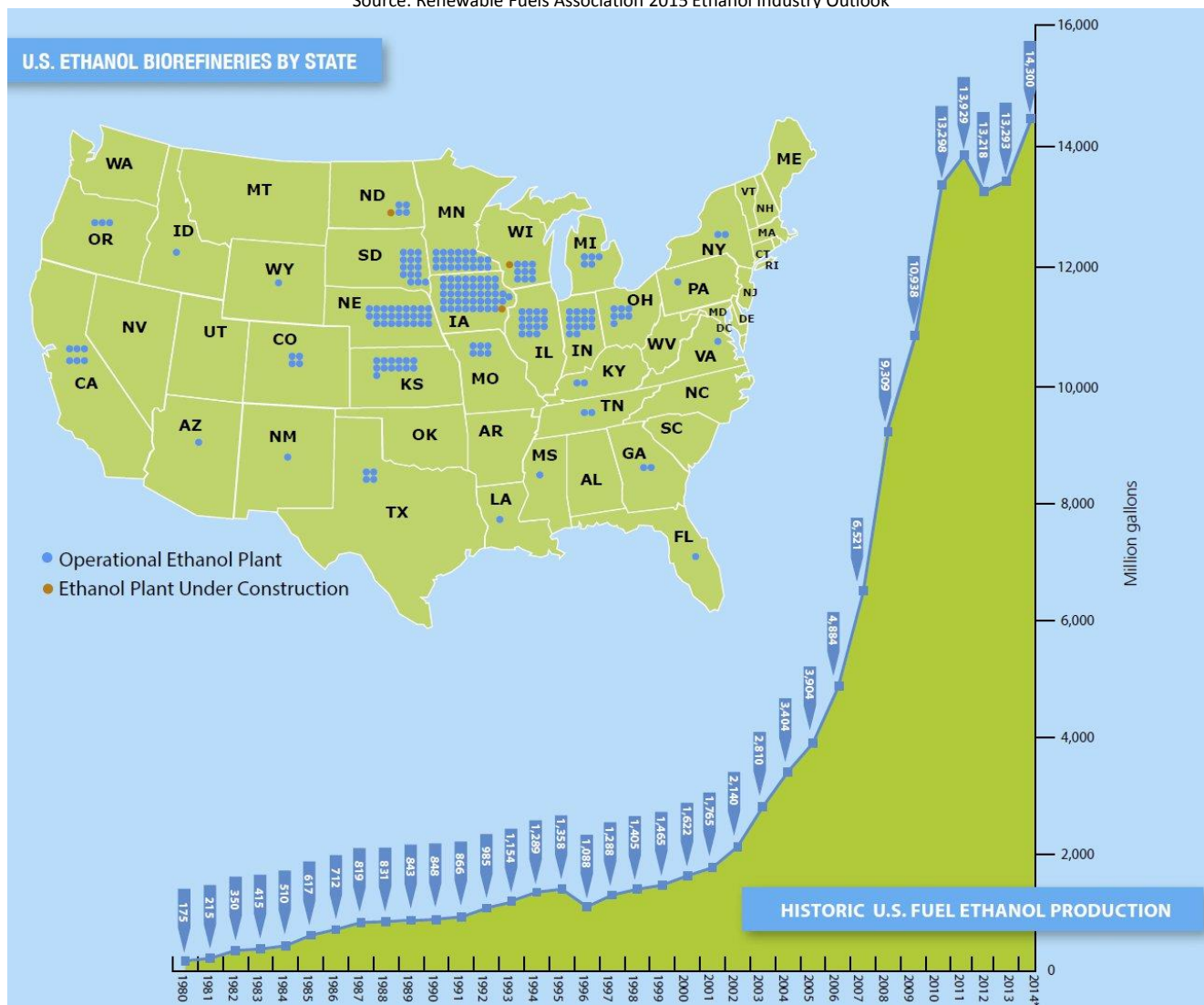
Tim Eggeman, Ph.D., P.E.

President & Chief Executive Officer – ZeaChem Inc.

S1041 Symposium | Wooster, OH | August 11th, 2015

1st Generation Ethanol Summary – United States

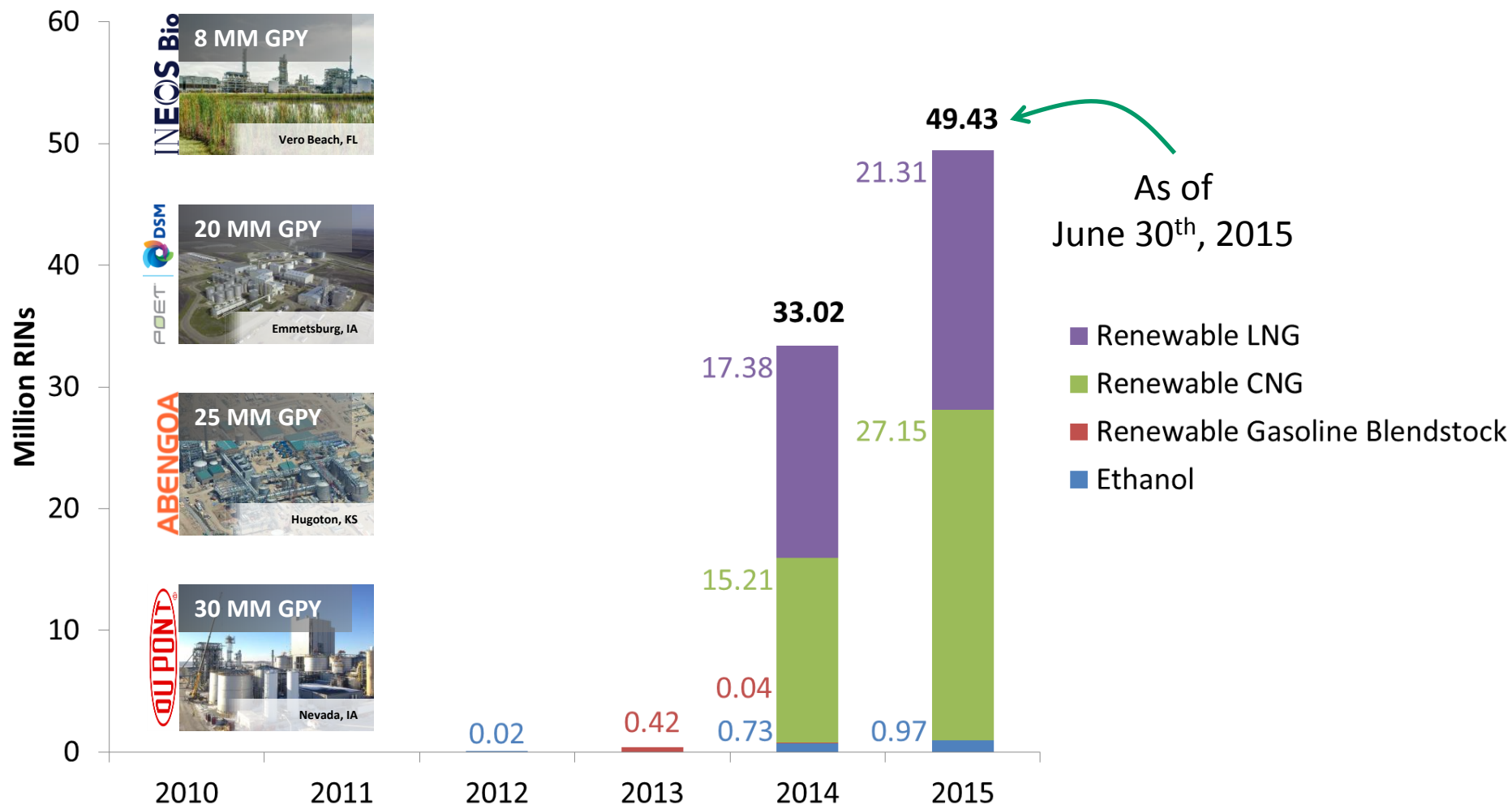
Source: Renewable Fuels Association 2015 Ethanol Industry Outlook



Exponential Growth Once Early-Stage Risks Were Mitigated

Meaningful Volumes of Cellulosic Biofuels are Coming Online

Cellulosic Biofuel D3 RIN Generation



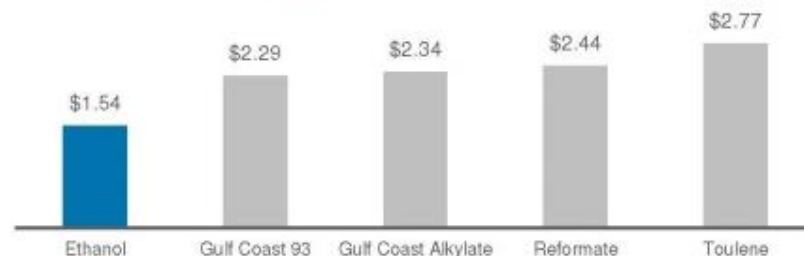
First Wave Of Pioneer Cellulosic Ethanol Plants Are In The Ground

Source: U.S. EPA RFS2 EPA Moderated Transaction System (EMTS) Information Data

Ethanol is a Success!!!

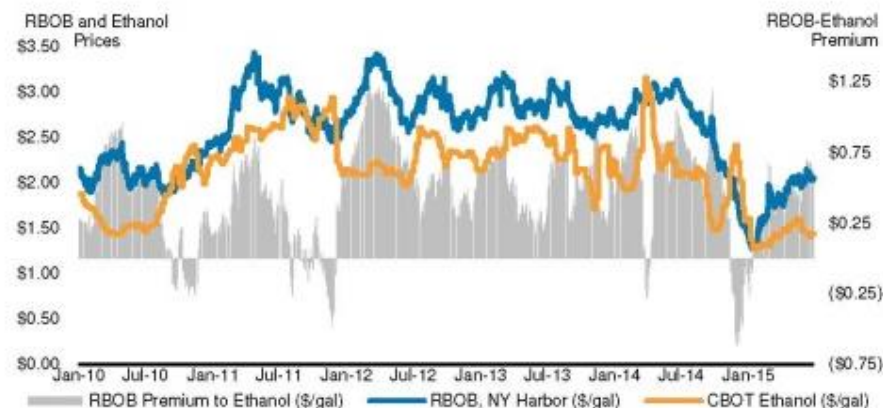
- Refiners/Blenders improve profits by blending ethanol into gasoline pool
- The 10% blend wall for ethanol is being addressed:
 - E15 now in 129 stations in 19 states
 - E85 now in 2,664 stations nation-wide
 - Exports to Canada, Brazil, and Rest of World
- Recent moves by EPA are removing policy uncertainty around RFS 2
 - March 2015: Issued updated to Cellulosic Waiver Credit
 - June/November 2015: Updates to Renewable Volume Obligations

Ethanol is the Cheapest Octane Enhancer⁽¹⁾



Substitute pricing reflects current low demand and is not representative of pricing in high demand substitution scenario

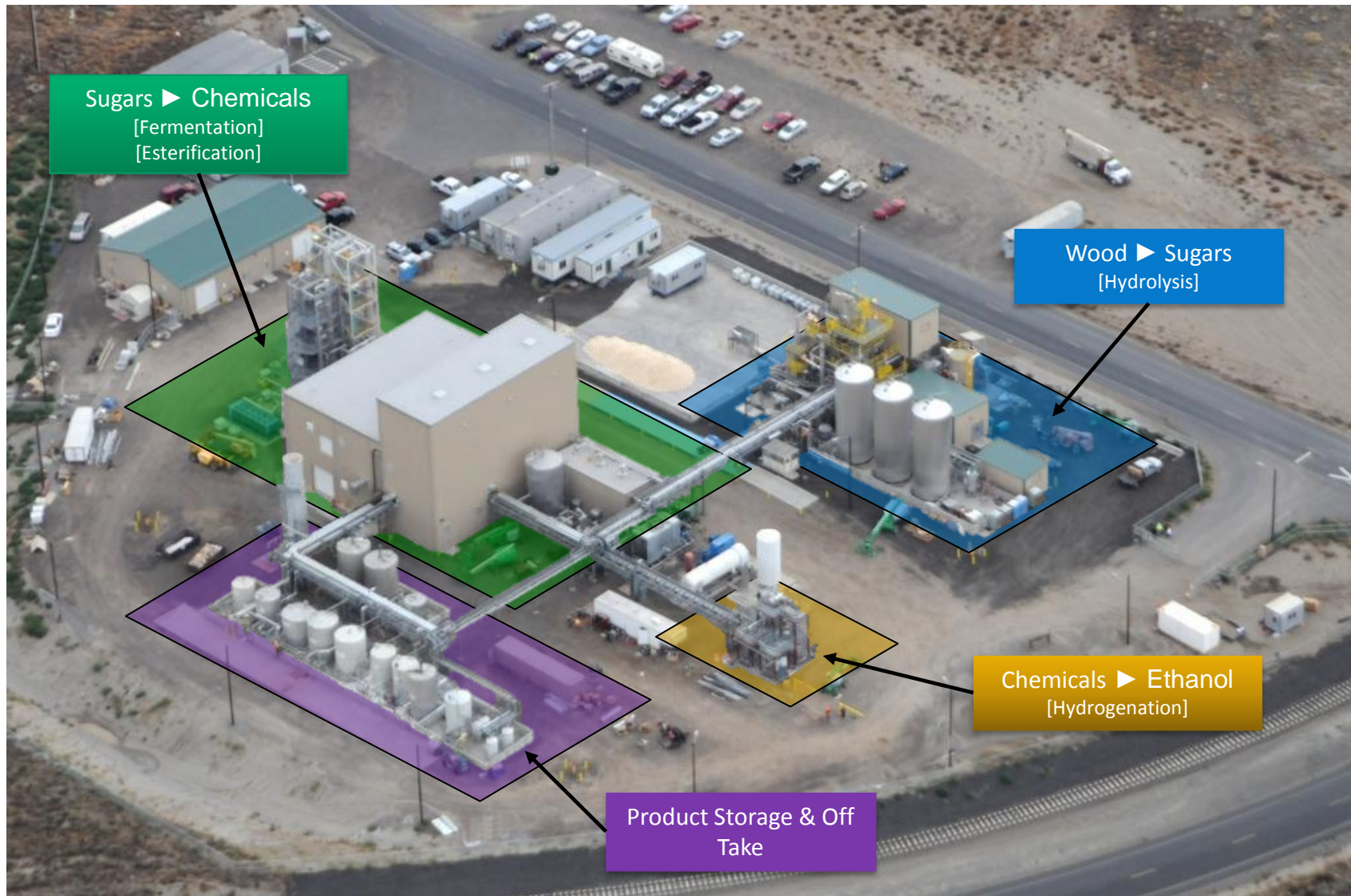
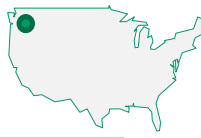
Ethanol Blending is Economically Incented



Source: Pacific Ethanol Second Quarter 2015 Earnings Conference Call Presentation

Financing Window for 2nd Wave of Pioneer Plant Should Open in Late-2015

ZeaChem 10 TPD IBR Facility – Boardman, OR

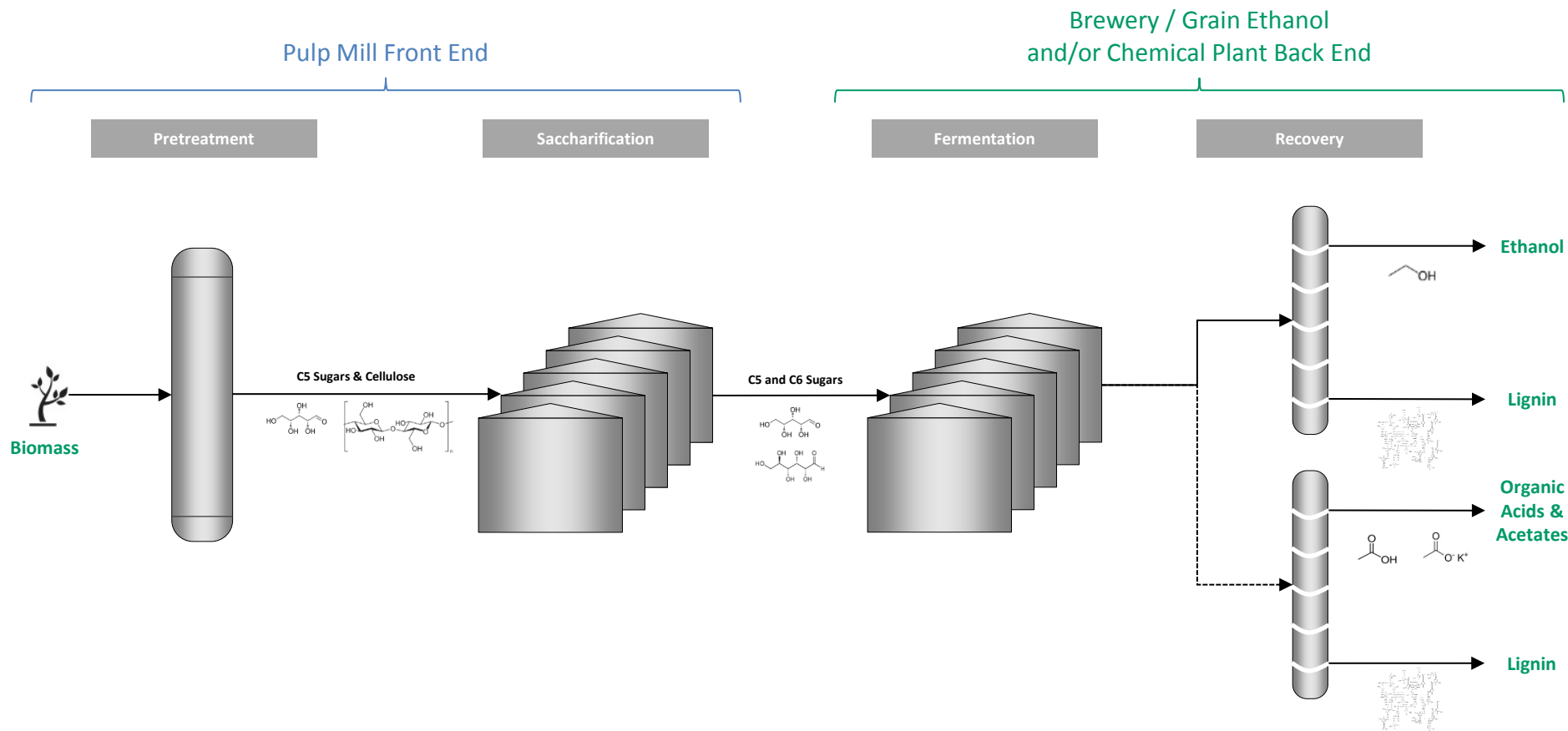


Facility has served original purpose for ZeaChem, now available for 3rd party use

ZeaChem 1st Commercial Cellulosic Biorefinery

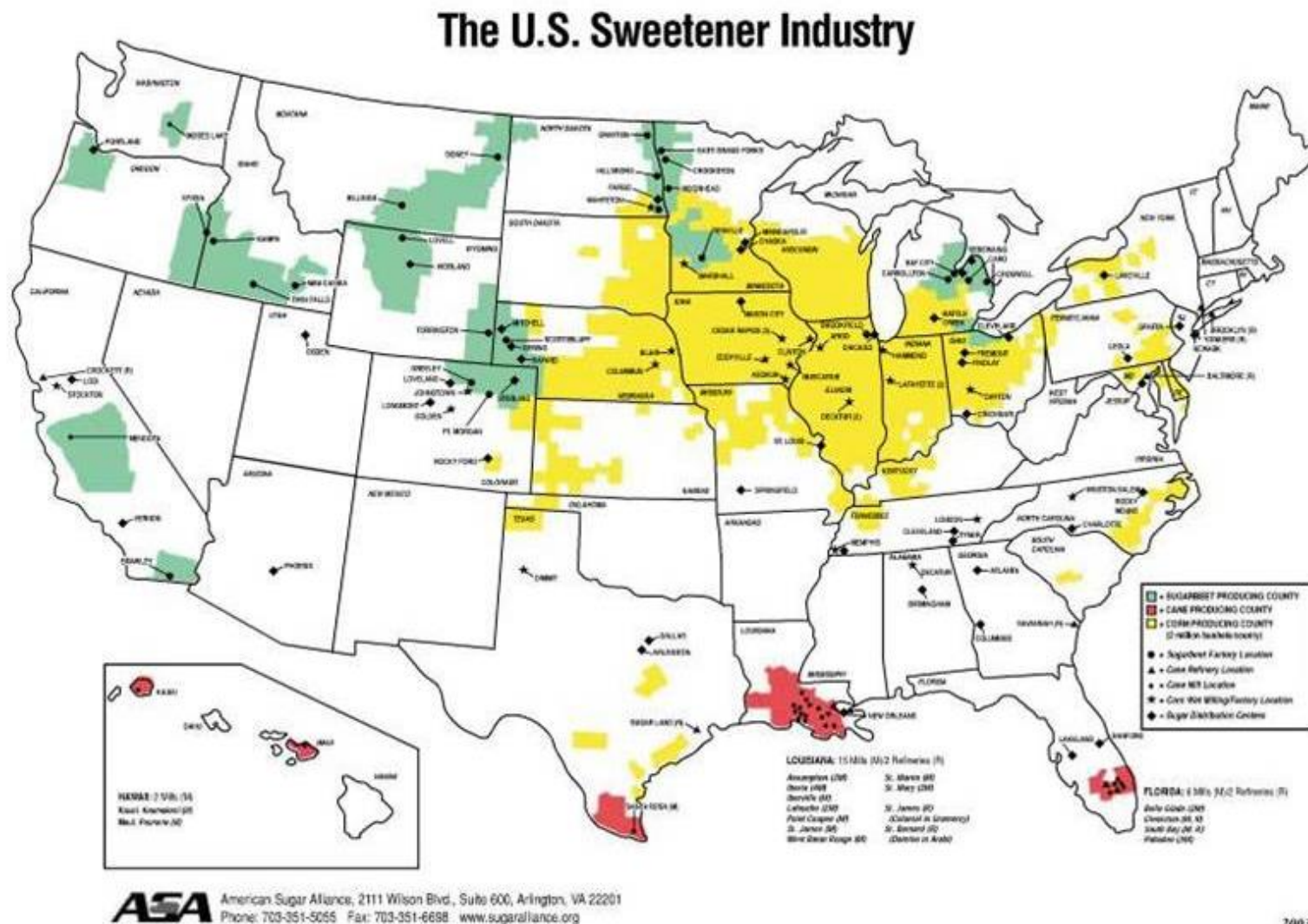


ZeaChem's Approach To Biorefining



Minimize technology risk, Maximize market diversity

U.S. Sweetener Industry



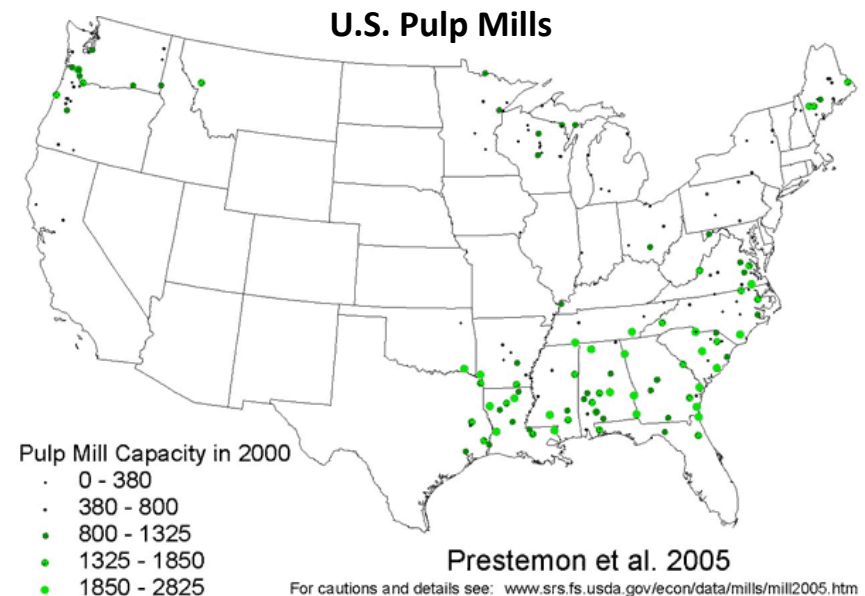
Untapped Colocation Opportunities to Reduce Costs and Speed Rollout of Cellulosic Biorefineries

Wood is an Advantaged Feedstock

- Financeable:
 - Long-term stable returns
 - Favorite assets class for risk adverse investors
- Known feedstock logistics:
 - Store on the stump
 - Established harvesting methods that support Just-In-Time deliveries
- Many colocation opportunities
 - Reduce costs by taking advantage of existing assets
 - Speed rollout of biorefinery projects
- Other technical factors that reduce costs:
 - Low dirt eliminates pre-processing wash steps
 - High bulk density reduces pretreatment reactor size



Source: U.S. DOE, U.S. Billion Ton Update: Biomass Supply For A Bioenergy & Bioproducts Industry



Wood is a Key Resource for Providing Geographic Diversity of Biorefinery Locations

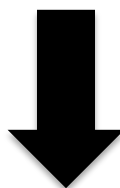
Industry Challenges & How They Are Being Overcome

Challenges

US EPA slow implementation of RFS 2 has created policy uncertainty, stifling investment in new biorefineries

Adversity faced by industry 1st movers has made the investment community much more cautious and slow to act

Renewable Fuels
Standard



Financing



Historical
Performance

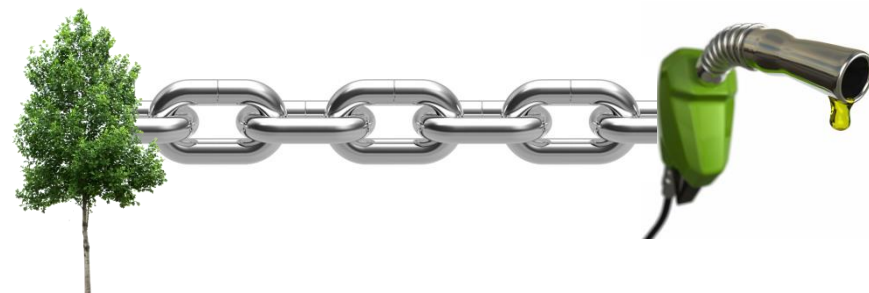
Progress

EPAs has proposed required fuel volumes for obligated parties for 2014, 2015 & 2016, with their final rule expected in November

Confidence is returning as industry pioneers complete construction of 1st commercial facilities and begin commissioning and operations

Risk Mitigation is Key to the Future Success Of Biorefining

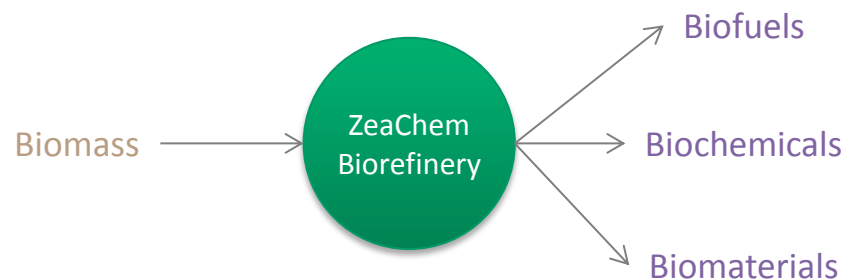
- ✓ Continued technical improvements to drive down capital and operating costs
- ✓ Address technology risk with disciplined lab-, pilot-, and demo-scale development
- ✓ Make smart site selection decisions: This has an enormous impact on project costs, risks, and timeline
- ✓ Secure both ends of the value chain
- ✓ Use standard FEL/EPC methods and contracting strategies to contain capital costs
- ✓ Gain operational excellence through partnerships or in-house development
- ✓ Diversify product slate with a portfolio of biofuels, biochemicals, and biomaterials



Pulp Mill Front End



Brewery / Grain Ethanol
and/or Chemical Plant Back End



Notwithstanding The Rocky Road Traveled So Far, There Is Reason To Look Ahead With Great Hope



Thank You

Tim Eggeman, Ph.D., P.E.
time@zeachem.com | (303) 248-7774