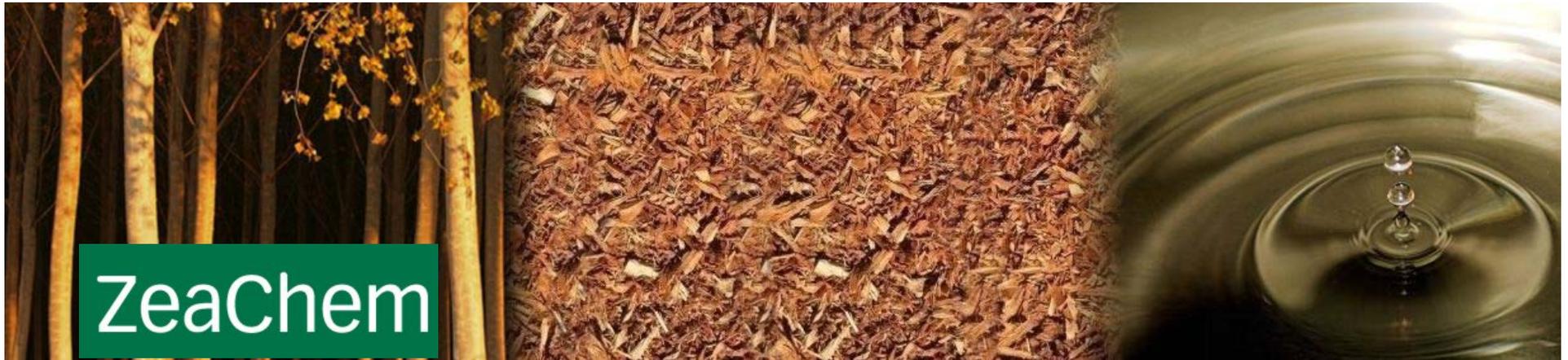


# Cellulosic Biorefinery for Jet and Distillate Production



**Tim Eggeman, Ph.D., P.E.**  
Chief Technology Officer, Founder

**Defense Energy Technology Challenge**  
Honolulu, HI  
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# Who We Are

- Developer of cellulosic biorefining technology
  - Combines fermentation with thermochemical conversion to maximize yield
  - Yield drives economics and environmental footprint
- Builder, owner, operator of advanced biorefineries
  - Feedstock agnostic, non-food based
  - Diverse portfolio of drop-in fuels and chemicals
  - Deployed today in US Pacific Northwest
  - Replicable, domestic and international



# Feedstock Strategy

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- Dedicated sustainable energy crops supplemented with locally available agriculture residues
  - “Grow where we go” supported with supply contracts
  - Readily replicable (Mainland US, Hawaii, Ports of Call)
    - Woody energy crops (Poplar, Eucalyptus)
    - Grasses and canes
    - Forest and agricultural residues
- Pacific Northwest: Contracts with GreenWood Resources for hybrid poplar, supplement with wheat straw
  - GreenWood: World leader in hybrid poplar development and farm management, supplies from 30,000-acre Forest Stewardship Council certified tree farm in Oregon
  - USDA Biomass Crop Assistance Program grant to establish 7,000 acres of intercropped coppiced hybrid poplar trees



# What We Have Done

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Lab/Bench  
Menlo Park, CA



2006

Pilot  
50,000 gallons/year (GPY)  
Golden, CO



2009

Integrated Biorefining Facility (IBR)  
250,000 GPY  
Boardman, OR  
\$25M US DOE Grant



2011



# What We Are Doing

## IBR Facility Expansion Alcohol to Hydrocarbon (ATH) Module

50,000 GPY Jet, Diesel & Gasoline  
Boardman, OR



2013

## Biorefinery

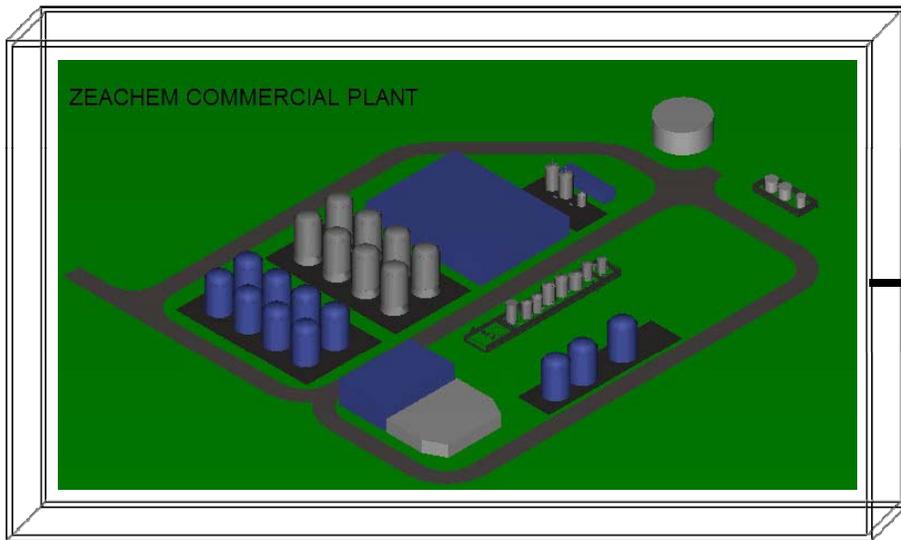
25 Million GPY Cellulosic Ethanol  
Boardman, OR



2014

# DETC Proposal

Biorefinery  
25 Million GPY  
Port of Morrow, Boardman, OR



2014

Alcohol to Hydrocarbon (ATH) Facility  
15 Million GPY  
Jet Fuel & Diesel



2014 - 2015

Cellulosic  
Ethanol

US  
Military  
Jet/  
Diesel

# What are the Benefits?

1. Ready to meet DOD targets
  - 50,000 gal/yr jet/diesel by 2013
  - 15 Million gal/yr jet/diesel by 2014-15
  - Replicate for additional volume
2. Least cost alternative
  - Fixed formula pricing
  - Great logistics to entire Pacific-rim
3. Excellent environmental and social metrics
  - Low impact feedstock
  - Non-food based, no farm land loss
  - >60% reduction in GHG emissions
  - Creates green jobs for rural America
  - Builds on US DOE and USDA funding



# How Can US DOD Help?

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1. Contract for jet/diesel from IBR ATH Module
  - Signed by end of 2011
  - Deliveries in 2013
2. Contract for jet/diesel from Biorefinery and ATH Facility
  - Signed by July 2013
  - Deliveries in 2014-2015
3. Option: Financial support for ATH Facility and/or future biorefineries under Defense Production Act Title III



# Thank You

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**Tim Eggeman**

**Chief Technology Officer,  
Founder**

[time@zeachem.com](mailto:time@zeachem.com)

(303) 248-7774

