Anaerobic Digesters for Kentucky Dairies

Opportunities for Generating Green Energy , Carbon Credits and Producing "Carbon Neutral" Products

Dr. Subodh Das , Founder & CEO

Phinix,LLC

Lexington, Kentucky

EXECUTIVE TASK FORCE ON BI0MASS AND BIOFUELS DEVELOPMENT IN KENTUCKY

Frankfort, KY

November 4, 2009

PHINIX LLC
Globally Responsible Resource Management

Phinix, LLC

- **Based in Lexington, KY (Minority Business Enterprise)**
- **Carbon Management & Trading**

  (Partnering with First Climate , LLC)
- **Recycling & Recycling- Friendly Processes & Products**
- **Development of Renewal Energy Projects fro Landfills, Waste-to-Energy and Dairy Farms**

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Dr. Subodh K Das

- **25 Years of Manufacturing and Aluminum Industry Experience**

- **Experienced in Building and Managing Industry/Academic/Government Consortia**

- **10 Years of Academic Experience at the University of Kentucky (Founded Aluminum Consortia : CAT, SECAT , CSAI – Sloan Foundation)**

- **Recognized and Published Expert in Aluminum Recycling and Development of Recycle –Friendly Aluminum Alloys**

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Market Potential

Dairy Farms	No. of Cows
Number of Dairy Farms in Kentucky	976
Kentucky	90,000
Robey Dairy Farms , Adairville	1,400
Coral Hill Dairy , Glasgow	1,000
Woodall Farms , Quality	650
Stanley Wilson ,Cave City	500
Wm. Crist, Jr., Glasgow	500
Joe Bertram ,Glasgow	400
Don Kinslow ,Glasgow	400

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INTRODUCTION

- Methane emissions occur wherever animal waste created
- Liquid manure management systems create oxygen free environments to capture methane
- Digester breaks down carbon based molecules to methane
- Livestock waste contributes about 8% of methane / CO2 emissions
- Emissions generated from the agriculture sector are not subject emission reporting
- Great opportunities exist to install methane capturing and conversion units to produce process heat and electricity
- Supports –
  - **Governor's " Intelligent Energy Choices for Kentucky's Future - Kentucky's 7-Point Strategy for Energy Independence " (November 2008)**
  - **Strategy 2: Increase Kentucky's use of Renewable Energy & Strategy 3: Sustainably Grow Kentucky's Production of Biofuels**

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Anaerobic Digester Advantages

Larger Benefits

Generate sellable electricity from Methane
Use Methane in lieu of Natural Gas as transportation fuel
Produce waste heat / hot water as byproduct
Sell voluntary carbon credits and promote “Carbon Neutral” product

Incremental Benefits

Reuse /Sell digested liquid effluent as fertilizer to increase crop yields
Reuse/Sell solids for bedding
Reuse/Sell solids as peat moss substitute , flower pots material, nutrient fertilizer

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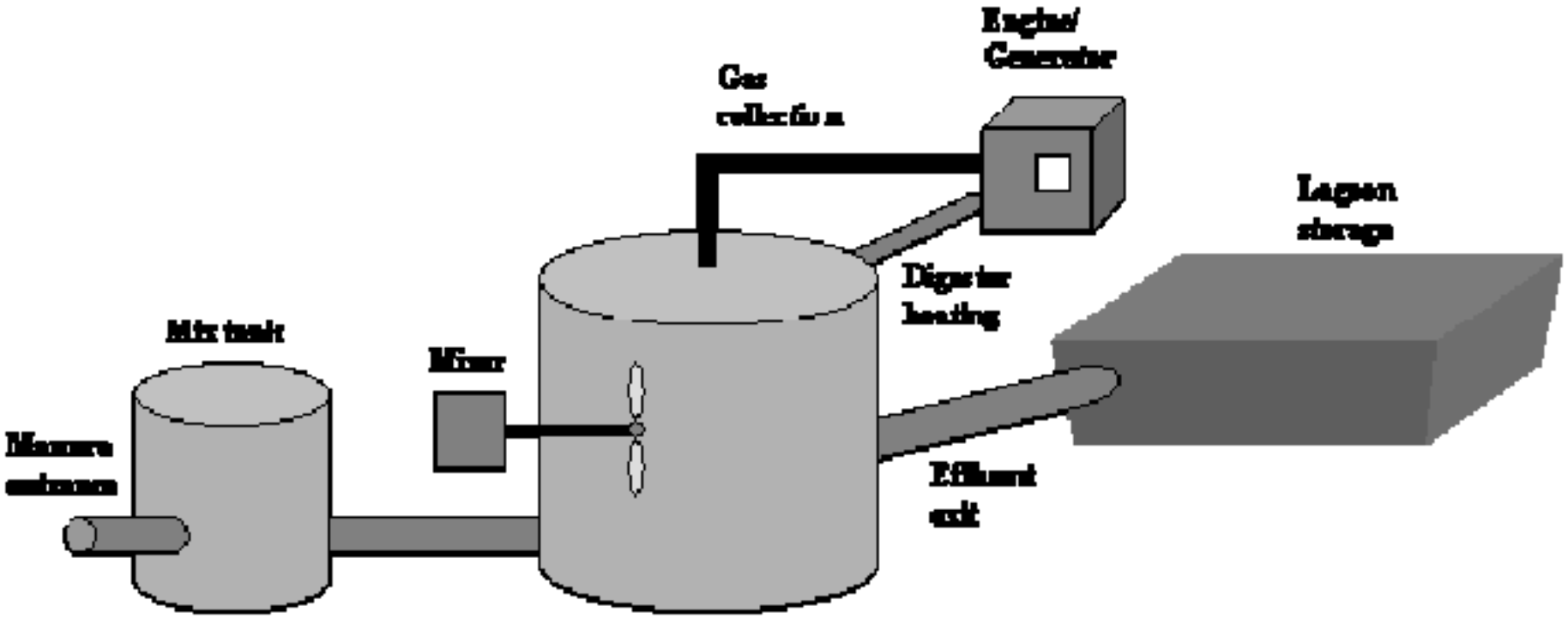
TYPICAL FARM APPLICATION

Kentucky has NO Manure Anaerobic Digester in Operation



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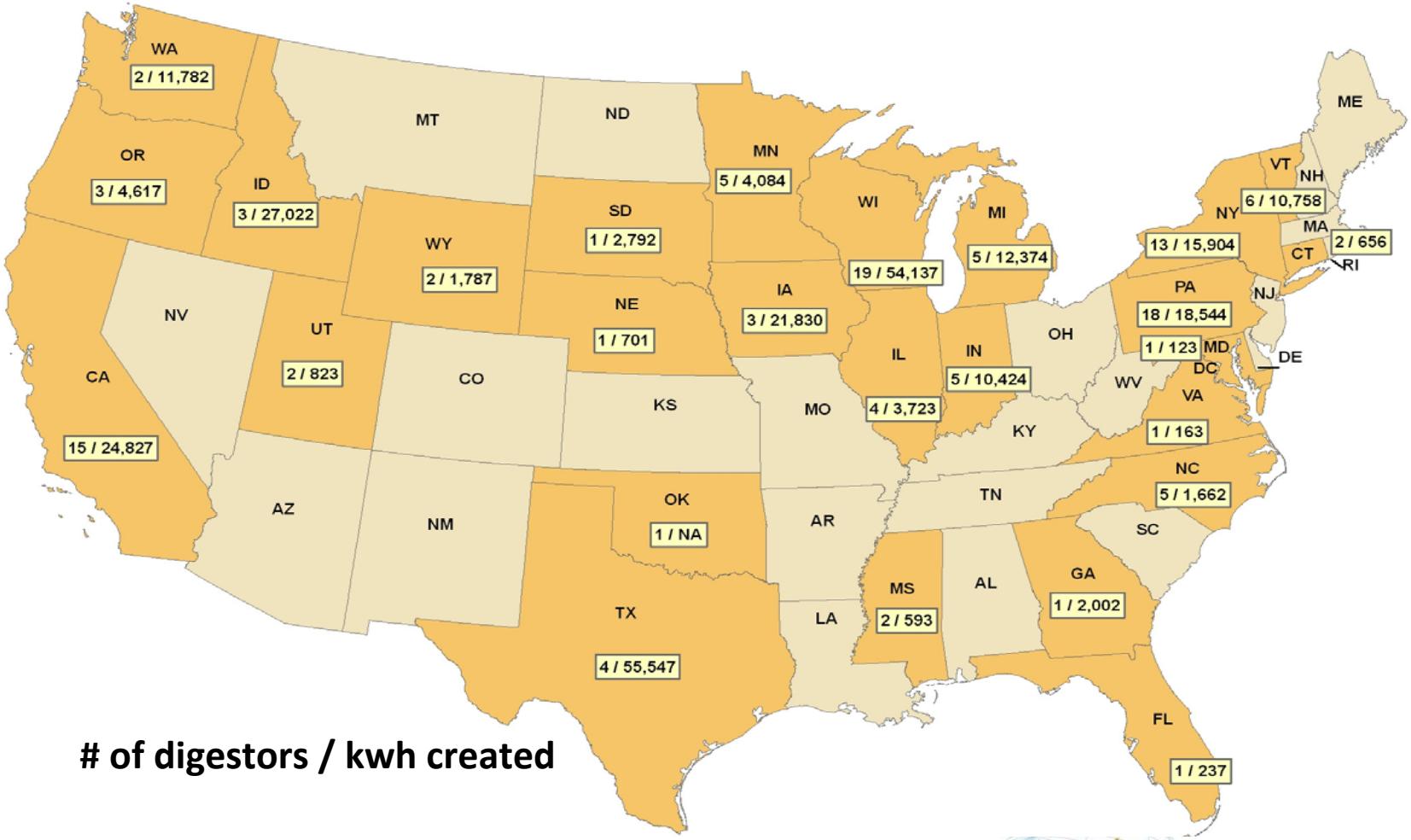
Operating Manure Digestors in the US



# of digestors / kwh created

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METHANE POLLUTION

The United Nation Intergovernmental Panel on Climate Change estimates of green house gas (GHG) impacts conclude:

The global warming potential of methane is 21 times more destructive than carbon dioxide.

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GLOBAL CARBON MARKET

The Carbon Trading Market has roughly doubled in value every year since 2006 creating an excellent opportunity for dairy farmers to:

1. **Capture and sell these credits for cash**
2. **Create energy and heat for use farm**
3. **Create a sustainable model for their industry**

- US $32 Billion (2006)
- US $64 Billion (2007)
- US $ 120 Billion (2008)

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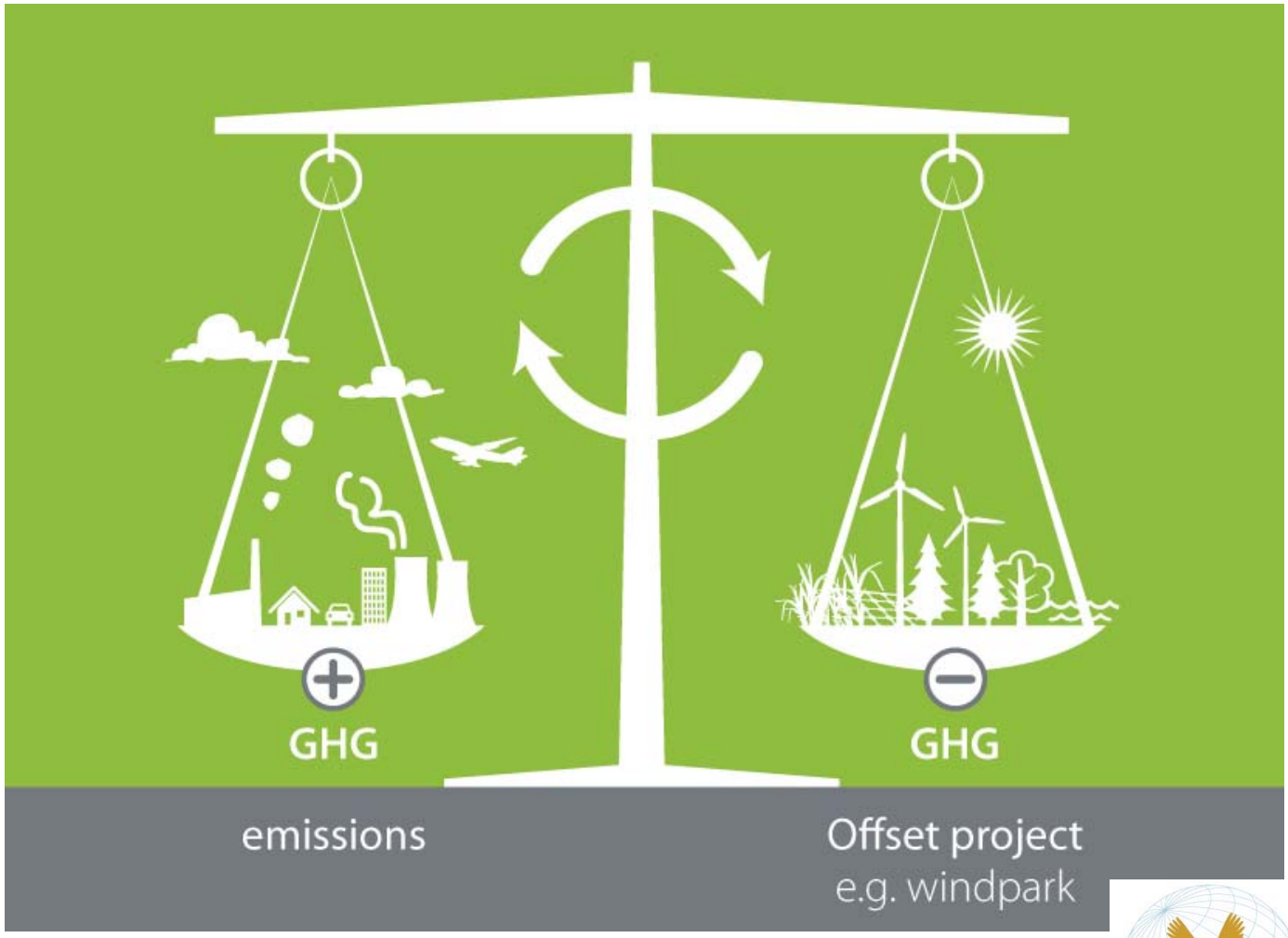
The Principle of Climate Neutrality



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Carbon and Energy Economics

# Cows	Type	MTCO2E	Carbon Value	kW	Energy Value
1	One	10	$50	0.3	$52
100	Average	1,000	$5,000	30	$5,200
500	Large	5,000	$25,000	150	$26,000
1,000	Optimum	10,000	$50,000	300	$52 ,000
90,000	Kentucky	900,000	$4,500 ,000	27 ,200	$4,680,000

MTCO2E = Metric Tonnes of Carbon Dioxide Equivalent
Carbon Value = **$ 5 per Metric Tonne** of Carbon Dioxide Equivalent
Energy Value = **$0.02 per kWh**

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Stake Holders Interviewed/Contacted

(May-October 2009)

Maury Cox: Executive Director , Kentucky Dairy Development Council

Tim Hughes : Senior Policy Analyst , Kentucky Office of Agriculture Policy

Scott Maas : United States Department of Agriculture, Rural Development

Dr. Scott Shearer: College of Agriculture, University of Kentucky

Frank Moore, Director of Biofuels, Kentucky Energy and Environmental Cabinet

Partners

Phinix,LLC, Lexington, Kentucky
Project Developer / Manager

Interested Kentucky Dairy Farms throughout KY
Project Implementer

effENERGY, LLC , Somerset, Kentucky
Technology Developer / Provider /International Technologies

Anaerobic Digester Company
Selection and discussion with a suitable partner underway

First Climate , San Francisco, California
Carbon Management Service Provider
Access to Global Digester Technology

PATH FORWARD

- **Assess potential of methane collection and conversion to usable and sellable energy including the potential of Carbon Credits**

- **Design and engineer "affordable, adaptable and scalable" systems designed for Kentucky Dairy Farms needs**

- **Estimate the economics and viability of AD and other energy systems for all size diaries in Kentucky**

- **Form a consortium of interested Kentucky Dairy Farms and qualified academic partners**

- **Approach Kentucky's and US Departments of Agricultures for seed funding and legislative support for state–wide efforts (need a contact person)**

- **Prepare research proposals for funding from private and public sources**

- **Help Kentucky Dairy Farms become economically competitive by attaining "carbon neutral" and "energy surplus" status.**

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