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ICM Contribution to Agriculture through New Technology Development

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ICM History

- Founded in 1995 by Dave VanderGriend
- Based in Colwich, Kansas and St. Joseph, Missouri with ~ 325 Employees
- 107 North American Bio-Refineries Producing 7+ Billion Gallons Ethanol and 3.5+ Million tons of value added Food and Feed Co-products Annually
- R&D, Engineering, Design, Construction, Manufacturing, Plant Support

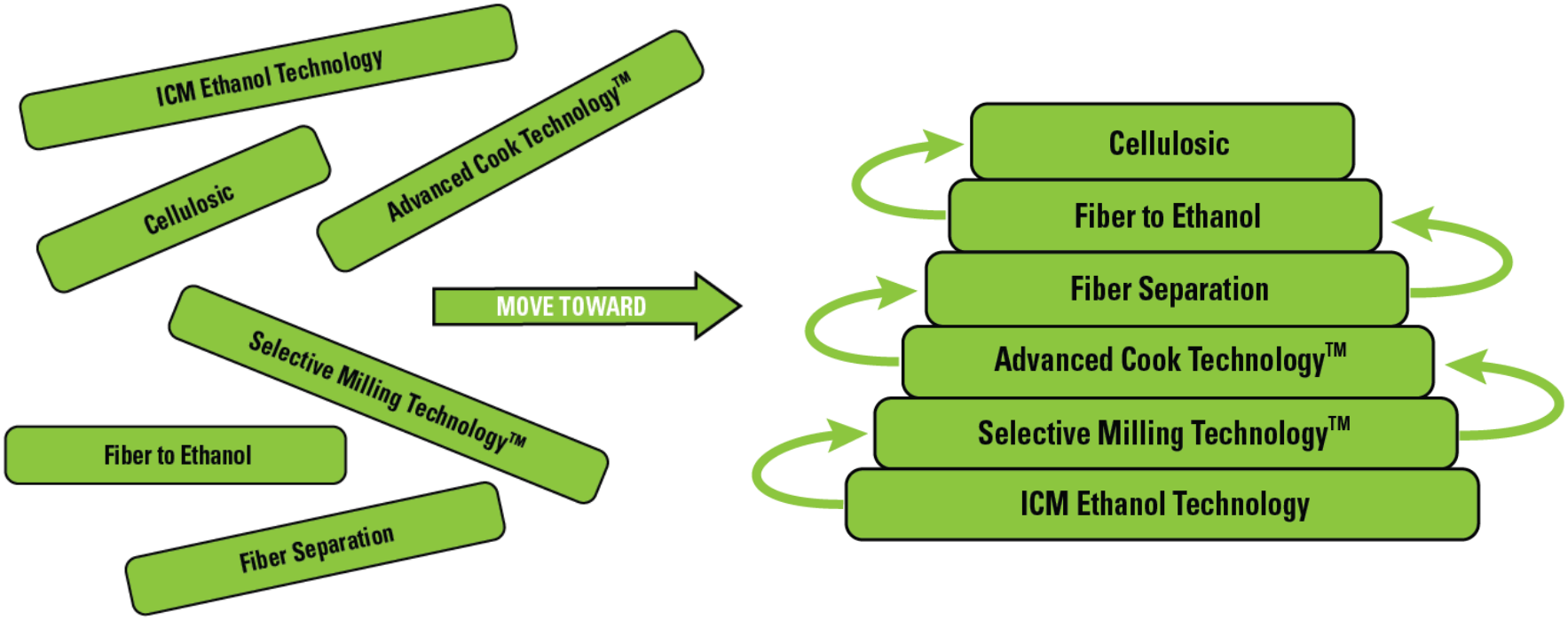
In 1978, The Vander Griend brothers built the first licensed fuel-alcohol still.

Generation 1: Grain Ethanol Plant

Feedstock Platforms

Grains (Corn)	Cellulose
Food/Feed/Fuels/Chemicals Gateway	No Food Product
100 gallons/ton (2.8 gallons/bushel) grain **109 gallons/ton** (86% conversion) fiber	**Corn Stover/Switchgrass** **80 - 90 gallons/ton**
0.7-0.9 lb/bu Oil w/ Solvent Ext.	NA
DDGS – 667 lb/ton	SCP – TBD
NA	Enriched Lignin Residue (8600 Btu/lb)
Historically Proven Operations	New Technology
$1.50 - $2.50 CAPEX/Gallon	$1.50 - $2.50 CAPEX/Gallon Grain Fiber $8-15 CAPEX/Gal Ag Residues/Energy Crops
< $0.35 OPEX Grain	< $0.35 OPEX Grain Fiber $1.83 OPEX Corn Stover
Gen 1.5 Fiber to Ethanol Platform	Gen 2.0 Co-Located to Ethanol Platform

Platform Technologies



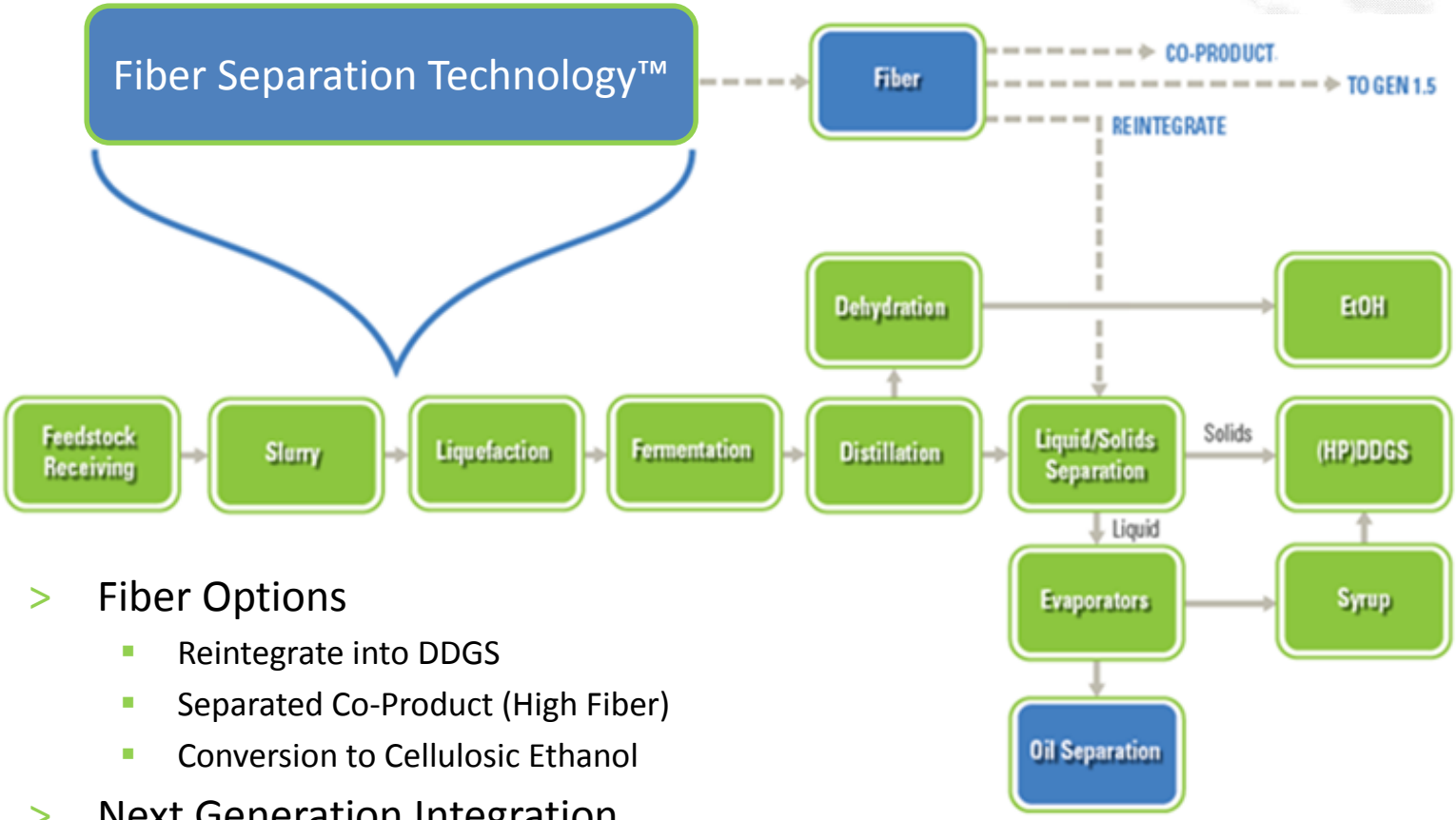
Selective Milling Technology™ System

- Circular mill system
  - Basic Components
    - Paddle Screen (top deck)
    - Disc Mill (middle deck)
    - Recombination Tank
    - Pumps
- Flow separation in front of the mill
- ICM's Selective Milling Technology™ with patents and patents pending.

SMT™ Performance from Plant Trials

- Higher ethanol yield
  - 1.5 to 3% observed
  - Hard to measure given noise inherent with process
- Additional oil recovery
  - 0.05 to 0.12 lbs/bu
- Lower DDGS recovery
- 16.42 lb/bu vs 17 lb/bu
- Lower residual starch in spent grains (Protein-Fat Concentration)
  - 20 to 50% typical (75% best observed to date) reduction in residual starch, varies by plant

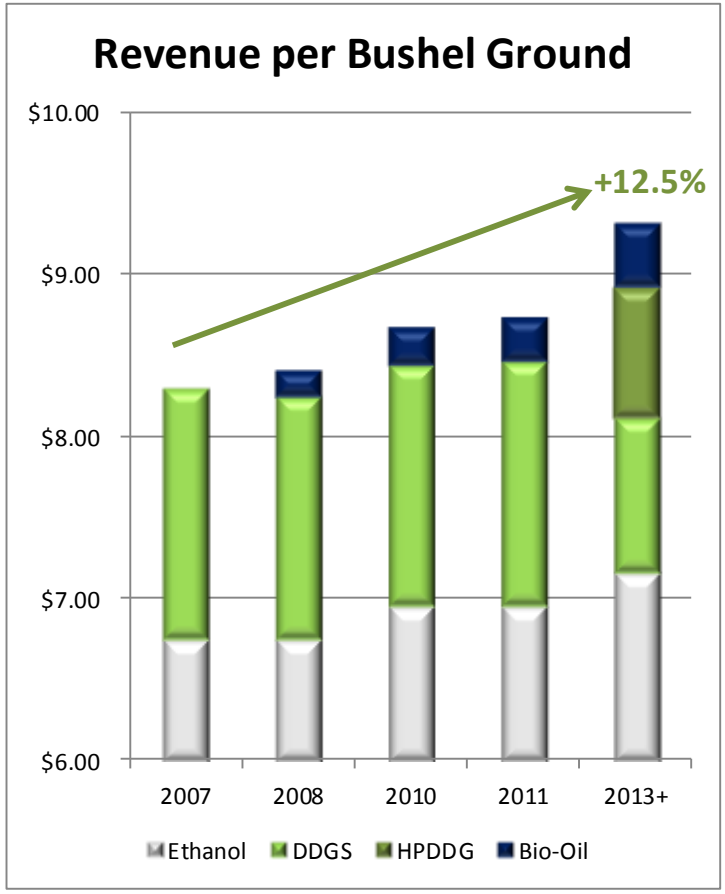
Fiber Separation Technology™



- Fiber Options
  - Reintegrate into DDGS
  - Separated Co-Product (High Fiber)
  - Conversion to Cellulosic Ethanol
- Next Generation Integration

Wet Fractionation Technology

Wet Fractionation Adds Value by Co-Product Diversification



- Debottlecks Ethanol Plant
- Creates Low Protein, High Fiber product as a Feedstock for Cellulosic Sugar Production or
- Creates Low Protein, High Fiber product good for Ruminant Feed
- Creates High Protein, Low Fiber product good for Monogastric Feed or
- Produces Bio-Oil good for high energy feed market or
- Produces Bio-Oil good for a Biodiesel feedstock
- Lower variable costs
- Lower fixed costs per gallon of ethanol

Projections based on pilot testing and/or early adopter installation.

*ICM Projection using $6/bu Corn and $2.50/gal EtOH

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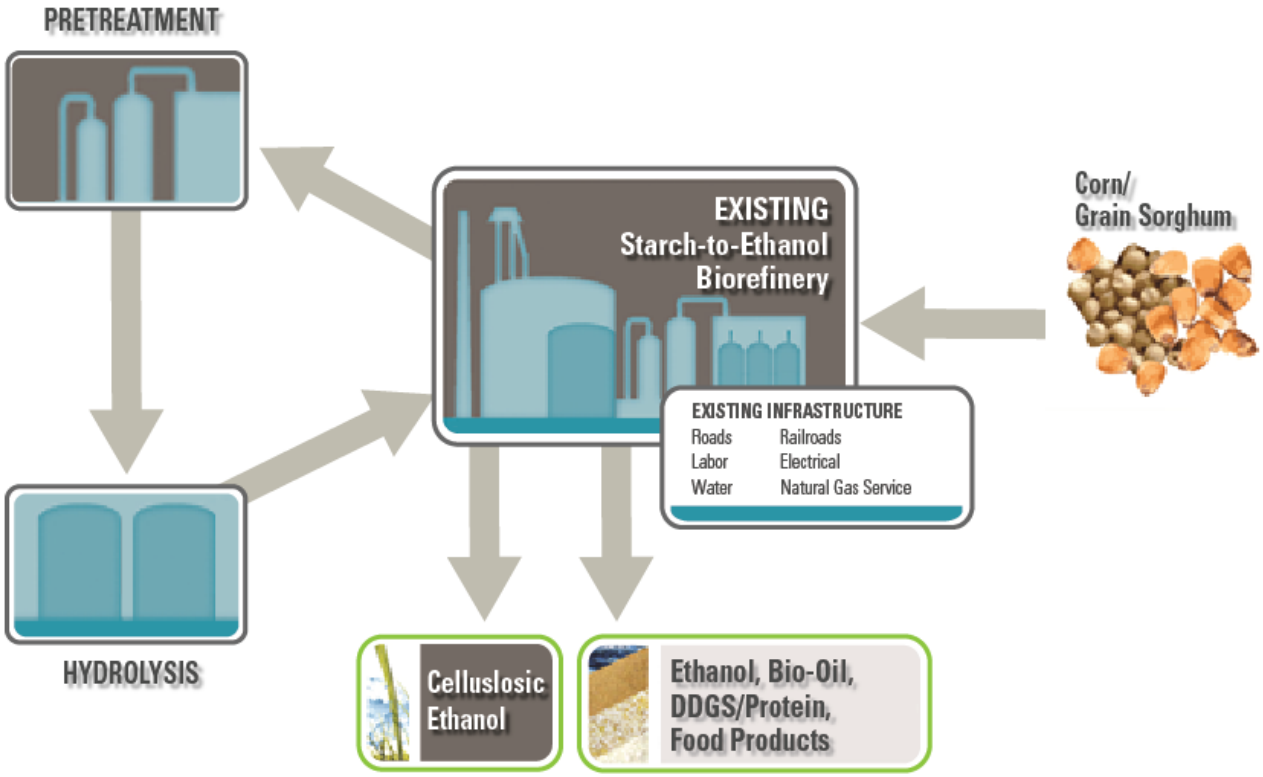
Why should we be interested in corn/milo fiber?

- Potential Fuels/Chemical Production from Cellulose
  - 56 pounds/bushel
  - 2.8 gallons ethanol/bushel
  - 100,000,000/2.8 = 35.7million bushels = 1 million tons x .056 = 56,000 tons fiber
  - Xylose/glucose = 10,000,000 additional gallons
- Potential Increased Ethanol Production from Starch
- Potential Increased Oil Production
- Potential Increased Protein/Fat in DDGS
- Potential Debottlenecking Existing Plant

Generation 1.5: Grain Fiber to Cellulosic Ethanol Technology

Integrated Cellulose at Existing Facilities



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What do you need to get there?

Transform Generation 1.0 into Generation 1.5

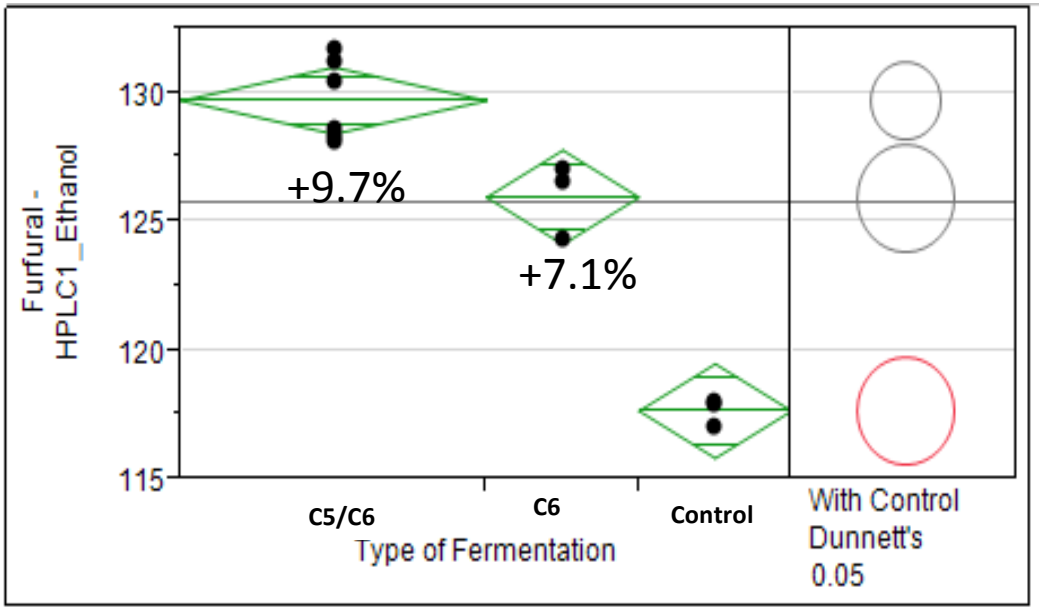
Pretreatment

Fractionation

Hydrolysis

Generation 1.5: Performance Run Overview

- 24 x 10,000 gallon starch/cellulose integrated pilot fermenters
- 18 x 35,000 gallon hydrolyzate tanks
- 5 x 535,000 gallon full-scale test fermenters
- 5 x 535,000 gallon full-scale control fermenters
- 1200 hours of pretreatment run time



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FST™ – Generation 1.5 Ethanol™

Summary Potential

- Additional ~2.1 Billion Gallons of Combined Starch/Cellulosic Ethanol Annually
  - 3.1+ gallons per bushel yield
  - Existing grain ethanol plants
- Advantages over Co-Located/Greenfield Design Models
  - Reduces capital requirements ($1.50 - $2.50 USD /installed gallon)
  - Reduces chemical inputs
- Flexible Platform Approach
- Increases Protein/Fat Value in DDGS
- Increases Oil Recovery – to 50%
- Co-Product Diversification

ICM R&D Team

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Thank You!

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Helpful websites:

ICM – icminc.com

Growth Energy – growthenergy.com

Urban Air Initiative – urbanairinitiative.com

Ethanol – drivingethanol.org

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