



*the **energy** of innovation™*

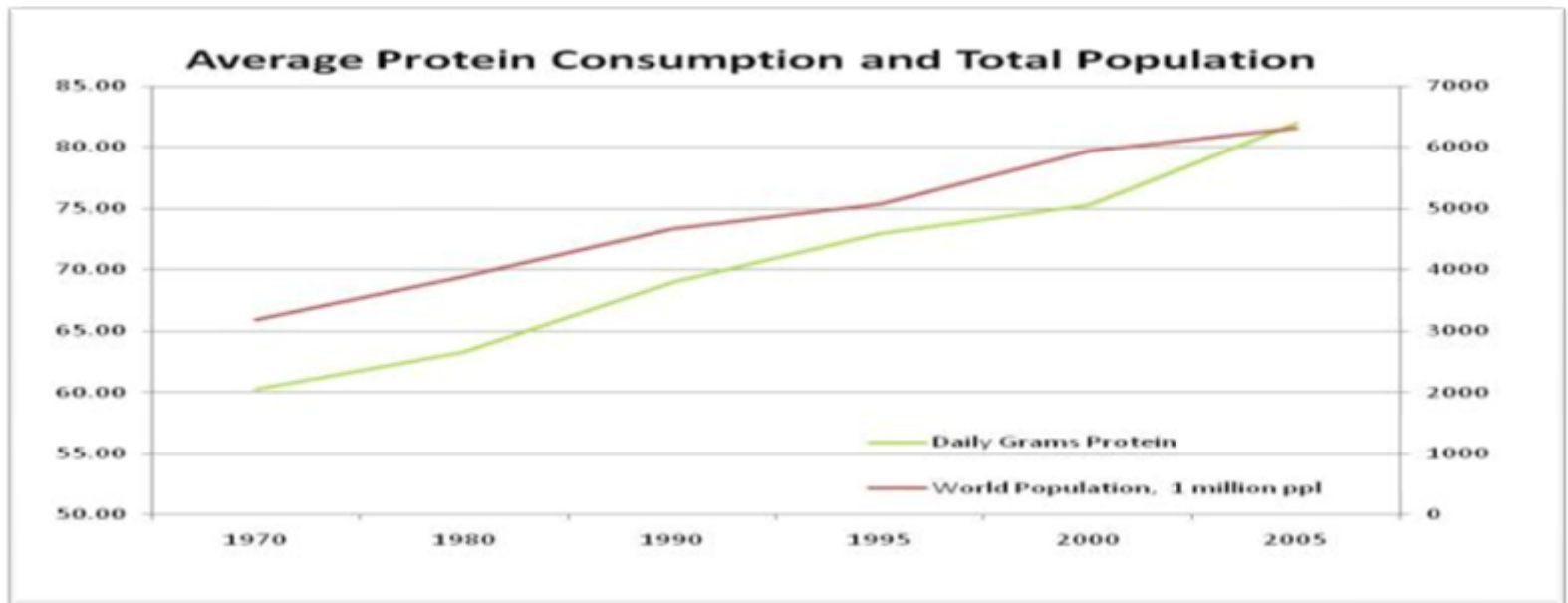
## **Product Overview: Gasification**

March 2009



# ICM Mission Statement

Provide innovative technologies, solutions, and services to sustain agriculture and advance renewable energy, including food and feed technologies that will increase the supply of world protein





# Brief Overview

- **Privately Owned**
- **Based in Colwich, KS**
- **R&D & Production in St. Joseph, MO**
- **Environmental Affairs in Fort Collins, CO**





# ICM History

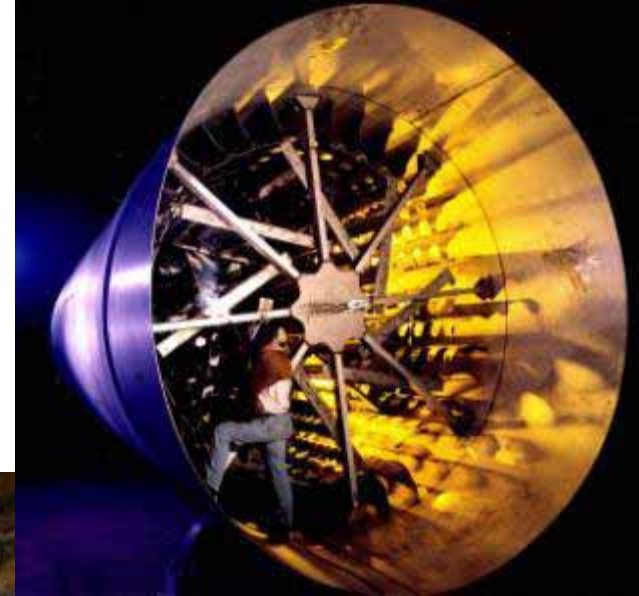


- 1979 Serial #0001 by BATF
- 1984 Dave VanderGriend to Colwich as High Plains Ethanol VP of operations
- 1995 Dave bought out the engineering and marketing groups of High Plains to start ICM
- 1996 Installed first DDGS Dryer
- 2001 First Ethanol Plant in Russell, KS



# ICM Manufactures Durable Equipment with 1-Year Parts and Labor Warranty

- DDG Dryers
- Thermal Oxidizers
- Small Tanks & Equipment
- Methanators
- Gasifiers





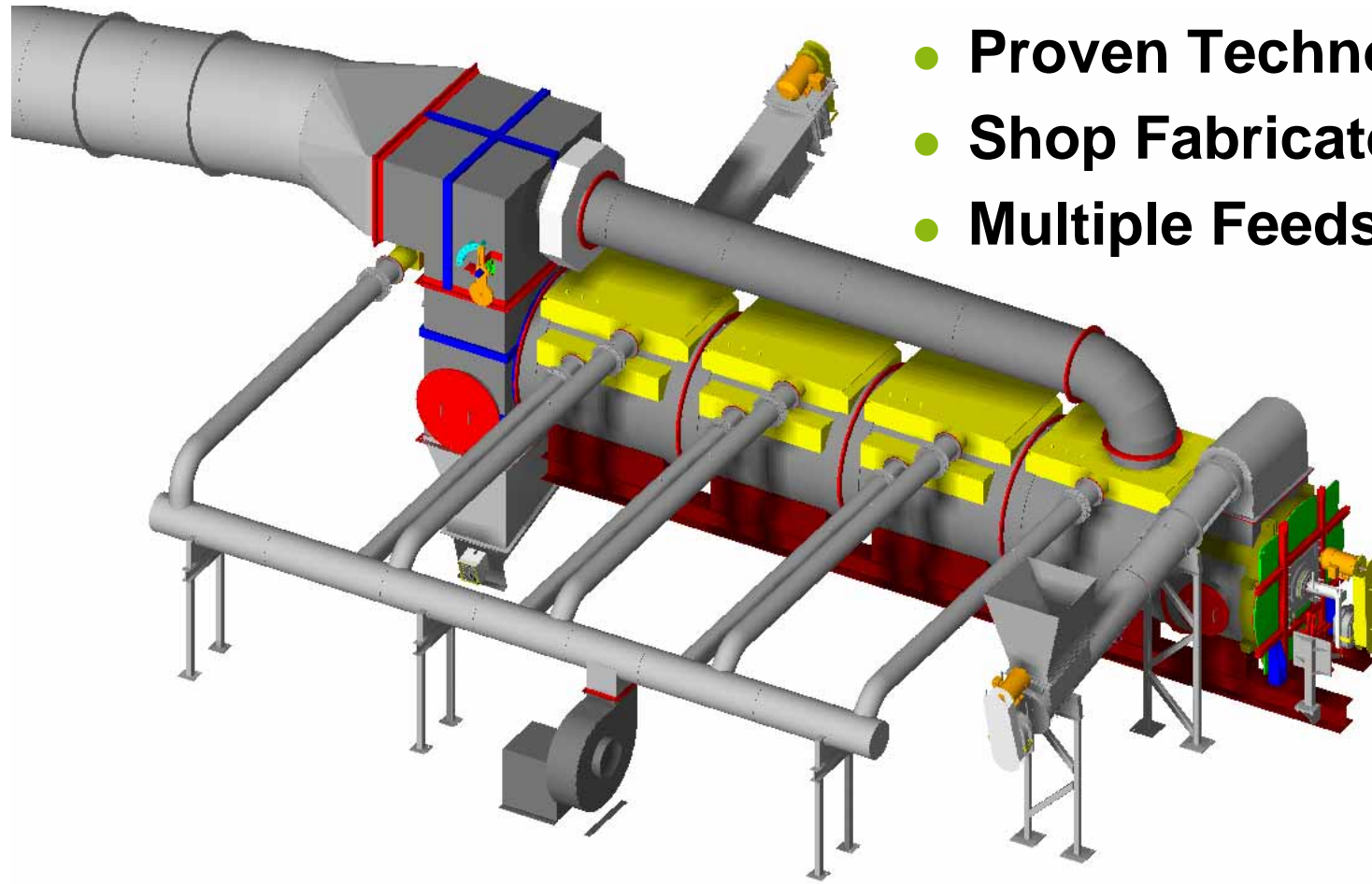
# LifeLine Foods -- R&D Facility St. Joseph, Missouri



- 50MGY Dry Frac
- R&D Labs and Pilot Facility
  - Operating Parts of TKO
  - Testing Multiple Grains
  - Integrated with Full Scale Plant
- Training
- Food Industry Relationships



# ICM Auger Gasifier

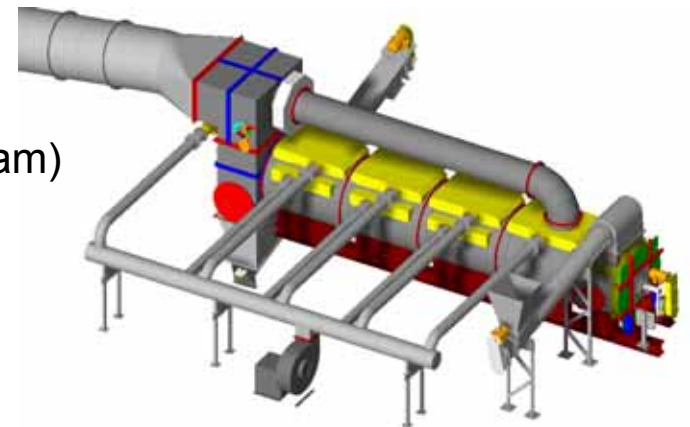


- Proven Technology
- Shop Fabricated
- Multiple Feedstock



# ICM Auger Gasifier

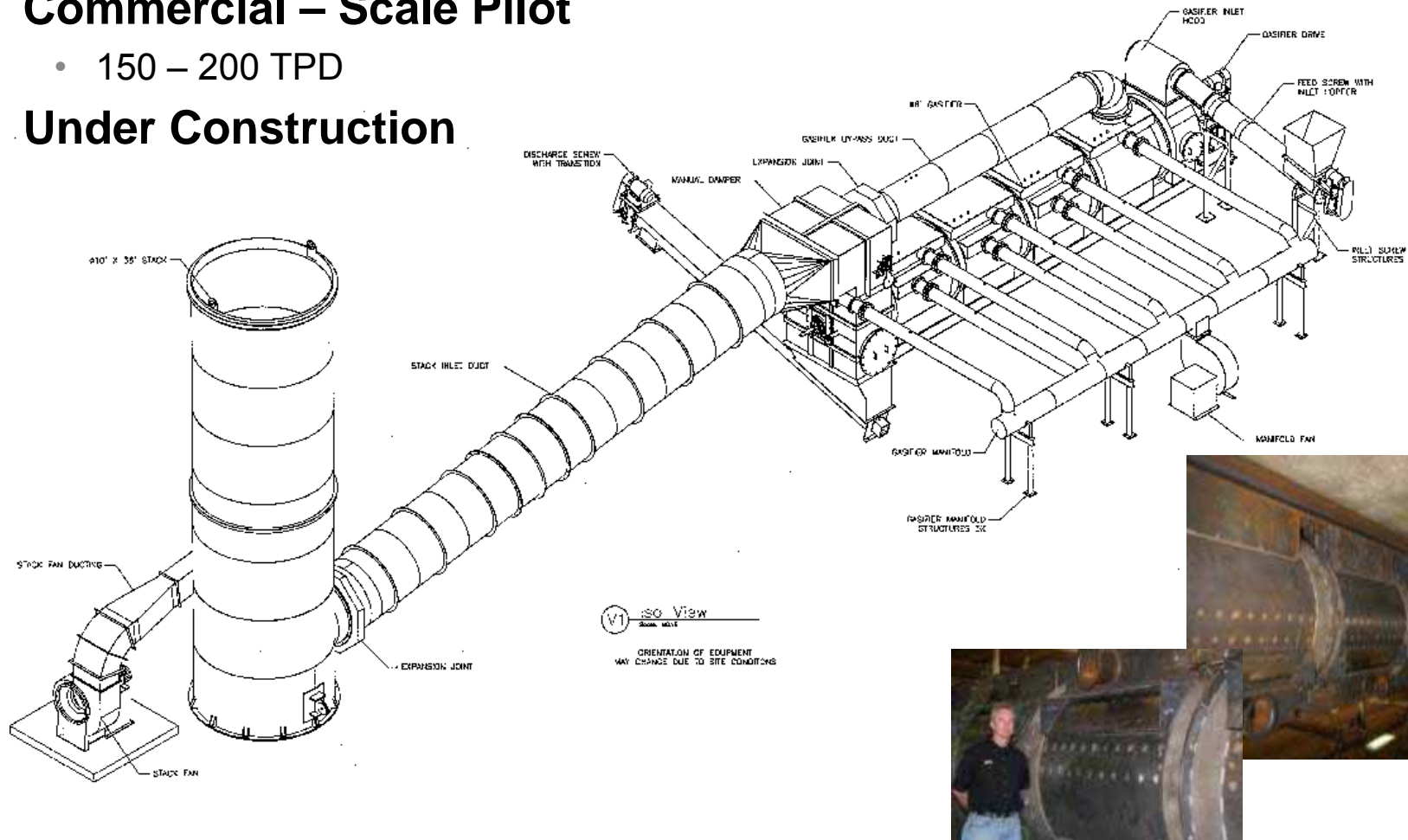
- **Proven Technology - developed early '80s**
  - Successfully tested at 250-300 TPD by DOE & Boeing
  - Held from Market - due to low petroleum \$\$ & low MSW tipping fees
- **Shallow Fluidized Bed Technology**
- **Air blown, but O2 Enriched Capable**
- **Flexible design - fuels and capacities**
  - Tested on MSW, auto shredder residuals, wood chips, bark and combinations of bark, wood chips & paper mill sludge
  - Ag & forestry residuals, high moisture capable
  - 175 TPD piloting scheduled Q1 2009
  - Commercial scale at 250 TPD (90,000 PPH Steam)
  - Readily scaled to 700 and 1000 TPD





# ICM Pilot Gasifier

- **Commercial – Scale Pilot**
  - 150 – 200 TPD
- **Under Construction**





# ICM Pilot Gasifier

## Pilot Test Schedule

- **Test runs scheduled: March – Dec. '09**
- **1500 Tons feedstock contracted**
  - 1000 stover, 400 milo, 100 wheat
  - Plus 300 tons of bran to be shipped from St Joe
- **Test Protocol**
  - Initial, multiple short duration tests
  - 2-3 day test period per feedstock
  - Independent analysis of feedstocks
    - Moisture, C, H, O, N, S and Cl
  - Continuous mass monitor: feed input & ash out
    - Continuous DP gas flow estimations
  - Continuous monitor: principle syngas components
    - H<sub>2</sub>, CO, CO<sub>2</sub>, N<sub>2</sub>; discrete sampling of trace HC, HCL, H<sub>2</sub>S
    - Independent test service for IE review



# ICM Pilot Gasifier





# Harvey County, Kansas





# According to Schedule



**Feed Hopper & Auger**



**Ash Pit**



# Co - Products

- Fertilizer

- Concentrated version of biomass used
- High value fertilizer

- Biochar

- Carbon sequestration
- Soil Yield Enhancement
- Domestic & International Need





# R&D to Pilot to Commercial

## Key Development Stakeholders

- ICM's Technical Integration
- Kansas BioScience Authority
- Harvey County
- USDA & DOE





# An Ideal Partner

## Harvey County

- The Problem
  - 5#/cap/day
  - Landfill Full October 2001
- Solution(s) Define Sustainability
  - Pride and Responsibility
  - “Solve Our Own Problems Rather than Pass On to Someone Else”

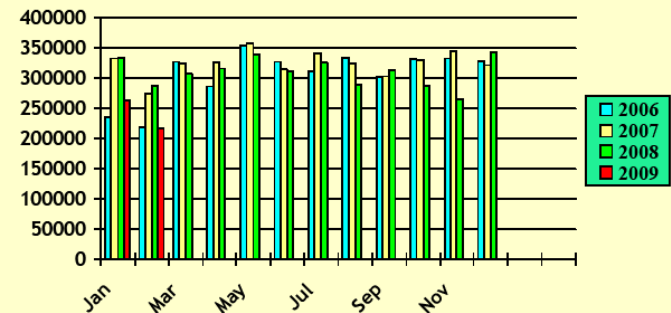




# Harvey County's Evolution

- Mandatory Residential Recycling
- Banned Leaves & Trash from Landfill
  - Compost
- Also Collect Some Recyclables from Tipping Floor
- Recycle C&D
  - Shingles
  - Concrete

*POUNDS OF TRASH RECYCLED*  
(glass, plastic, metals, newsprint)





# The Model

- Municipality or Privately Owned Landfill and/or Transfer Station
- Waste & Biomass to Energy
- Distributed Baseload Power Production
- Recyclables Recovery
- 25-75% Landfill Diversion
- Green Waste Disposal
- Potential BioChar Production
- USDA and/or DOE Grant & Loan Assistance





# Questions

## Contact:

**Ryan Heuer**

Product Management

310 N. First Street

Colwich, KS 67030

Phone: (316) 796-0900

E-mail: [info@icminc.com](mailto:info@icminc.com)

### Helpful Websites:

ICM – [icminc.com](http://icminc.com)

BioChar – [biochar.org](http://biochar.org)

Ethanol – [growthenergy.org](http://growthenergy.org)