Energy & Store
Development Conference

E+SD 2013

Producing Clean Renewable Energy from Organic Waste

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Anaerobic Digesters

INDUSTRIAL

AGRICULTURAL

MUNICIPAL

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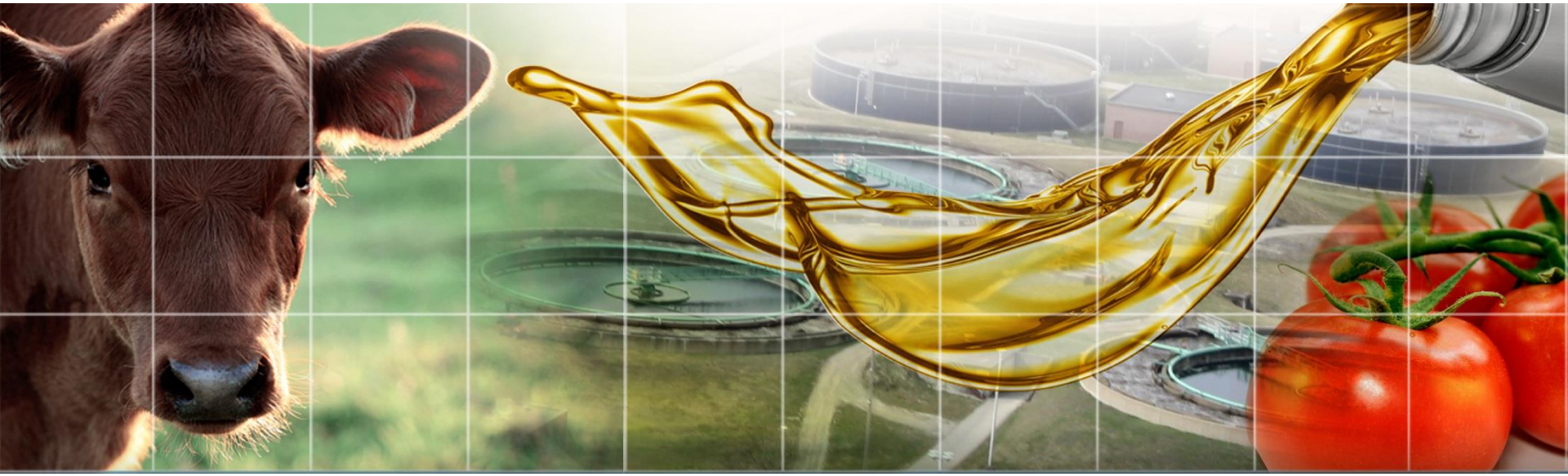
INPUTS



TYPES OF ORGANIC RESIDUALS:

- Food Processing Residuals
- Manure
- Energy Crops & Spent Grains
- Biobased Oils & Lubricants
- FOG (fats, oils & grease)
- Waste Water Treatment Sludge
- Personal Care Products
- Ethanol and Biodiesel processing residuals
- Dissolved Air Flotation (DAF)
- Expired, damaged or off-spec consumer goods
- Packaged Organics (depackaging technology)
- Crop Residuals
- Glycerin & Stillage
- Whey
- Sugar Water

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PRODUCTS

- Renewable energy – natural gas, vehicle fuel (CNG/LNG), electricity & heating/cooling.
- Animal bedding, peat alternative and compost
- “equate” liquid plant food is a natural solution in lieu of chemical fertilizers.
- Reduced greenhouse gas emissions, cleaner air, soil and water

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ADSORPTION CHILLER

Ice Cubes from AD

- AD converts 90% of volatile solids to energy
- only 7% of the energy produced is used to operate the anaerobic digester

The heat from a 1 MW CHP generates enough hot water to cool (via adsorption chilling technology) a 70,000 square foot distribution center*.

*Estimates above are based on facility temperatures of between 38° and 45°. The cooling capacity of the equipment will vary based on the specifications of the distribution facility. Load calculations will be performed prior to installation to confirm performance.

URBAN DIGESTER

Community Collaboration

Urban Anaerobic Digestion: Cleveland, Ohio

Project Information:

- former GM Fisher Body Plant
- small footprint and urban location
- partnership with Forest City Enterprises
- 1.3 MW
- electricity sold to Cleveland Public Power
- supports Cleveland sustainability goals

Grand Opening Collaborators: Major collaborators from July 2012 event in Cleveland, Ohio

CITY OF CLEVELAND
Mayor Frank G. Jackson

Cleveland PublicPower
Count on it

Pierre's Ice Cream Company

Ohio Department of Development

CLEVELAND 1796 CITY COUNCIL

RECOVERY.GOV

FORESTCITY

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FOOD WASTE

33.8 Million Tons Wasted

In 2010, about 33.8 million tons of commercial organic substrate were discarded in landfills or incinerators.

Food waste is:

- high in volatile solids
- one of the least recovered materials in the municipal solid waste stream
- 2010[1] annual supermarket losses averaged
  - 11.4% for fresh fruit
  - 9.7% for fresh vegetables
  - 4.5% for meat, poultry and seafood.

1. Innovation Center for US Dairy. , National Market Value of Anaerobic Digester Products – information from Research Service (ERS) /USDA; Informa Economics

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SOLUTIONS | Digester Ready Waste Streams

quasar has developed technology with InSinkErator that will allow us to accept and process contaminate-free AD-ready waste streams from:

- **food manufacturers**
- **cafeterias**
- **restaurants**
- **hospitals**
- **hotels**
- **supermarkets**
- **colleges & universities**
- **sports venues**

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SOLUTIONS

Simple Implementation

The integrated solution manages unlimited volumes of industrial and commercial material worldwide.

Your operation can achieve **Zero** food waste while;

- sustainably saving money
- improving the environment
- producing energy from waste

insinkerator

SOLUTIONS

Grind2Energy

SOLUTIONS

Improved Waste Storage

Below – traditional storage bins leak, smell and attract rodents and are easily vandalized.

New storage tanks (**right**) are leak free and odor free, protecting against rodents and vandals.

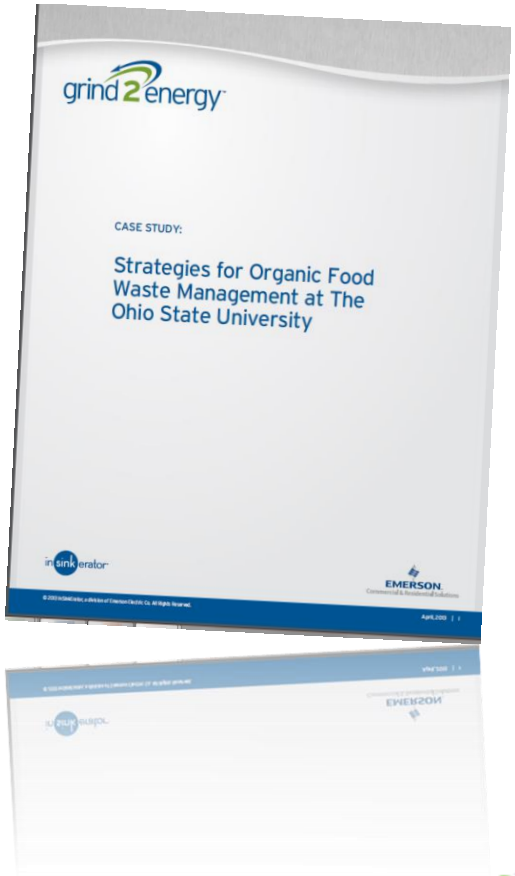
Case Study

The Blackwell Inn at OSU

The Blackwell Inn and Conference Center at The Ohio State University

- Diverts 80 to 85% of its organic waste from the landfill for about the same cost as disposing of all materials as trash.
- Reduces collections from 11 times a week to 7 times a week.
- Diverts approximately 20 tons a month from the landfill.
- Food material is ground by an InSinkErator unit.
- Materials are taken to an anaerobic digester operated by quasar energy group.

Read the white paper



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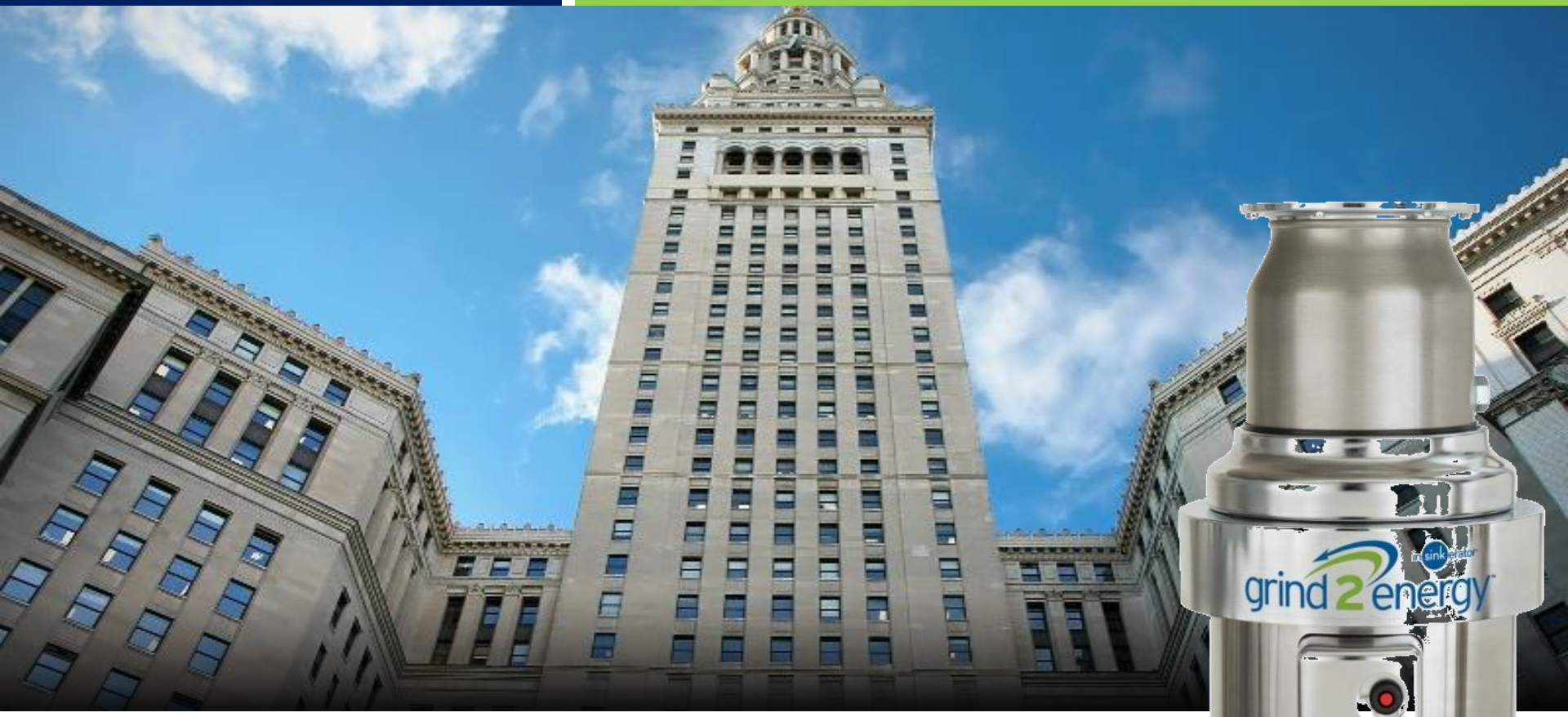
CASE STUDY

Tower City Center



Forest City is the first Cleveland company to install an InSinkErator grind2energy system at Tower City Center.

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CASE STUDY

The Cleveland Indians

- The Cleveland Indians have cut the amount of waste going to the landfill in half over 4 years.
- In 2012, the organization sent approximately 60 tons of food waste to a compost facility.
- They will be able to recycle **80 to 100 tons of food waste** with macerating technology and AD.

CASE STUDY

Depackaging

Depackaging equipment in quasar's Zanesville, Ohio, facility

Depackaging equipment

- wax-coated cardboard
- glass bottles
- aluminum cans
- plastic bottles, wrappers & containers

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CASE STUDY

Depackaging

Liquid Waste Streams:
Milk, sour cream, yogurt, and dips, drinks and concentrates including fruit juice, ice tea, coffee syrups, and frozen concentrates, and condiments.

Customers:
Dairy manufacturing, distributors, cold-storage warehouse, and brokers.

Capacity:
3-4 truckloads per week (20 tons each).

Organics Content:
75-90% of the weight is organics.

LEGISLATION

Mandatory Food Waste Recycling

Mandatory food waste recycling programs:

- Organics make up 25 percent of the waste stream going to landfills and incinerators.
- Connecticut – policy in place
- Vermont – policy in place
- Massachusetts considering similar regulations and $4 million in grants/loans.

BUILDING AN INDUSTRY

Challenges & Solutions

Our plan was to partner with a European digester technology, import components and run systems on a steady stream of biosolids. The 2008 financial crisis and U.S. operating realities forced **quasar** to reevaluate our plan.

THE EASY PLAN	THE REALITY
Credibility: Europe's 6000 operating digesters	**Credibility:** Required a U.S. track record
Technology: European	**Technology:** quasar redesigned & reengineered
Components: Imported from Europe	**Components:** 99% U.S., 85% Ohio sourced
Financing: Traditional lenders & customers	**Financing:** Cash, incentives, sales & suppliers
Biomass: Waste Water Sludge	**Biomass:** More than 30 types of mixed organics
Regulatory: Outside engineering firm	**Regulatory:** In-house
Energy: Electricity & heat	**Energy:** Electricity, heat, cooling, natural gas & CNG
Construction: Source to outside firms	**Construction:** In-house
Operations: Sell systems, customers operate	**Operations:** Own Systems & in-house operators
Laboratory: Send analytical to outside labs	**Laboratory:** Collaborate with OSU & manage in-house

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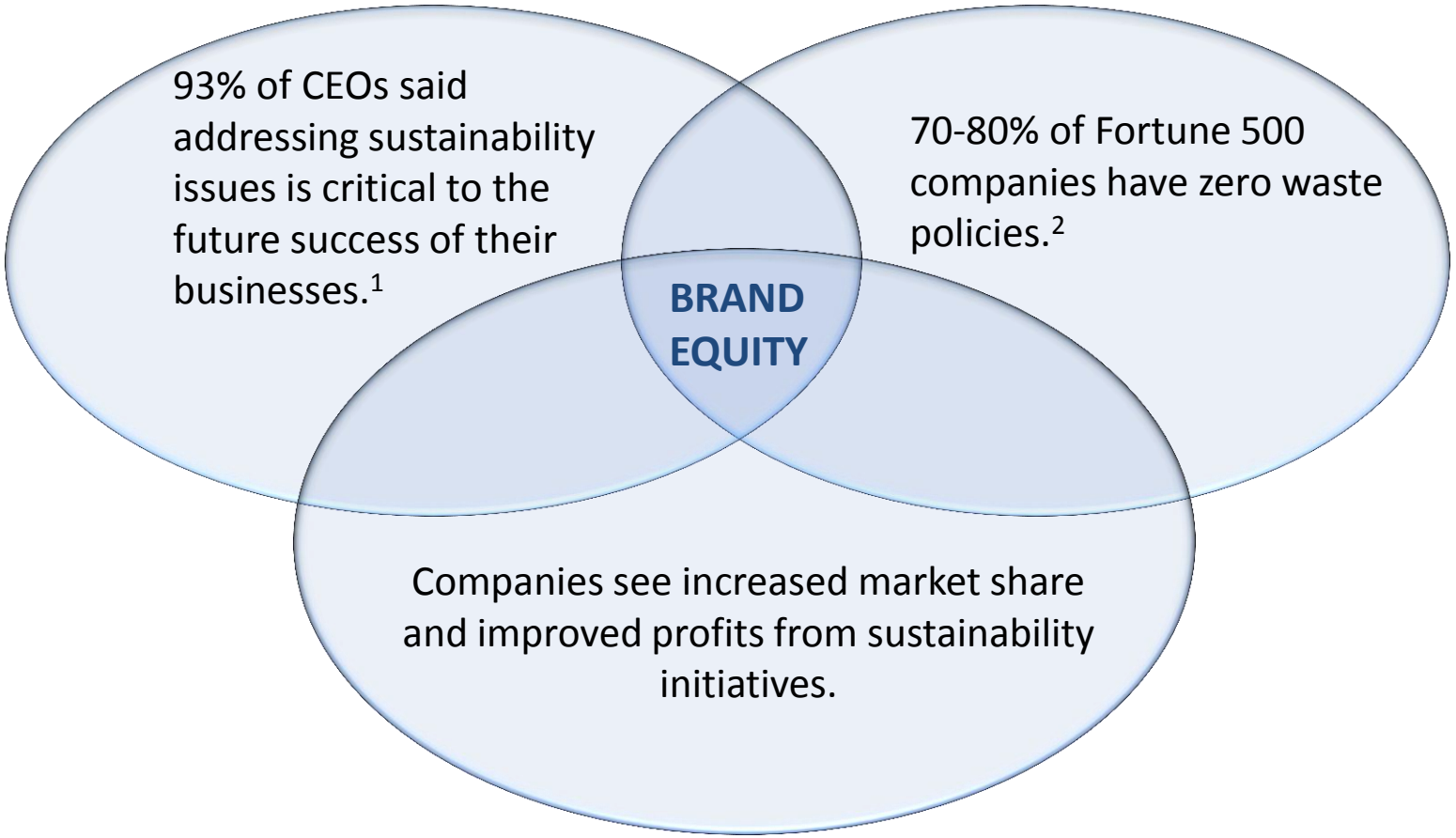
VALUE PROPOSITION

Liability vs. Opportunity

Anaerobic digestion changes waste management from a liability to an opportunity, allowing businesses to meet zero waste goals while building their brands' sustainability image.



1. A New Era of Sustainability: UN Global Compact, Accenture, 2010
2. Waste Management, Inc.

VALUE PROPOSITION

Environmental Impact

Reduce carbon equivalent emissions[1]: Sending 20 million tons of organic substrate (6% of annual U.S. landfill dumping) to digesters can remove the carbon-equivalent emissions of over 3.2 million automobiles.

Reduced methane emissions[1]: 38% of landfill methane is emitted directly into the air, making the diversion of organic substrates from landfills to digesters the largest single environmental benefit of digester use.

1. Innovation Center for US Dairy National Market Value of Anaerobic Digester Products

Sustainability
only works
if it
COSTS LESS

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