

Opportunities for Generating Green Energy, Carbon Credits and “Carbon Neutral” Milk Products

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Lexington, Kentucky

Kentucky Dairy Development Council Meeting
Broughtontown Community Center
Crab Orchard , Kentucky
December 11 , 2009



Phinix, LLC

- Based in Lexington, KY
- Carbon Management & Trading (Partnering with First Climate , LLC)
- Recycling & Recycling- Friendly Processes & Products
- Development of Renewal Energy Projects from Landfills, Waste-to- Energy and Dairy Farms (Partnering with effENERGY, LLC , Somerset, Kentucky)



Dr. Subodh K Das : CEO & Founder – Phinix, LLC

- 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 Recycling and Development of Recycle –Friendly Products & Processes

Dave Weddle : CEO – effENERGY, LLC

- Founded effEnergy ,LLC , a project development company offering technology, engineering and site management for renewable and waste-to-energy projects
- Held senior level, executive management positions in the recycling, energy, marketing and technology
- Proven “hands on” experience in creating , building and growing businesses & managing new startups and construction projects
- 20+ years global experience in recycling and waste–to–energy projects



Kentucky Market

Number of Dairy Farms	969
Dairy Cows	+/- 90,000
Amount of dairy waste per year	1.7 million tons
Waste generated per capita	790 lbs



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
 - Governor’s Executive Task Force on Biomass and Biofuels Development in Kentucky : A collaborative effort of the Governor’s Office of Agricultural Policy and the Energy and Environment Cabinet , December 10, 2009



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 by-product

Sell voluntary carbon credits and promote “Carbon Neutral” products

Incremental Benefits

Reuse /Sell digested liquid effluent as fertilizer to increase crop yields

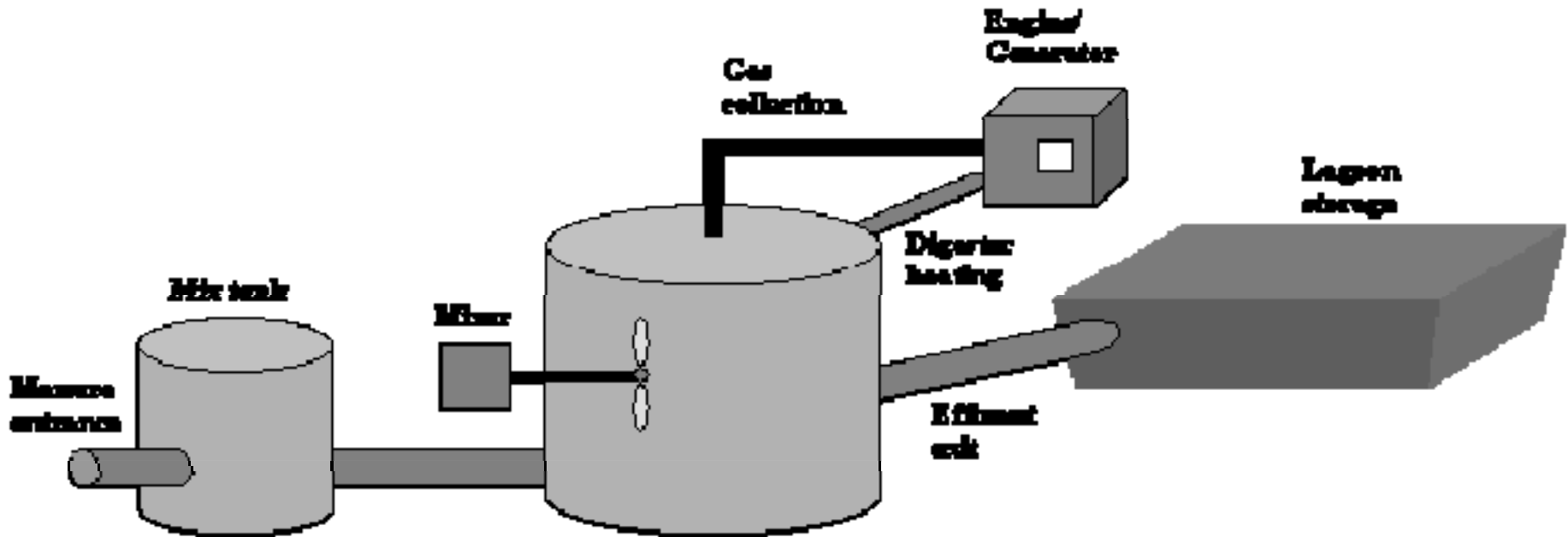
Reuse/Sell solids for bedding

Reuse/Sell solids as peat moss substitute , flower pots material, nutrient fertilizer

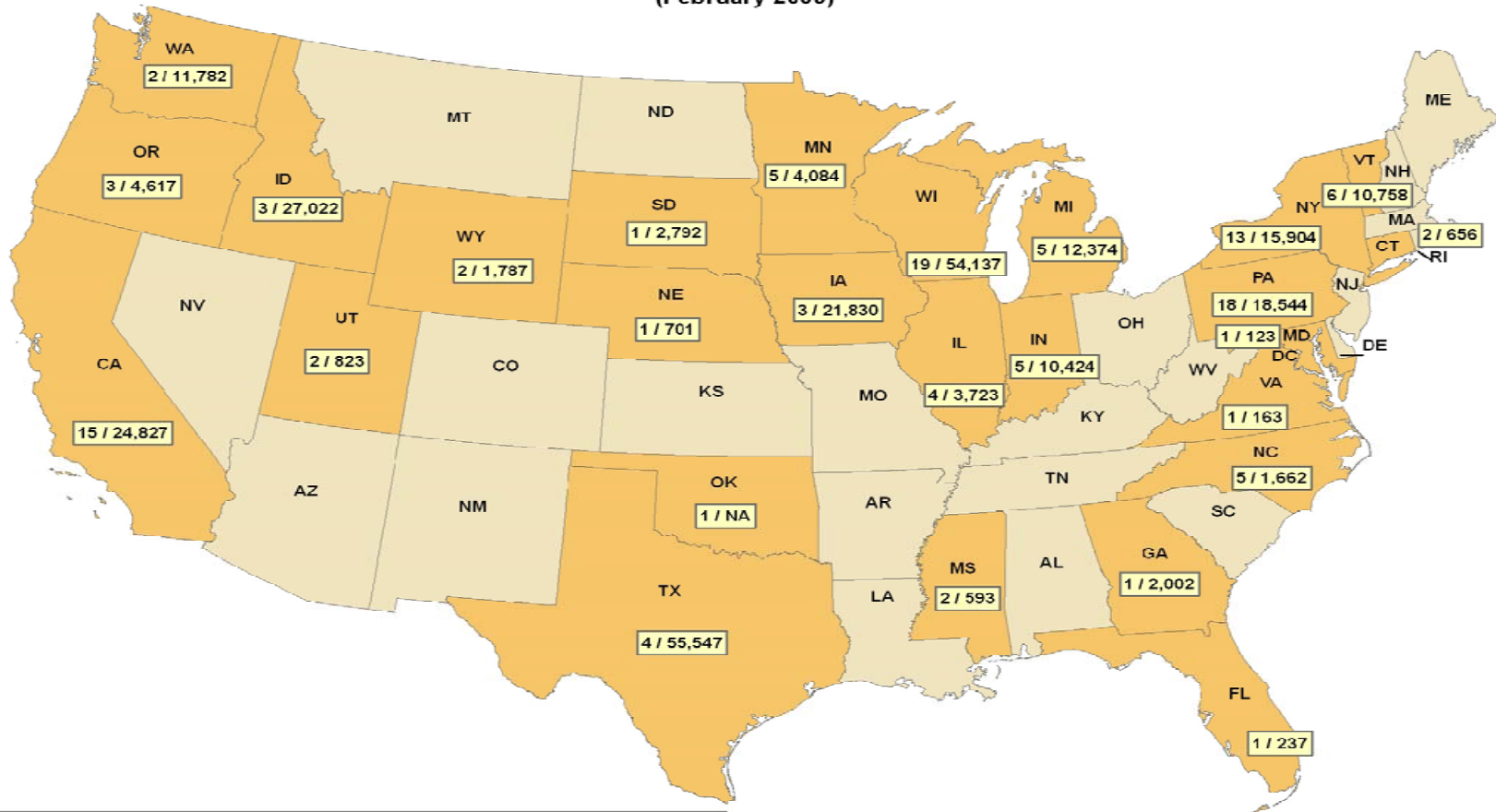


TYPICAL FARM APPLICATION

Kentucky has NO Anaerobic Digester in Operation



Operating Manure Digesters (February 2009)



Number of Operating Projects / Estimated Energy Production (MWh/yr equivalent)
 Total Operating Projects: 125
 Total Estimated Energy Production: 290,000 MWh/yr equivalent



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.



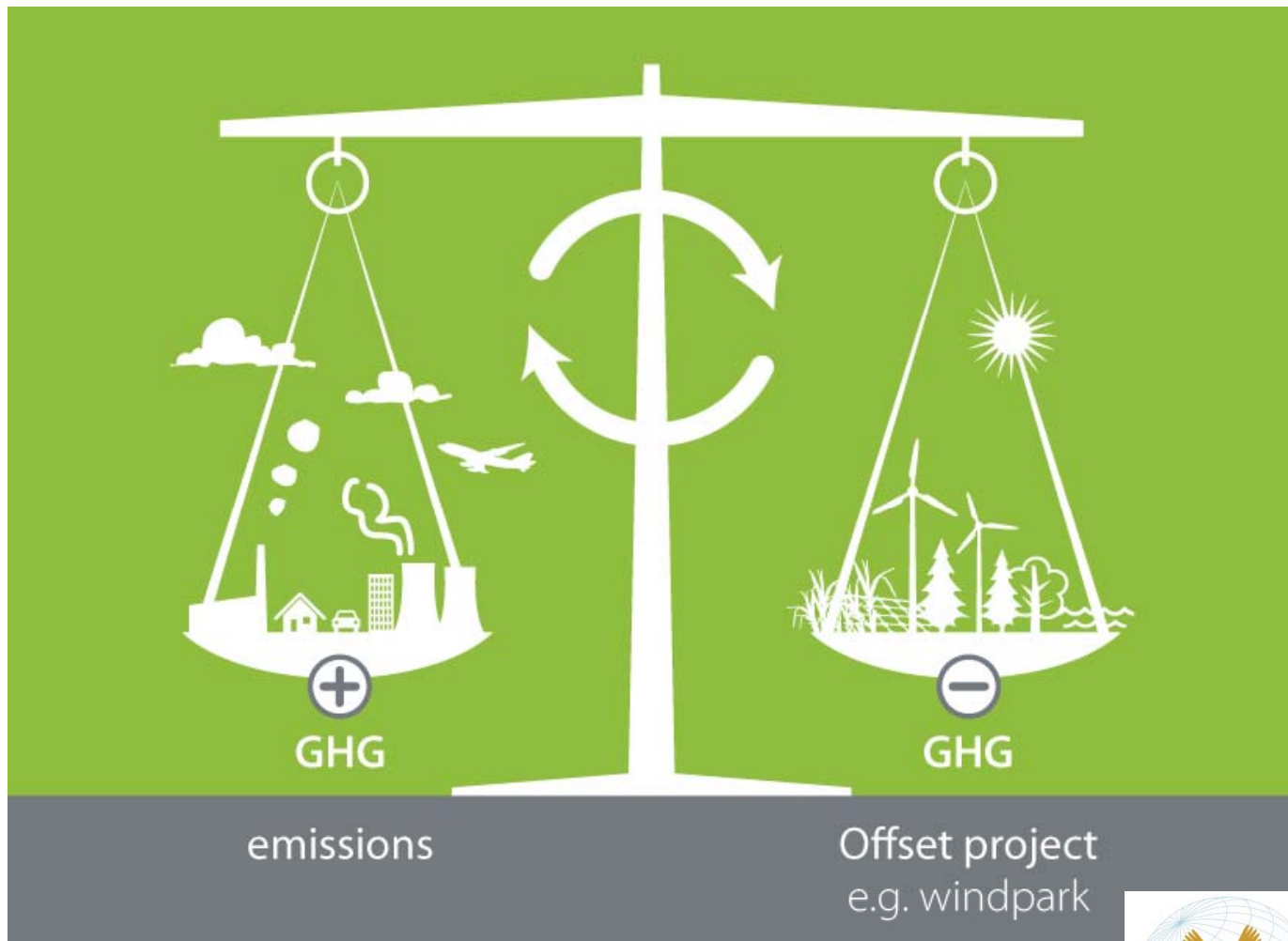
GLOBAL CARBON MARKET

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 farm use
 3. Create a sustainable model for their industry
- US \$32 Billion (2006)
 - US \$64 Billion (2007)
 - US \$ 120 Billion (2008)



The Principle of Climate Neutrality



Comparative Carbon, Energy and Milk Economic Values

<u># Cows</u>	<u>Type</u>	<u>MTCO2E</u>	<u>Carbon Value</u>	<u>kW</u>	<u>Energy Value</u>	<u>Milk Value</u>
1	One	10	\$50	0.3	\$156	\$3,000
100	Average	1,000	\$5,000	30	\$15,600	\$300,000
500	Large	5,000	\$25,000	150	\$78,000	\$1,500,000
1,000	Optimum	10,000	\$50,000	300	\$156,000	\$3,000,000
90,000	Kentucky Total	900,000	\$4,500,000	27,200	\$14,040,000	\$270,000,000

MTCO2E = Metric Tonnes of Carbon Dioxide Equivalent

Carbon Value = **\$ 5 per Metric Tonne** of Carbon Dioxide Equivalent (Voluntary Market)

Energy Value = **\$0.06 per kWh**

Metric Tonne = 2200 pounds



Stake Holders Interviewed/Contacted

(May-December 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 /Access to European Technology



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, modularly , adaptable and scalable “ systems designed for Kentucky Dairy Farms needs
- Estimate the economics of the digester process as well as the potential for carbon credits
- Form a consortium of interested Kentucky Dairy Farms and qualified academic partners
- Approach Kentucky’s and United States Departments of Agricultures for seed funding , equipment grants & loans guarantees and legislative support for state –wide efforts
- Prepare research proposals for major funding from private and public sources
- Help Kentucky Dairy Farms become economically competitive by attaining “carbon neutral” and “energy surplus” status.



FUNDING OPPORTUNITIES

REAP FEASIBILITY STUDY GRANTS (Phase 1)

Objective and Logistics :

1. Determine the technical, economic and market feasibility of a 100 and 1,000 head cow anaerobic digester for Kentucky Dairy Farms
2. Design and present a “ shovel-ready projects “ proposal
3. Application : January 31 , 2010 , Negotiation : May 2010 , Contraction : August 2010
4. Project Size : \$60,000
5. Funding Source : USDA (\$15,000), KY GOAP (\$15,000) , Federal Stimulus ARRA Funds (\$15,000)
6. Cash or Equity needed from KY Dairy Farm(s) : 25 % or \$15,000

REAP PROJECT GUARANTEED LOANS (Phase 2)

Objectives and Logistics

1. Construct either one or several 100 head anaerobic digesters (Approx. cost \$ 500,000 each)
2. Construct either one or several 1,000 head anaerobic digesters (Approx. cost \$ 3,000,000 each)
3. Application after completion of Phase 1
4. Funding Sources : USDA REAP Grant (25%) , USDA REAP Guaranteed Loan (25%) , KY GOAP (25%)
5. Cash or Equity Required from KY Dairy Farm(s) : 25 %



Benefits to KY Dairy Farms

- Develop a long term strategy for assisting dairies to lower their carbon footprint and environmental impact
- Create an energy system process that can be utilized by ALL Kentucky dairies
- Implement a system that is easy to use and more productive
- Provide economic incentives (grants, loan guarantees) to assist dairies in acquiring systems
- Develop a system that will generate more profits for Kentucky dairies



CONTACT INFORMATION

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