# FROM BENCH TO COMMERCIAL: THE POET EXPERIENCE

### BIO WORLD CONGRESS ON INDUSTRIAL BIOTECHNOLOGY

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## WHO IS POET?





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### **POET - CHANCELLOR**

- 120 MM gal facility
- 2.88 gal/bu for corn
  - California Air Resources Board (CARB) assumes 2.72 gal/bu
  - + Reduces farming emissions (per MJ ethanol)
- Gas from Sioux Falls Regional Sanitary Landfill
  - + Dedicated pipeline, credit for methane emission avoidance
- Solid fuel boiler
  - + Waste wood
- Carbon Intensity of 63.88 gCO<sub>2e</sub>/MJ
  - + CARB assumes 97.56 gCO<sub>2e</sub>/MJ





### POET RESEARCH FACILITIES

#### POET Research, Inc.

- 70 team members in POET Research located in Sioux Falls and Scotland, SD
- Science & Technology, Research Engineering, Commercial Development groups
- Develop technology for license to plants

#### **POET Research Center**

- Located in Scotland, SD
- Commercial ethanol plant
- Piloting facility for starch ethanol, oil recovery, cellulosic ethanol, and other POET processes





## GRAIN ETHANOL VALUE CHAIN





### **PROCESS OPTIMIZATION**





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7

## **FERMENTATION RESEARCH**



#### **HTS Laboratory Research**

- mL to L scale (1000×)
- 10-20× increased throughput

#### Enables

- 8 variable modeling
- Large DoE
- Accelerates technology roll-out

#### Predictive

- Pilot/Biorefinery data/economics
- Identifies most interactions

## **FERMENTATION RESEARCH**



#### Pilot scale

20,000 gal pilot fermentation

#### Enables

- Biorefinery effects
  - Recycle
  - Plant atmosphere
  - Operators vs. Scientists

#### Predictive

- Biorefinery data/economics
- Identifies problems early

## **FERMENTATION RESEARCH**

#### **Biorefinery Research**

- 550,000-770,000 gal, to 1,000,000
- Dedicated PRI Deployment resource
- POET Plant Management involvement
- Sophisticated data acquisition

#### Enables

Biorefinery process modeling

Economic Value Determined



# YEAST TECHNOLOGY





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### **TECHNOLOGY ADOPTION**









- BEST COLLABORATORS IN VALUE CHAIN
- CONTINUOUS PROCESS IMPROVEMENT
- ITERATIVE BETWEEN LAB AND PILOT
  - + DESIGN OF EXPERIMENT TO ENSURE STATISTICAL RELEVANCE
  - + STRONG MASS CLOSURE
- MATHEMATICAL AND ECONOMIC MODELING
- RAPID ROLL-OUT

### **THANK YOU!**