Enhanced Profitability through Technology, Integration, & Diversification

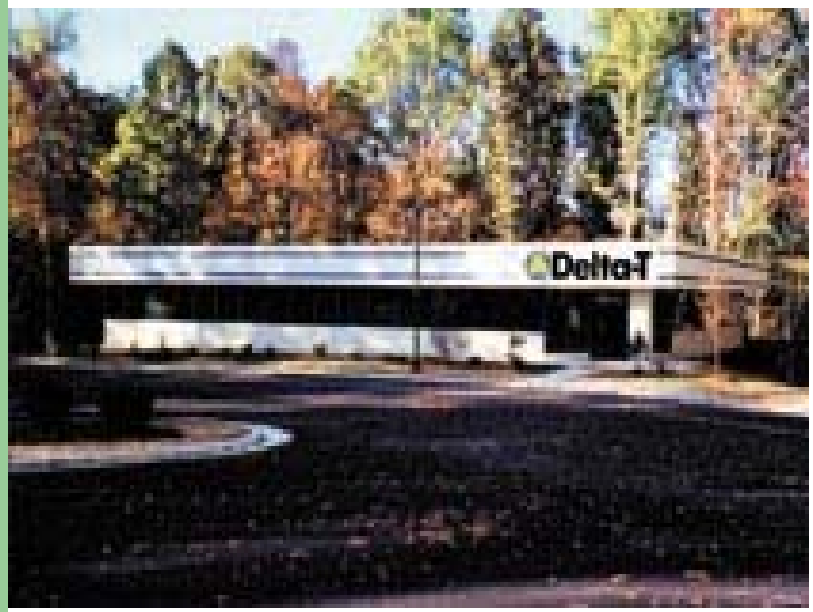
Presented by:

Jeffrey P. Robert

Delta-T Corporation

Williamsburg, VA USA

Enhanced Profitability through Technology, Integration, & Diversification



Jeffrey P. Robert

VP – Technical Services

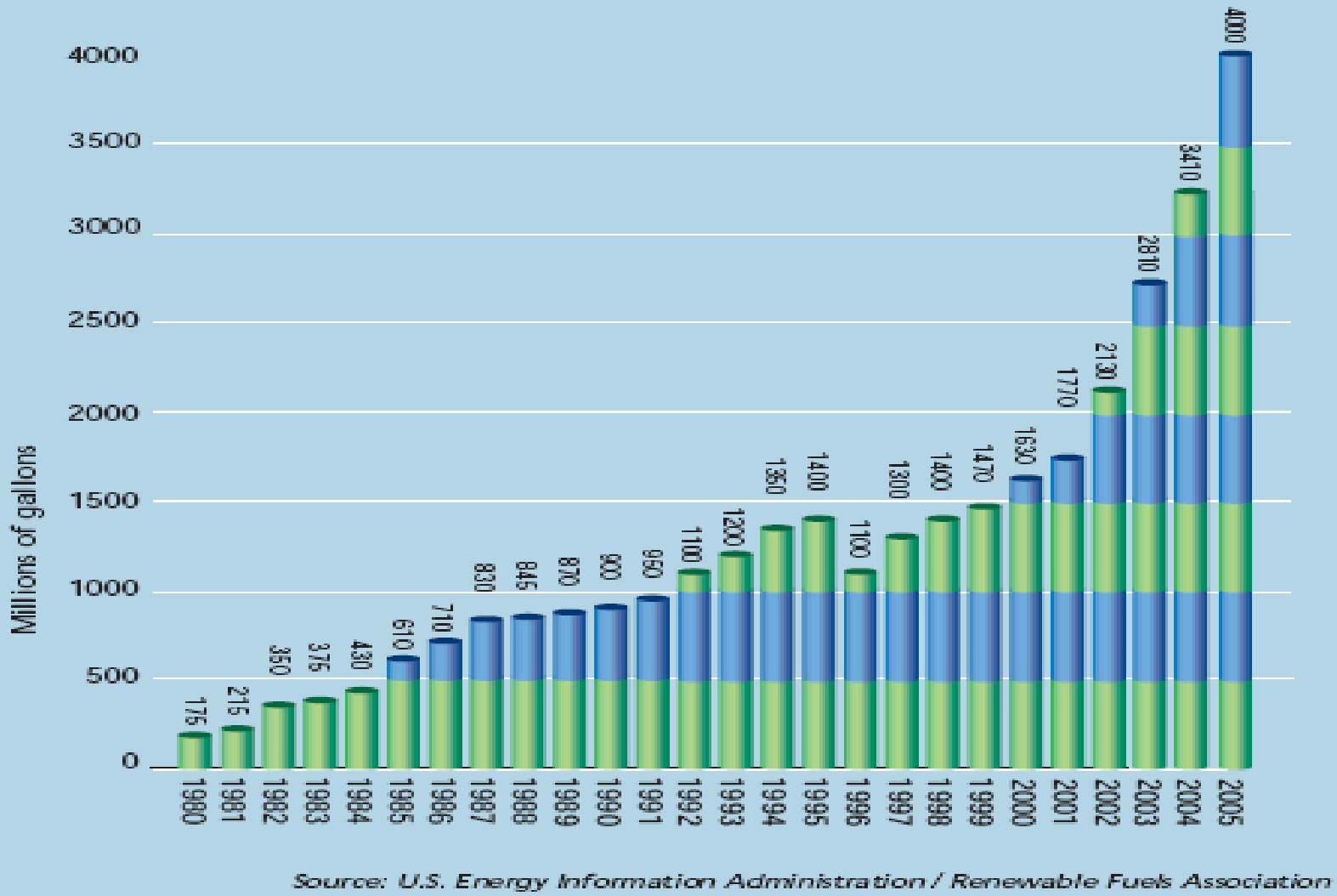
Delta-T Corporation

323 Alexander Lee Pkwy
Williamsburg, VA USA 23185
(757) 220-2955

Enhanced Profitability through Technology, Integration, & Diversification

- **Historical Impact of Technology**
- **Current State of Technology *(Financial Perspective)***
- **New Technology Introductions/Developments**
- **Opportunities/Challenges for Future Technology**

HISTORIC U.S. FUEL ETHANOL PRODUCTION



Source: U.S. Energy Information Administration / Renewable Fuels Association

Historical Impact of Technology

Evolution to Current State

PERIOD	CAPITAL ($US/gal)*	ENERGY (BTU/gal)*	CO-PRODUCTS	POLICIES
Early 80's	$7.20	160,000	Preliminary Product Development	• Oil Embargo • Fed Incentives
Early 90's	$1.60	63,000	Significant Expansion as Cattlefeed	• Clean Air Act • State Incentives
Early 00's	$1.25	36,000	Excess Supply = Depressed DDGS Pricing	• Phase Out of MTBE

Contributions by Enzyme and Yeast Technology Significant

* Basis: 40 mmgpy AEtOH plant adjusted to 2002 $US CPI

Historical Plant Financial Returns

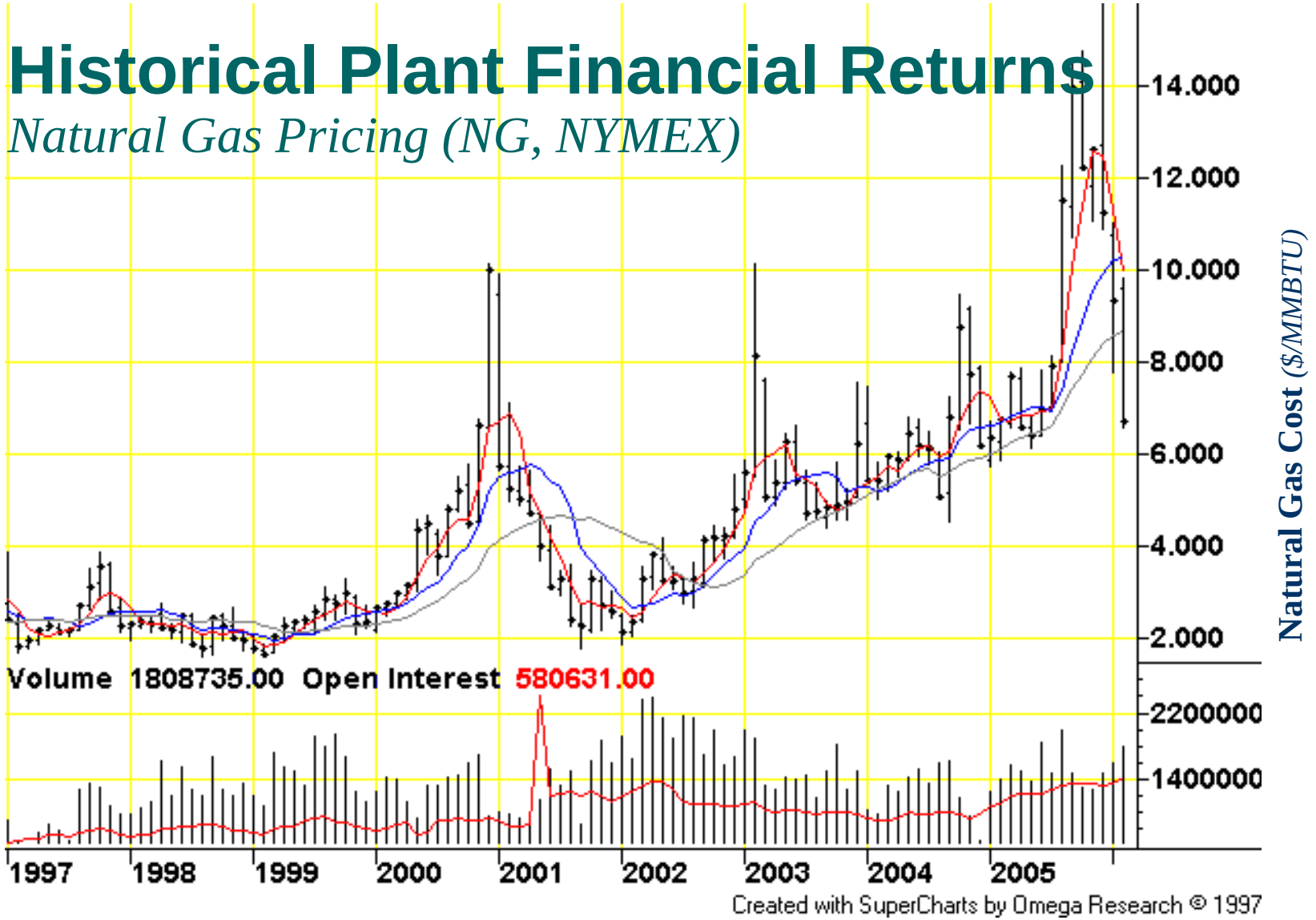
Total Revenues

	Jan '03	Nov '05	Jan '06
Ethanol	70.9%	84.9%	88.2%
DDGS	16.8	10.3	8.7
Other	1.6	0.2	0.1
Incentives	10.7	4.6	3.0
Total Revenue	100.0%	100.0%	100.0%

Assumes: 40Mgpy Dry Grind Corn Plant in Midwest USA

Historical Plant Financial Returns

Natural Gas Pricing (NG, NYMEX)



Historical Plant Financial Returns

Variable Costs (as a % of Revenues)

	Jan '03	Nov '05	Jan '06
Grain	46.0%	33.6%	36.9%
Additives	6.5	8.4	8.7
Energy	6.3	23.2	23.2
Labor	2.2	2.2	2.2
Total COGS	61.2%	67.4%	70.7%
Gross Margin	38.8%	32.6%	29.3%

Assumes: 40Mgpy Dry Grind Corn Plant in Midwest USA

Impact of Technology Today

Maturing Commodity Mindset

- Smaller/Older plants ***(pre 2002)*** will survive in long run
- Newer/Larger Plants ***(post 2002)*** using "current technology" will struggle financially
- Future Plants, with New Technology & Risk-Embracing Investors, will set the bar for the market

Survival of the Fittest …

ONLY THE STRONG WILL SURVIVE

Impact of Technology Today

Maturing Commodity Mindset

Market is demanding Technology Providers to:

1. Provide Acceptable Returns to Investor

   while …

2. Minimizing Technology/Investment Risk

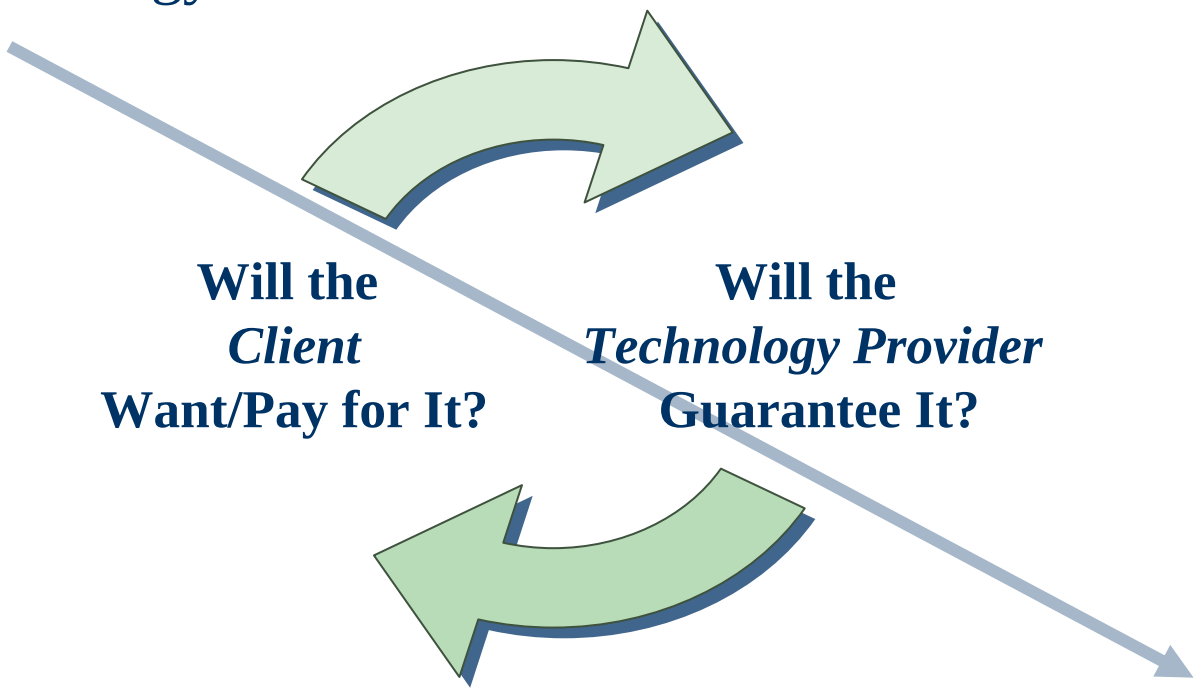
   while …

3. Producing THE Lowest Cost Ethanol on the Market

New Technology Commercialization

Life Cycle Challenges – Previous High Risk/High Return Model

New Technology

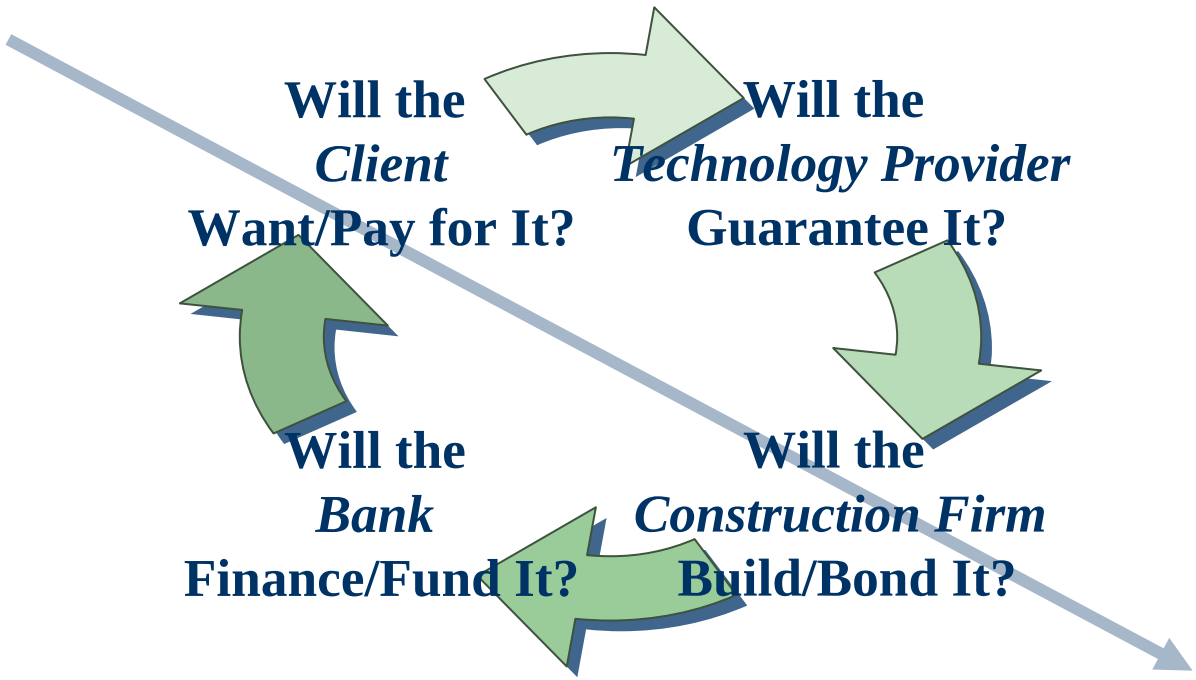


Build It !!

New Technology Commercialization

Life Cycle Challenges – Today's Low Risk Position

New Technology



Build It !!

Impact of Technology Today

Transition in Marketplace - Change is Coming

PERIOD	CAPITAL ($US/gal)*	ENERGY (BTU/gal)*	CO-PRODUCTS	POLICIES
Early 80's	$7.20	160,000	Preliminary Product Development	• Oil Embargo • Fed Incentives
Early 90's	$1.60	63,000	Significant Expansion as Cattlefeed	• Clean Air Act • State Incentives
Early 00's	$1.25	36,000	Excess Supply = Depressed DDGS Pricing	• Phase Out of MTBE
Current State	$1.00 - $1.75 ***Technology Dependent***	36,000 to << 20,000	New Product Development & Market Diversification	• Permanent Energy Policy • Phase Out of Gov. Incentives

* Basis: 40 mmgpy AEtOH plant adjusted to 2002 $US CPI

Ethanol Manufacturing

Configuration Considerations

Fixed Costs will increase with Increased Technology

Therefore, Technology must reduce Variable Costs

Examples:

1. Energy Consumption
2. Energy Cost
3. Higher Integration
4. Effectively Lower the Cost of the Feedstock
5. Diversification of Non-Starch Components to other markets

Ethanol Manufacturing

Traditional Configuration

Corn → EtOH

Corn → CO_2

Corn → DDGS

@ 28% Protein (db)

Advantages

- "Lowest" Capital per Gallon Produced
- Increased Scale Reduces $/Gallon
- Lowest Technology Risk (Standard US Design)

Disadvantages

- "High" Energy Consumption
- Low-quality, High Volume Animal Feed By-product

Ethanol Manufacturing

Traditional Configuration with Retrofit and Integration

Corn →

→ EtOH

→ CO_2

→ DDGS

@ 28% Protein (db)

- High Efficiency Drying ("steam" drying)
- More Highly Integrated DD&E
- Mechanical Vapor Recompression
- Membrane Separations of Whole Stillage
- Vapor Permeation (MolSieve Replacement)

Advantages

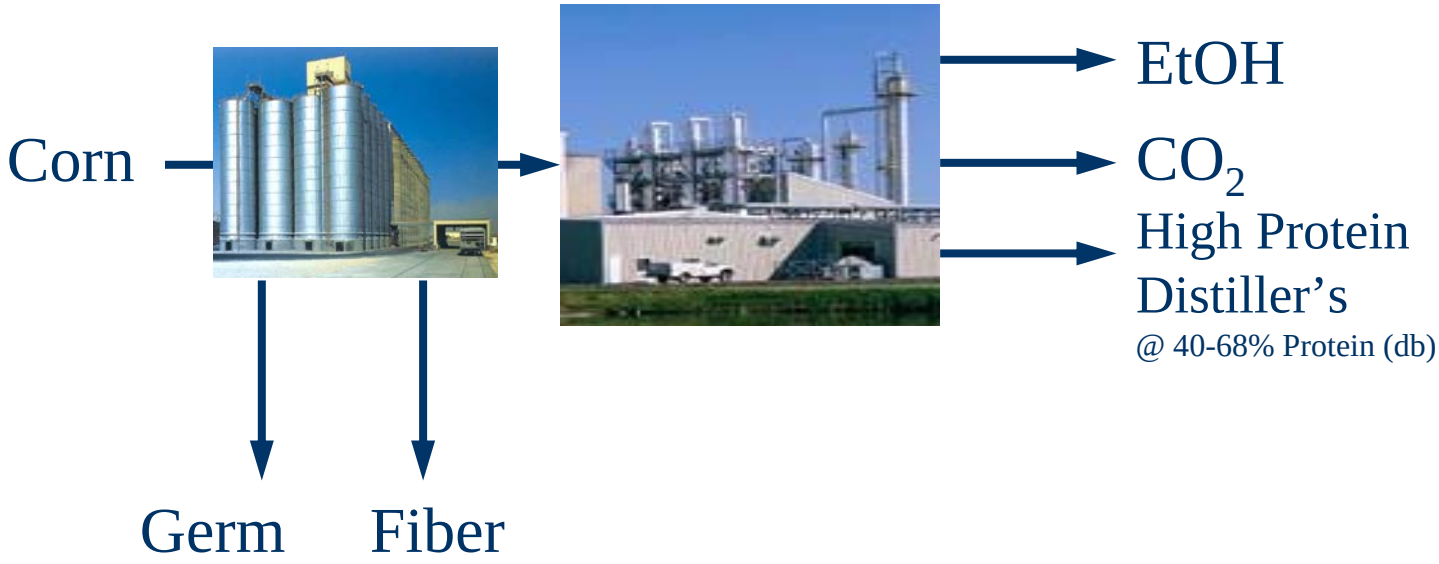
- Reduced energy by 4-6,000 BTU/gal
- Relatively Low Capital.
  Therefore, stays "under the radar"

Disadvantages

- Reduced Operational Flexibility
- Reduced Operational Robustness

Ethanol Manufacturing

Grain Fractionation



Advantages

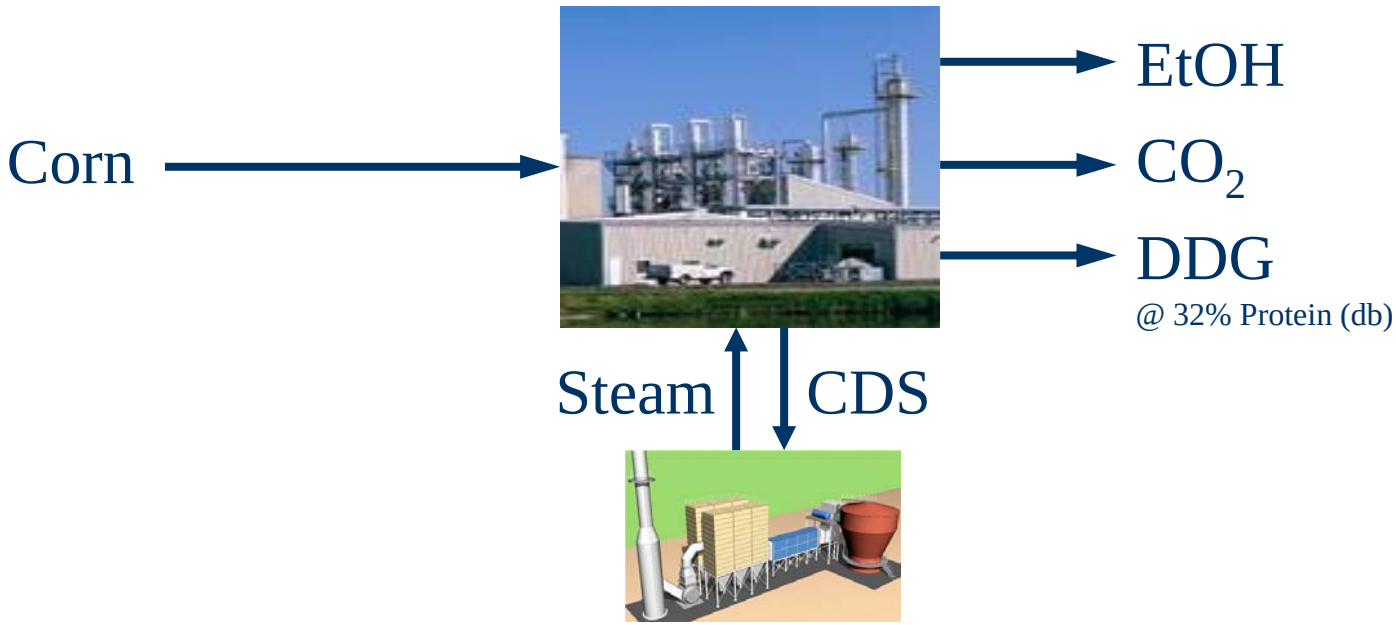
- EtOH Production increased by 10%+
- Thermal Energy reduced by 15-25%
- Increased By-Product Revenues
- Diversify outside of Cattle Feed
- Retrofit with minor process adjustments

Commercial Demonstrations

- Broin Companies (installed)
- Delta-T Corp (installed by 2007)
- Cargill/Monsanto (development site)
- Other Commercial Offerings

Ethanol Manufacturing

Co-Generation



Advantages

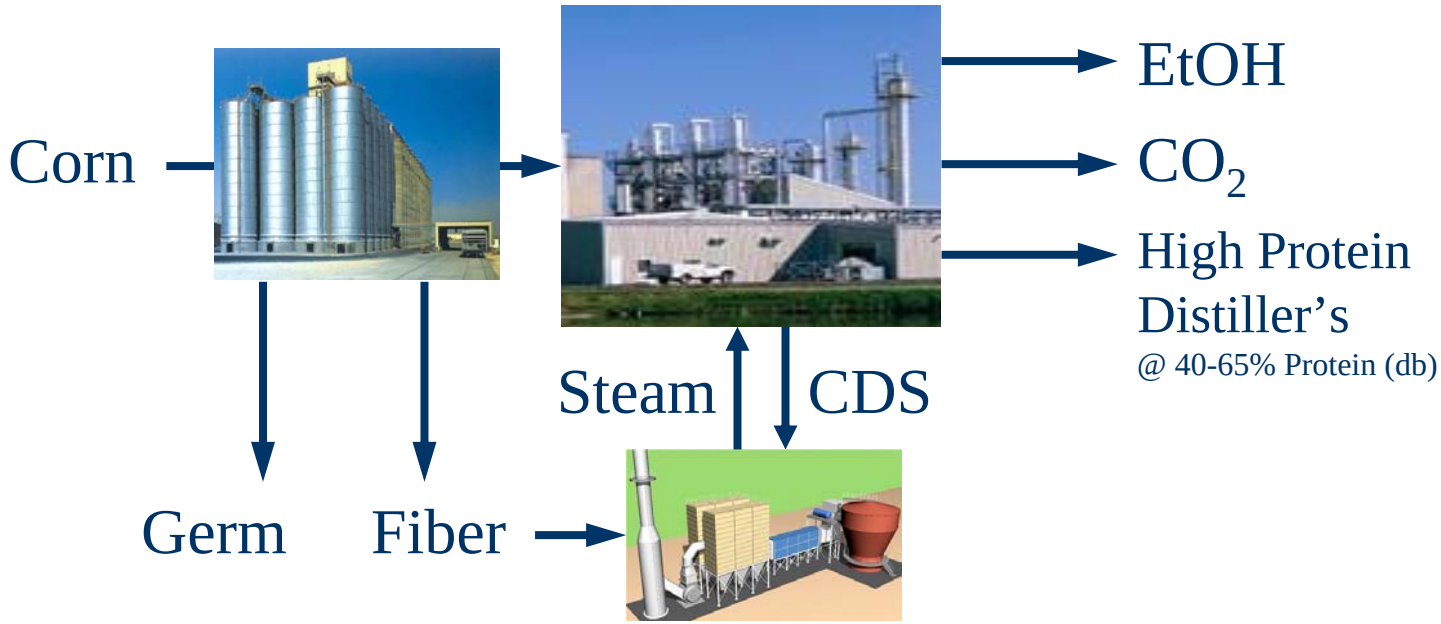
- Thermal Energy reduced by 45%
- 4.5 yr Payback reported

Commercial Demonstrations

- Corn Plus, LLC

Ethanol Manufacturing

Grain Fractionation & Co-Gen



Advantages

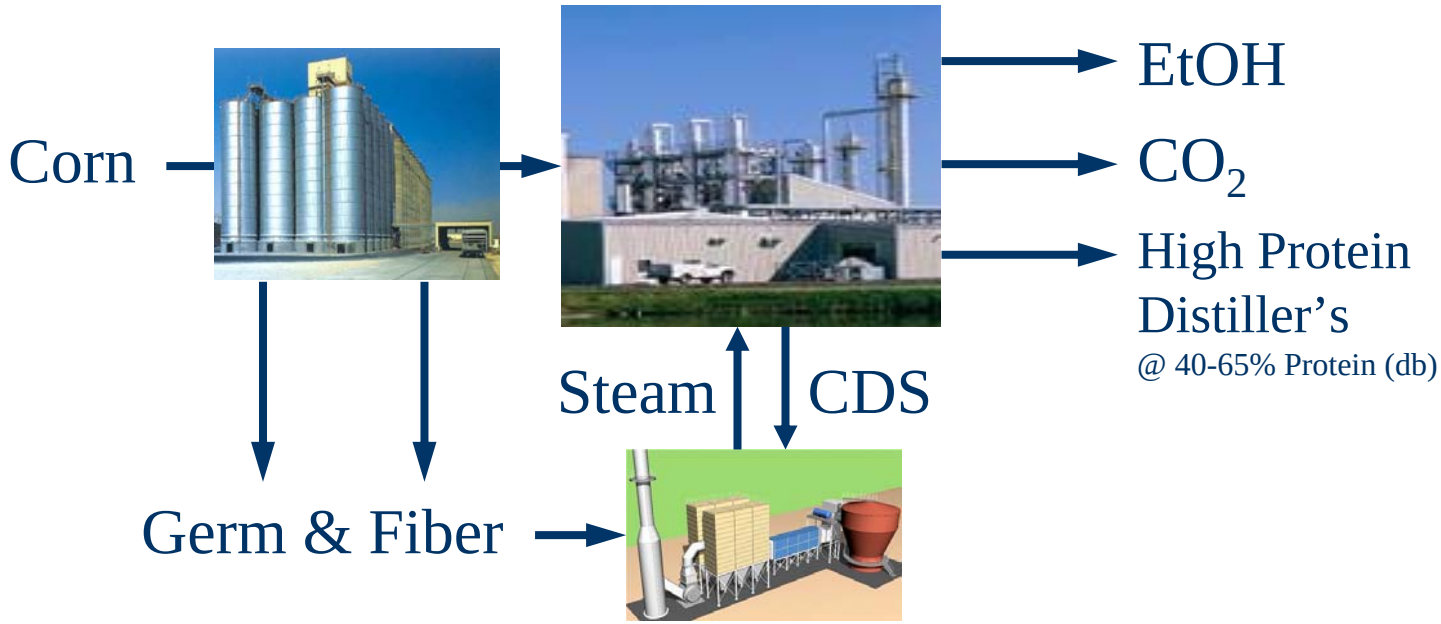
- EtOH Production increased by 10%+
- Thermal Energy reduced by 60-65%
- Increased By-Product Revenues

Commercial Demonstrations

- None to date
- Being developed

Ethanol Manufacturing

Grain Fractionation & Co-Gen



Advantages

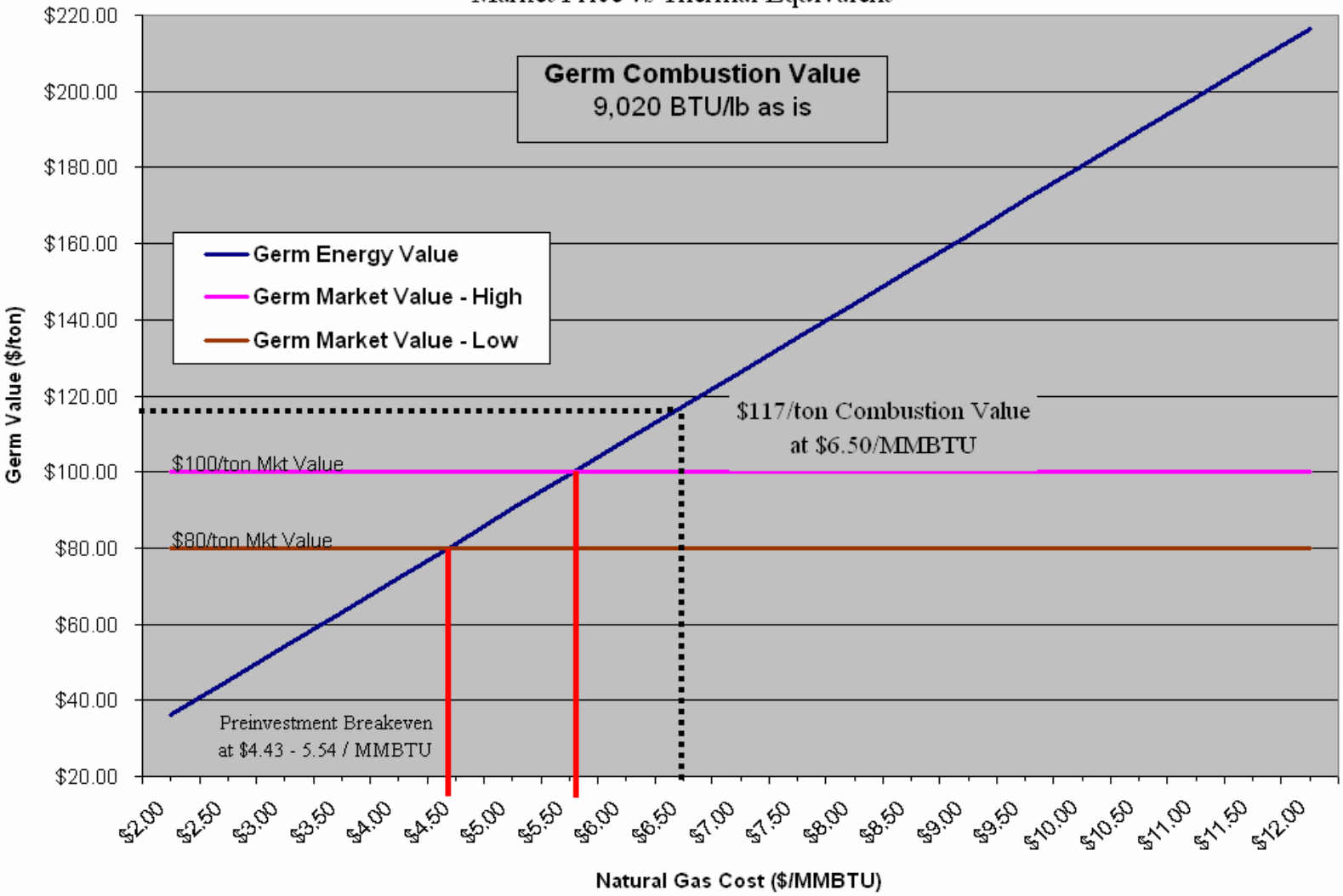
- EtOH Production increased by 10%+
- Thermal Energy reduced by 80-90%
- Increased By-Product Revenues

Commercial Demonstrations

- None to date
- Being developed

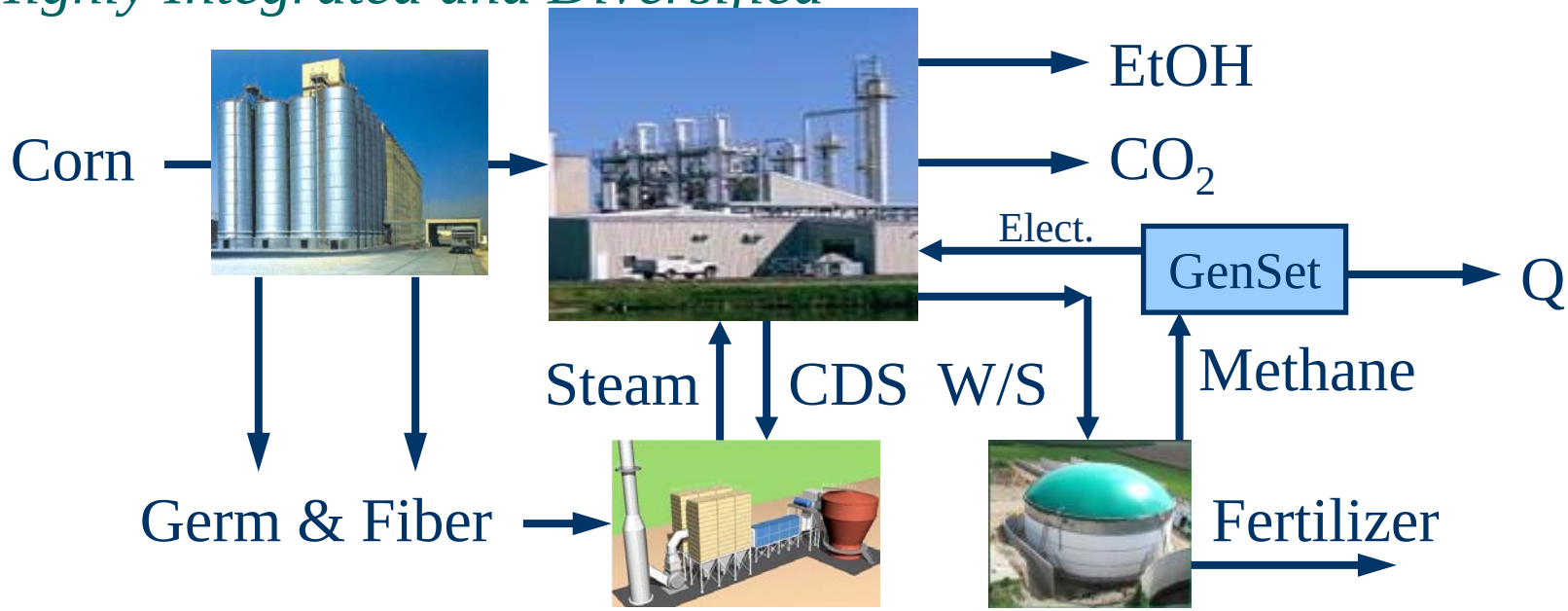
GF Germ Valuation

Market Price vs Thermal Equivalent



Ethanol Manufacturing

Highly Integrated and Diversified



Advantages

- EtOH Production increased by 10%+
- Thermal Energy reduced by 95%+
- Potential for Surplus Energy
- Increased By-Product Revenues

Commercial Demonstrations

- Being Developed
- 2008 - 2010 Start Up?

Opportunities/Challenges for the Future

How will New Technology be Commercialized?

- **Alliances/Partnerships will be the Key**
- **Retrofit Market for New Technology will be Large**
- **Institutions & Entrepreneurs will Finance ?!?**
- **Balance between Technology Advancement vs Risk Management will be Critical**

Enhanced Profitability through Technology, Integration, & Diversification

The Only Constant is Change …

Think Big!!