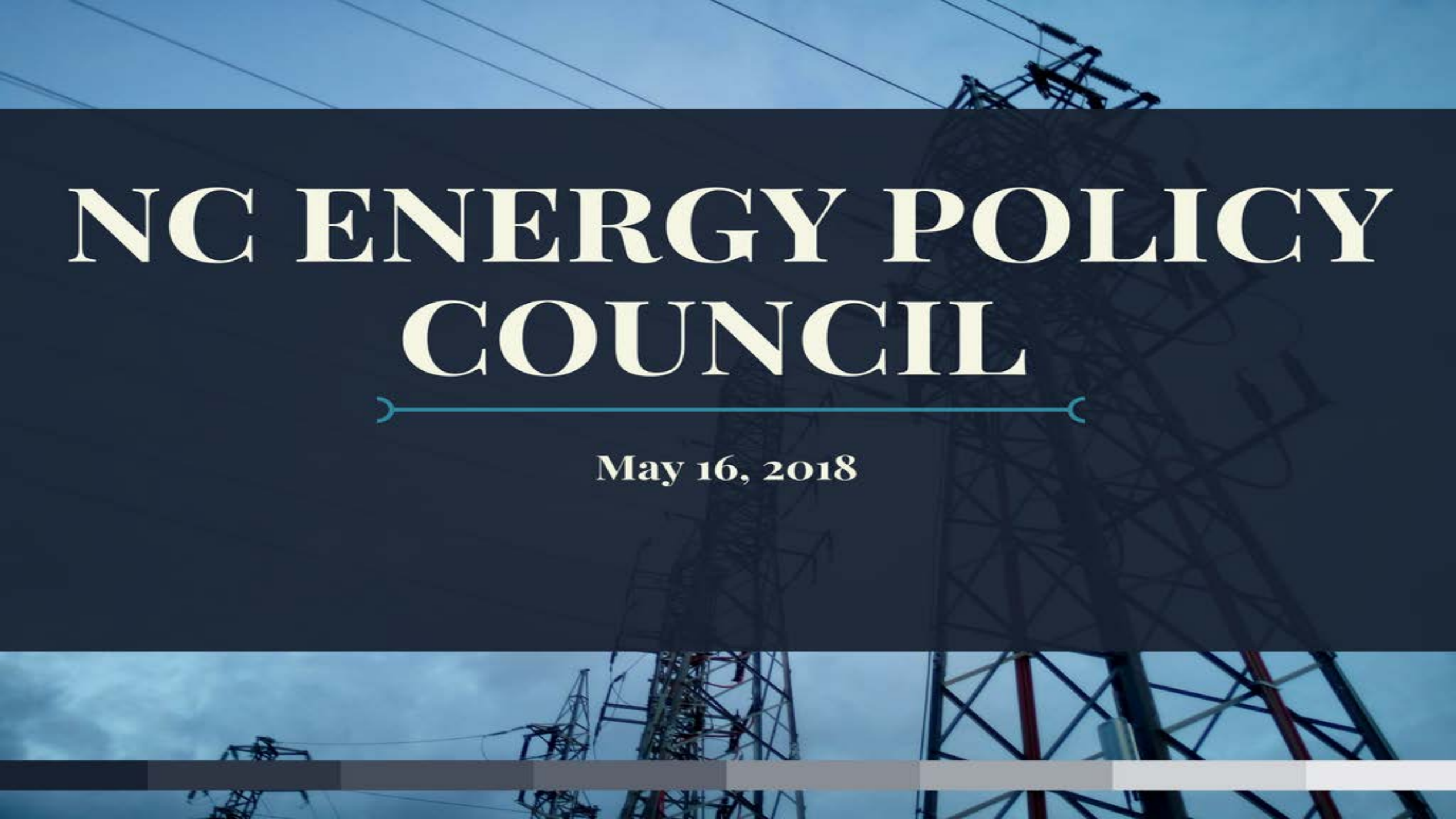


# NC ENERGY POLICY COUNCIL

May 16, 2018

DEQENERGY

# North Carolina Energy Policy Council

## AGENDA

1:00 p.m. Wednesday May 16, 2018
Ground Floor Hearing Room
Archdale Building
Raleigh, North Carolina 27603

1. **Call to order, opening remarks, and approval of the minutes from the February 21, 2018, Council meeting (5 mins)**
   Lieutenant Governor Dan Forest, Chair

2. **Discussion of Bioenergy: Resources, Perspectives, Opportunities, and Impacts (1 hour, 35 mins)**
   a. Bioenergy Overview: Directed biogas, economics, policies, and regulations (20 mins)
      Tanja Vujic, Director of Biogas Strategy
      Duke University

   b. Bioenergy Sources and Products: Forestry, Agriculture, Food, and Beverage (15 mins)
      Randall Johnson, Executive Director
      Southeastern Office, North Carolina Biotechnology Center

   c. Industry Perspective (15 mins)
      Rick Brehm, General Manager
      Tyton NC Biofuels, LLC

   d. Generating Bioenergy from Swine Waste (20 mins)
      Kraig Westerbeek, Senior Director
      Smithfield Renewables

   e. Environmental and Community Impacts (25 mins)
      Dr. Joe Rudek, Lead Senior Scientist
      Environmental Defense Fund

      Jamie Cole, Environmental Justice, Air, & Materials Policy Manager
      North Carolina Conservation Network

3. **Council discussions and actions (30 mins)**
   a. Discussion and Adoption of the Council's 2018 Biennial Report
   b. Discuss date of November Council meeting
   c. Other business

4. **Public comment (10 mins)**

5. **Closing remarks and adjourn (5 mins)**
   Lieutenant Governor Dan Forest, Chair

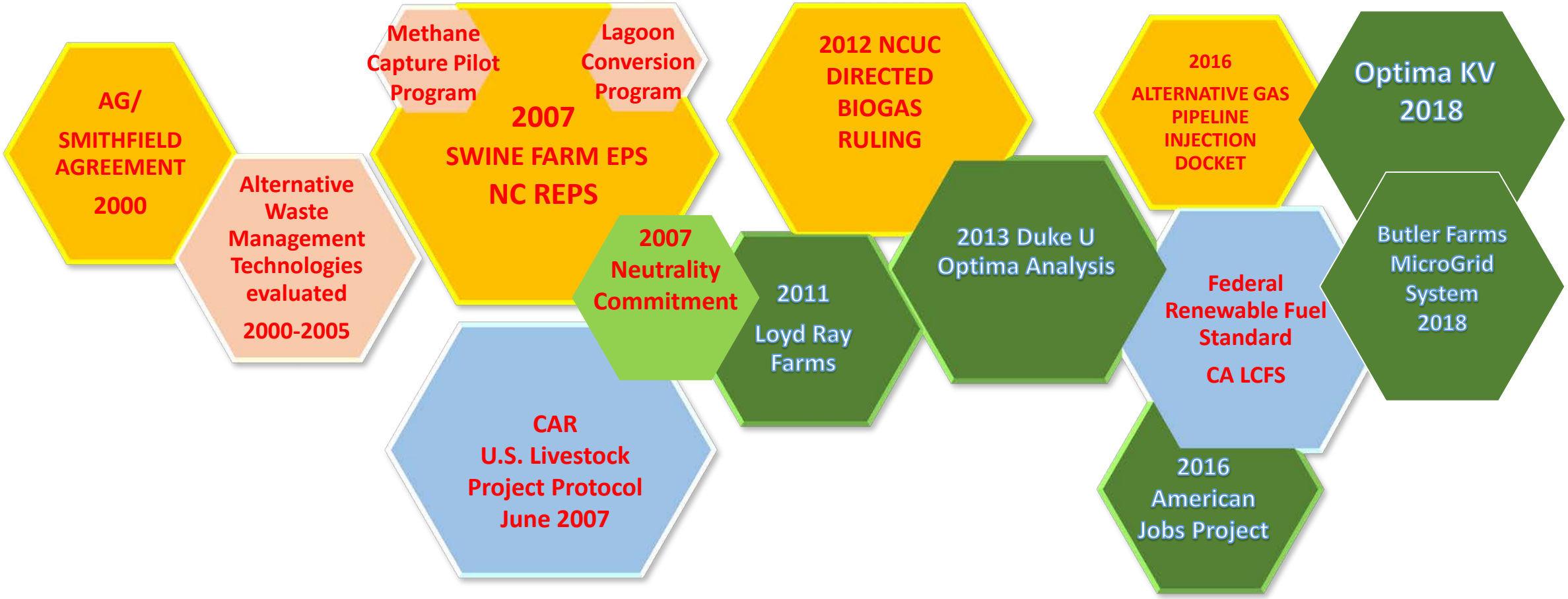
# BIOENERGY OVERVIEW: DIRECTED BIOGAS, ECONOMICS, POLICIES, AND REGULATIONS

**Tanja Vujic**
**Director of Biogas Strategy**
**Duke University**

# DIRECTED BIOGAS, ECONOMICS, POLICIES, AND REGULATIONS

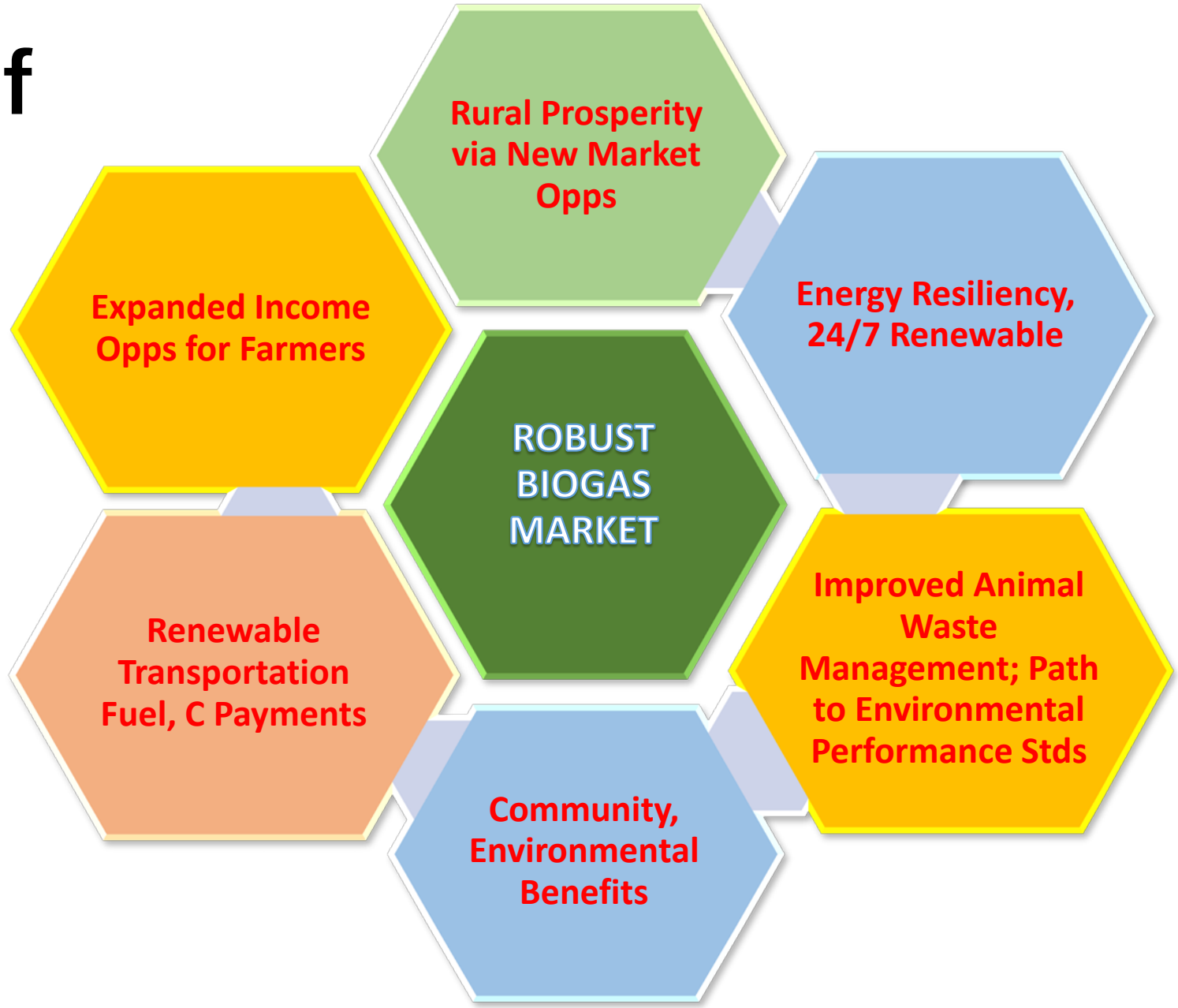
North Carolina Energy Policy Council
May 16, 2018

Tatjana (Tanja) Vujic
Director of Biogas Strategy
Duke University



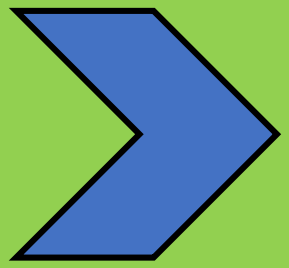

# Path of Biogas Development: 2000-Present

# Potential of Directed Biogas



**Significant Supply**
**REPS carve out**
**Directed Biogas Ruling**
**Roadmap**
**RFS/CA LCFS**
**Long-Term Contracts**
**Opportunity to leverage biogas payments to achieve environmental performance standards**
**Settlement and lawsuits provide window for change**

**Lack of infrastructure to transport gas; lack of priority for LDC**
**Ease of Noncompliance with REPS**
**Cost to connect, inject biogas**
**Price of conventional natural gas**
**Fatigue, tendency to overlook opportunity, avoid swine waste issue**
**Lack of entity able to bring stakeholders together**



**Leadership & Coordination**
**Address transport, infrastructure issues**
**Leverage biogas investments to meet environmental performance standards**
**Access to markets**

# Leadership Needed

1. Create entity capable of actively coordinating biogas development with other change factors to achieve maximum benefit for all stakeholders
2. Bring private, public resources to bear where gaps remain; utilize existing expertise, opportunities and markets
3. Facilitate necessary discussions amongst stakeholders, provide support, technical and otherwise, for solutions

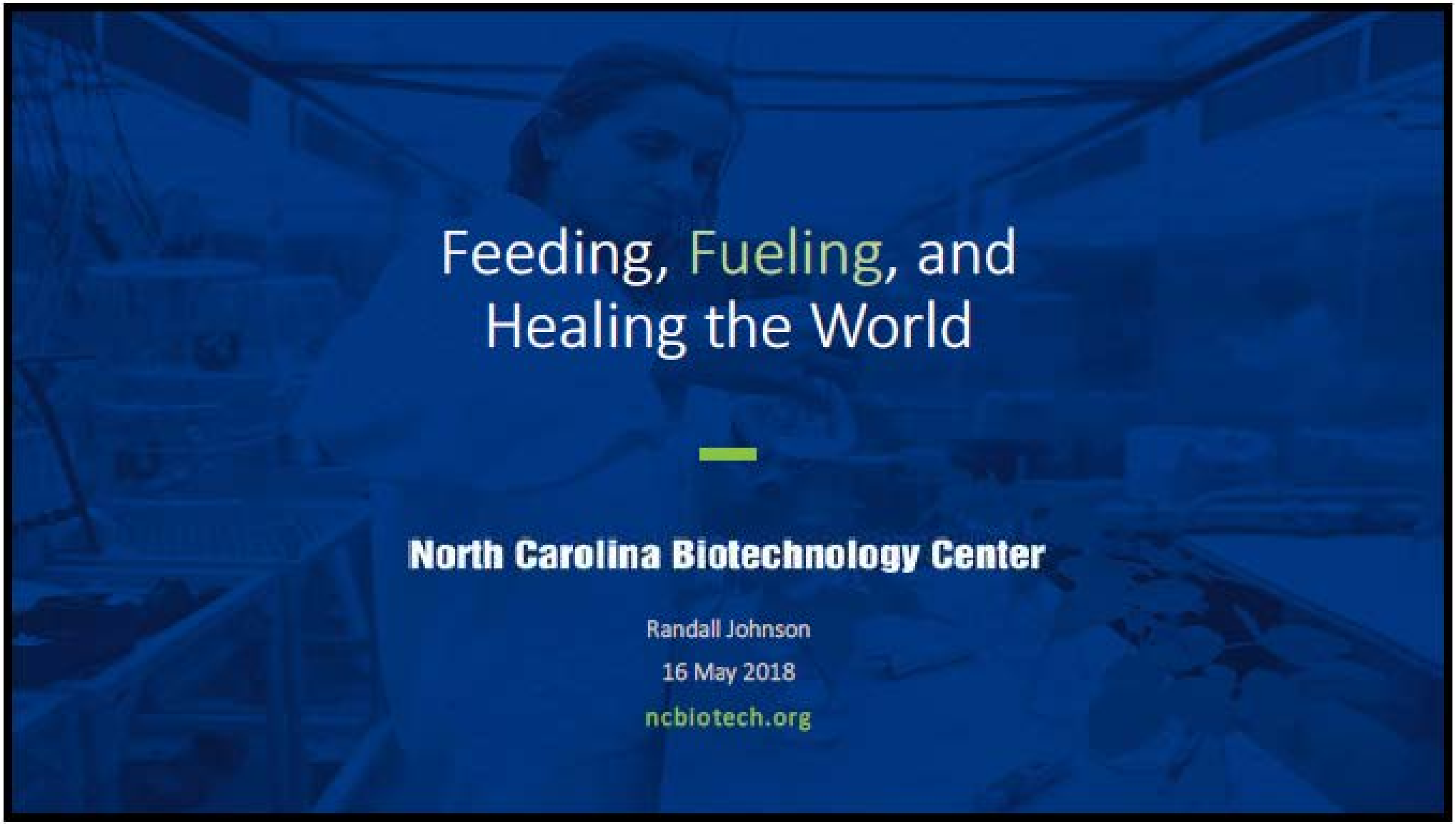
# DIRECTED BIOGAS, ECONOMICS, POLICIES, AND REGULATIONS

North Carolina Energy Policy Council
May 16, 2018

Tatjana (Tanja) Vujic
Director of Biogas Strategy
Duke University
tv2@duke.edu 919-358-0055

# BIOENERGY SOURCES AND PRODUCTS: FORESTRY, AGRICULTURE, FOOD AND


Randall Johnson
Executive Director
Southeastern Office
North Carolina Biotechnology Center


Feeding, Fueling, and
Healing the World
North Carolina Biotechnology Center
Randall Johnson
16 May 2018
ncbiotech.org

# Biotechnology Development in North Carolina


NORTH CAROLINA BIOTECHNOLOGY CENTER

ncbiotech.org

# North Carolina

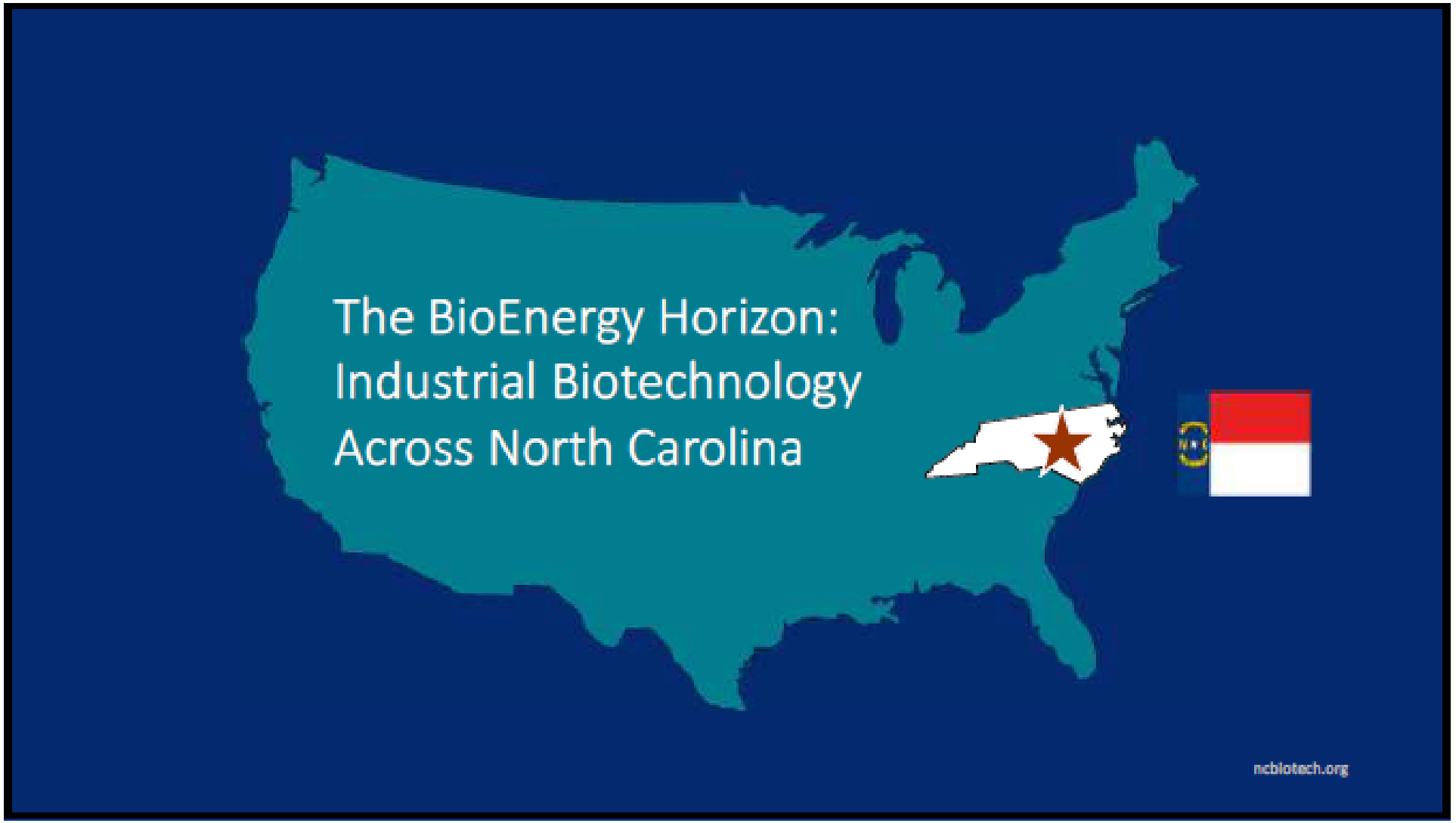
## Biotech Development is Economic Development

- $86 billion annual industry impact in NC
- 700+ BioSci Companies employing over 63,000 people
- 2200+ additional life science support companies
- 260,000 total jobs in biotech and biotech-related fields
- $93,000+ average salary for biotech jobs
- 30.9% net job growth 2001 – 2012; 6.6% 2012 – 2014
- $2.2 billion annually in state and local revenues

North Carolina Biotechnology Center

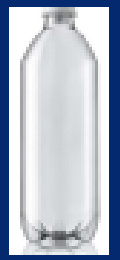
TECONOMY PARTNERS LLC

ncbiotech.org


The BioEnergy Horizon:
Industrial Biotechnology
Across North Carolina
ncbiotech.org

# Industrial Biotechnology:
## New & Emerging Markets for BioProducts

- **Energy Products**
  - Electricity –homes, business
  - Biogas / Natural Gas
  - Fuel for Vehicles
    - Ethanol
    - Biodiesel
- **Fiber**
  - Paper, Cardboard
- **Agri Nutrients**
  - Fertilizer
  - Soil supplements




- **Consumer Products**
  - Plastics
  - Pharmaceuticals
  - Nutraceuticals
  - Cosmetics
  - Textiles

- **Environmental Credits**
  - Renewable Energy Credits (RECs)
  - Renewable ID Numbers (RINs)
  - Carbon Offsets / Carbon Credits
  - Nutrient Credits
- **More to come…**

ncbiotech.org

# Industrial Biotechnology:
# NC Inputs for Emerging BioProducts Markets

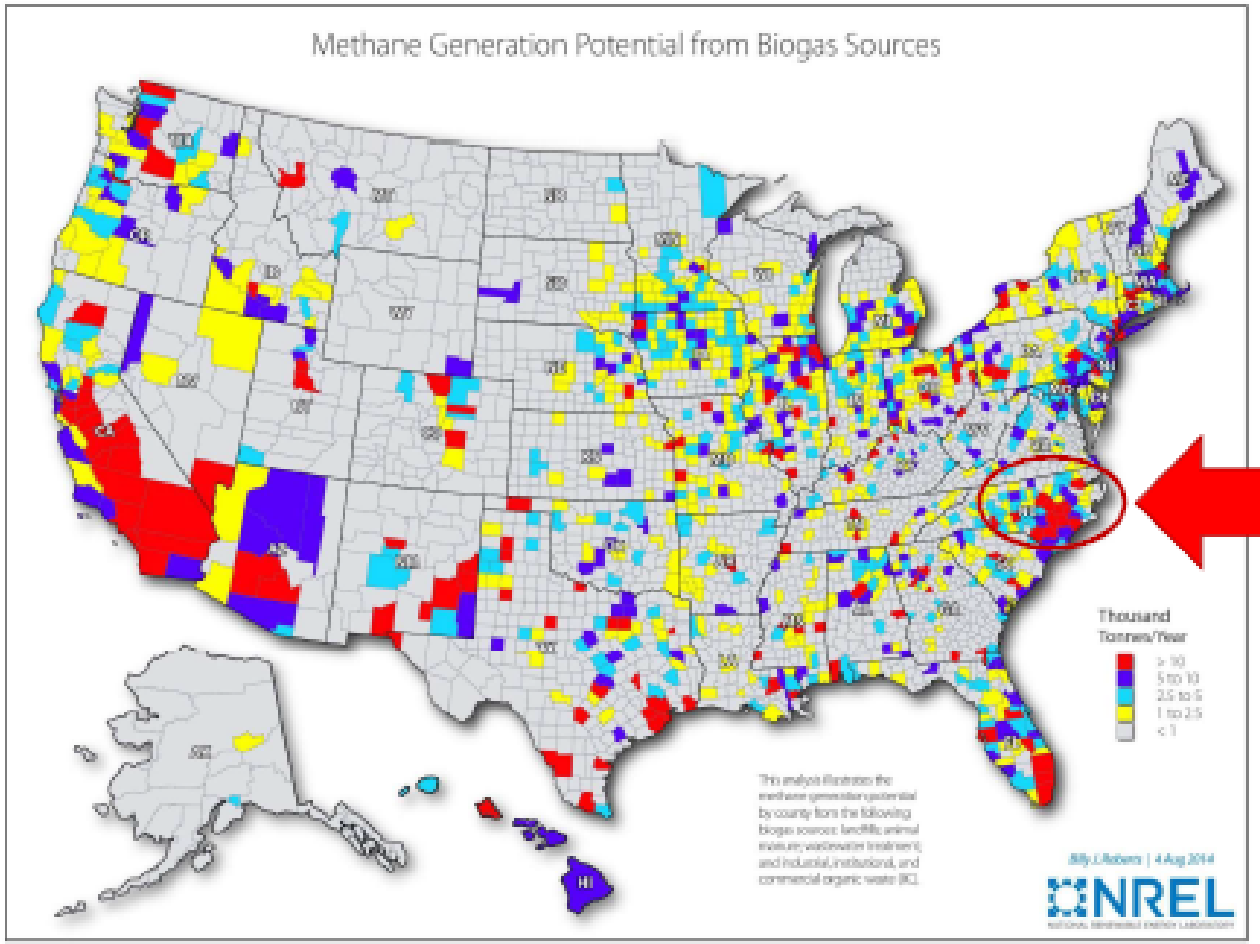
❖ Energy Products
- Energy Crops
  - Tobacco
  - Wood
  - Miscanthus
  - Algae

- **Waste Streams**
  - **Animal Manure**
  - **Food Production & Processing**
  - **Municipal Waste Streams**
  - Industrial Operations
  - Power Production
  - Wood Processing Residues

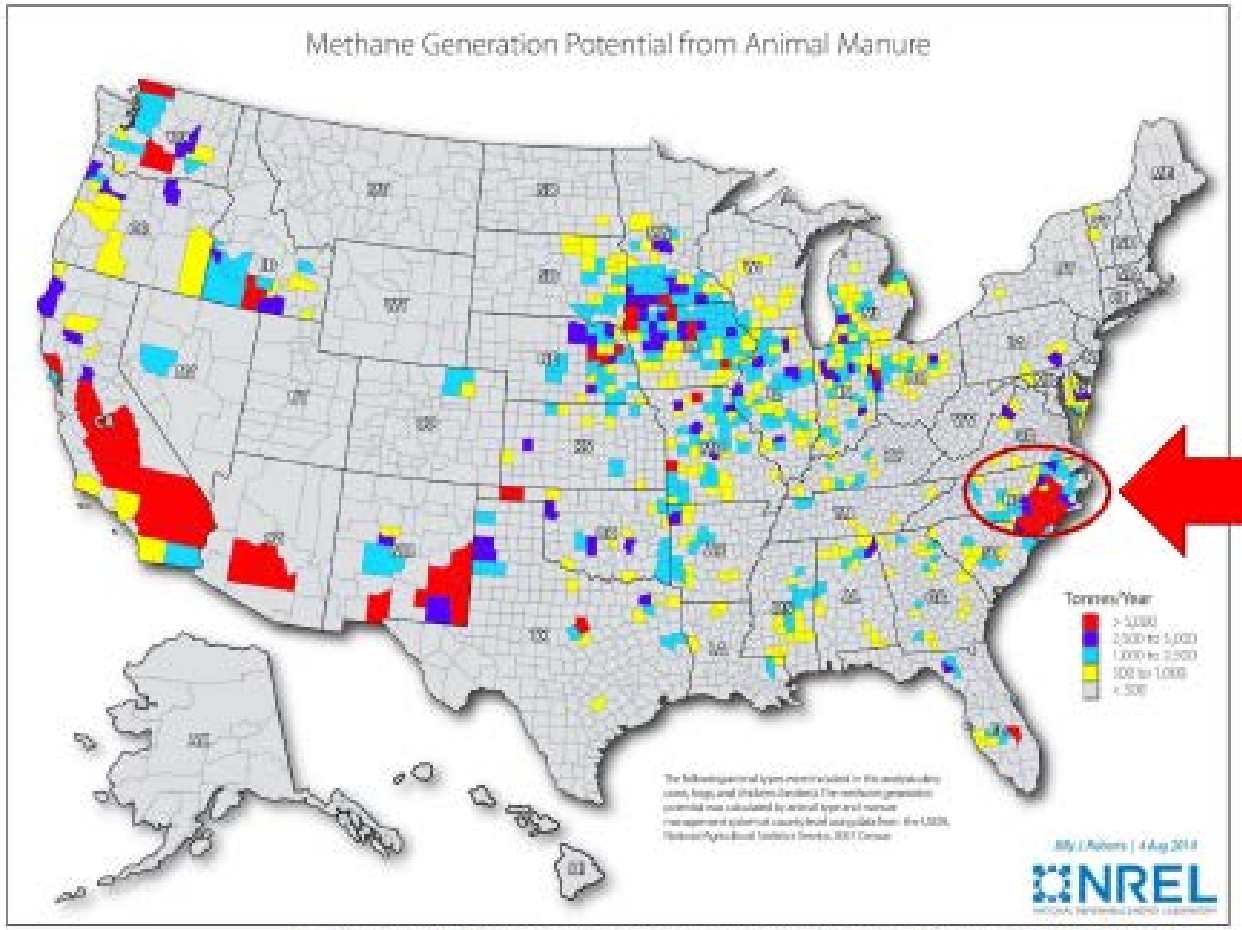
ncbiotech.org

# BioEnergy/Industrial Biotech Market Outlook in North Carolina

- Waste-to-Energy one of the most rapidly expanding energy markets
- Food waste and animal waste plentiful; landfill & MSW capacity limited
- Growing need for greater diversity in sources of energy
- Favorable policy and regulations
- Corporate sustainability goals: GHG's & Zero Waste
- Economic development and environmental benefits




Source: www.nrel.gov/gis/images/biomass_2014/National-Biomass-Biogas-2014-01.jpg



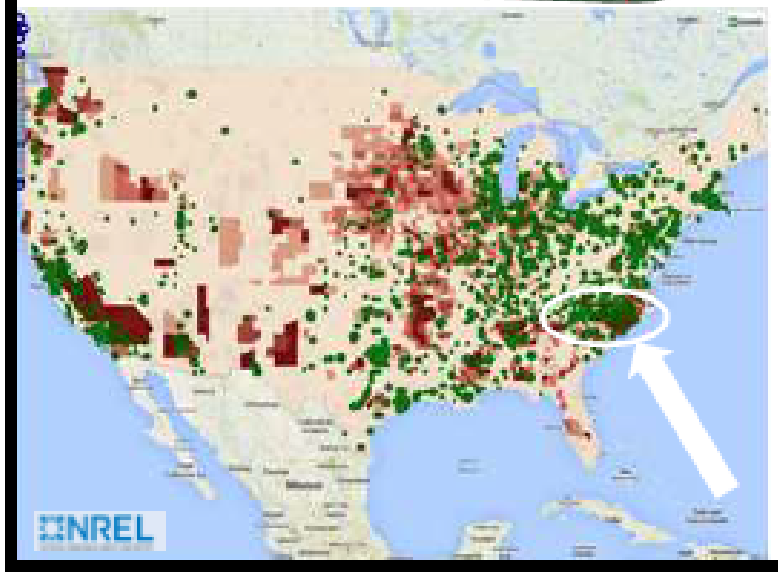

Source: www.nrel.gov/gis/images/biomass_2014/National-Biomass-Manure-2014-01.jpg

# NC Bioenergy Potential Map

North Carolina has the 3rd richest bioenergy resources in the Country!

*According to NREL and the American Biogas Council*

*NC "All Bioenergy" Facilities Map (with NG Pipelines)*




- Minor Muni WWTPs
- Major Muni WWTPs
- MSW Landfills
- Dairy Farms
- Wet Poultry Systems
- Swine Farms

# *Snapshot of the NC Potential*

**Biogas Systems**

| Food Waste | |
|---|---|
| Operational food waste biogas systems[3] | - |
| Potential food waste biogas systems[4] | 22 |

| Agriculture | |
|---|---|
| Operational biogas systems on farms[5] | 10 |
| Potential dairy farm biogas systems[6] | 175 |
| Potential swine farm biogas systems[7] | 529 |

| Waste Water | |
|---|---|
| Operational biogas systems at water resource recovery facilities[8] | 19 |
| Potential biogas systems at WRRFS[9] | 161 |

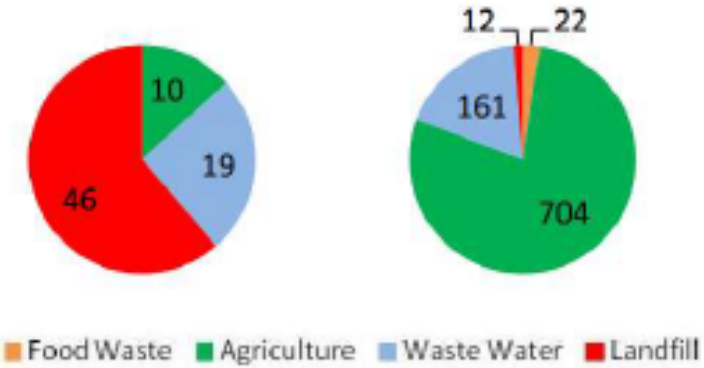
| Landfills | |
|---|---|
| Operational landfill gas systems [10] | 46 |
| Potential landfill gas systems[11] | 12 |

**+ $2.7 billion in capital investment**
**> 22,475 short-term construction jobs**
**~ 1,800 long-term jobs created**

https://www.americanbiogascouncil.org/State%20Profiles/ABCBiogasStateProfile_NC.pdf

**North Carolina currently has 75 operational biogas systems.**

**Operational Systems** **Potential Systems**




"We see the potential for more than 899 new projects to be developed based on the estimated amount of available organic material."

*Source: Biogas State Profile: North Carolina; American Biogas Council, 2015*

# Who Buys Renewable Natural Gas (RNG)?

DUKE ENERGY.

Atlanta Gas Light

SoCalGas

ups

bp

WM

FritoLay

Coca-Cola

**UPS to purchase RNG from Clean Energy**

By *BioMass Magazine* | May 11, 201[illegible]

*"UPS has announced it has entered into an agreement to purchase renewable natural gas (RNG) for its delivery vehicle fleet..."*


ncbiotech.org

# Economic Drivers

- Costs of Waste Disposal
  - Landfill space becoming more costly over time
  - Testing, Compliance, and Permitting Costs
- Costs of Energy
  - Energy fuels subject to externalities (not from NC)
- Consumer Choice & Premiums
  - Consumers value choice for sustainability
- Economic Growth & Sustainability
  - Catalyst for new investment in NC Agriculture
    - Agriculture is largest portion of NC GDP
  - Economic engine for rural & agricultural communities
  - ***Access New & Emerging Markets***
- Building Asset Value
  - Infrastructure expansion serving new customers
  - Optimization of existing, underutilized assets

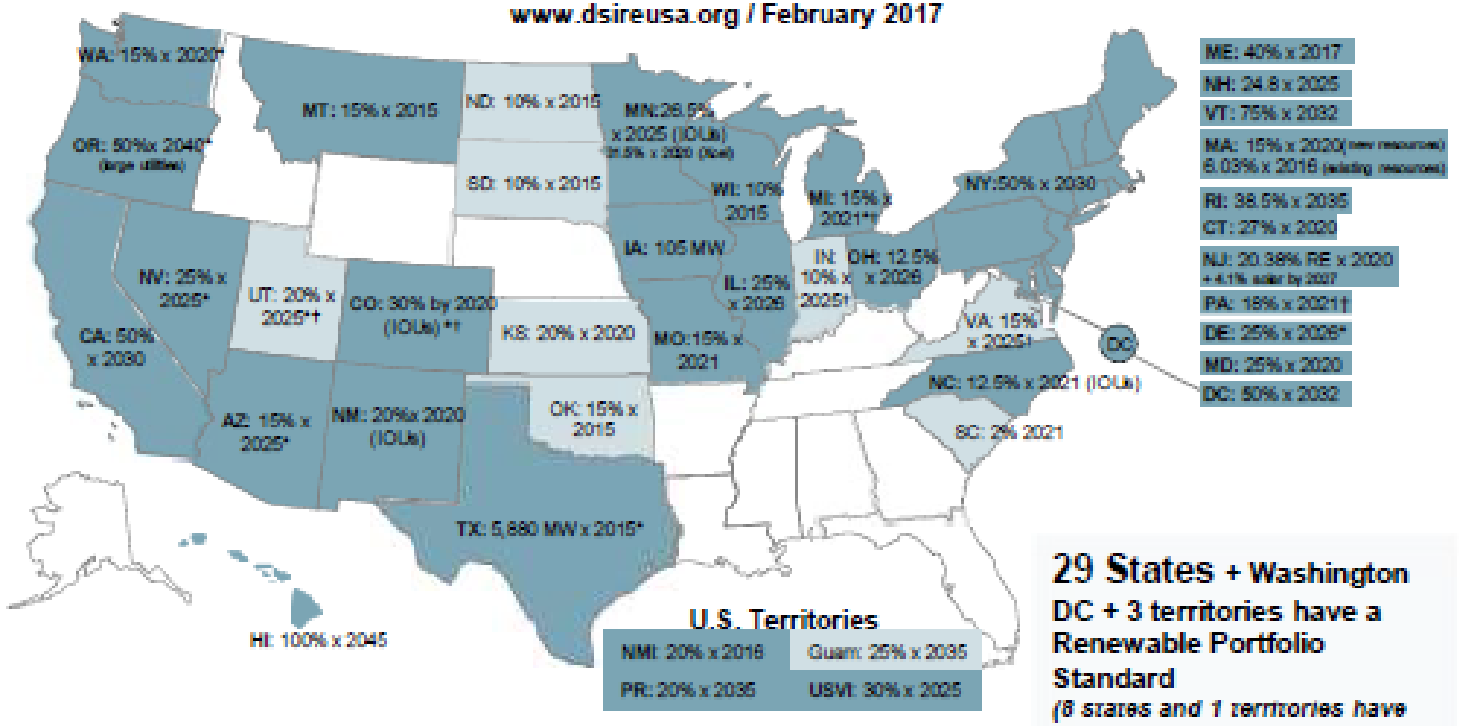
DSIRE®

NC CLEAN ENERGY TECHNOLOGY CENTER

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

# Renewable Portfolio Standard Policies

www.dsireusa.org / February 2017




**U.S. Territories**

| | |
|---|---|
| NMI: 20% x 2016 | Guam: 25% x 2035 |
| PR: 20% x 2035 | USVI: 30% x 2025 |

**29 States + Washington DC + 3 territories have a Renewable Portfolio Standard**
***(8 states and 1 territories have renewable portfolio goals)***

Renewable portfolio standard

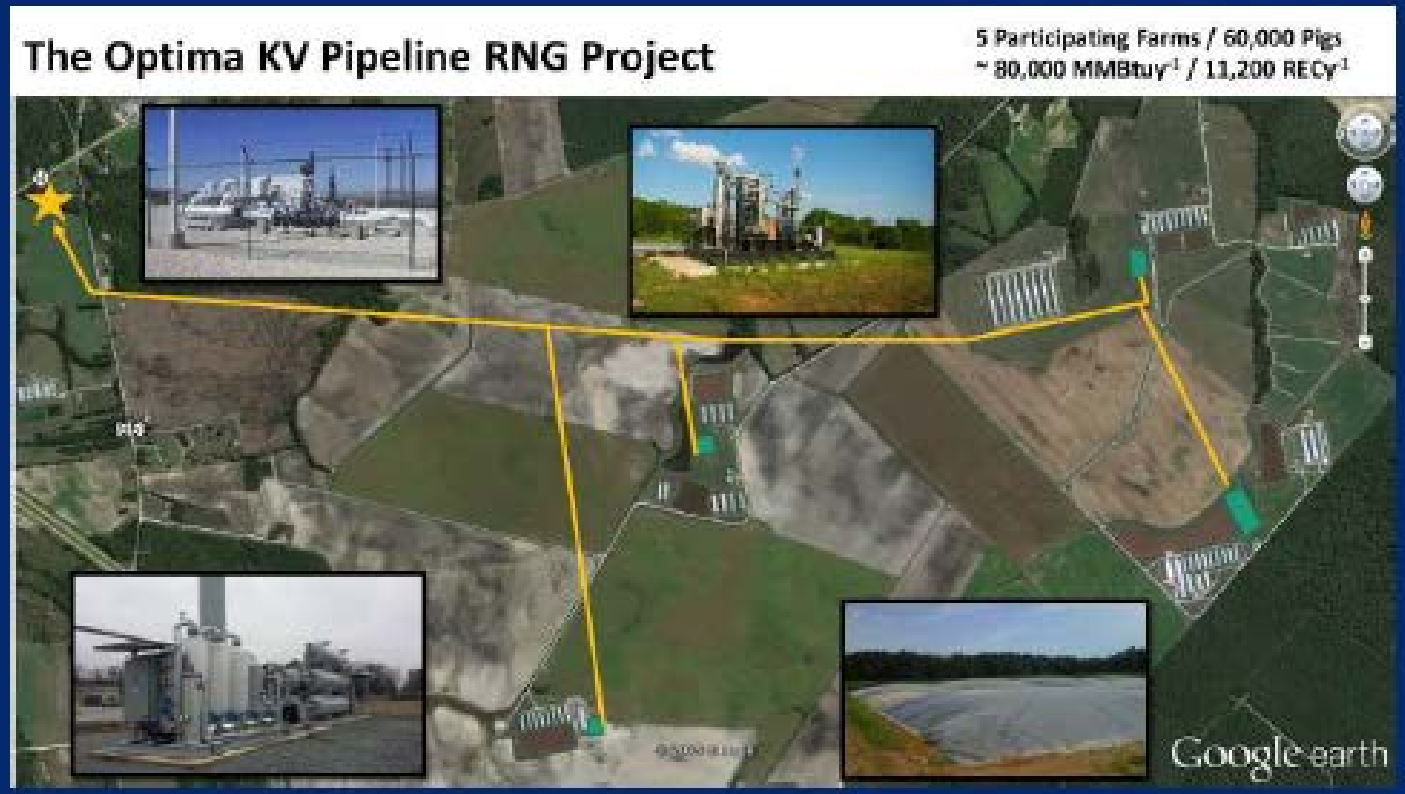
Renewable portfolio goal

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources


Loyd Ray Farms commissioned in 2011, was the first swine waste project in North Carolina to generate and transfer renewable energy credits (REC's) to a public utility.
Swine Waste-to-Energy

# Industrial Biotech/BioEnergy Projects in North Carolina




Food Waste-to-Energy
ncbiotech.org

# Industrial Biotech/BioEnergy Projects in North Carolina

***Blue Sphere***

- 5.2 MW facility in Charlotte
- Food waste
- Development in progress
- Fully operational later this year

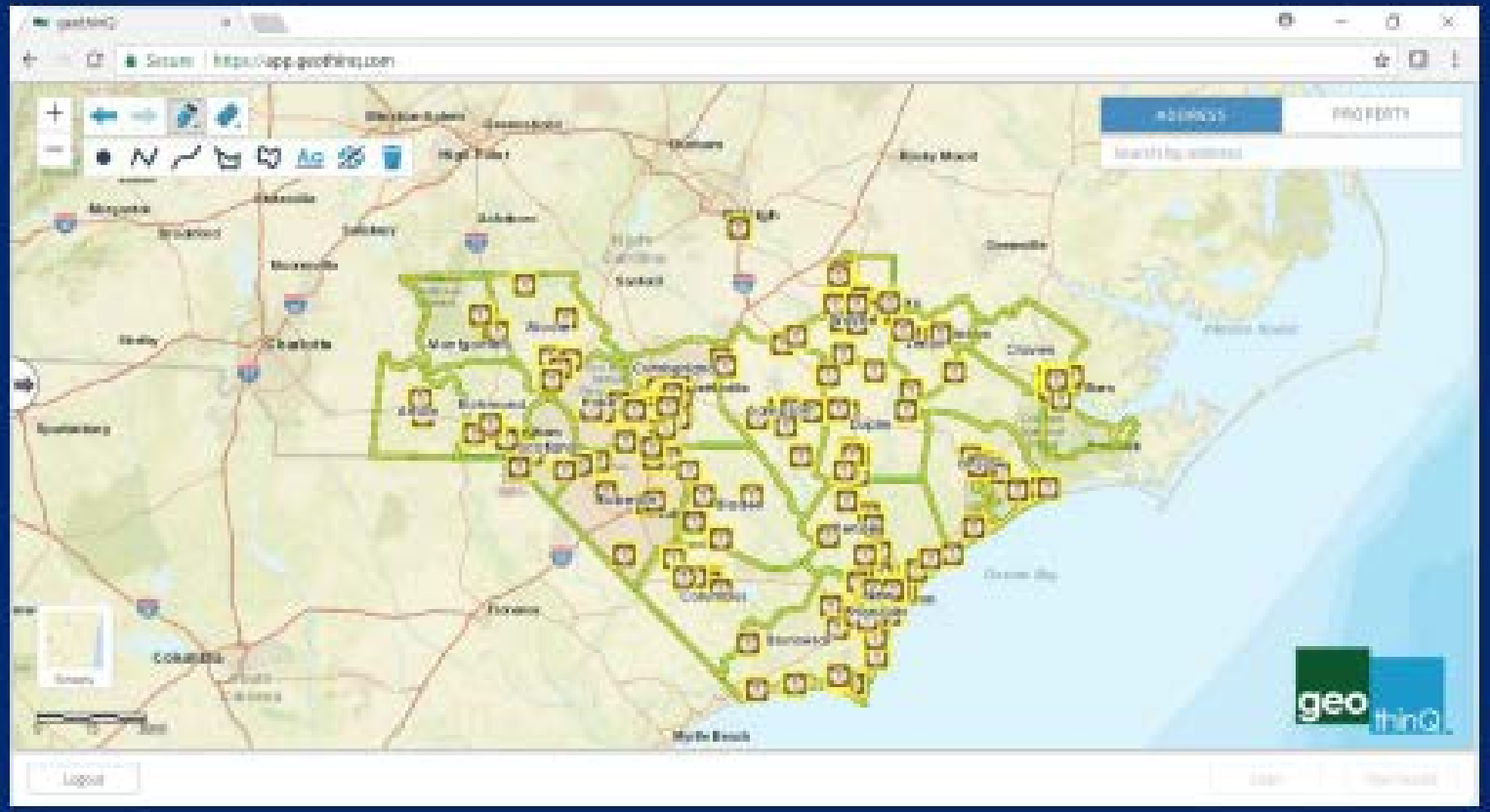
# Industrial Biotech/BioEnergy Projects in North Carolina

*Carbon Cycle Energy*

- Conversion of Animal Waste, Agricultural Residues, and Food Processing Waste to power >10,000 homes.

# Strong Assets for Biotechnology Development in Southeastern NC

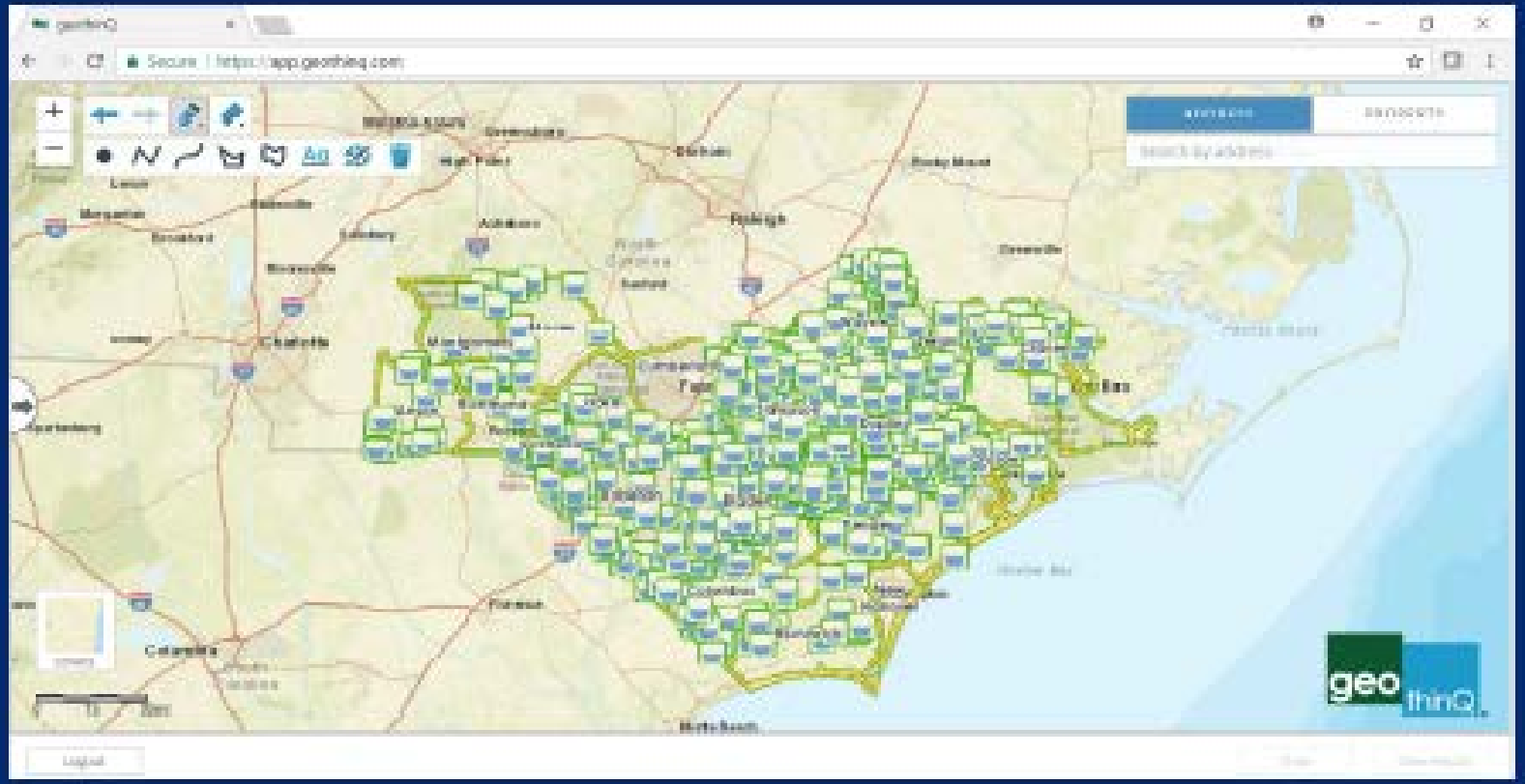
## Industrial Biotech >> BioProducts >> BioEnergy




Food Processing

# Strong Assets for Biotechnology Development in Southeastern NC

## Industrial Biotech >> BioProducts >> BioEnergy




Hog Lagoons

# Strong Assets for Biotechnology Development in Southeastern NC

## Industrial Biotech >> BioProducts >> BioEnergy

16 Asset Categories Included on Map

- Power Production
- Industrial Operations
- Cement/Concrete Production
- Biorenewables/Recyclables
- Beverage Production
- Food Processing Operations
- Swine Lagoons
- Waste Spray Fields
- Large Parcels of Land
- Agricultural Volumes
- Agricultural Producers
- Wood Volumes
- Wood Products Companies
- Landfills
- Waste Water Treatment
- Spoilage

# Strong Assets for Biotechnology Development

## Industrial Biotech >> BioProducts >> BioEnergy

How is the Asset Map Useful for Businesses?

**Asset Map**
- Visual representation of biorenewable resources in the region.

**Asset Cluster**
- Shows geographic clusters of the biorenewable resources.

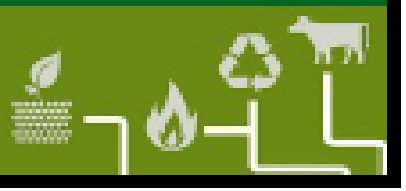
**New Products**
- Economic Developers and companies find greater access to biorenewable inputs for new industrial biotech products.

# Biogas Working Group for North Carolina


1. Increase access of North Carolina's corporate customers to new clean energy options sourced locally;
2. Identify policy initiatives that will remove obstacles and impediments to biogas development in North Carolina;
3. Promote biogas development such that it is available in sufficient quantities to create a thriving biogas market in North Carolina; and,
4. Provide future market visibility to attract sufficient investment and minimize cost uncertainties.

# Why is bioenergy great for North Carolina?

- ✓ **Economics**
  - ✓ Wide-spread resources, opportunity in every County
  - ✓ National Markets for NC-made product
  - ✓ Reduction in costs of waste disposal
- ✓ **Energy Security**
  - ✓ Indigenous resource for baseload energy demand



## Final Thought…

## 3rd richest bioenergy resources in the Country

## *How can we put these assets to work for NC?*


Contact:

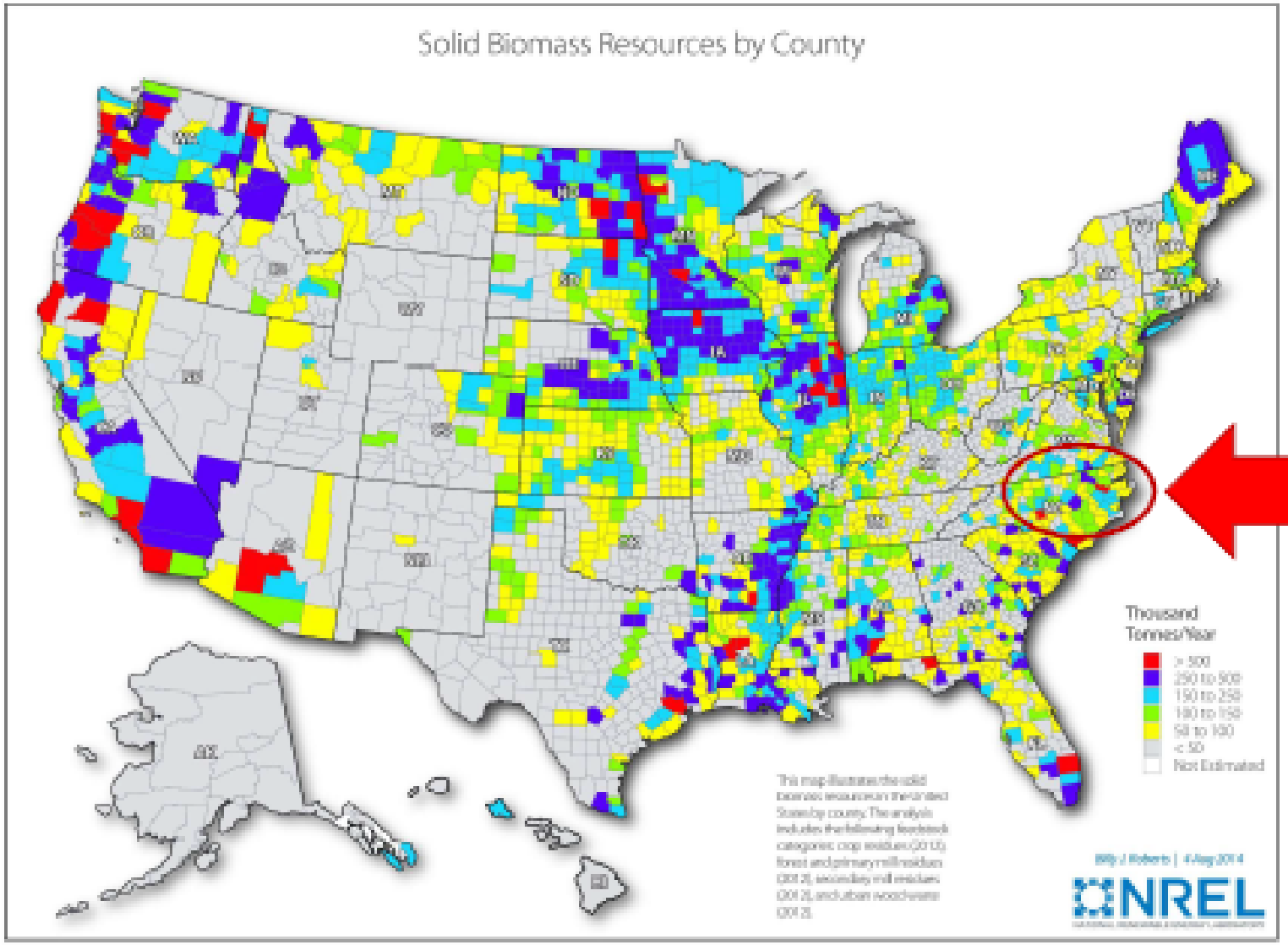
Randall Johnson

NC Biotechnology Center

Southeastern Office,

Wilmington, NC

Randall_Johnson@NCBiotech.org


Solid Biomass Resources by County
Thousand Tonnes/Year
> 500
250 to 500
150 to 250
100 to 150
50 to 100
< 50
Not Estimated
NREL

# INDUSTRY PERSPECTIVE

**Rick Brehm**
**General Manager**
**Tyton NC Biofuels, LLC**

# BIOETHANOL INDUSTRY

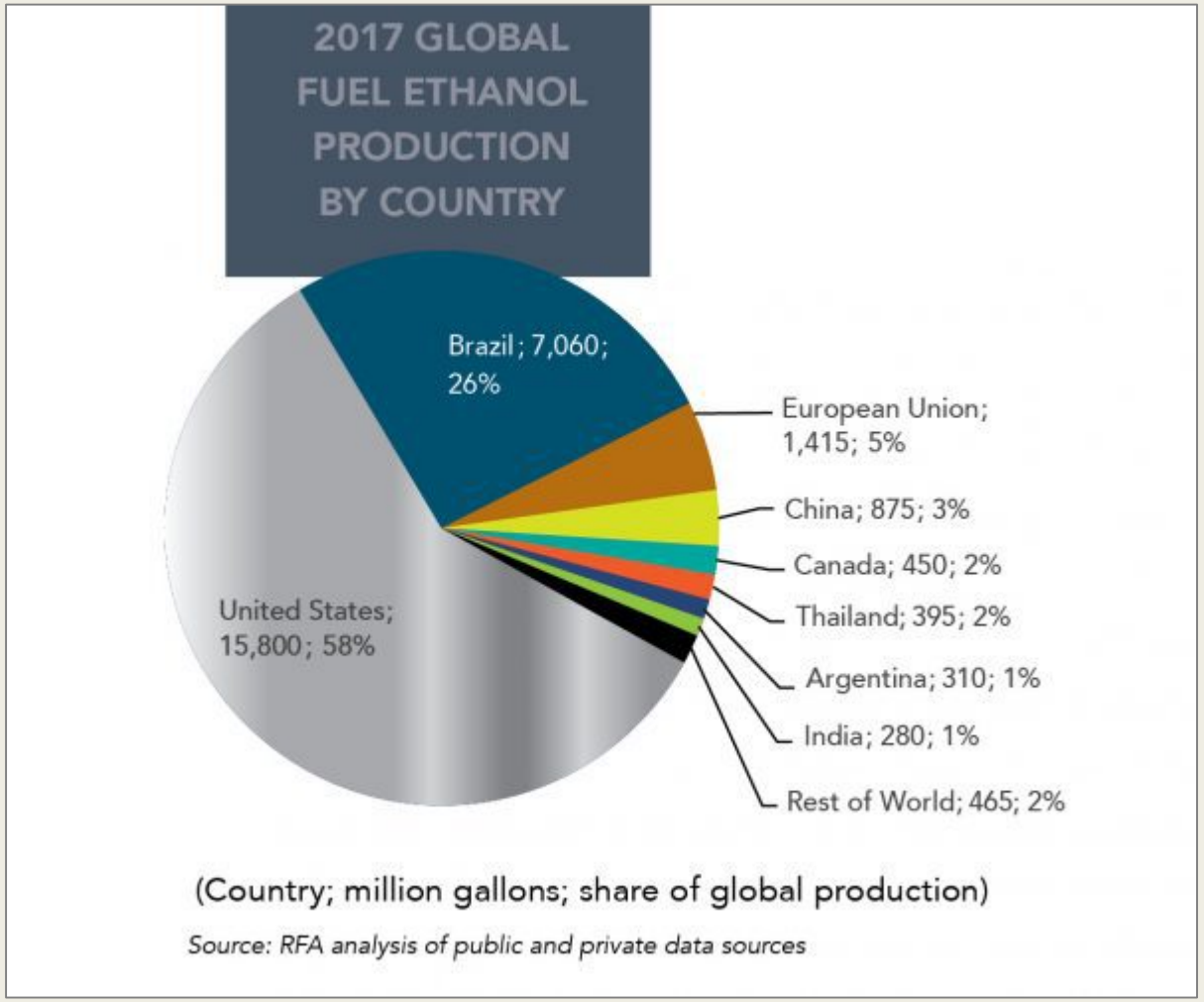
Rick Brehm
General Manager, Tyton NC Biofuels, LLC
rbrehm@tytonbiofuels.com
(910)248-6714

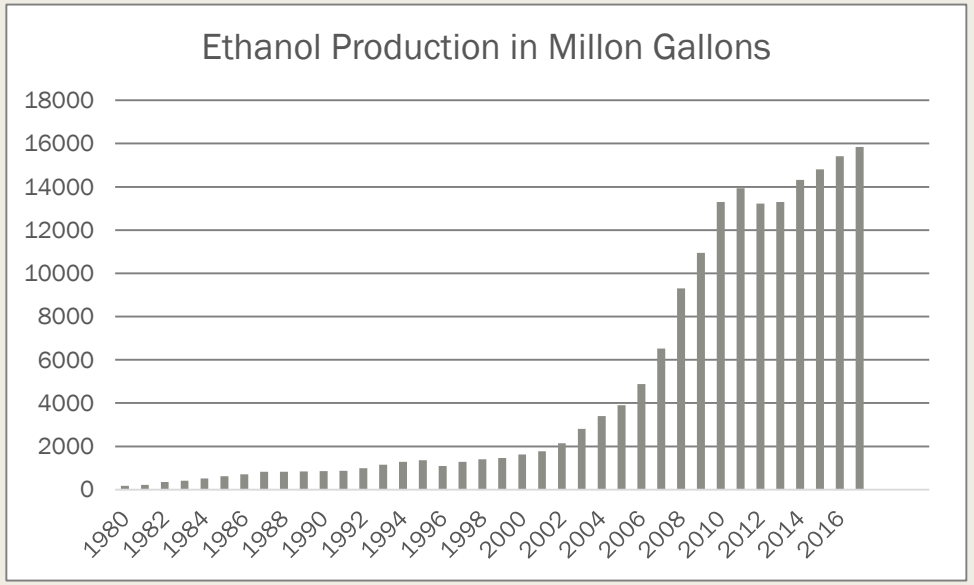
# Overview

- Brief History
- Production volumes
- Industries in North Carolina that depend on renewable fuels
- Importance of Biofuels in North Carolina
- Dry Mill Process Overview
- Ethanol Co-Products
- The Future of Biofuels

# Brief History

- 1860 Nicolas Otto develops a cycle engine that runs on ethanol
- 1910 Ford Model T designed and ran on both gasoline and ethanol
- January 29, 1929 Prohibition Enacted which stopped the legal production of ethanol
- 1929 discovery of oil in Texas decreases the price of gasoline by 60%
- 1940 United States Army builds an ethanol plant in Omaha Nebraska to fuel military vehicles during WWII
- 1981 President Jimmy Carter works with Archer Daniels Midland (ADM) to restart a renewable fuels program in response to 1973 OPEC oil embargo


2017 GLOBAL FUEL ETHANOL PRODUCTION BY COUNTRY
Brazil; 7,060; 26%
European Union; 1,415; 5%
China; 875; 3%
Canada; 450; 2%
Thailand; 395; 2%
Argentina; 310; 1%
India; 280; 1%
Rest of World; 465; 2%
United States; 15,800; 58%
(Country; million gallons; share of global production)
Source: RFA analysis of public and private data sources


Ethanol Production in Millon Gallons
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016

Source: RFA

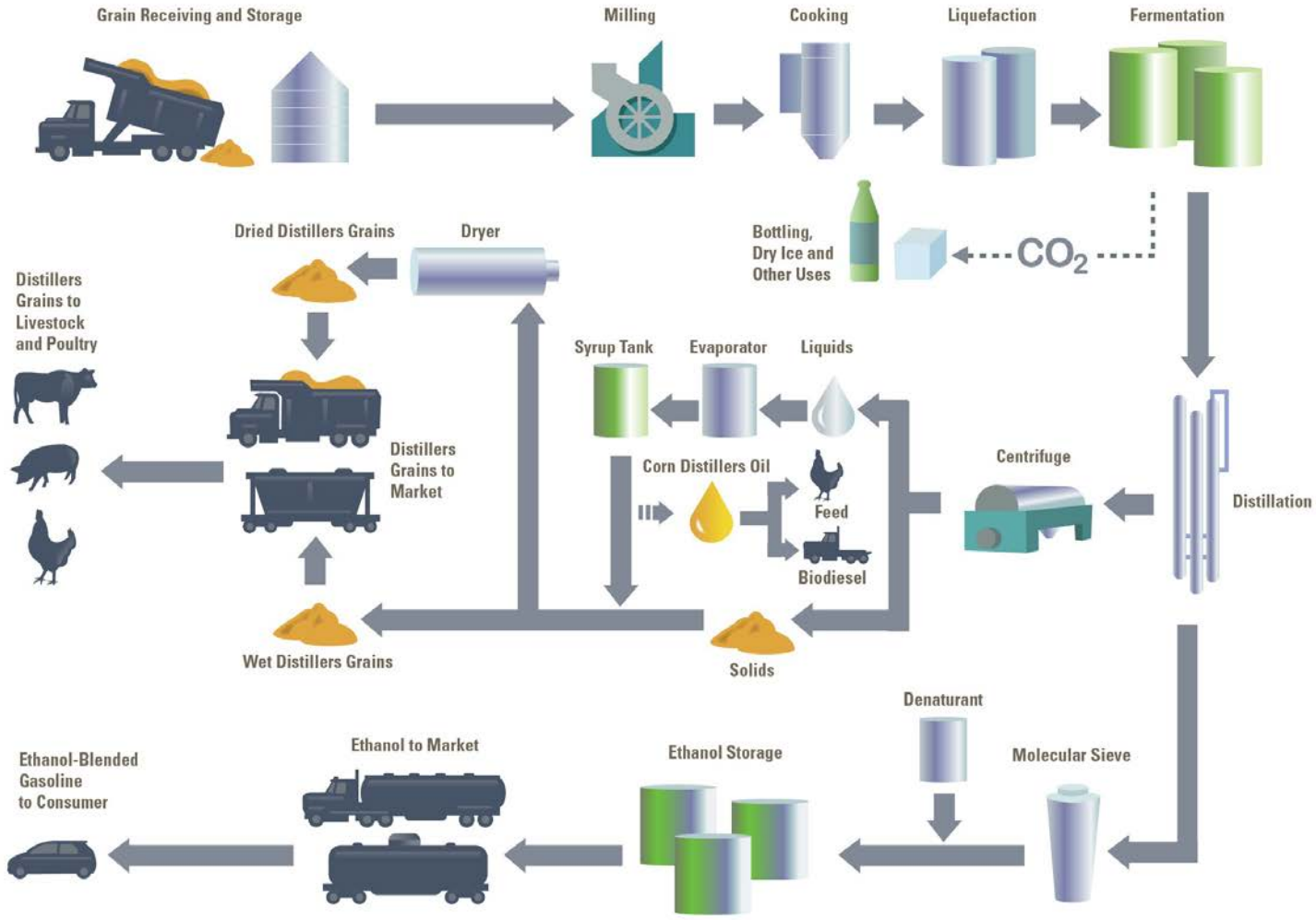
# NC Industries That Benefit From Biofuels

- Novozymes
  - *Enzymes and protease*
- Syngenta
  - *Enogen Corn*
- Trinity Industries
  - *Caustic Soda, Bleach, Sulfuric Acid, Water Treatment Chemicals*
- Nutrien
  - *Ammonia and Urea Nitrogen*
- LaSaffre
  - *Yeast*

# Why Biofuels are Important in North Carolina

- Continued support of NC agriculture both crop and animal
- Increased crop prices help support local biocultural research
- Contribute to lower automobile emissions
- Help lower NC auto fuel costs ( currently reducing fuel cost by $.04 per gallon )
- Help make NC energy independent
- Promote growth of local large scale industrial fermentation

# DRY MILL ETHANOL PROCESS




*Source: RFA*

# Ethanol Co-Products

- Corn Oil
- Distillers Grains
- $CO_2$
- Biodiesel
- Industrial Applications

# The Future of Biofuels

- Increase Octanes in Motor Fuels
  - *E15*
  - *E85*
  - *Bio Butanol*
- A building block for green carbon based compounds (1,3 Propanediol, DuPont – Sorona, Mohawk)
- Cellulosic Ethanol
- Renewable Diesel

# QUESTIONS?

Rick Brehm
General Manager, Tyton NC Biofuels, LLC
rbrehm@tytonbiofuels.com
(910)248-6714

# GENERATING BIOENERGY FROM SWINE WASTE

**Kraig Westerbeek**
**Sr. Director**
**Smithfield Renewables**

# Smithfield® RENEWABLES

# UNIFYING & ACCELERATING

## Smithfield Foods' Carbon Reduction & Renewable Energy Initiatives

SUSTAINABILITY AT

Smithfield

Good food. Responsibly.®

# OUR SUSTAINABILITY PROGRAMS

**Differentiate Our Product and Brand From Competitors**

**Make Us More Efficient and Competitive**

SUSTAINABILITY AT

Smithfield

Good food. Responsibly.®

# OUR NEWEST SUSTAINABILITY INITIATIVES:

CARBON REDUCTION GOAL:

## 25 by '25

GRAIN SUPPLY CHAIN

## FERTILIZER OPTIMIZATION

# CARBON REDUCTION GOAL: *25 BY '25*

REDUCE GHG EMISSIONS FROM U.S. OPERATIONS

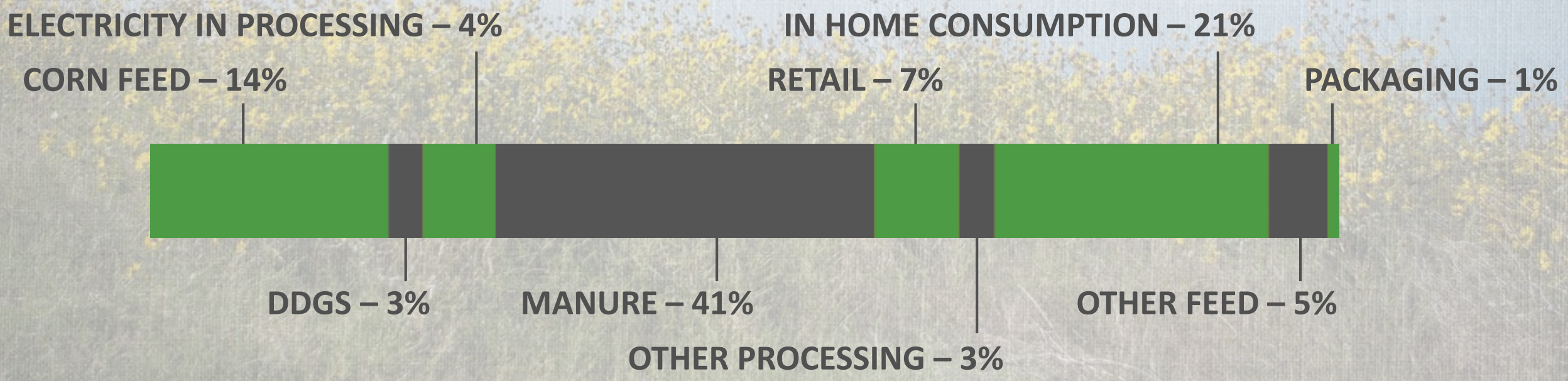
## 25% by 2025

(2010 baseline)

FOCUS

MANURE MANAGEMENT → GRAIN SUPPLY CHAIN → PROCESSING → PRODUCTION EFFICIENCY

# PERCENT CONTRIBUTION TO OVERALL CARBON FOOTPRINT



# MANURE MANAGEMENT

## 41% – MANURE

# MANURE MANAGEMENT

## 41% OF SMITHFIELD'S CARBON FOOTPRINT

**VAST MAJORITY IS METHANE EMISSIONS FROM MANURE TREATMENT**

CAPTURING AND CONVERTING METHANE TO RENEWABLE ENERGY →

THE MOST COST-EFFECTIVE WAY TO ADDRESS THESE EMISSIONS

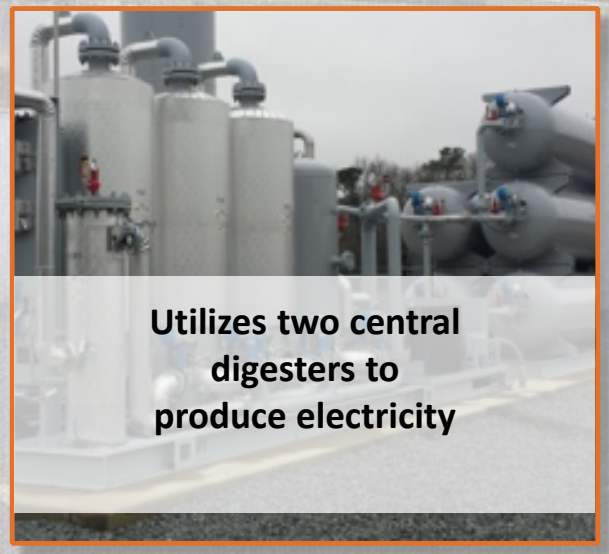
# MANURE MANAGEMENT

## AMERICA'S TWO LARGEST MANURE-TO-ENERGY PROJECTS ARE LOCATED ON OUR FARMS!

**ROESLEIN ALTERNATIVE ENERGY PROJECT IN MISSOURI**

Lagoon covers capture methane prior to cleaning and injection into an existing natural-gas pipeline

**BLUE MOUNTAIN BIOGAS PROJECT IN UTAH**



Utilizes two central digesters to produce electricity

# MANURE MANAGEMENT

## TODAY

Identify and develop projects in North Carolina and elsewhere to generate renewable natural gas from our farms

## TOMORROW

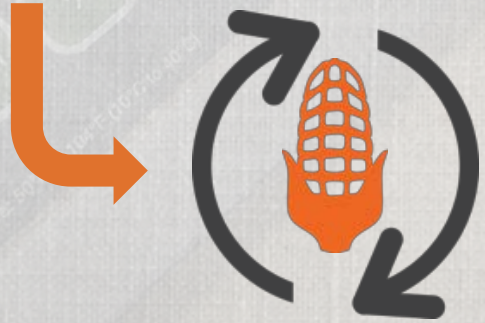
Incorporate biogas capture and reuse in the design of future opportunities

# PRODUCTION EFFICIENCY –BIOGAS IMPACT

FEED CONVERSION: Measures the pounds of feed it takes a finishing animal to produce a pound of gain

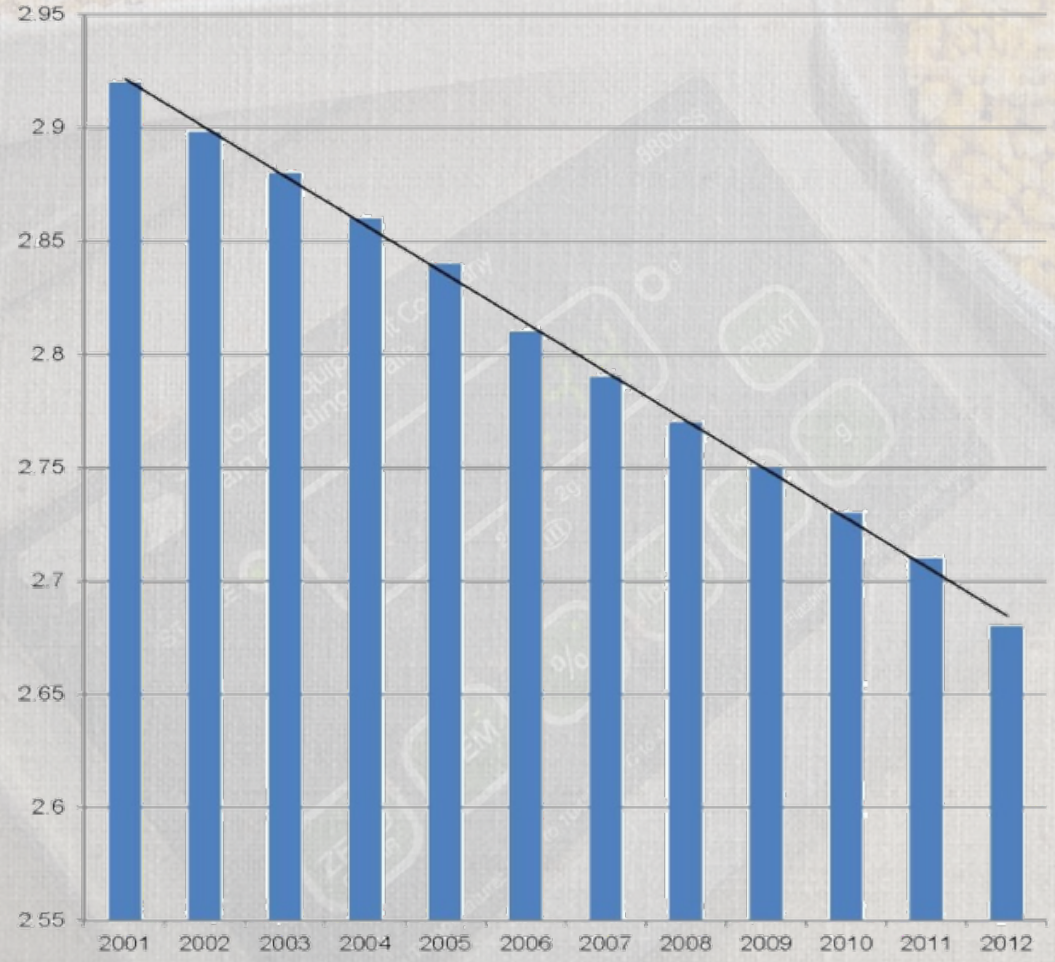
2001 to 2012: Feed conversion improved by ~9%

Provides linear reduction in our manure and feed grain contributions



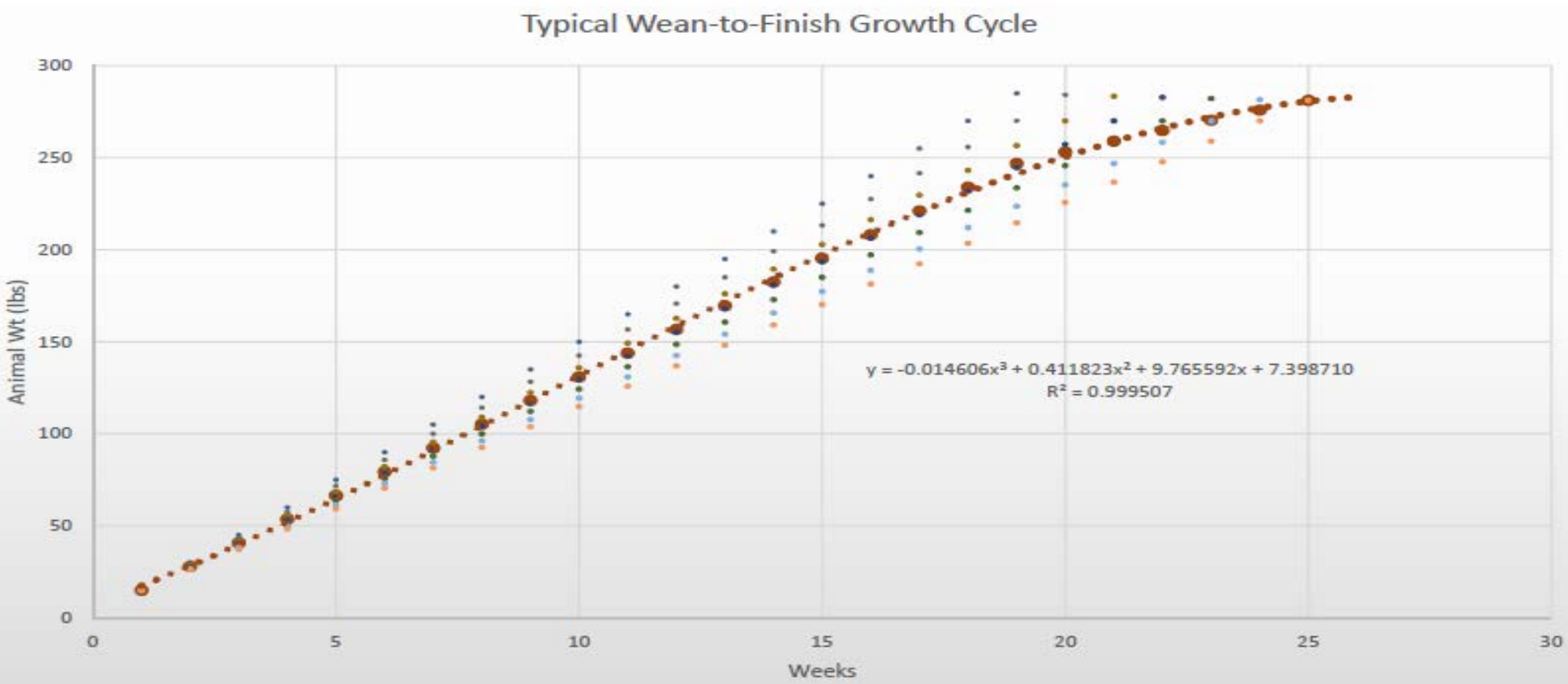
Feed-conversion improvements continue at similar or improved rates today

# PRODUCTION EFFICIENCY –BIOGAS IMPACT



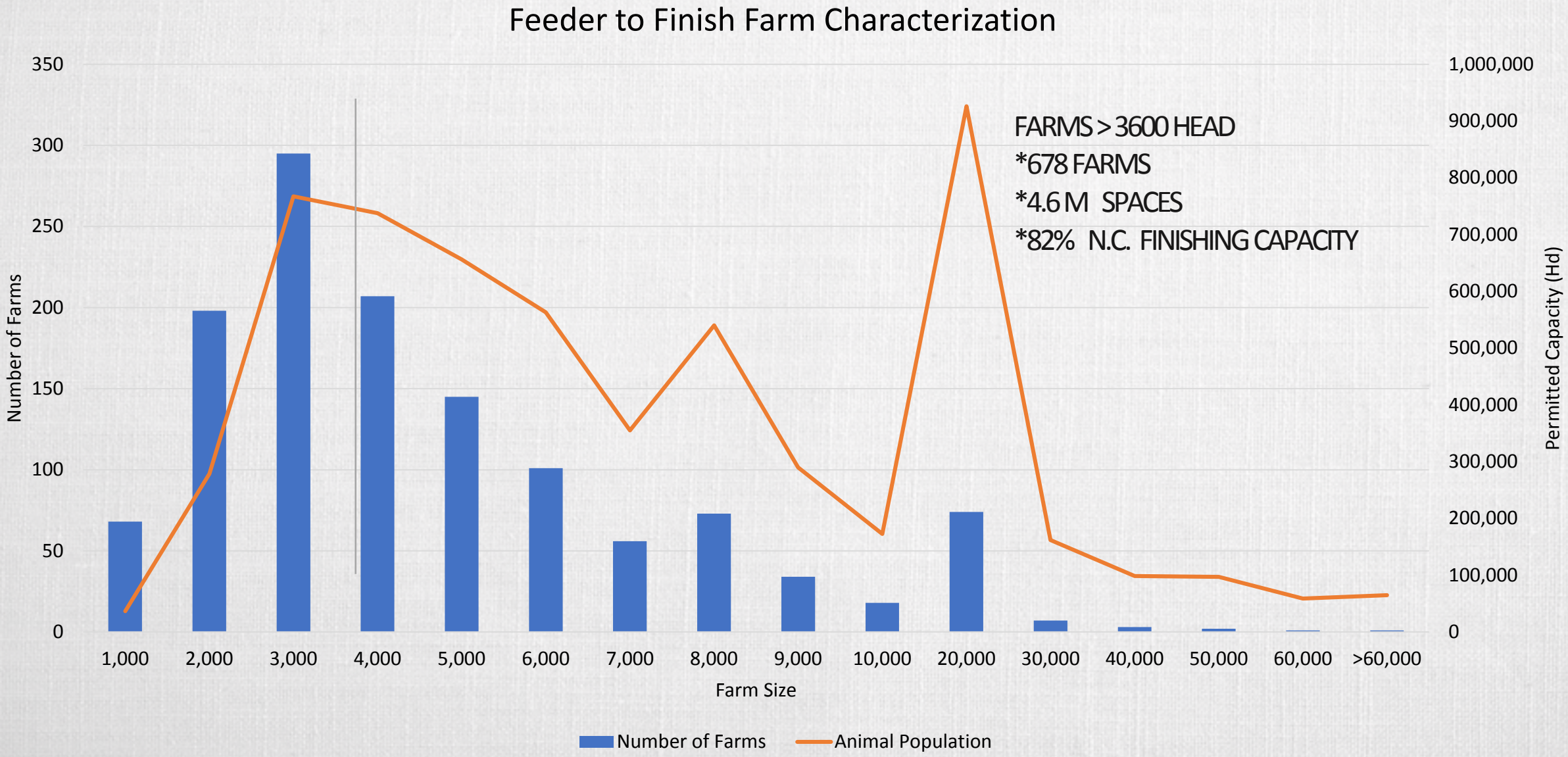

**FEED CONVERSION**
(Pounds of Feed per Pound of Animal Weight Gain)

# BIOGAS PRODUCTION BASELINE

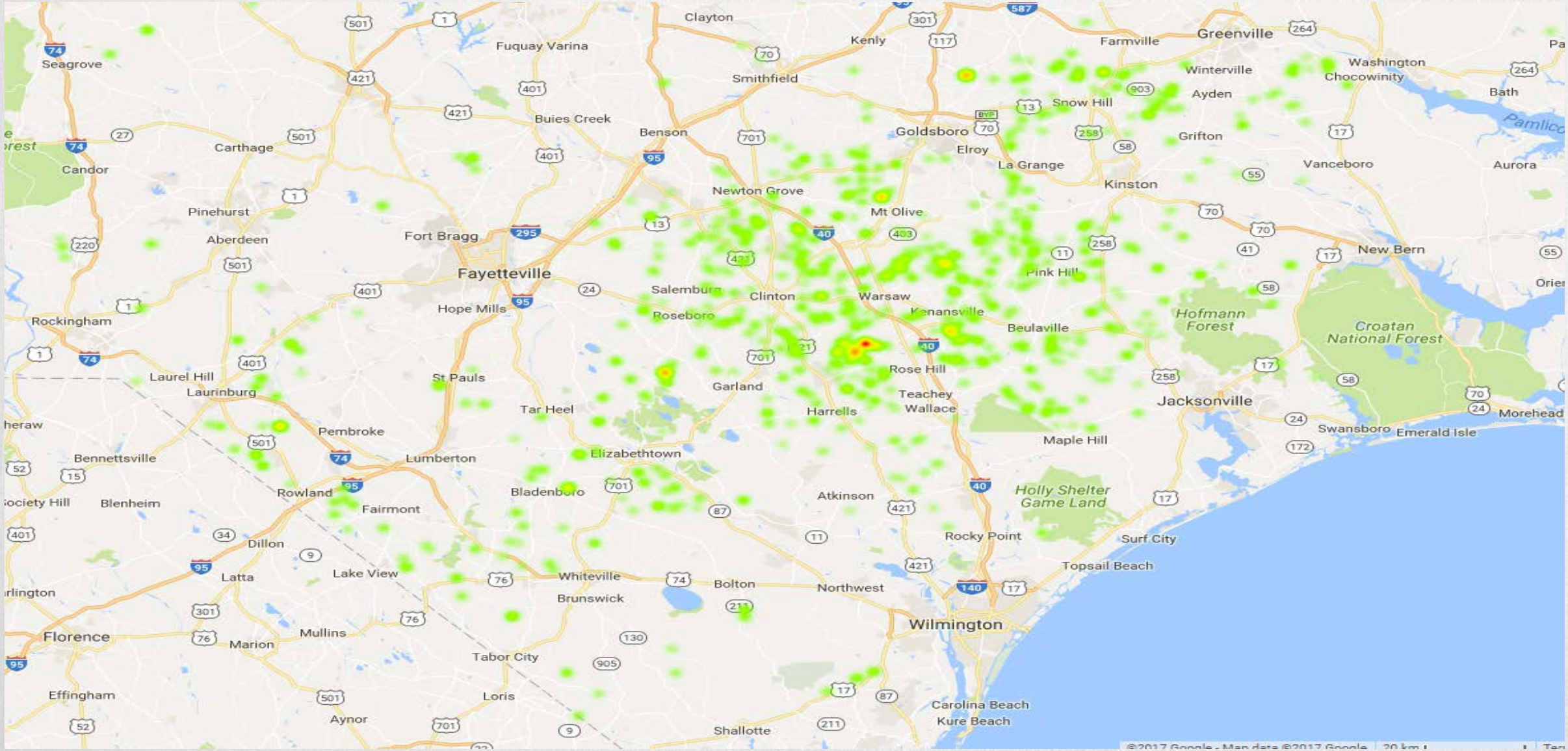


# BIOGAS PRODUCTION BASELINE

# N.C. BIOGAS OPPORTUNITIES



# N.C. BIOGAS OPPORTUNITIES



# N.C. BIOGAS OPPORTUNITY

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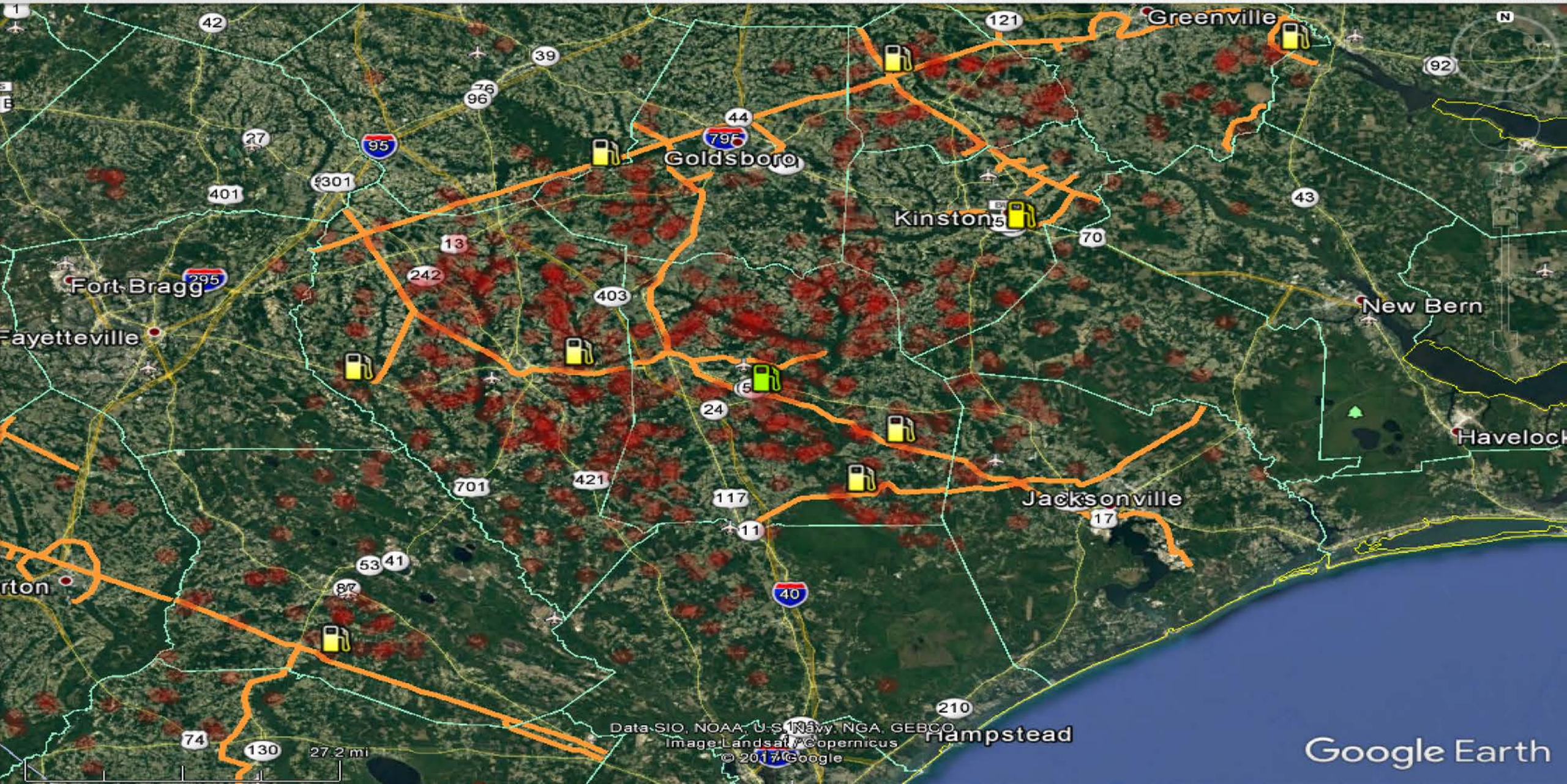


# N.C. BIOGAS OPPORTUNITY

*Smithfield has been consistently supportive of renewables in N.C., and of projects that produce renewable energy from swine manure

*We believe that farmer owned digesters/covers and gas aggregation may be the best option for N.C. farmers

*GOAL: 82% of finishing capacity in N.C. participating in renewable natural gas production – approximately 5 million mmbtu opportunity

*First two projects planned for N.C. total approximately 600,000 mmbtu

*We are very pleased with gas offtake pricing and the economies of scale that impact renewable natural gas production costs

*We will continue to look for opportunities to partner with technology providers and farmers to fully develop the biogas opportunities in N.C.

Smithfield

2016 Sustainability Report

Table of Contents

## Environment

- Value Creation
- Agricultural Supply Chain +
- Hog Production +
- Processing +
- Transportation and Consumer Use
- Performance Summary
- Recognition & Awards
- Environmental Policy
- Water Policy

## Environmental Stewardship

For more than a decade, Smithfield has worked to significantly reduce our water and energy use and the amount of waste we send to landfill. We're continuing to pursue challenging targets that call for even greater improvements, all while our business expands in response to increasing global demand for pork.

In 2016, we took our environmental stewardship efforts to the next level in what was widely heralded as an ambitious first for our industry: a far-reaching greenhouse gas (GHG) reduction goal across our entire supply chain, from feed grain to packaged bacon. We have pledged to reduce our absolute GHG emissions by 25 percent by 2025, which will cut emissions by more than 4 million metric tons for the equivalent of removing 900,000 cars from the road.

To learn more, visit
smithfieldfoods.com/environment

Smithfield RENEWABLES

# QUESTIONS?

# ENVIRONMENTAL AND COMMUNITY IMPACTS


**Dr. Joe Rudek**
**Lead Senior Scientist**
**Environmental Defense Fund**

**Jamie Cole**
**Environmental Justice, Air, & Materials Policy Manager**
**North Carolina Conservation Network**

# Environmental Considerations of Biogas Collection from Swine Farms

May 16, 2018

Joe Rudek
Environmental Defense Fund

EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

# Biogas Collection Systems -

Collect methane emissions otherwise lost from open anaerobic lagoons – Big Environmental Benefit

Methane:

-potent GHG

-$GWP_{20year}$= 84 X $CO_2$

- short term climate change forcer.

Responsible for ~25% of current warming

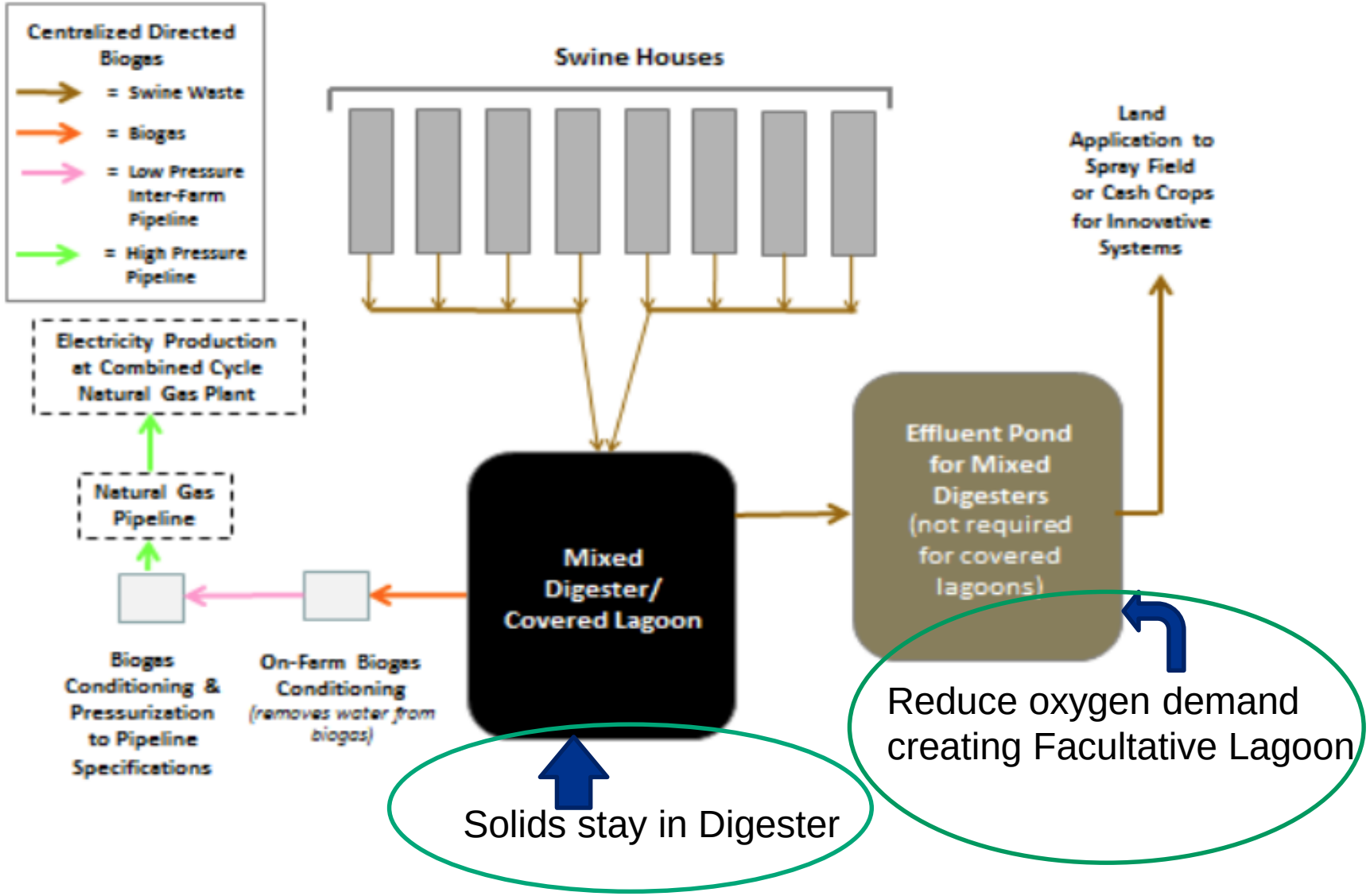
But Anaerobic Digesters not designed to solve all swine farm environmental and public health risk issues.

## Innovative Technology Standards

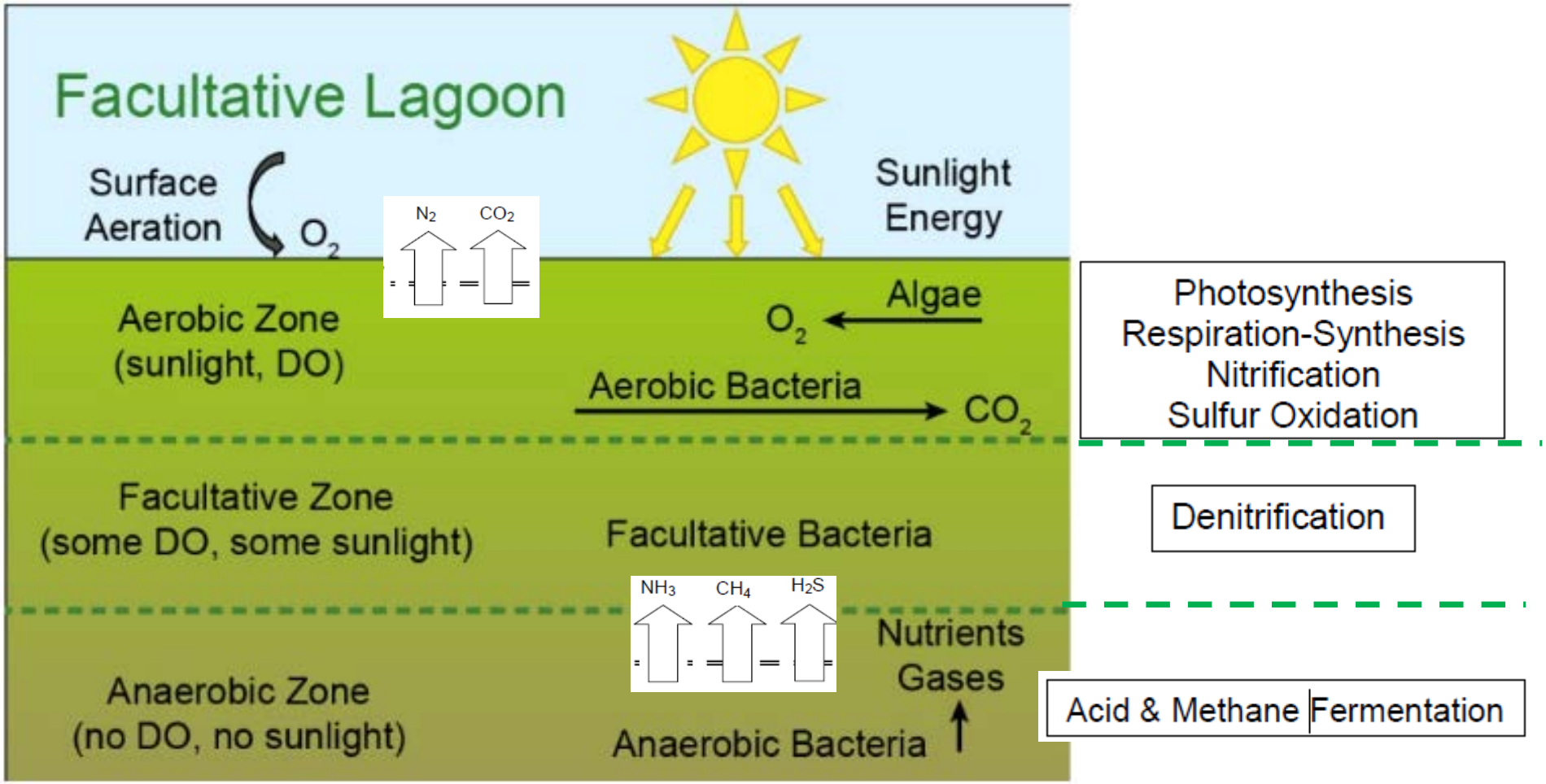
- Reduce pathogens by 99.99%
- Reduce $NH_3$ emissions by 80%
- Reduce odor to “weak” at farm boundary
- No discharge
- Reduce soil buildup of P and metals

Opportunity for further treatment

# Flow Diagram of Centralized Biogas Processing and Pipeline Injection




A Spatial-Economic Optimization Study of Swine-Waste ... Nicholas Inst., Duke 2013
https://nicholasinstitute.duke.edu/climate/spatial-economic-optimization-study-swine-waste-derived-biogas-infrastructure-design




Water Environment Research Foundation
https://www.researchgate.net/publication/264335071_Characterization_of_DoD_Installation_Wastewater_Treatment/figures?lo=1

Michigan Training Manual of operators of Wastewater Stabilization Lagoons 2010
https://www.michigan.gov/documents/deq/wrd-ot-lagoon-manual_426356_7.pdf


Opportunity to:
• Reduce odors from Hog Barns?
• Reduce ammonia emissions?

# Best Practices for Anaerobic Digester Operation?

- optimize the revenue extraction from manure management
- minimized environmental and public health risks

- Barn flushing as frequent as practicable to increase methane production. Could reduce barn odor. (Revenue)
- Barn flushing with aerobic water from facultative lagoon. Could reduce barn odor and improve swine vitality. (Minimal or no cost, potential revenue)
- Minimize ammonia-nitrogen loss to the atmosphere, increasing availability for crop fertilization, offsetting the cost of inorganic fertilizer (Revenue)

Thank you

jrudek@edf.org

# BIOGAS FROM HOG WASTE: COMMUNITY CONSIDERATIONS

Jamie Cole
Policy Manager
NC Conservation Network

# Constraints

The Energy Policy Council's responsibilities include:

- Conducting an ongoing assessment of the opportunities and **constraints** presented by various uses of all forms of energy to facilitate the expansion of domestic energy supplies and to encourage the efficient use of energy.

**Constraints:**

We contend that a major constraint presented by the production of biogas is what the industry and developers see as an asset: the abundance of animal fecal waste in communities in eastern NC.

The North Carolinians living near these operations will still live with the burdens of the lagoon and sprayfield systems in their communities while biogas projects proceed, and are concerned that those projects actually further incentivize the unsustainable, antiquated, and harmful "lagoon" and sprayfield system.

While we focus this conversation on a small source of energy production for the state of NC, we cannot ignore the legitimate concerns coming from community members.

Please do not let biogas technology distract from seeking real long term solutions and the unfulfilled mandate for Environmentally Superior Technologies.

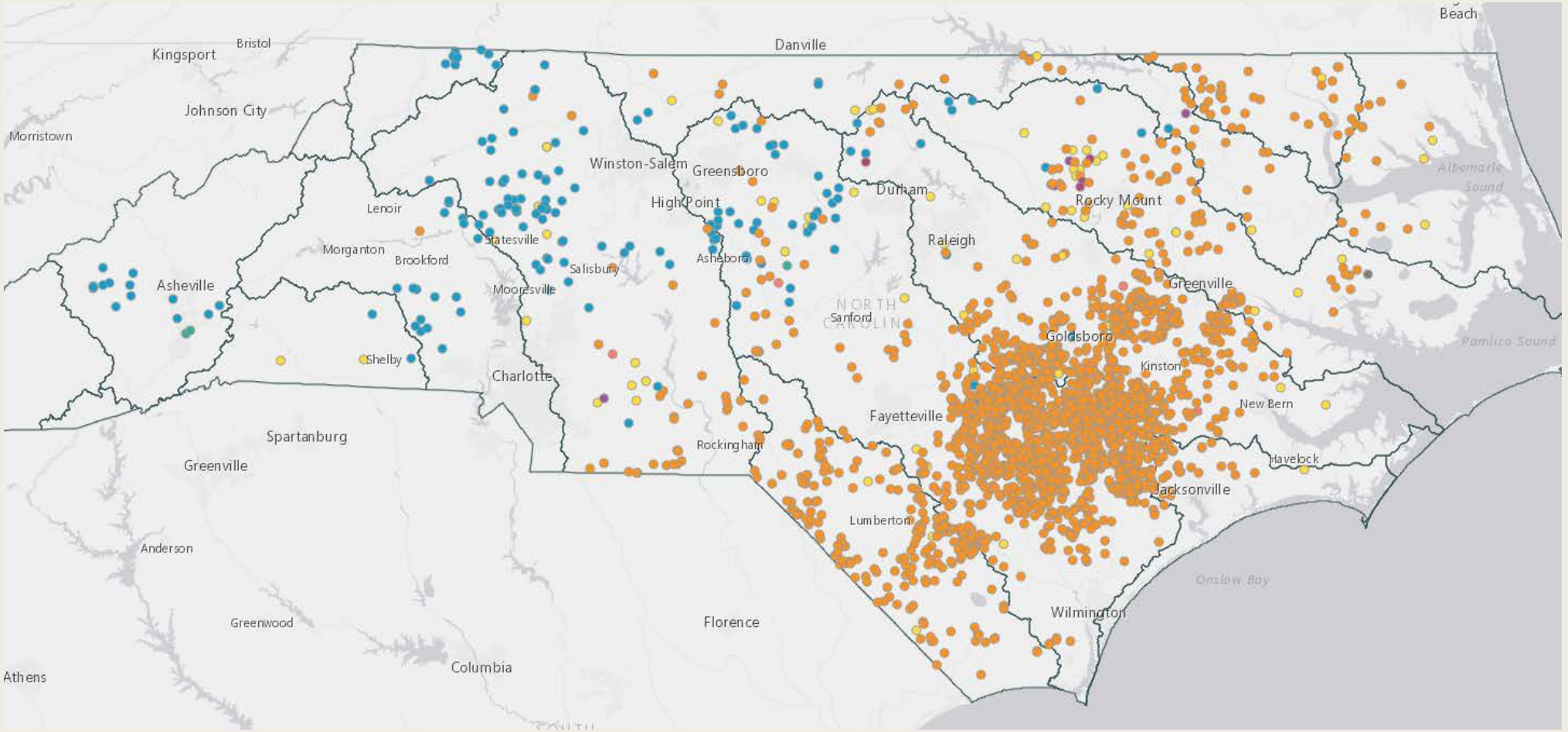
# CAFOs in North Carolina

- Hog/swine CAFOs produce almost 10 billion gallons of fecal waste yearly.
- Duplin and Sampson Counties produced around 40 percent of the state's total animal manure.

- Environmental Working Group and Waterkeeper Alliance, 2016 "Exposing Fields of Filth".


Environmental Working Group and Waterkeeper Alliance Report: https://www.ewg.org/release/fields-filth-landmark-report-maps-feces-laden-hog-and-chicken-operations-north-carolina#.WvOjE4gvyUk

# CAFOs in NC – Permitted (NC DEQ)




Orange = hog operations

# Duplin & Sampson County

**Duplin**

- Humans – 59,039
- Hogs – 2,334,134
- Wet waste output – 2,063,146,270 gallons per year

**Sampson**

- Humans – 63,430
- Hogs – 2,137,525
- Wet waste output – 1,938,728491 gallons per year


U.S. Census 2017 data

Environmental Working Group and Waterkeeper Alliance, 2016 "Exposing Fields of Filth".

# Biogas: Community Considerations

- Air Quality
- Water Quality
- Sprayfields/Land application
- Lagoons/Storage
- Transporting gas
- Regulatory
- Community Voices
- Community Engagement

# Environmentally Superior Technologies (EST)

For farms that use anaerobic waste lagoons as primary waste treatment - new or expanding swine farms must meet five performance standards.

(1) Eliminate the discharge of animal waste to surface water and groundwater through direct discharge, seepage, or runoff.

(2) Substantially eliminate atmospheric emission of ammonia.

(3) Substantially eliminate the emission of odor that is detectable beyond the boundaries of the parcel or tract of land on which the swine farm is located.

(4) Substantially eliminate the release of disease-transmitting vectors and airborne pathogens.

(5) Substantially eliminate nutrient and heavy metal contamination of soil and groundwater. (2007-523, s. 1(a).)

NC Gen Stat § 143-215.10I(b) (2014)

# Directed biogas projects are not ESTs

Although covering the lagoons for methane capture does assist with odor control and reduces the release of methane into the environment (thereby decreasing greenhouse gases), research indicates that atmospheric emissions of ammonia ($NH_3$) actually increase through this process, as do residual nitrate levels. In addition, the facilities holding the hogs continue to emit an extremely noxious odor from the hog barns and composting facilities.

(Lowery, et al. “The Effect of Biofuel Production on Swine Farm Methane and Ammonia Emissions”. Published in the Journal of Environmental Quality in 2010)

Questions and considerations:

- What is needed for these projects to be an EST? How much does it cost?
- Compare the cost of EST to what is taking place on these operations.
- A study should be conducted to analyze the cost of ESTs vs. the cost of directed biogas projects.
- Encourage Smithfield to invest in additional technologies that better support the improvement of the environmental of surrounding communities.

# Other questions and considerations:

- *How will the residual bio solids be removed from the digester?*
- *Need to measure the reduction of solids in the lagoon.*
- *What is the nitrogen content remaining in the lagoons?*
- *What is the nitrogen and phosphorus content being land applied?*

# Transporting Gas

- Pipeline concerns
  - *Where will the pipelines be placed?*
  - *Will pipelines run through private property?*
- Trucking concerns
  - *Green House Gas emissions considerations.*

# Regulatory Considerations

- DEQ should require additional monitoring and information production for biogas technology.
- Rules and permit requirements should be developed to address the potential of growth in biogas production.
- Further consideration needed for:
  - *Permitting for innovative technology*
  - *Requirements for modifications of general permits*
  - *Field Testing*
  - *Edge of property line monitoring*
  - *Increased evaluation of land applied effluent and nutrients*
  - *New residual rules for bio solids and pathogen reductions*
  - *Ground water testing around facilities*
  - *Residuals management*

# Regulatory Considerations, Cont.

- Meaningful involvement of community members
  - *DEQ, using its discretionary power when issuing permits, should put special effort toward seeking the meaningful involvement of communities around these projects.*
  - *Require public comment and hearings for permits that seek modifications for directed biogas and other projects that do not meet EST.*

# Finally…

Any final report from the Energy Policy Council should consider potential community impacts of energy production.

# THANK YOU

Jamie@ncconservationnetwork.org

**919-857-4699 x 113**

DEQENERGY

# North Carolina Energy Policy Council

## AGENDA

1:00 p.m. Wednesday May 16, 2018
Ground Floor Hearing Room
Archdale Building
Raleigh, North Carolina 27603

1. **Call to order, opening remarks, and approval of the minutes from the February 21, 2018, Council meeting (5 mins)**
   Lieutenant Governor Dan Forest, Chair

2. **Discussion of Bioenergy: Resources, Perspectives, Opportunities, and Impacts (1 hour, 35 mins)**
   a. Bioenergy Overview: Directed biogas, economics, policies, and regulations (20 mins)
      Tanja Vujic, Director of Biogas Strategy
      Duke University

   b. Bioenergy Sources and Products: Forestry, Agriculture, Food, and Beverage (15 mins)
      Randall Johnson, Executive Director
      Southeastern Office, North Carolina Biotechnology Center

   c. Industry Perspective (15 mins)
      Rick Brehm, General Manager
      Tyton NC Biofuels, LLC

   d. Generating Bioenergy from Swine Waste (20 mins)
      Kraig Westerbeek, Senior Director
      Smithfield Renewables

   e. Environmental and Community Impacts (25 mins)
      Dr. Joe Rudek, Lead Senior Scientist
      Environmental Defense Fund

      Jamie Cole, Environmental Justice, Air, & Materials Policy Manager
      North Carolina Conservation Network

3. **Council discussions and actions (30 mins)**
   a. Discussion and Adoption of the Council's 2018 Biennial Report
   b. Discuss date of November Council meeting
   c. Other business

4. **Public comment (10 mins)**

5. **Closing remarks and adjourn (5 mins)**
   Lieutenant Governor Dan Forest, Chair

## FUTURE MEETINGS:

The Energy Policy Council will tentatively meet quarterly on the third Wednesday of the month. While this schedule is tentative and subject to adjustment, please reserve the following dates:

Wednesday August 15, 2018
*Wednesday November 21, 2018

## ADDITIONAL INFORMATION:

Persons having questions about the Council meeting or other matters related to the Council may contact Council staff, Jeannette Martin at Jeannette.Martin@ncdenr.gov.