# Himark bioGas Inc.

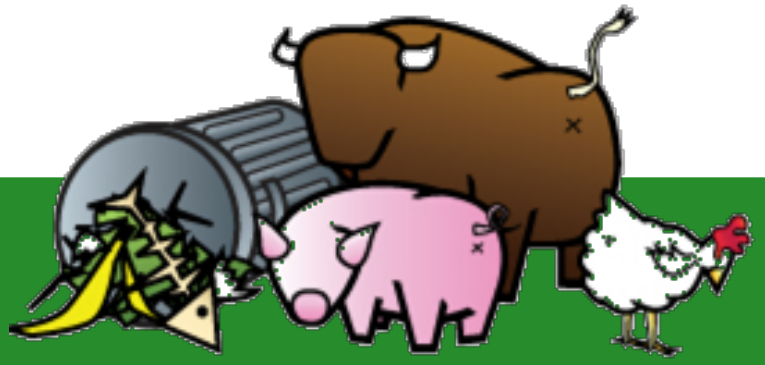
Patented Digester Design, Construction & Operation

# Making Waste the Renewable Resource – Substrate Availability

**2013 Works Conference**
**Manhattan, Kansas**
**March 26 and 27**

**Presented by John A. George, P.E.**

**www.HimarkBioGas.com**



# Overview

- **Himark BioGas Inc.**
  - What we do
  - Who we are
  - Where we are
- **Making Waste the Renewable Resource – Substrate Availability**
- **Flexible and Robust Technology to Utilize Difficult (by normal AD standards) Feedstocks**
- **BioGas / Electricity**
- **Integrated Energy Projects / Ethanol**

# “What”

- **Waste → Energy**
  - Since ‘99
  - >$30 Million invested
  - Alberta
- **Anaerobic Digestion Related Technologies** (sexy bugs)
  - IMUS™ - High Solids and other challenging feedstocks
  - Integrated Bio Refinery™ - Ethanol Production, etc.
  - BioUtility™ - Marketable Renewable Energy
- **8 Patent families in the U.S.**
  - Also in multiple global jurisdictions
- **Revenue Sources**
  - Technology licensing (Primary)
  - Consulting/engineering design

# “Who”

- 21st Century Agrologists – “Four Brothers”
- Bern & Mike Kotelko (P. Ag., ICD.D, Ag.Eng. cert.)
  - Award winning environmental stewards
  - Owner/Operators of Top-20 N.American feedlot
  - Vision & funding since 1999, with Alta. Research Council
- Evan & Shane Chrapko (CPA, Law, P.Ag.)
  - Technology commercialization Investor/Operators
  - Nearly $1 Billion in registered, liquid assets
  - OPERATORS
- 30 others including 4 Ph.D’s, lots of Masters

# Growing Power Hairy Hill

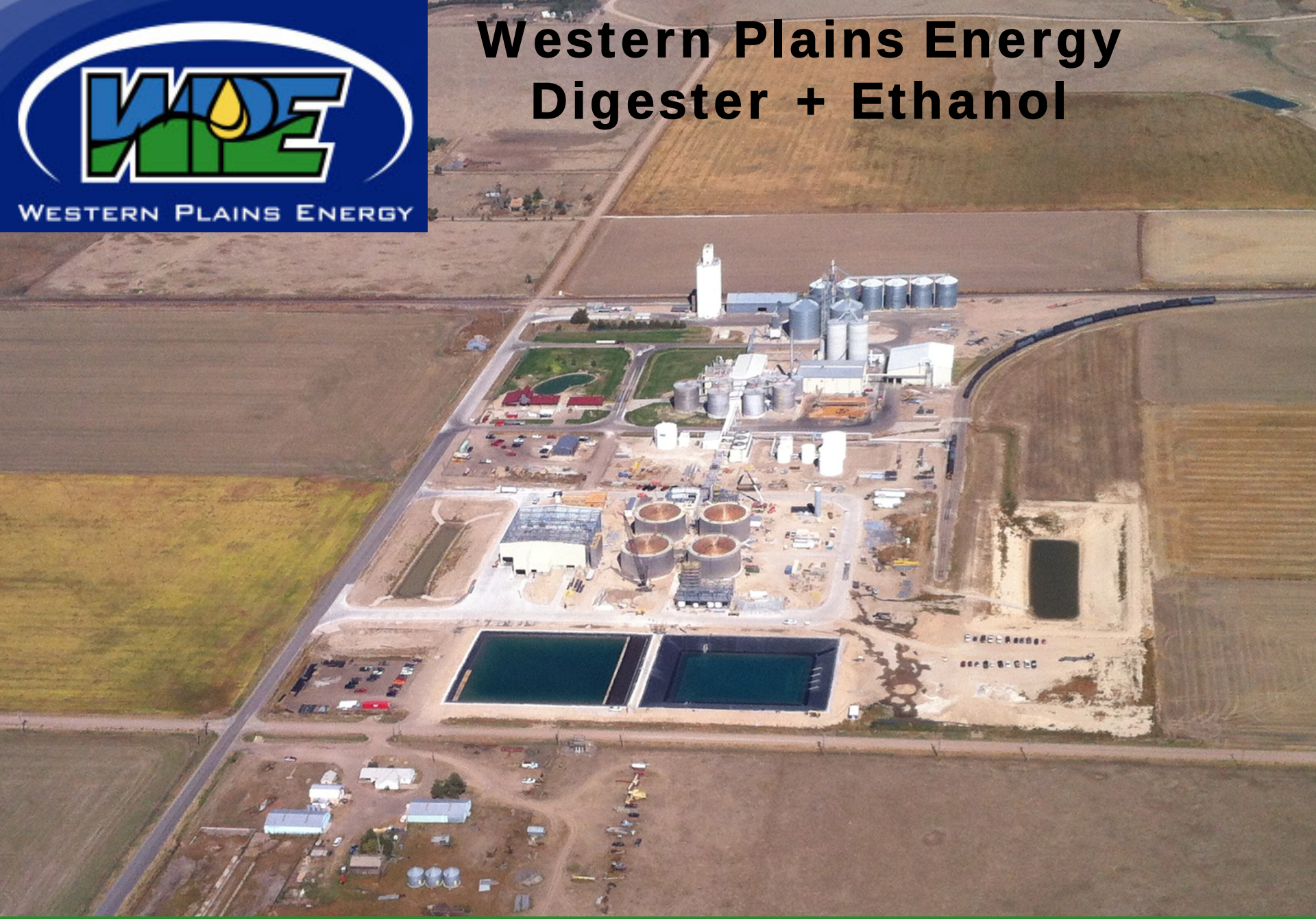
**GPHH December 3, 2012: ~100 million dollars**

-10MM gal/year wheat ethanol plant (on left)

-Expanded, fully integrated IMUS™ facility (on right)

-Profitable due to Synergies – even in tough ethanol marketplace!

# Western Plains Energy
# Digester + Ethanol



# World's Largest bioGas Project – KESC + G.E.

- Feasiblity Study successfully concluded
- ~400,000 animals (World Health Org. census), 4,200 tons/day of waste
- Feedstock Capacity for >30MW, to be accessed in stages
- Inside a city of 18 million people
- Detailed design work now underway
- Backed by the largest Private Equity firm in the Middle East, based in Dubai, UAE

# “Secret” = Preparation & Expertise

- Mobile units are immediately deployable to do proper, full-size feasibility studies on-site.


- Himark can perform various other services, and B.O.O.M./T.
- Your feedstock @ Your site Your conditions = Bankable data

# Project Advantages

- Industrial-grade process (Thermophilic) designed for high-uptime, maximum life-cycle value
- Pathogen & Weed Seed Destruction
- “Dirty” waste, heavy contamination with inorganic & non-digestable material
- From typical scale to very, very large
- Experts in integration with adjacent plants & activities
- Feedstock Recipes: 1000s of combinations
- Full industrial-size “owned” facility (no guinea pig customer)
- Intensive Technical Fundamentals useful to rescue failed digesters designed/supplied by others!

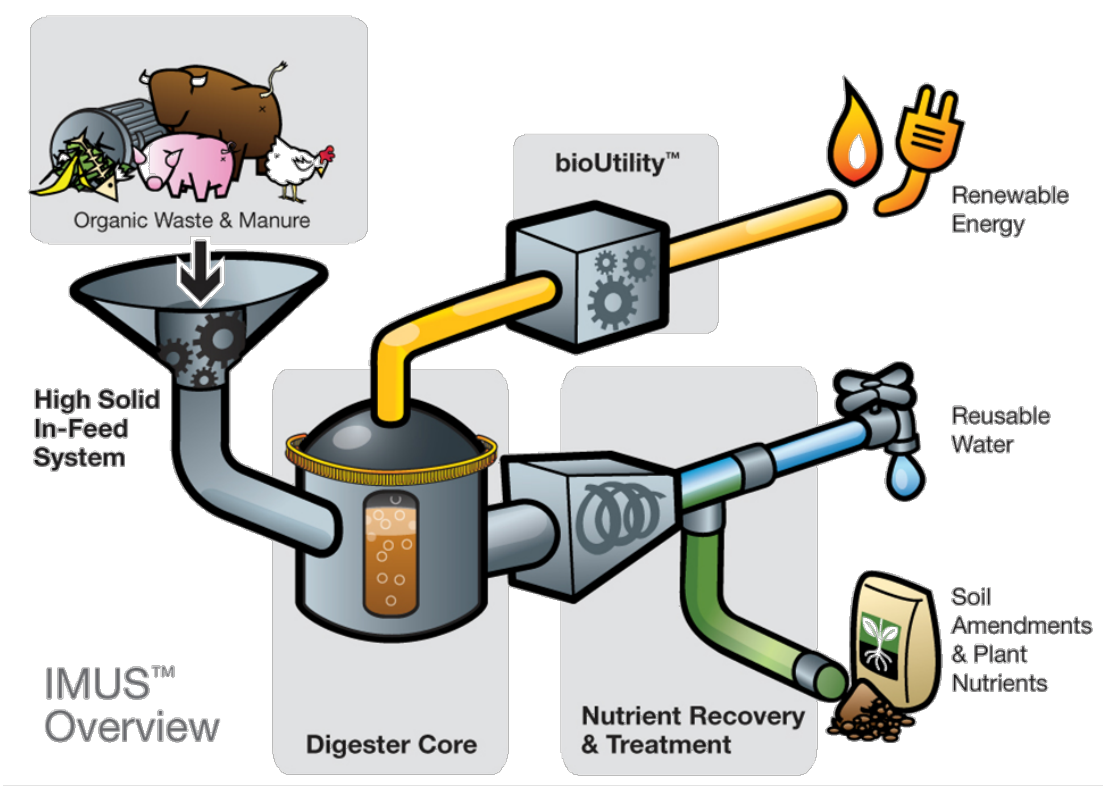
# Process & Substrates

Waste treatment for:

- Open-pen feedlot manure
- Sand-laden dry lot & free stall dairies
- Poultry, hog & other livestock

- Stillages
- Slaughter waste
- Food processing waste

- Pulp & paper sludge
- MSW & wastewater
- Landfill

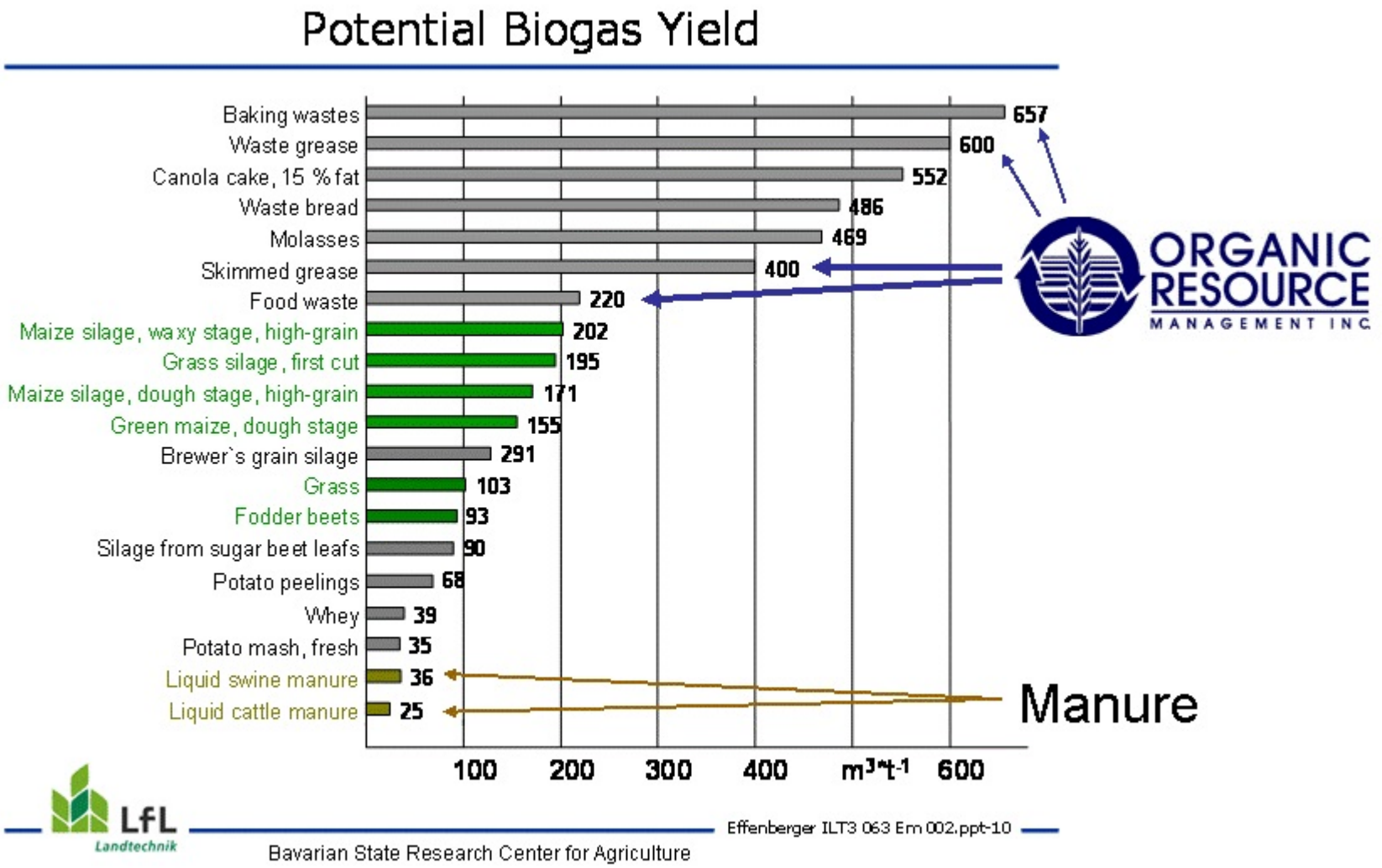



**>> AND MIX THEM ALL TOGETHER !!**

# Environmental Attributes and Resource Utilization

- Converts Environmental Threats into Renewable Energy
- Reduces Carbon Intensity of Host Facilities
- Reduces Odors, Vectors, Water Pollution, & Air Emissions
- Certifiable pathogen and weed seed free
- Conserves and Enhances Valuable Crop Nutrients (N, P, & K)
- Three Digestate Streams
  1. Nutrient Rich Liquid – Crops or "Value Added" uses
  2. Nutrient Rich Organic Solids – "Value Added" uses, i.e., gardening, greenhouse, landscaping, or crop use.
  3. Inorganic Solids (sand, grit, dirt, rocks, etc.) – to feedlot

# Substrate Sourcing



# Expanding Substrate Choices a Plus

- Manure as Baseline Substrate Buffers other Substrates
- Digesting Higher Strength Substrates Expands Environmental and Economic Returns
  1. Reduces reactor size for given energy production
  2. Potentially reducing Landfill and WWTP Loads
  3. Potentially reducing disposal costs while capturing tipping fees.
- Co-Mingling Compatible Substrates Aids Resilience and Consistency of Digester Operations
- At Project Development Stage, Identifying Available Substrates is a Challenge

**You Can Help!**

# “Anaerobic Digesters in Kansas”

- **Your Presenter has been monitoring AD Technology for four Decades and has participated in 25 digestor projects of all sizes in numerous states and several foreign countries!**
- **We finally got the first digester built in Kansas - WPE**
- **Integrated Energy Projects (AD/Ethanol) are great, but with the feedlot/dairy belt we could do a lot more (6+ million tons manure harvested per year in Kansas)?**
- **Kansas Needs an AD carve out in our “Renewables Porfolio” which currently restricts all renewable energy projects to “Utility” company ownership instead of projects collaborative with agriculture to “Make Waste The Renewable Resource” and put the energy on the Grid!**
- **You Can Help!**

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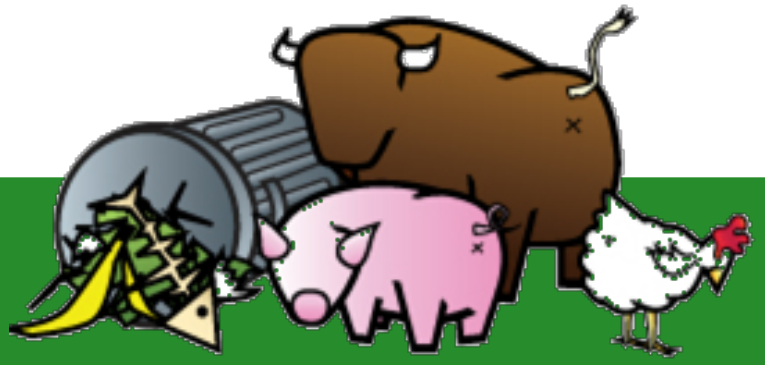

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