



Natural Solutions™

Applied CleanTech
Increased Profits
Decreased Risk
Cleaner Environment

BACKEND FRACTIONATION
The Solution is in Solution

© 2009 GreenShift Corporation
All Rights Reserved





THE EVOLUTION OF CORN ETHANOL

- The Corn Ethanol Industry contributed over \$65 billion to the GDP by offsetting 7% of America's fossil fuel needs during 2008.
- The existing fleet must evolve into increased sustainability.
- '*Increased sustainability*' means that we need to make better use of feedstock for less cost, energy, carbon, and risk.
- Making '*better use*' of corn requires innovation.





CHALLENGES

- Innovation requires Emerging Technology Development Risk.
- **Technology Risk:** does it work? what is the impact on my existing plant?
- **Financial Risk:** how do I generate a return on my R&D and my CAPEX?
am I in compliance with banking covenants?
what is the impact on my cash flow?



CORN ETHANOL & CO-PRODUCTS

- For every **1 Pound** of ethanol we produce **1 Pound** of co-product (DDGS)
- **Bad News:** The second pound is an untapped proven reserve of additional yield.
- **Good News:** Technology is available to mine these co-products in ways that reduce cost, energy, carbon and risk.





THE SOLUTION IS IN SOLUTION





BACKEND FRACTIONATION: The Solution is in Solution....

- In solution, we can separate components by:
 - vapor pressure (distillation)
 - density (centrifuge technology)
 - filtration (membrane/micro/nano)
- In solution, we can create reactions that:
 - alter molecular structures making new products
 - alter physical and chemical characteristics to allow recovery



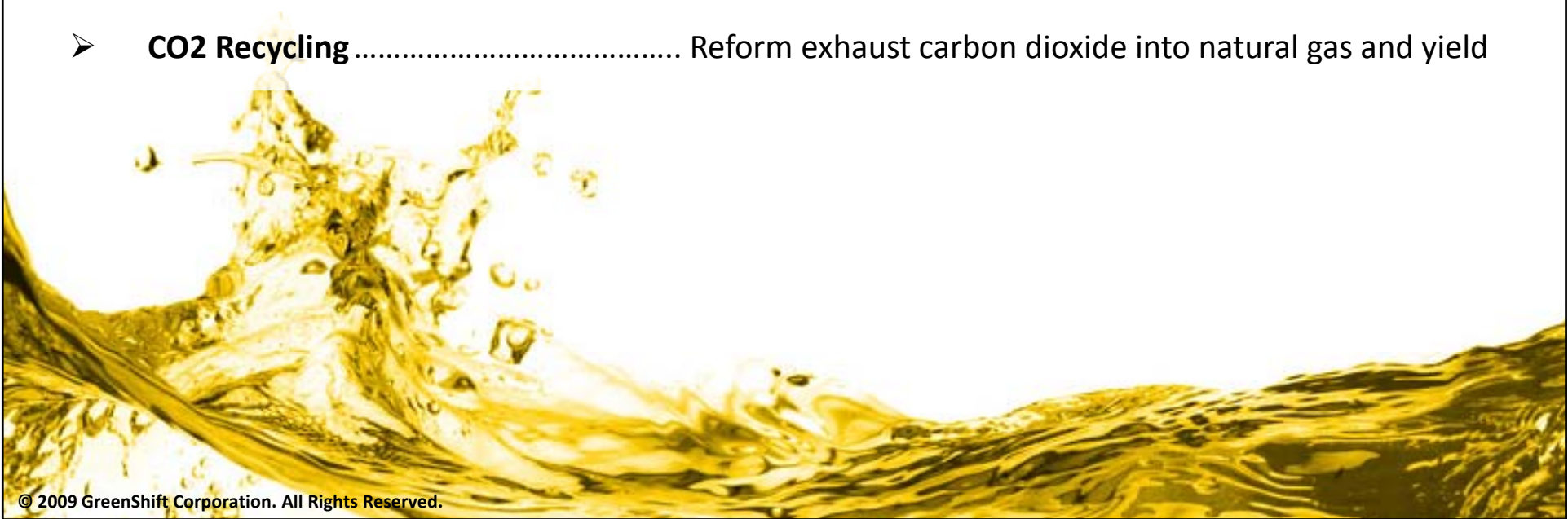
BACKEND FRACTIONATION: Do What You Do Best Better ... *and Then Do It More*

- If what you have works, don't reinvent it *improve it; add to it*
- If it is wet, keep it wet *and then use water to increase yield*
- If it quacks like fermentation, ferment better *and then ferment some more*
- If oil is worth more than grain, extract as much as you can *and then extract more*
- If feed is worth more with protein, concentrate protein *and then produce more*
- If a residual is worth more as a biopolymer, sell biopolymer *and then sell some more
(and don't burn or digest it)*



BACKEND FRACTIONATION: Technology Portfolio

- **Desiccation & Cavitation** Condition feedstock to increase yield
- **Corn Oil Extraction** Extract corn oil from thin and whole stillage
- **Cellulosic Oil™** Convert residual biomass into additional oil and protein
- **Biopolymer Extraction** Extract and convert byproducts into bioplastics
- **Integral Refining** Refine extracted oil for additional yield
- **CO2 Recycling** Reform exhaust carbon dioxide into natural gas and yield





BACKEND FRACTIONATION: Deploy in a controlled and rational manner

- We need to minimize Emerging Technology Development Risk as we innovate '*better uses*' of corn.
- Our approach is to achieve this with ***incremental shifts*** forward, where each shift favorably impacts the financial and environmental needs of our clients by decreasing raw material needs, facilitating co-product reuse, and reducing the generation of wastes and emissions.
- We focus on upgrades designed to '*trim the fat*' to create and capitalize on operating synergies with the host facility, and of each preceding technology upgrade ... $1 + 1 = 3$... $1 + 3 = 5$... $1 + 5 = 7$
- Less '*fat*' means less cost and incremental cash flow ... ***more cash flow mitigates Technology Risk.***



CORN OIL EXTRACTION





ONE KERNEL: TWO FUELS™

CORN ETHANOL INDUSTRY

3,750 MM Bushels of Corn

10.5 BGY of Ethanol
29.7 MM TPY of DDG

<< 680 MMGY of Extracted Corn Oil >>

GreenShift intercepts the flow of Distiller's Dried Grain (DDG), extracts corn oil, and returns the flow with increased protein content for less energy

BIODIESEL INDUSTRY

2.9 MM TPY of FOG

700 MMGY of Biodiesel

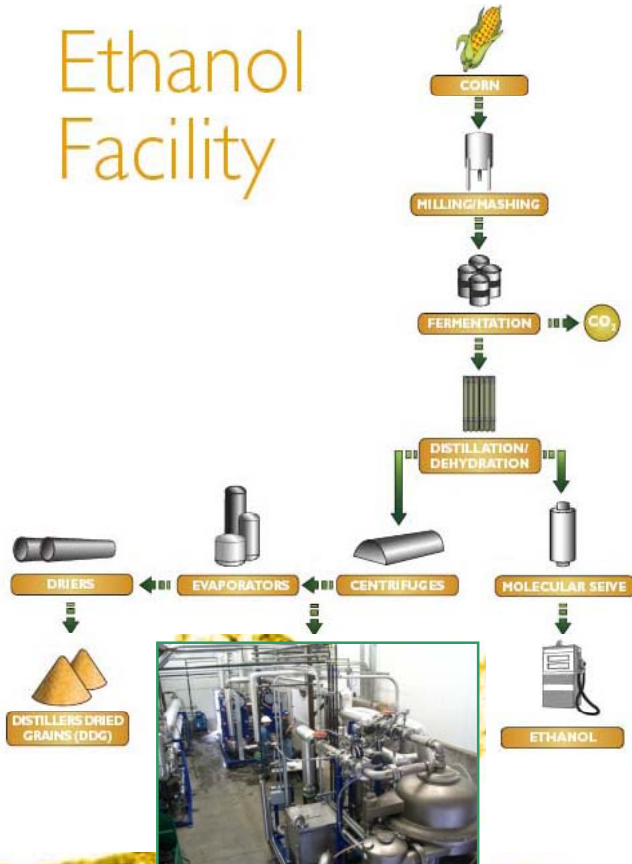
<< 630 MMGY of Corn Oil Biodiesel >>

70% of the biodiesel industry is shut down due to lack of conventional Fats, Oils & Greases (FOG); GreenShift's extracted corn oil is a new feedstock that could fill the industry



SECOND GENERATION FEEDSTOCK

Ethanol Facility



GreenShift's Method I
Corn Oil Extraction Facility

GreenShift integrates turn-key, skid-mounted, plug-and-play Corn Oil Extraction facilities into ethanol plants in two stages, or Methods:

- Method I extracts oil from Thin Stillage
- Method II frees oil from Wet Cake for added extraction with Method I.

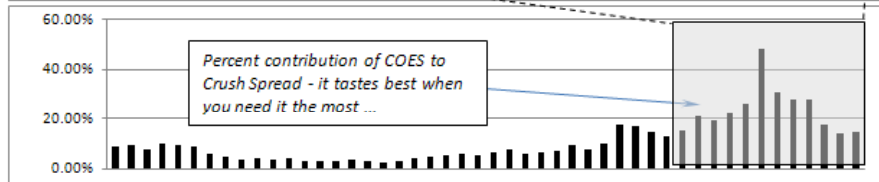
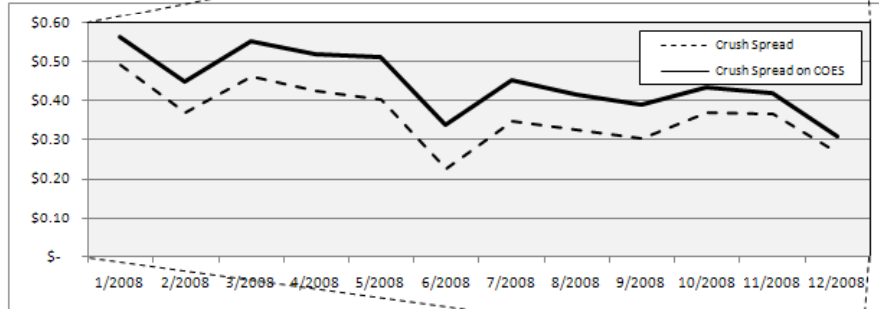
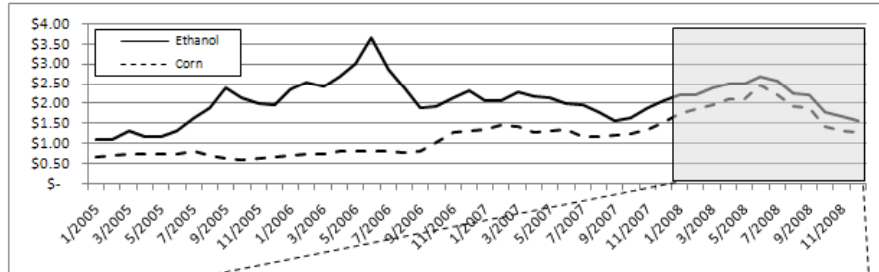
Extracted corn oil is shipped for refining into biodiesel or renewable diesel.

Benefits of Corn Oil Extraction

- Increased revenue and earnings
- Decreased commodity and financial risk
- Increased nutritional content of DDGS
- Enhanced energy balance from corn with less carbon emissions
- Increased sustainability and competitiveness



BENEFITS OF CORN OIL EXTRACTION



COES technology **increases biofuel yields** per bushel of corn by 7% while **reducing the energy and greenhouse gas (GHG) intensity** of corn ethanol production by more than 21% and 29%, respectively.

More Yield:

- Method I – Thin Stillage ~ 0.53 lbs/bushel (0.025 gallons/gallon of ETOH)
- Method II – Wet Cake ~ 0.75 lbs/bushel (0.035 gallons/gallon of ETOH)
- **Total Yield of Corn Oil ~ 1.28 lbs/bushel (0.060 gallons/gallon of ETOH)**

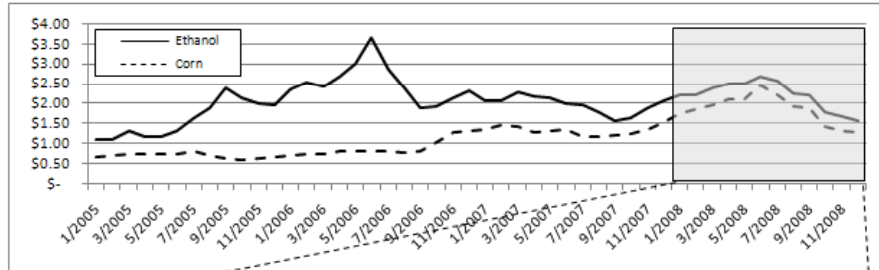
Less Energy:

- Method I – Thin Stillage Can Reduce Up to ~ 3,500 Btu/gallon of ETOH
- Method II – Wet Cake Can Reduce Up to ~ 5,500 Btu/gallon of ETOH
- **Total Possible Energy Reduction ~ 9,000 Btu/gallon of ETOH Produced**

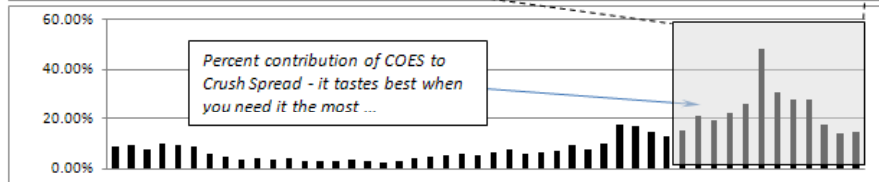
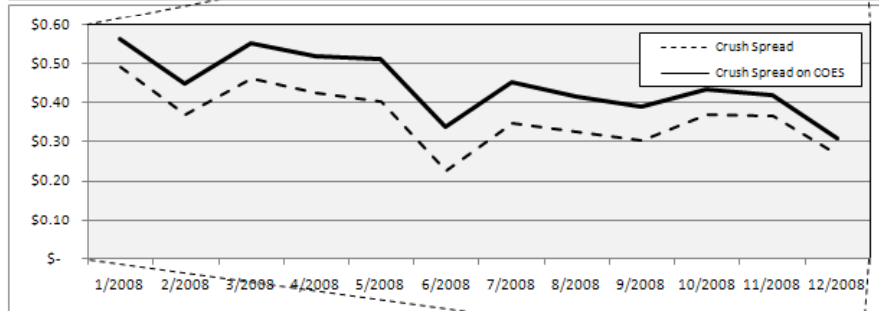
There are currently **no other technologies** that have been developed for the corn ethanol industry that begin to approach these results – in the **entire history** of the ethanol industry.



IMPACT ON STARCH SPREAD: Tastes Best When Needed Most



Corn oil extraction technology is widely considered to be the ***quickest path for margin improvement*** for corn ethanol producers today.



Percent contribution of COES to Crush Spread - it tastes best when you need it the most ...

Corn oil extraction technology provides ***safe harbor*** in tight margin environments and gives participating producers a ***powerful cost advantage***.



OFFERING

License Agreement Right to use technology in return for the right to purchase the extracted oil.

Purchase Price 51% of diesel spot.

Financing Licensee installs: receive 90% of cash proceeds until ROI
51% of diesel spot thereafter
GreenShift installs: 51% of diesel spot from inception





CONTACT INFORMATION

David Winsness, Chief Technology Officer
GreenShift Corporation
5950 Shiloh Road East, Suite N
Alpharetta, Georgia 30005
Office: 770.886.2734
Cell: 410.916.1800
Fax: 770.886.2738
Email: dwinsness@greenshift.com
Web: www.greenshift.com

