BIOENERGY INNOVATIONCENTER

20+ YEARS: HELPING MANAGE CHICKEN INDUSTRY WASTE

FACILITY HISTORY

- Facility constructed and operated by Perdue from 1999 to 2020 (pelletizing and composting)
- Bioenergy Development Company (BDC) ownership since 2020 as Bioenergy Innovation Center
- Permitted by DNREC and have sold up to 30,000 tons of organic compost per year
- Inputs: Poultry processing material, chicken hatchery and litter from the Delmarva Peninsula chicken industry
- Fully tested before sale and tracked during life cycle
- 11 full time employees with benefits

Anaerobic Digestion

A fully enclosed facility managing up to 250,000 tons of excess materials

Minimizing environmental impact, enriching the land while creating new economic opportunities on the Delmarva

Composting

Operational integration of organics from the anaerobic digestions process

Our Seaford AD facility is estimated to generate 410 ,000 MMBtu of energy and prevents the release of the carbon dioxide equivalent (CO_2-eq) of the following:

11,545	18,861	84	909
US households' annual electricity consumption	Gasoline powered cars taken off the road for a year	A forest area 84x times of Central Park	Times the distance from Earth to the Moon by car

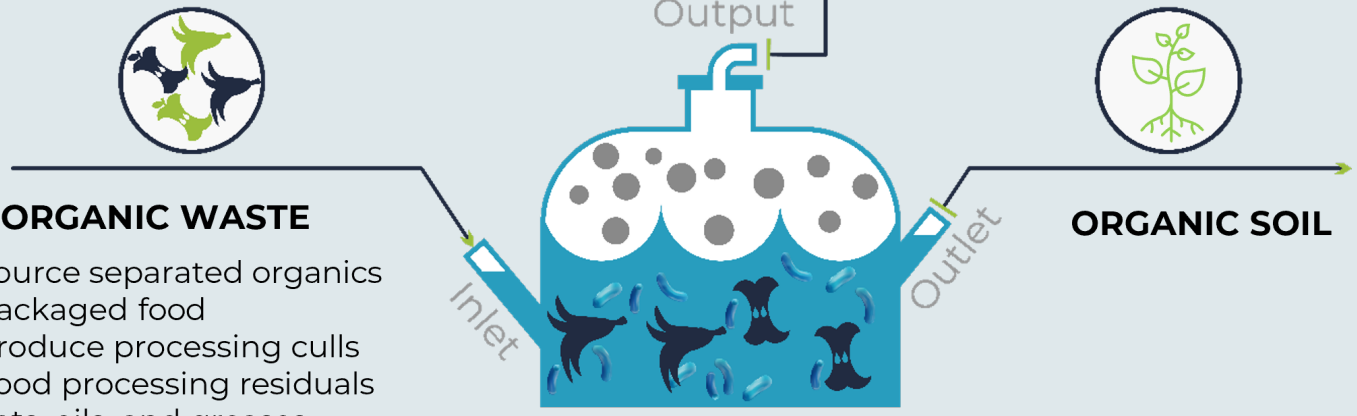
WHAT IS ANAEROBIC DIGESTION?

- Renewable electricity
- Cogeneration/combined heat and power

- Renewable natural gas into pipeline
- Compressed RNG for fleet vehicles
- Green Hydrogen

RENEWABLE ENERGY

Output



ORGANIC WASTE

- Source separated organics
- Packaged food
- Produce processing culls
- Food processing residuals
- Fats, oils, and greases
- Animal manures
- Daf Waste (Dissolved air floatation)

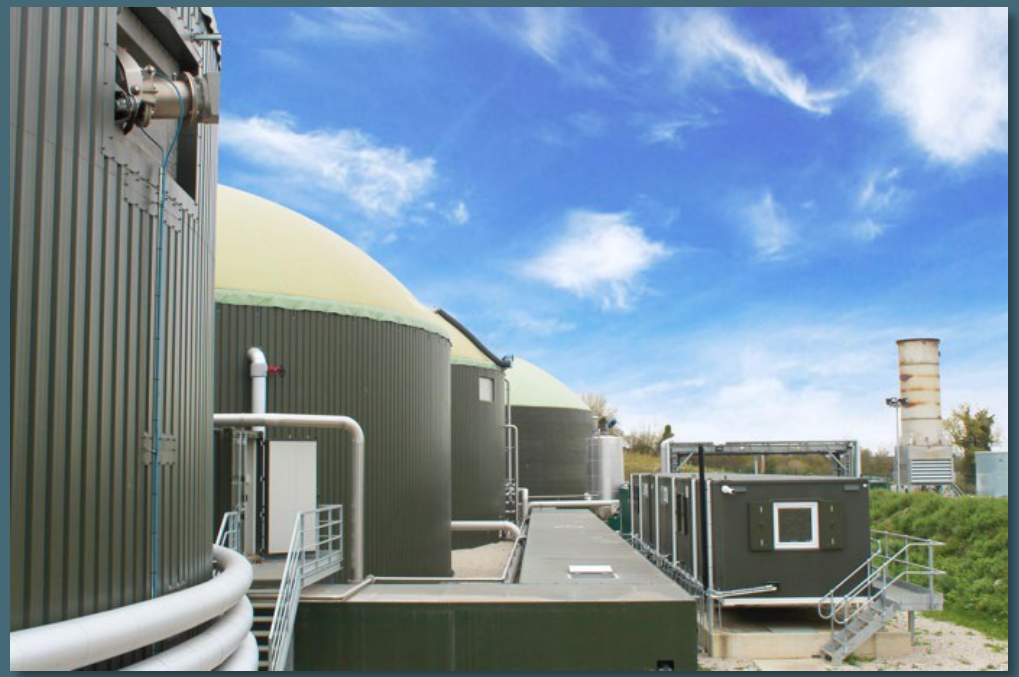
ORGANIC SOIL

ANAEROBIC DIGESTER

- Organics are fermented in large cylindrical tanks
- Organics diversion from landfills, incinerators, and land application
- Cost-effective and sustainable

THINK OF THIS PROCESS AS A COW'S FOUR-CHAMBERED STOMACH, BUT ON A COMMERCIAL SCALE.

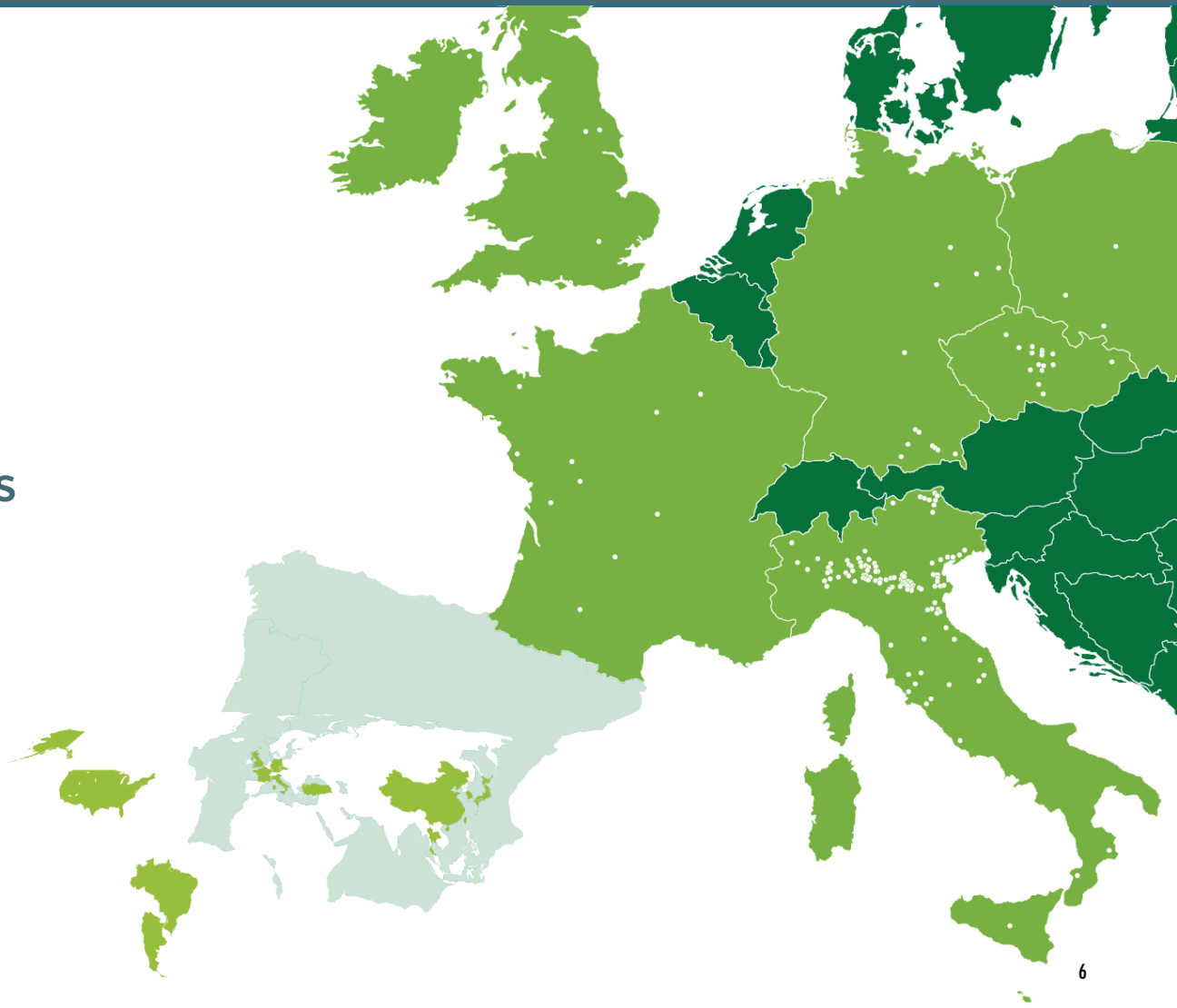
ANAEROBIC DIGESTION WILL:



- Recycle excess organics headed for landfills, land application or incineration
- Reduces odor as organics are deposited into sealed tanks
- Produce truly renewable natural energy from organic waste
- Reduce greenhouse gases enabling methane capture and use
- Create a high-nutrient, non-fossil-fuel soil product supporting local consumers and farmers
- Work within the community to drive innovation and local adoption of best management practices

A Global Leader in the Finance, Design, Build, and Operation of Anaerobic Digesters

- 25 years in the anaerobic digestion industry
- 250+ worldwide plants
- Maintenance and service of 140 plants
- Build, assembly, maintenance, and operations
- Fully automated, proprietary and patented technology
- Experience in 4 international gas grids
- A microbiological lab dedicated to anerobic digestion and co-digestion of waste



A Commitment to Safety

- Monitored continuously, the completely enclosed AD process is complimented by plant-wide integrated controls and automation system as well as daily visual inspections
- Designated ports allow digester samples to be collected for lab analysis - guaranteeing the digester is operating optimally, ensuring the safety of facility workforce and surrounding community
- Each facility complies with all required safety and emission standards
- Ensured use of certified tools and redundant safety measures (i.e., pressure relief systems) to prevent accidents

Our History Of Safety

BDC has site specific practices that are well documented in our operational manuals that ensure community safety.

We adhere to OSHA regulations regarding safe practices and all AD facilities are designed to meet required codes.

- No events
- No down time
- No injury
- No incidents: from leaks to fires
- And no incidents related to energy production or distribution

Site As Approved By Sussex County

- Repurpose former pelletizing plant
  - Feedstock receiving and shipping
  - Odor control system
  - Control room
  - Electrical distribution
- Anaerobic Digesters and Pre-tanks
- Biogas Processing Area
- Relocated stormwater pond
- Wastewater pretreatment system
- Facility footprint 11 acres of 220-acre site.

WHAT IS RENEWABLE NATURAL GAS?

Renewable natural gas (RNG) is pipeline-quality and fully interchangeable with conventional natural gas

It enables the transition to a carbon-neutral fuel without modifying existing pipeline infrastructure

RNG can also be used as a transportation fuel in the form of compressed natural gas or as a precursor to green hydrogen

All About Soils

- Improves soil health by recycling nutrients and carbon in organic waste back to the earth
- This dewatered material can be used in agriculture and the consumer horticulture market
- A replacement plant nutrient source in lieu of synthetic fertilizers
- Reduces pathogens and antibiotics in the environment as digested organics are effectively pasteurized and dewatered before application
- Currently working with Delaware Department of Agriculture and Universities on product content and use

Economic Development And Employment

- $20 million estimated local economic impact of AD construction
- $1.2 million estimated yearly local operational investment: engineering, electric, plumbing management of rolling stock, and on-going services
- 25 new and fully benefited employees: environmental technicians and microbiologists
- Opportunity to collaborate with Delaware Tech, University of Delaware, Sussex Technical High School, Future Famers of America (FFA), Spade and Trowel, Nanticoke Watershed Alliance, and more

Anaerobic Digestion Organic Recycling Center

Anaerobic Digestion and Clean Air

Anaerobic Digestion is a completely enclosed process with associated biogas upgrade and air pollution controls

We reduce use of carbon intensive disposal methods like land application and landfills that release polluting green house gases

How:

- Materials are processed immediately and incorporated in the enclosed systems to control emissions
- Our receiving building is under negative pressure with quick opening/closing doors
- Air ventilation systems manage all emissions in the receiving building

Anaerobic Digestion and Clean Water

BDC's process provides an alternative to land application of nutrients and landfill operations that can cause groundwater pollution

No potable water will be used in the operation of the AD. All required liquid extracted and recycled in the AD process

Wastewater will be treated on-site and initially transported to the City of Seaford for discharge

- Up to 60,000 gallons per day
  - Seaford WWTP designed for: 2 million gallons per day

The facility uses ultrafiltration and reverse osmosis and will meet the Seaford and Chesapeake Bay water quality standard

Anaerobic Digestion and Healthy, Natural Soils

- Anaerobic digestion breaks down nutrients from raw feedstocks creating a high nutrient product which promotes overall soil health
- This soil product promotes regenerative agriculture, reduces reliance on fossil fuel based and expensive fertilizers
- Healthy soils naturally manage nutrients more effectively - -which results in lower runoffs and higher nutrient absorption by crops and plants.

Renewable Energy Offtake

- Bioenergy Devco is committed to improve and increase the availability of renewable energy that is produced and used locally
- The generated renewable natural gas will be compressed and injected into the local natural gas infrastructure
- The renewable energy generated by this project is equal to the annual electricity consumption of 11,545 households

Continuing our 20-year History Supporting the Community

- Anaerobic digestion is an environmentally sound, safe and secure way to manage organic waste and create economic and community opportunity
- Anaerobic digestion represents just one way that today we can address the local and national challenge of carbon and GHG emissions
- By managing organic waste, creating green energy and establishing the use of carbon smart soil products, we support the environmental and economic goals of a sustainable chicken industry and community

BIOENERGY INNOVATION CENTER

For more information visit:

www.bioenergyic.com