LanzaTech

DOE BETO Advancing the Bioeconomy:

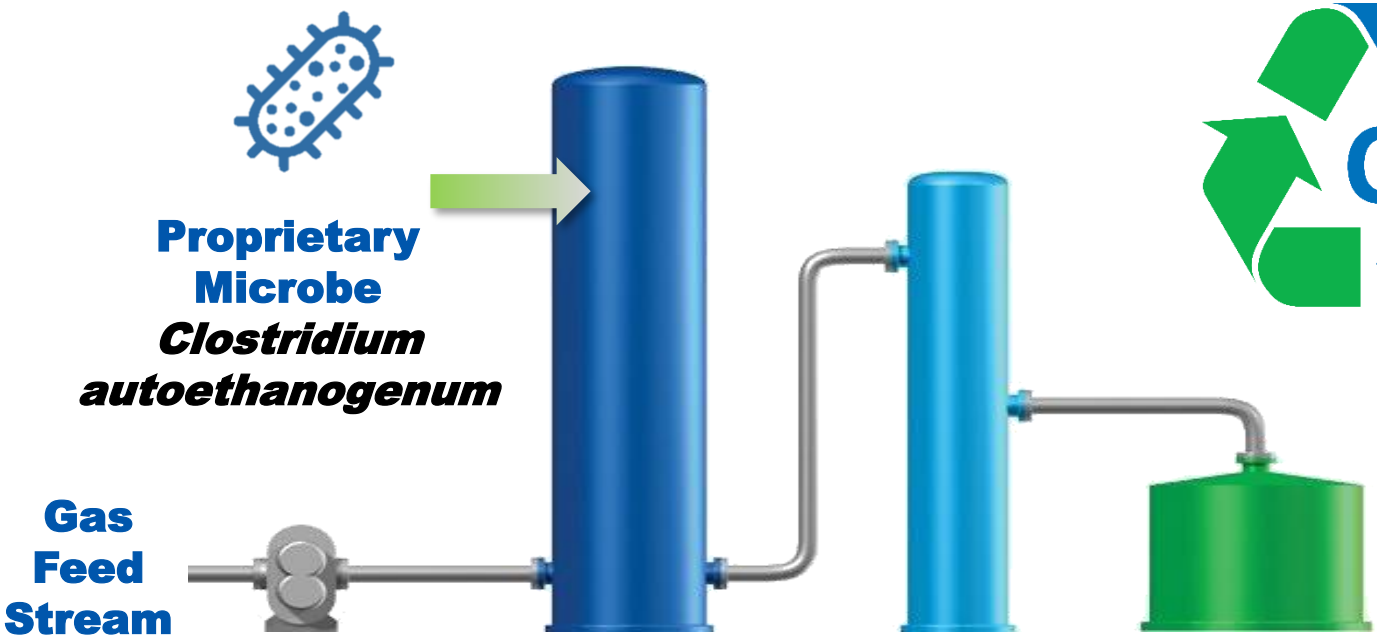
From Waste to Conversion-Ready Feedstocks

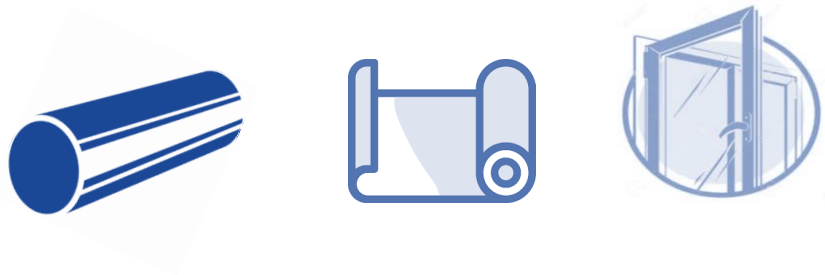
Feb. 19 & 20, 2020

Crystal City, Arlington, VA

Recycling Carbon 101

Industrial Off Gas, Biomass, MSW Syngas





Liew, Köpke (2016). *Frontiers Microbiol* 7, 694. DOI: 10.3389/fmicb.2016.00694
Köpke et al (2011) *Curr Opin Biotechnol* 23: 320. DOI: 10.1016/j.copbio.2011.01.005

Ethanol Build Out

ArcelorMittal
21M gpy
Steel Off Gas

首钢朗泽
Shougang LanzaTech
16M gpy
Steel Off Gas

12M gpy
Gasified Biomass
AEMETIS

SEKISUI
165k gpy
Gasified MSW

11M gpy
Refinery Off Gas
IndianOil

17M gpy
Ferroalloy Off Gas
SWAYANA

Converting MSW to Ethanol

SEKISUI

World-first demonstration of continuous direct ethanol production from MSW-derived syngas

LanzaTech Perspective on MSW

- Unsorted, non-recyclable MSW represents a significant resource for making fuels and chemicals.
- Conversion of plastic waste and RDF to syngas is already practiced in some places (e.g. Japan).
- One gap is the lack of data regarding feedstock composition and its impact on syngas or other intermediates.
  - Current MSW operations are primarily landfilling or incineration, which are not sensitive to composition.
  - Therefore, very little long-term composition data exist.
- Composition of waste streams has significant implications for downstream conversion.
  - Thermochemical processes typically require homogeneous inputs, with additional capital investment to further process waste feedstocks and treat produced syngas.
  - Biological processes enable conversion of heterogeneous waste streams and reduced gas treatment.
- Successful MSW utilization projects require technology investments and supportive policies
  - Investment in MSW processing technologies and large-scale demonstrations
  - Policies that prioritize products from MSW over power
  - Policies that put products from non-recyclable MSW on par with traditional bioproducts

Mechanical Recycling

Gasification

Fermentation to Chemicals

Conversion to Plastics

Plastic Waste

Collection of Waste Plastic