



# **Energy Information Administration**

## **ADVANCE BIOFUELS WORKSHOP**



Fiberight has developed a solution for waste disposal that recovers the highest value from every ton of waste, using a unique technology platform which is focused on conversion of organic materials to sugars as a precursor to bio-fuels and bio-chemicals.



The United States disposes of almost 175 million tons of waste every year, with little or no value extraction.

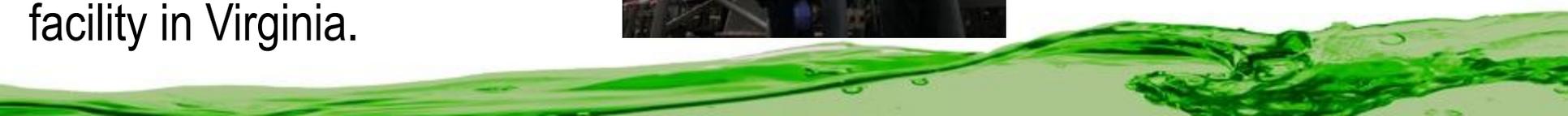
Almost half of this waste is organic, and represents an opportunity to extract billions of pounds of industrial sugar.



In 2005 Fiberight started developing a new concept that recovers organics from waste using biotech advances.

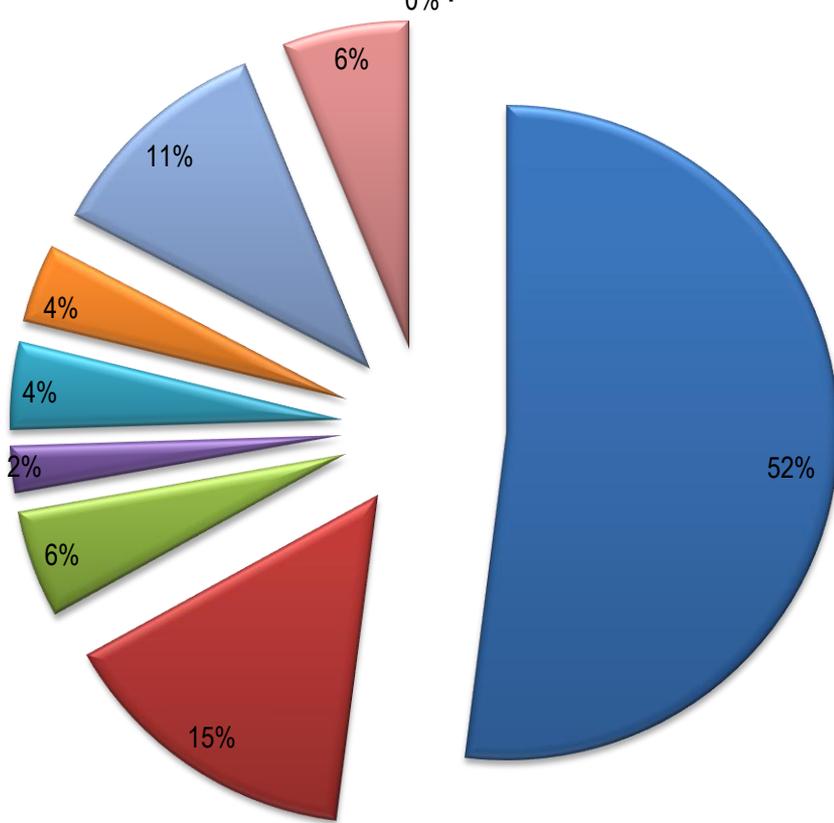
Fiberight has created a flexible “sugar platform” technology and has tested key process modules at large scale.

Fiberight has now produced cellulosic sugars from waste and is building an integrated facility in Virginia.



Typical waste composition Iowa

Example



■ Organic (Low Lignin)

■ Plastics & Rubber

■ Metals

■ Glass

■ Textiles & Leathers

■ Durables

■ C&D/Wood

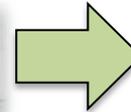
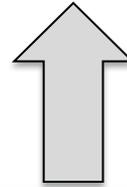
■ Non Processible



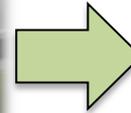


Low Capex – Low Labor  
process that efficiently  
separates organic  
materials

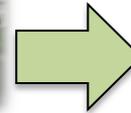
20% Transfer to  
landfill



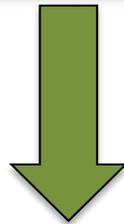
6% Metals



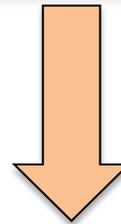
7% Other  
Recyclables



5% Plastic  
Bottles



62%  
Transfer to  
Fiberight



Mixed Organic  
Pulp or crude  
sugar solution

Mixed  
Plastics

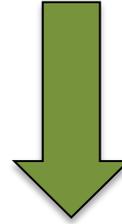




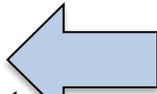
Materials  
Processing hub

Material may be trucked in or conveyed "over the wall"

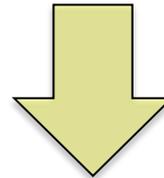
Mixed Organic  
Pulp



CNG as  
diesel  
Equivalent

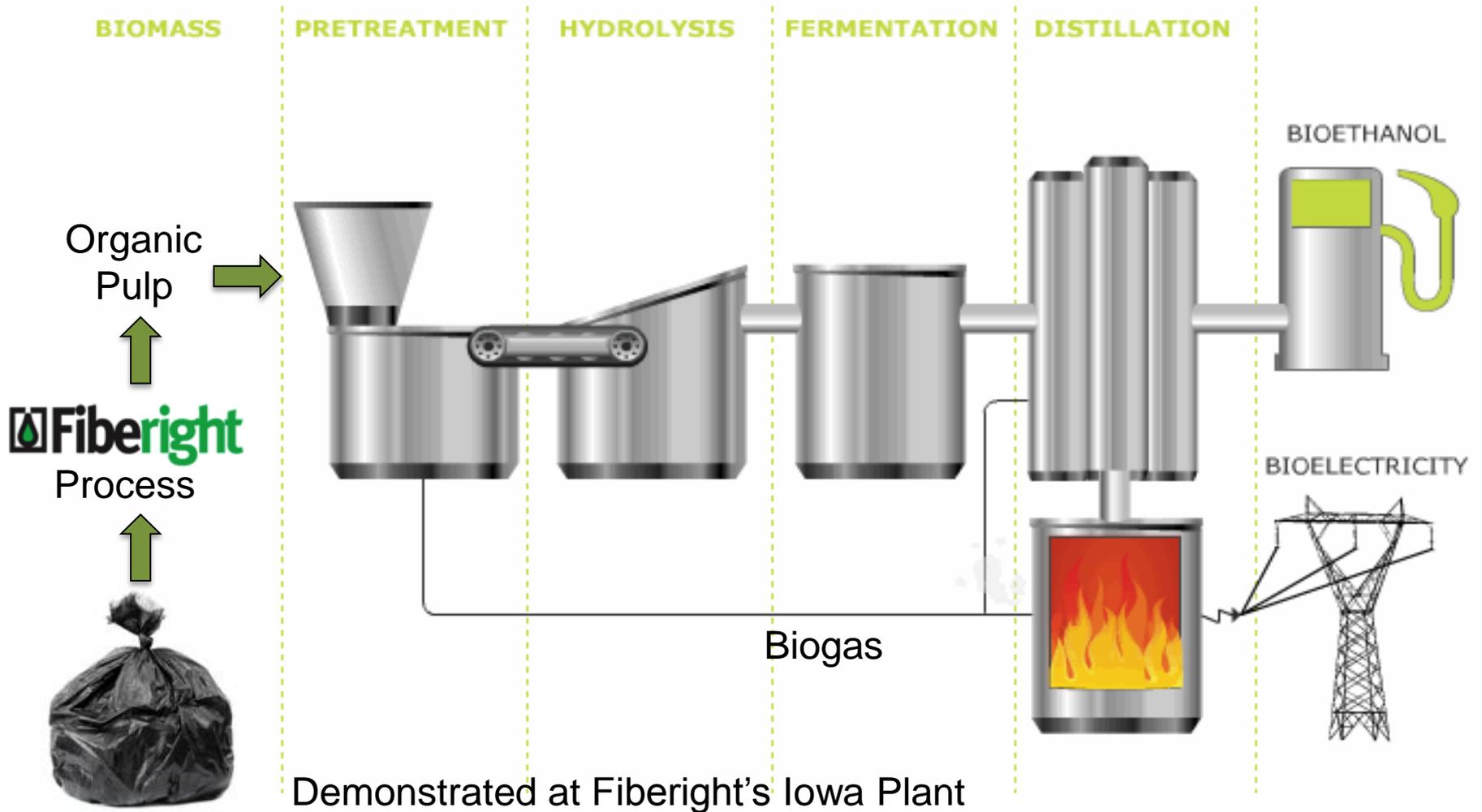


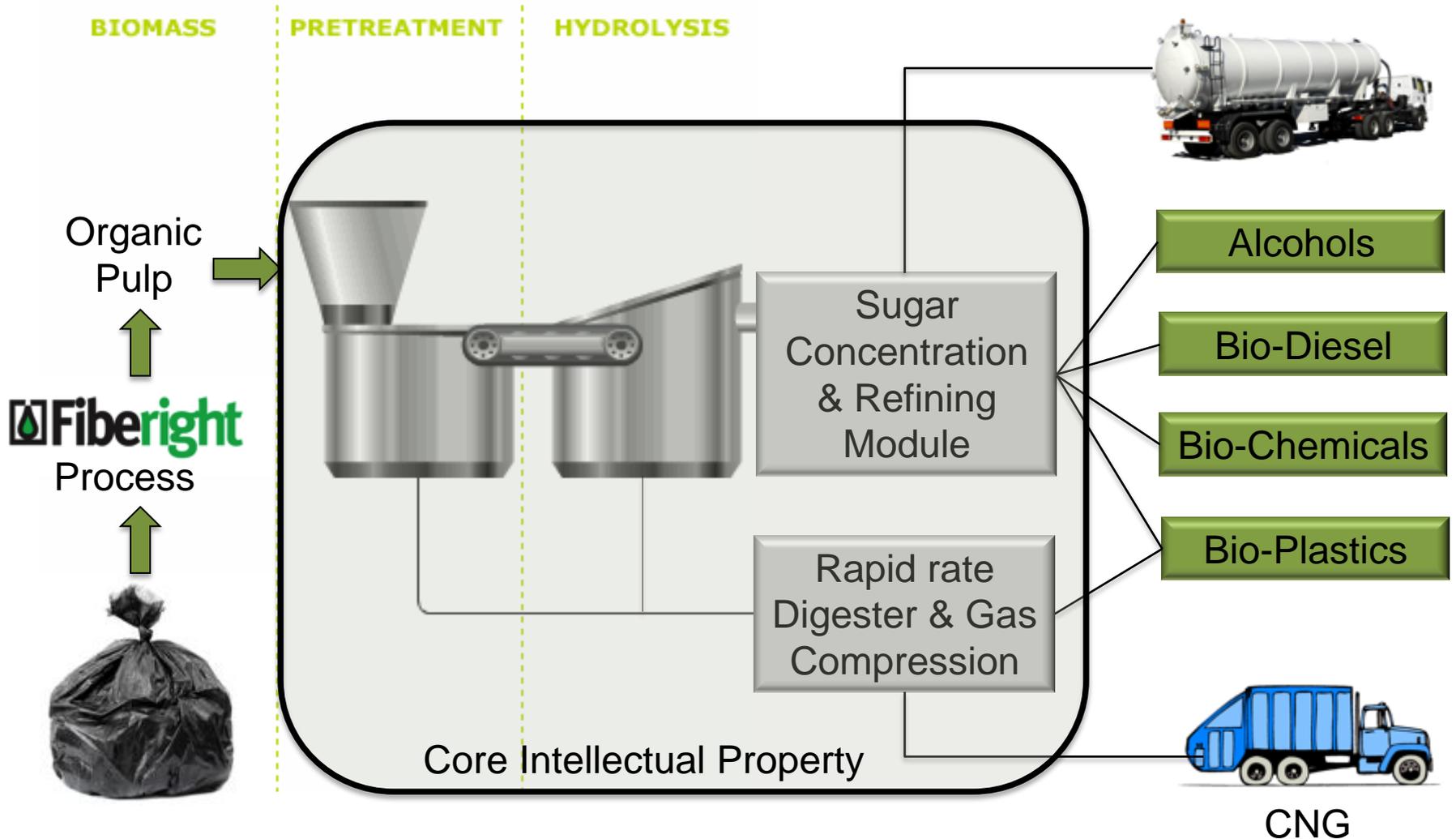
Cellulosic sugars  
converted into biofuels  
and/or bio-chemicals



Remaining Mass as  
Clean Organic Pellets  
for soil amendment etc.







- **MSW Processing**
  - Process reduces labor inputs associated with dirty MRF and adds value to organic waste fraction.
- **Biomass Production**
  - Bespoke components to be manufactured exclusively for Fiberight, with knowledge from 900 TPD plant.
  - Process conditions well developed by Fiberight to preserve sugars and limit VOC release
  - Patented unit operations critical for biomass preparation
- **Sugar Preparation**
  - Significant body of work around optimizing wash step for A/D
  - Fiberight Demo plant the only facility where composition of soluble stream is understood, new pathways developing.
  - Sugar concentration step affords numerous value pathways



- **Enzymology – Significant Dose Reduction Achieved**
  - Proprietary pre-treatments optimized to feedstock
  - Close working relationship with Novozymes
  - Upstream processing of cellulosic biomass
  - Overcoming glucose inhibition
  
- **Fermentation**
  - Pre-treatment must not create fermentation inhibitors
  - Sugars include C6 and C5
  - Advances in catalysts & fermentive organisms offer broad spectrum of metabolic pathways



- **Fewer Unit Operations**

- Reduces capex and footprint of plant
- Simplifies and reduces operational risk
- Major impact on logistics & value chain

- **Process Flexibility**

- Multiple products from common process train
- Cost effective to ship sugar to remote processing plant or 3<sup>rd</sup> party processor – **Cost of sugars below #11 current market price.**
- Ideal bolt-on for existing refinery infrastructure

- **Revenue Flexibility**

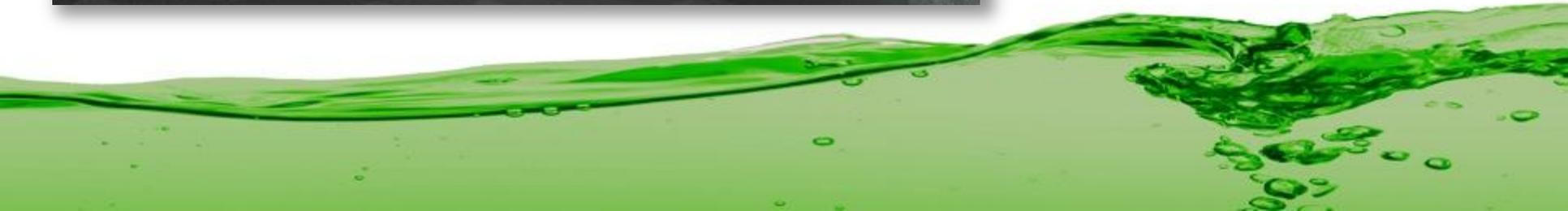
- Ability to optimize outputs to market conditions
- Multiple off-take options provides revenue security and limits effects of volatility in fuels markets
- Potential for higher margin options such as bio-chemicals and bio-plastics which may be sold under long-term contract.





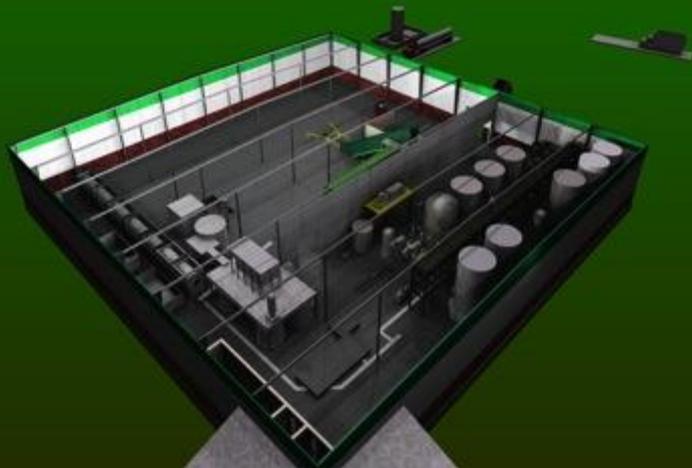
 **Fiberight**

**Demonstration  
Plant**





- **Reliable data**
  - Affirms Mass & Energy assumptions
  - Marketability of all outputs at commercially viable values
  - Demonstration that operations can sequester Hazmats and minimize odors
- **Operations**
  - Design for commercial plants informed by appropriate scale experience
  - Actual waste to be processed may be tested, knowledge informs design modifications





- Facility is available for demonstration to potential customers that waste to sugars is a viable, reliable, solution for advanced waste processing
- Waste may now be accepted from any municipality or private source, operations, compositional and value data may be generated to support project economics.



- **Operations**
  - Optimized for a small tonnage requirement – 250 TPD lines.
  - Maximal recovery of recyclables
  - Permitting eased by lack of stack emissions and water re-use
- **Value**
  - Fixed or variable price off-take available for organic fractions
  - Removal of organics enables clean, high value, plastics and metals recovery.
  - Rapid deployment of modular solution
- **Risk**
  - Low-capex solution and using existing infrastructure
  - Multiple off-take options provides revenue security and limits effects of volatility in fuels markets
  - Front-end MRF process well-proven in Europe, with process guarantees and reference operations available for conversion steps.





**Turning trash into cellulosic sugars...a disruptive and transformational clean technology**



[www.fiberight.com](http://www.fiberight.com)