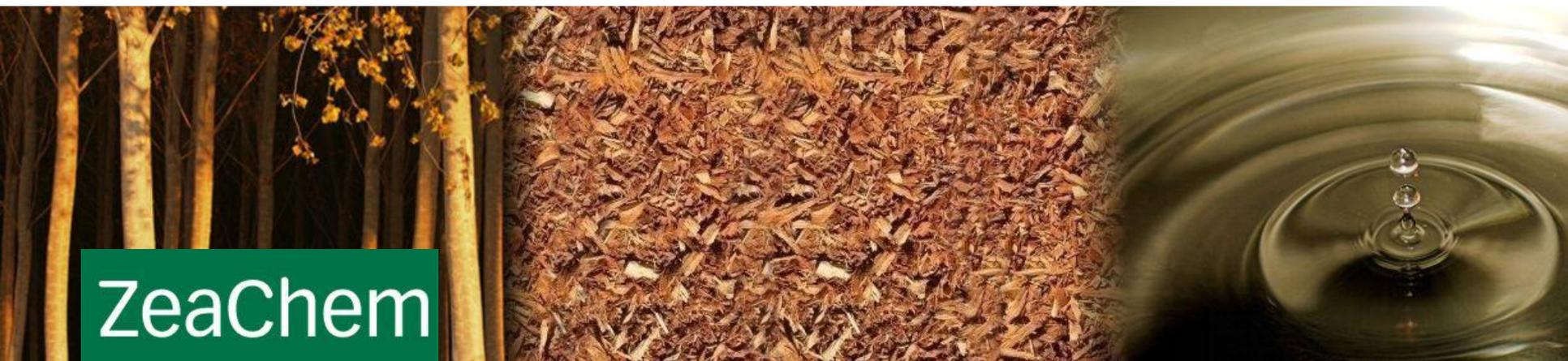


ZeaChem Integrated Biorefinery



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

Chief Technology Officer, Founder

11 July 2012

Tomorrow's Fuels & Chemicals Today

ZeaChem

We Create High Margin and Sustainable Alternatives to Petroleum-Based Fuels and Chemicals in Use, *Today.*



**Poplar Harvesting
Boardman, OR**

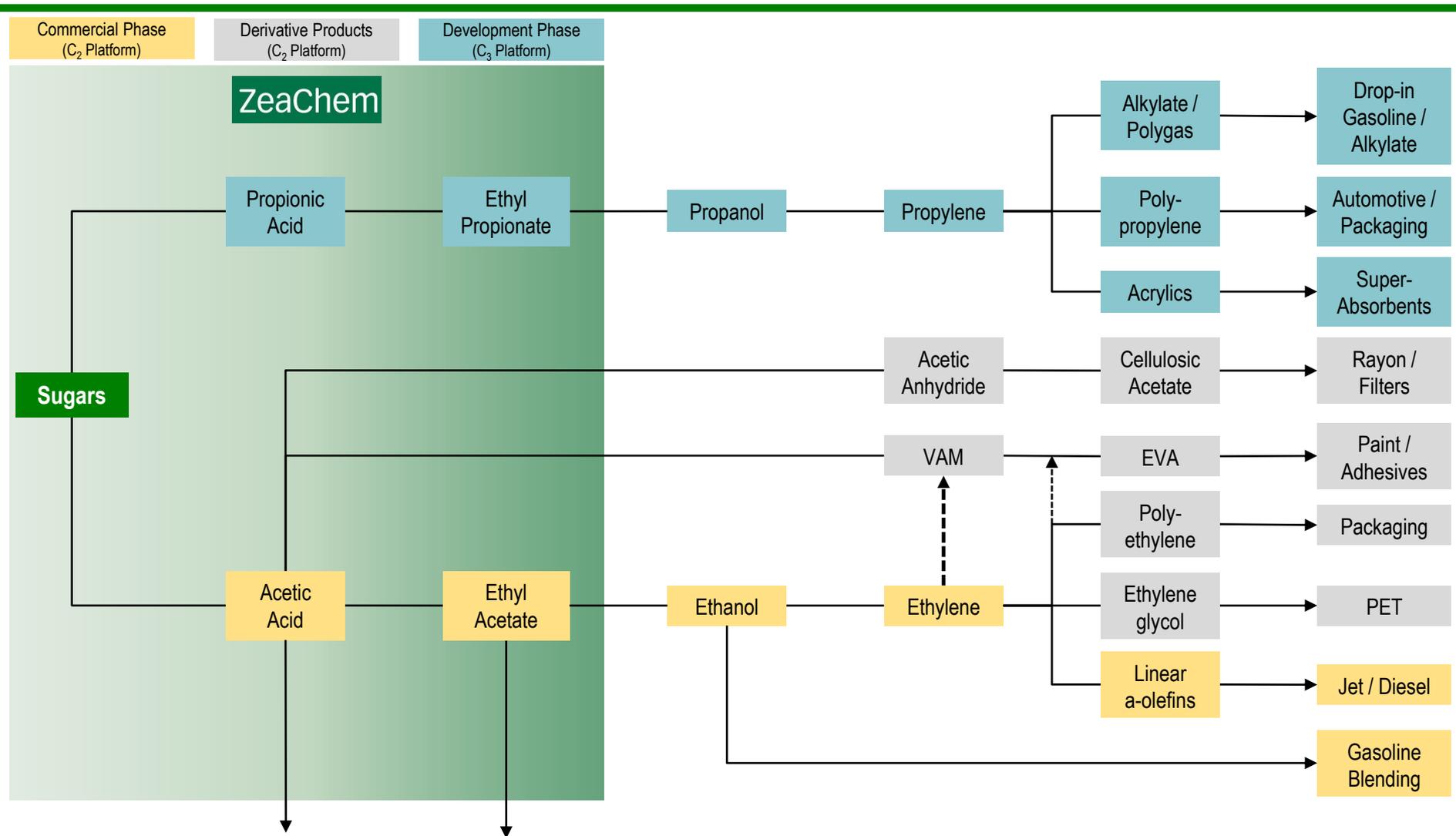


**250K GPY IBR Facility
Boardman, OR**



Fuels and Chemicals

Overview of C2 and C3 Platforms



Multiple Independent Projects at Boardman, OR

ZeaChem



ZeaChem Core

Sugars
↓
Acetic Acid
Ethyl Acetate



US DOE Cooperative Agreement

Cellulose ↓ Ethyl Acetate ↓
Sugars & Ethanol



Alcohol to Hydrocarbons

Ethanol / Propanol
↓
Jet
Diesel
Gasoline



Integrated Biorefinery

Cellulose
↓
Ethanol

ZeaChem Core Project

- Sugars to Acetic Acid & Ethyl Acetate
- Private Funding
- Construction completed 2011
 - No lost time or reportable accidents
 - On-time
 - Under budget
- Commissioning and initial start-up completed January 2012



US DOE/ZeaChem IBR Cooperative Agreement

- Adds biomass hydrolysis & ethyl acetate hydrogenolysis for complete “Biomass-to-Ethanol” integrated process
- \$25MM cooperative agreement with US DOE IBR program
- Currently under construction
- Start-up in Fall 2012



IBR Cooperative Agreement - Biomass Hydrolysis Unit



IBR Cooperative Agreement - Hydrogenolysis Unit



USDA AFRI Regional CAP - Alcohol to Hydrocarbons



2013



2015



- \$40MM USDA NIFA AFRI Regional CAP award to consortium led by University of Washington
- Creates regional, holistic model for advanced biofuels development
- \$12MM sub-award to ZeaChem for modules to produce bio-based jet, diesel, and gasoline
- Supports ZeaChem's role in CAAFI/ASTM Alcohol-to-Jet Task Force for certification



IBR – A Critical Stepping Stone To 1st Commercial



Agency Collaborations



- US DOE: A key development and financial partner
 - IBR Cooperative Agreement



- USDA: Expanding the IBR & enabling 1st Commercial project development
 - AFRI Regional CAP
 - Biomass Crop Assistance Program (BCAP)
 - Loan Guarantee conditional award



- US DOD / Navy / Air Force / FAA: Supporting commercialization of drop-in hydrocarbon biofuels
 - Parallel certification efforts for Alcohol-to-Jet in civilian and military use



Acknowledgment and Disclaimer

- ***Acknowledgment:*** This material is based upon work supported by the Department of Energy under Award Number DE-EE0002880
- ***Disclaimer:*** This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Thank You



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

Chief Technology Officer, Founder
(303) 248-7774

time@zeachem.com

