BIOENERGY DEVCO

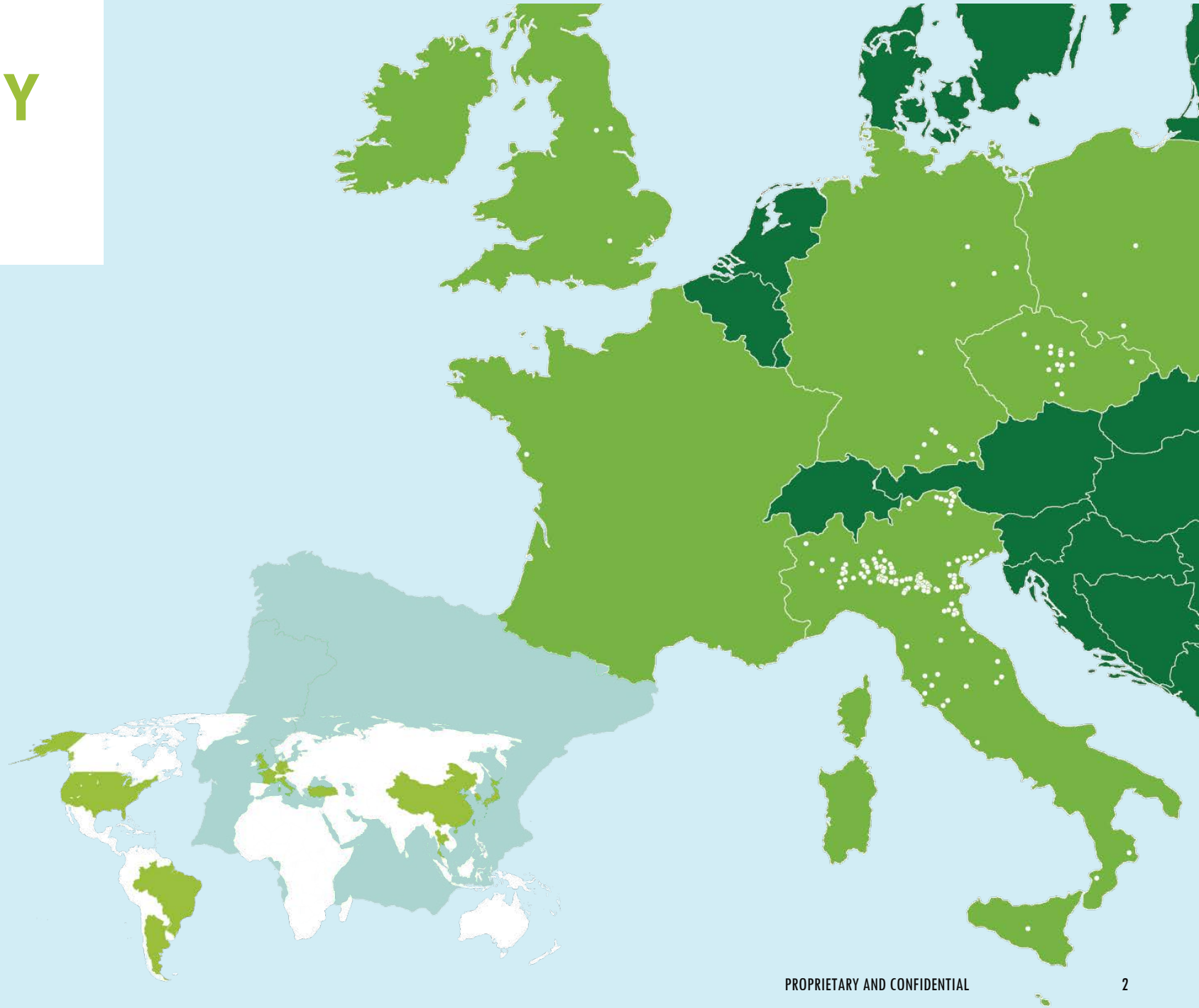
Maryland Department of the Environment

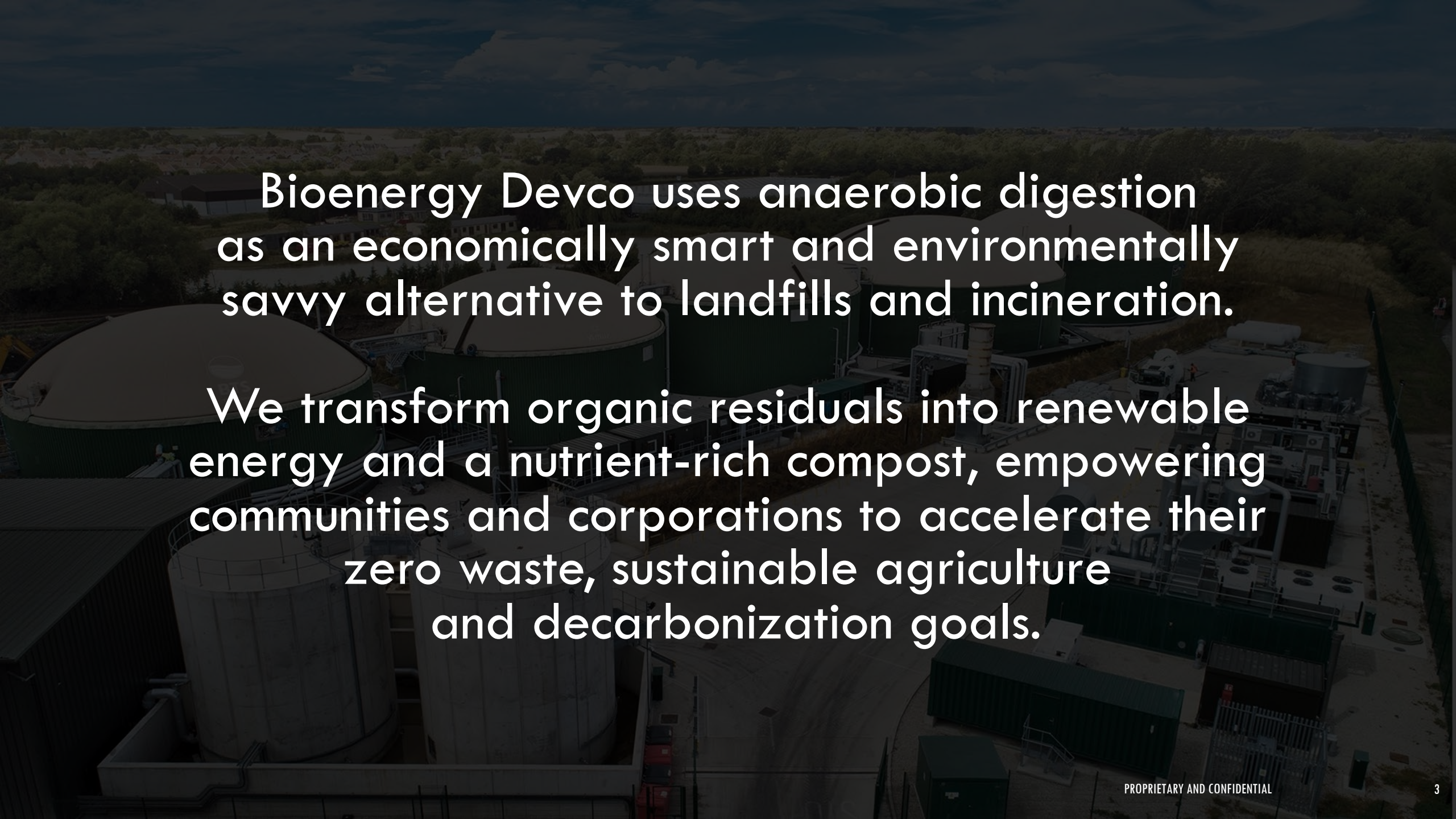
DELIVERING ON THE PROMISE OF ORGANICS RECYCLING: CREATING RENEWABLE ENERGY AND HEALTHY SOILS

A Presentation for:
Maryland Food Recovery Summit

BIOENERGY DEVCO

- 240 modular biogas plants built in Europe, Asia, and North America with continued maintenance and service of 140 plants
- Guaranteed and insured performance and interconnection services
- Build, assembly, maintenance, and operations
- Lab testing, monitoring and nutrient management support from a dedicated microbiology laboratory with 25 years of performance data





Bioenergy Devco uses anaerobic digestion as an economically smart and environmentally savvy alternative to landfills and incineration.

We transform organic residuals into renewable energy and a nutrient-rich compost, empowering communities and corporations to accelerate their zero waste, sustainable agriculture and decarbonization goals.

WHAT IS ANAEROBIC DIGESTION?

Organic Materials

- Source separated organics
- Packaged food
- Food processing culls
- Food processing residuals
- Fats, oils, and grease
- Animal manures

Anaerobic Digestion Facility

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

Renewable Energy

- Renewable electricity
- Cogeneration/combined heat and power
- Renewable natural gas into pipeline
- Compressed RNG for fleet vehicles
- Green Hydrogen

Organic Soil Amendment

- Nutrient-rich compost
- Dewatered, dried, pelletized, nutrient stripped digestate

Think of this process as a cow's four-chambered stomach, but on a large scale.

WHY NOW: SHARED ORGANIC WASTE CHALLENGES?

Incineration

- Not sustainable with high pollutants and greenhouse gases generated via burning waste
- Expensive process
- Transportation costs continue to rise
- Increased legislation and environmental justice issues are sunsetting facilities

Landfills

- NIMBY issues and not sustainable; land, water, and air pollution
- Nearing full capacity and difficult to permit expansion or new facilities
- Increasing costs
- Increased legislation due to environmental justice and air, water & soil pollution

Land Application

- Increasing State legislation requiring reduction of nutrients, timing and amounts
- Expensive process and costs growing exponentially
- Negative impacts on soil, water, & air

ENVIRONMENT & ECONOMIC CONVERGENCE

The Drive to Sustainability and GHG Reduction

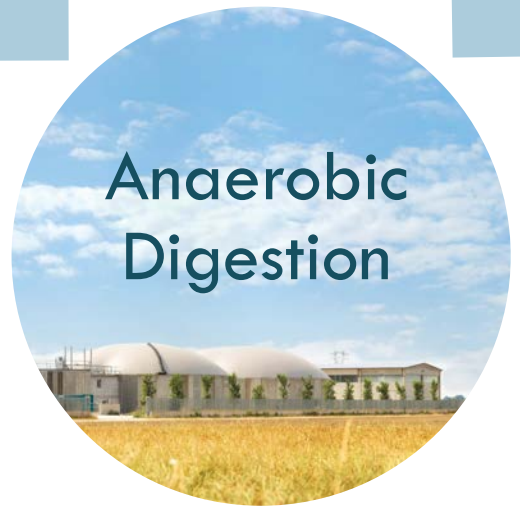
Counties, municipalities, and the state are quickly moving to enact carbon neutrality measures.

Demand for Renewable Energy

A desire for truly organic natural gas, CNG, and even hydrogen is growing throughout the Chesapeake region.

The Zero Waste Revolution

New laws in Maryland demanding the diversion of organics from GHG-emitting landfills, pollution-causing incineration, or nutrient challenges of land application.



Healthy Soils and Clean Water Requirements

Using digestate as an important carbon sequestration tool and soil product (compost and nutrient-rich topsoil). Managing excess nutrients and water quality are key ESG requirements on both sides of the shore.

ORGANICS RECYCLING IN MARYLAND

The Need

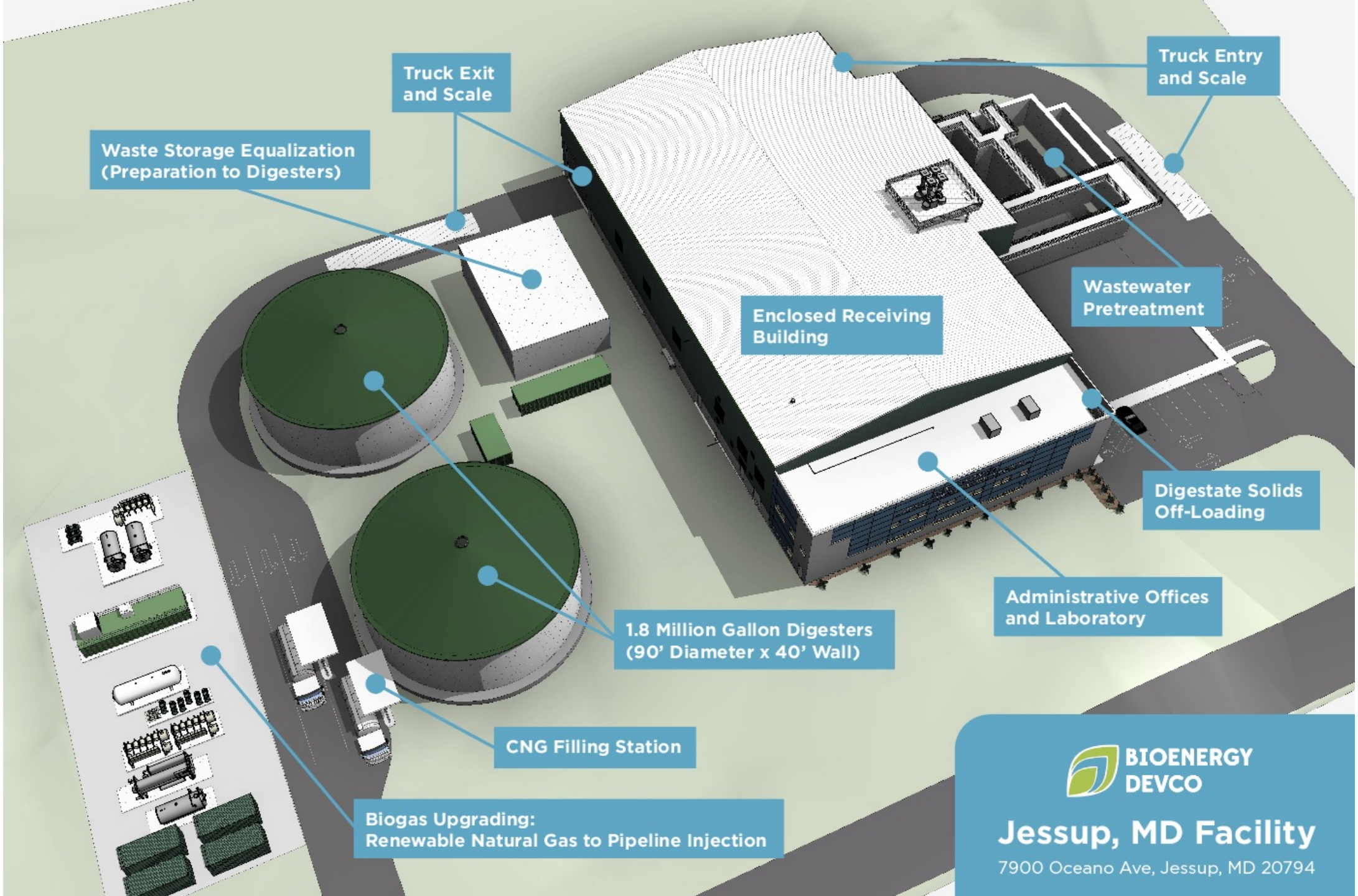
- The Maryland Department of Environment(MDE) estimates the state generates nearly 928,000 tons of food waste per year.
- Currently only 15.5% of this food waste is recycled.

The Solution

- Maryland Organics Recycling and Waste Diversion law -Beginning January 1, 2023, commercial entities generating more than 2 tons p/week of food residuals will be required to separate and divert food residuals away from final disposal in landfills and incinerators.
- Anaerobic digestion offers needed organics recycling capacity to allow for successful implementation of this law

BDC'S ENVIRONMENTAL COMMITMENT

- Renewable Energy
  - When organic materials are anaerobically digested, biogas is created. Biogas is a renewable source of energy. Biogas can be used for producing electricity and heat, as a natural gas substitute and also a transportation fuel.
- Healthier Air
  - Our facilities help to minimize carbon-intensive disposal practices like landfills and land applications that release polluting greenhouse gases into the atmosphere – improving the air that we breathe.
- Healthier Water
  - BDC's fully enclosed anaerobic digesters eliminate groundwater pollution often caused by excessive land application of nutrients and landfill operations, minimizing excessive nutrient runoff that can poison ecosystems and cause significant human health issues.
- Healthier Soils
  - As a byproduct of the anaerobic digestion process, our facilities produce organic, odorless soil amendments that can be applied to public lands and community gardens to replenish nutrients.


Truck Exit and Scale
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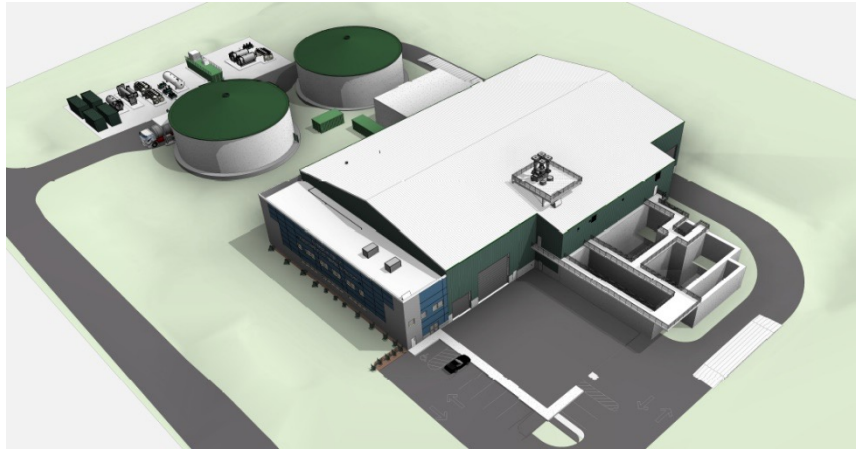
Waste Storage Equalization (Preparation to Digesters)
Enclosed Receiving Building
Wastewater Pretreatment
Digestate Solids Off-Loading
Administrative Offices and Laboratory
1.8 Million Gallon Digesters (90' Diameter x 40' Wall)
CNG Filling Station
Biogas Upgrading: Renewable Natural Gas to Pipeline Injection
BIOENERGY DEVCO
Jessup, MD Facility
7900 Oceano Ave, Jessup, MD 20794

MARYLAND FOOD CENTER ANAEROBIC DIGESTER

Location: Maryland Food Center, 7900 Oceano Avenue, Jessup, MD
Feedstocks: 120,000 tons/year liquid and solid food waste
Gas Production: 295,000 mmBTU/year
Digesate Production: 20,000 tpy @ 25% solids
Development Stage: Construction



ADVANTAGES OF THE MFCA ANAEROBIC DIGESTER

Proximity to Clients

The Maryland Food Center AD is in the geographic center of the Washington DC / Baltimore metropolitan region in the heart of food processing and distribution.

Tolerance for Contamination

State-of-the-art de-packaging equipment allows for contamination found in typical SSO.

Convenience

24-hour operations and easy in-and-out layout increases hauling efficiency.

Organics Diversion

Maryland has passed organics diversion legislation requiring the recycling of organic waste.

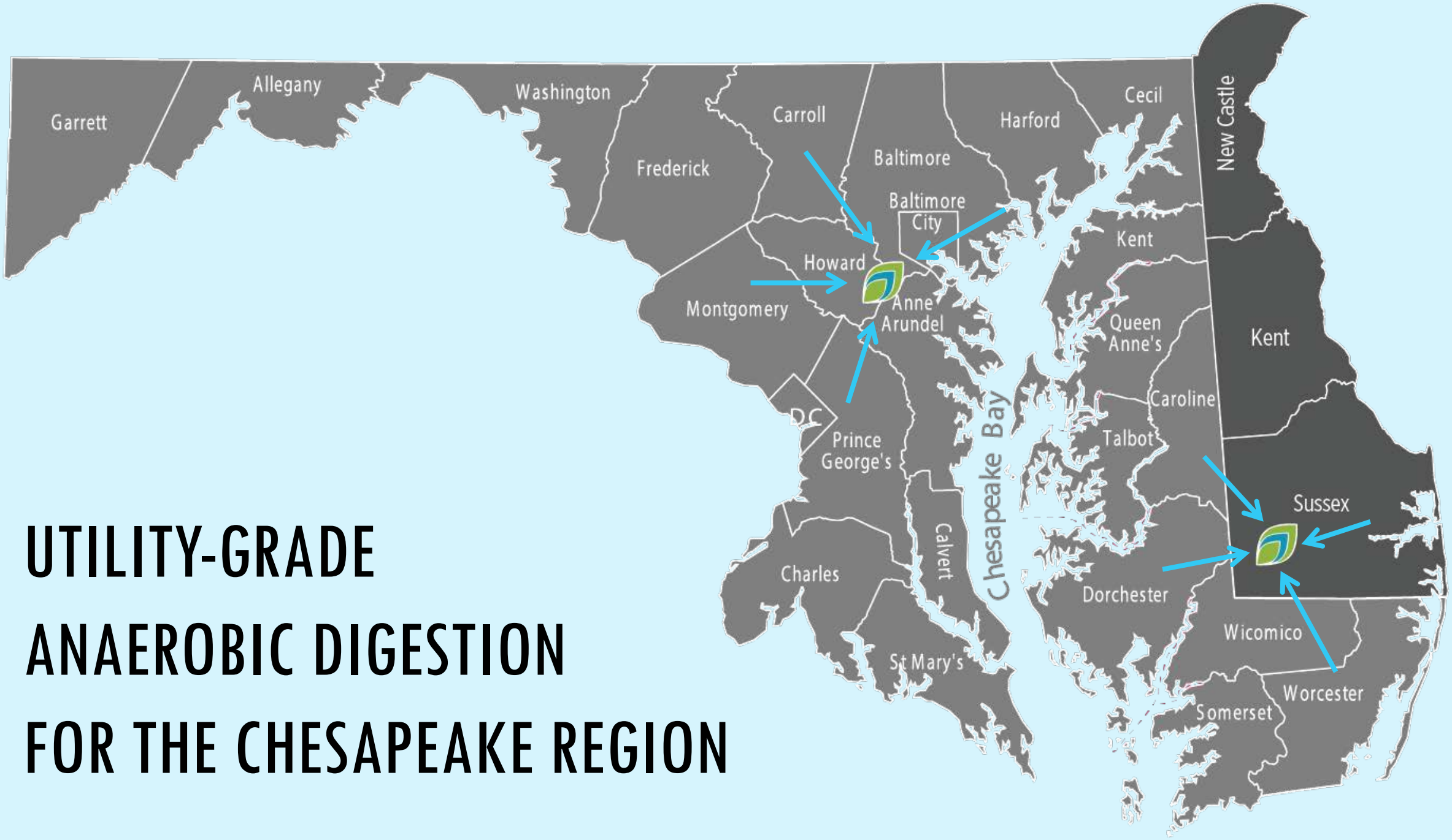
A typical commercial-scale AD facility treats 115,000 US tons of excess food organics residues and generates 275,000 mmBTUs of energy. The benefits:

Annual electricity consumption of 6,635 US households	-26,200* US tons CO2eq.	-6,160* cars out from streets	-38,000* acres of US forests in one year

Calculations are based on landfill diversion of feedstocks and substitution of the same amount of fossil-based methane

*Negative sign refers to savings

UTILITY-GRADE ANAEROBIC DIGESTION FOR THE CHESAPEAKE REGION



ANAEROBIC DIGESTION (AD) AS AN INTEGRATED SOLUTION

Environmental

- AD rapidly processes organic waste into organic fertilizer while trapping climate change related methane gas, turning this into valuable renewable natural gas
- AD reduces the greenhouse gasses and diverts waste from landfills, incinerators, and land application

Economic

- Municipalities, businesses, food processors and agricultural producers can save money by using AD with long term visibility on waste costs and available capacity
- AD facilities are close to the source reducing processing and transportation costs
- Permits as a recycling facility

Proven Technology

- AD is a natural, safe, proven and scalable technology that acts as nature's recycling engine
- Much like a cow's stomach on a large scale, AD is nature's fermentation process and is the best methodology/technology to recycle organic matter into clean renewable energy and organic soil amendments

THE IMPACT OF ANAEROBIC DIGESTION

- Increases the lifespan of a local landfill, reducing percolates, increasing water quality
- Reduces odor as organics are deposited into sealed tanks
- Shrinks transport costs and associated environmental impact
- Reduces greenhouse gases and enables CO_2 and methane capture and use
- Reduces pathogens and antibiotic use in the environment as digested organics are effectively pasteurized and dried digestate can be used as an organic soil amendment
- Creates both direct and indirect jobs to construct and manage the facility as well as attend to the resulting offtake use and distribution

OUR HOLISTIC VISION: INTEGRATED SUSTAINABILITY SOLUTIONS

Build on MD organics recycling mandate

Replace heavy polluting diesel trucks with CNG or green hydrogen

Add composting and healthy products to the lifecycle of organics recycling building on the healthy soil movement

Increase number of AD facilities in Maryland and worldwide

Replace 20% of fracked gas with RNG

WHERE ECOLOGY AND ECONOMICS CONVERGE TO SHAPE OUR CLIMATE SUCCESS STORIES

Create a new source of renewable, sustainable, and clean energy

Reduce GHG emissions that come from traditional disposal methods of excess organics

Eliminate the land application of nutrients

Ensure that what's good for the environment is good for business by providing long-term waste expense visibility while going green

WHERE SOME SEE WASTE, TOGETHER WE CAN SEE OPPORTUNITY.

THE TIME IS RIGHT IN MARYLAND.

BIOENERGY DEVCO

Get in touch or schedule a site tour:

Peter Ettinger

info@bioenergydevco.com

(443) 782-3427