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Farmer Ethanol in a "Flat World" - How Information Technology
is Changing the Nature of Fuel Ethanol Operations

Tony Crooks
USDA, Rural Development

Energy From Agriculture: New Technologies, Innovative
Programs & Success Stories

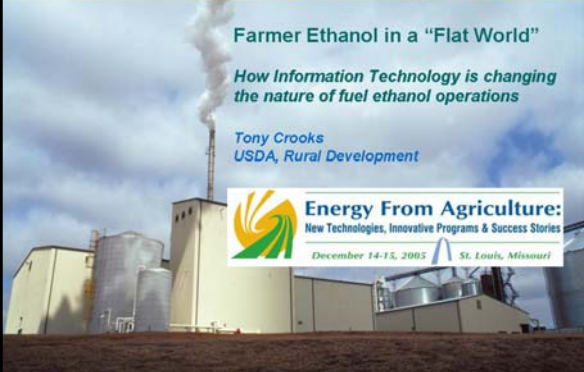
December 14-15, 2005

St. Louis, Missouri



Energy From Agriculture:
New Technologies, Innovative Programs & Success Stories
December 14-15, 2005 | St. Louis, Missouri

Farm Foundation | USDA's Office of Energy Policy and New Uses | NRCS | Rural Development




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"Role of Information Technology in the Fuel Ethanol Industry"

- Two workshop/focus panels of industry experts
 - Minneapolis and Omaha (March '05)
 - Specialists in – Commodity futures (NYMEX, CBOT), finance, producer assns., legal structures, information technology, plant management, R&D, energy, procurement/logistics
- USDA, University of Minnesota, and Informa Economics (formerly Sparks Commodities)
- 12 follow-up interviews
 - Plant managers, directors, industry principals

Badger State Ethanol, Monroe, WI



Study background/motivation

- Rural Development – investments, opportunities, strategies
- Structurally, the emerging fuel-ethanol industry is uncharacteristic of typical agricultural processing
 - Fragmented balance – multinationals v. farmer-owned plants
 - Dispersed ownership/production
 - Few integration/assimilation activities
- Information technology (IT) is a driving force in business – operations, strategies, structures, ownership, and performance
 - Does IT Matter?, Carr
 - IT Doesn't Matter. Business Processes Do. Smith and Finger
 - The Only Sustainable Edge, Hagel and Brown
 - The World is Flat, Friedman

Ace Ethanol LLC, Stanley, WI



- Carr, "Not so much ..."
 - IT same as other tech: railroads, electric power, telephone
 - From proprietary resource to a cost of doing business
 - Impacts erode with availability and affordability
- Smith and Finger, "Not so fast ..."
 - IT as industry maybe, but not IT business applications
 - 1st 50 years of data – storage, processing, transport
 - Next 50 years of BP – storage, processing, transport
- Hagel and Brown, "Just fast enough ..."
 - Sustained business success depends on "productive friction" and "dynamic specialization"
 - IT enables work to be: digitized, decomposed, distributed



Changing nature of business

- From vertical "Command and Control" hierarchies to:
 - Horizontal, multi-dimensional, multi-modal, collaboration
 - A global, Web-connected, IT-leveled, playing field
 - "Real time" sharing and distribution of knowledge/work -- regardless of: Geography, Distance, Language
- From simple "make or buy" decisions to "digitize, decompose, and move work around"
- From labor v. capital to employee v. consumer



Study objectives

Is the present ethanol industry structure stable or transitional toward concentration?

How has IT altered the playing field for the medium-sized firm?
Re: Scale economies, market access, supply/value chain coordination, finance/investment, etc.

Is IT serving as a proxy for vertical integration?

To what extent is IT lowering transaction costs across -- enterprises, business processes, and/or functions?

What are the Rural Development implications?



Big River Resources LLC, W. Burlington, IA



Industry structure, then and now

Then (mid 80's to early 90's):

- Top 3 firms (80% of production) and 'the rest' (~17 plants)
- 1 billion production capacity
- Construction costs ~ \$2.50/gal
- Conversion efficiency ~ 2.2 gal/bu
- 52 staffing FTEs
- 320 operation days/year

Now:

- Fragmented structure -- Top 3 firms (31%), 44 of 71 plants F/O
- 4+ billion production capacity
- Construction costs ~ \$.98/gal
- Conversion efficiency ~ 2.75 gal/bu
- 35 staffing FTEs
- 360 operation days/year



Platte Valley Fuel Ethanol, Central City, NE



How did industry get 'here'?

- Federal/State policies & incentives**
 - Natural progression of an emerging industry
 - Classic "production push" agricultural business model
- Farmer-owned facilities**
 - Associated capital constraints
- \$50+/barrel oil**
 - From commodity-ingredient to energy substitute?
- Cheap corn, Growers' associations, Other things ...
- Information technology?



Commonwealth Agri Energy LLC, Hopkinsville, IL



The "cookie-cutter" ethanol plant

- "Put down" quite easily in most any location
- A "one-stop ethanol shop" -- Feasibility to turn-key and beyond
 - Feasibility/Business plan
 - Fund raising/Financing
 - General contracting/Licensing/Permits
 - Marketing/Procurement agreements
 - General/Plant management
- Hand holding
 - Producer-investors through the entire process
 - Operations contracts into 5th marketing year
- Not your father's "still on the hill"



Midwest Grain Processors Co-op, Lakota, IA



IT and the ethanol plant "franchise"


- Process design technology
- Distributed control systems
 - Dynamic specialization
 - Process networks
 - Performance fabric




Midwest Grain Processors Co-op, Lakota, IA

Process design technology

- **Old plants:**
 - Analog loop controls
 - Lever, gauge, & technician for each process component
 - Sophisticated maintenance, strip chart recording
- **Standardized design plants:**
 - Integrated circuitry
 - 1 technician for many processes
 - AI monitored, real time updates
 - Broin, Fagen/ICM, Delta T



Husker Ag LLC, Plainview, NE

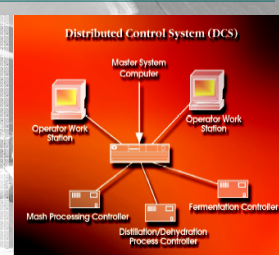


Distributed control systems


Consolidation of process management over many enterprises/plants/companies simultaneously

Massive data collection/analysis effort
Business/bio process metrics and benchmarking
Precise factor/product coordination
Sourcing/usage specifications

➤ Staff reduction
➤ Productivity gains
➤ Cost savings!



KAAPA Ethanol, Minden, NE



Dynamic specialization

Outsourcing, In-forming & Off-shoring to accelerate growth

Innovation -- incentives, opportunities, capabilities

- Marketing "partnerships"
 - Ethanol, Distillers' grains (DDGS)
- Procurement "contracts"
 - Feedstock, Energy, Inputs (Enzymes)
- Management "agreements"
 - Operations/Process benchmarking
 - Trading/Risk mitigation
 - Market analysis/Consulting
 - Transportation/Logistics



Western Plains Energy LLC, Oakley, KS



Marketing "partnerships"

Aventine Renewable Energy, 11 plants ~ 560 mg/y

Aventine Renewable Energy, Inc.	Aventine Partners	Location
	Aventine Renewable Energy, Inc.	Pekin, IL
	Ace Ethanol	Stanley, WI
	Adkins Energy	Lena, IL
	Agri-Energy	Luverne, MN
	Glacial Lakes Energy	Watertown, SD
	Heartland Grain Fuels	Aberdeen, SD
	Heartland Grain Fuels	Huron, SD
	Nebraska Energy	Aurora, NE
	Quad County Corn Processors	Galva, IA
	Reeve Agri-Energy	Garden City, KS
	VeraSun Energy	Aurora, SD



Glacial Lakes Energy, Watertown, SD



FAGEN/ICM services

Management -- General management services, Contracted employees permanently at plant site, Strategic and daily management of plant operations, Group purchasing opportunities, Monthly benchmark information program

Trading -- Risk management/consulting services, Factor / product risk management -- corn, grain sorghum, natural gas / ethanol, gasoline; Market analysis services, Licensed commodity brokerage

Ingredients -- Grain origination, DDGS marketing services, Transportation logistics, Full accounts receivable responsibility, Credit risk assumption

Fuels -- Ethanol marketing (off-take contracts), Transportation logistics, Full accounts receivable responsibility, Credit risk assumption

<http://www.lcminc.com/partnerships.aspx>




Agri-Energy LLC, Luverne, MN




United Bio Energy client list

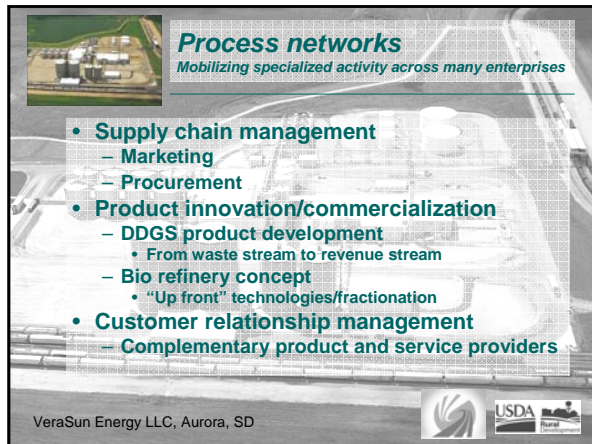
17 plants (13 F/O) - 58 contracts

Plant	Grain Origination	Marketing		Management			
		Ethanol	DDGS	General	Plant	Risk	Consulting
Amazing Energy	X	X					
Badger State		X					
Big River Resources	X	X	X	X		X	
East Kansas Agri Energy	X	X	X	X		X	
Golden Triangle		X					
Hokye Renewables - Fairbank		X					
Hokye Renewables - Iowa Falls		X					
KAAPA							X
North County Ethanol	X	X	X	X	X	X	
Rite Valley Fuel Ethanol	X	X	X	X	X	X	
Trenton Agri Products					X	X	
US Bio Energy - Albert City	X	X		X	X	X	X
US Bio Energy - Superior	X	X		X	X	X	X
US Energy Partners	X	X	X			X	
Western Plains Energy		X					
Western WI Renewable Energy		X	X	X	X	X	X
White Energy				X	X	X	X



Big River Resources LLC, W. Burlington, IA






Process networks

Mobilizing specialized activity across many enterprises

- **Supply chain management**
 - Marketing
 - Procurement
- **Product innovation/commercialization**
 - DDGS product development
 - From waste stream to revenue stream
 - Bio refinery concept
 - “Up front” technologies/fractionation
- **Customer relationship management**
 - Complementary product and service providers

VeraSun Energy LLC, Aurora, SD




Performance fabric

Weaving together process networks

- Enabling coordination across:
 - Enterprises, companies, specialties
- That are dispersed:
 - Geographically, institutionally, dimensionally
- And are the basis for using “productive friction” to build and accelerate capabilities
 - 500 mg/y ethanol marketing requirement problem
 - DDGS quality, reliability, & sufficiency problem
 - Bio-diesel production costs problem

Big River Resources LLC, W. Burlington, IA




Study results -- IT matters!

IT and ethanol industry structure:

- Plant operations and costs
- The nature of the firm
- Relationships between firm and industry
- Future dynamics

Trenton Agri-Products, Trenton, NE




IT and plant operations

- **Fosters standardization & “best practices”**
 - Strips costs out of system
 - Mitigates risk
 - Squeezes time loss out of system
 - Speeds construction – ground breaking to turnkey
 - Reduces downtime – 320 to 360 days of operation/year
- **Facilitates capital inflow**

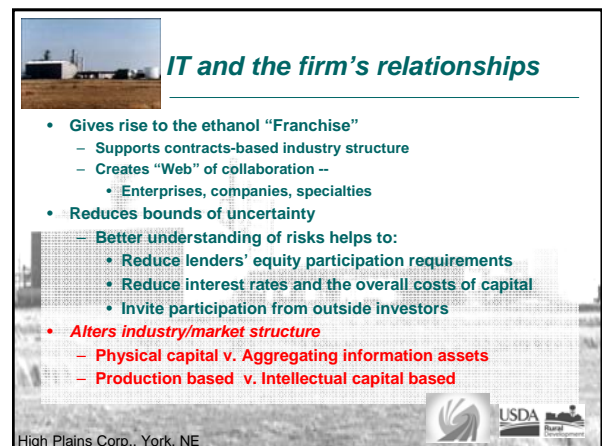
Little Sioux Corn Processors LLC, Marcus, IA




IT and the nature of the firm

- **Digitizes and decomposes activities for outsourcing**
 - Alters asset location requirements
 - Encourages labor mobility
- **Further separates ownership from management**
- **Alters the skill sets needed for management and labor**
- **Encourages firm transformation**


Central MN Ethanol Co-op, Little Falls, MN

IT and the firm’s relationships

- **Gives rise to the ethanol “Franchise”**
 - Supports contracts-based industry structure
 - Creates “Web” of collaboration --
 - Enterprises, companies, specialties
- **Reduces bounds of uncertainty**
 - Better understanding of risks helps to:
 - Reduce lenders’ equity participation requirements
 - Reduce interest rates and the overall costs of capital
 - Invite participation from outside investors
- **Alters industry/market structure**
 - Physical capital v. Aggregating information assets
 - Production based v. Intellectual capital based

High Plains Corp., York, NE





IT and the ethanol industry's future

Looking to the future, we ask:

- What else can be digitized, decomposed, outsourced?
- From where will the talent to continue operations come?
- Will IT erode the same advantages it once endowed?

Exol Corp., Albert Lea, MN



Rural Development implications

- **Develop human capital/capacity of rural residents**
 - IT capability/access is a rural business cornerstone
 - IT skill sets critical to rural business development
- **Connect RD investments to rural IT-based businesses**
 - Full adoption of IT improves:
 - Relative business risks
 - Chances of RD program success
 - Long term economic prospects/growth

Agri-Energy LLC, Luverne, MN

