CAAFI Biennial General Meeting

Parade of Commercialization Efforts

Chris Wilcox

Gevo Incorporated

December 2018

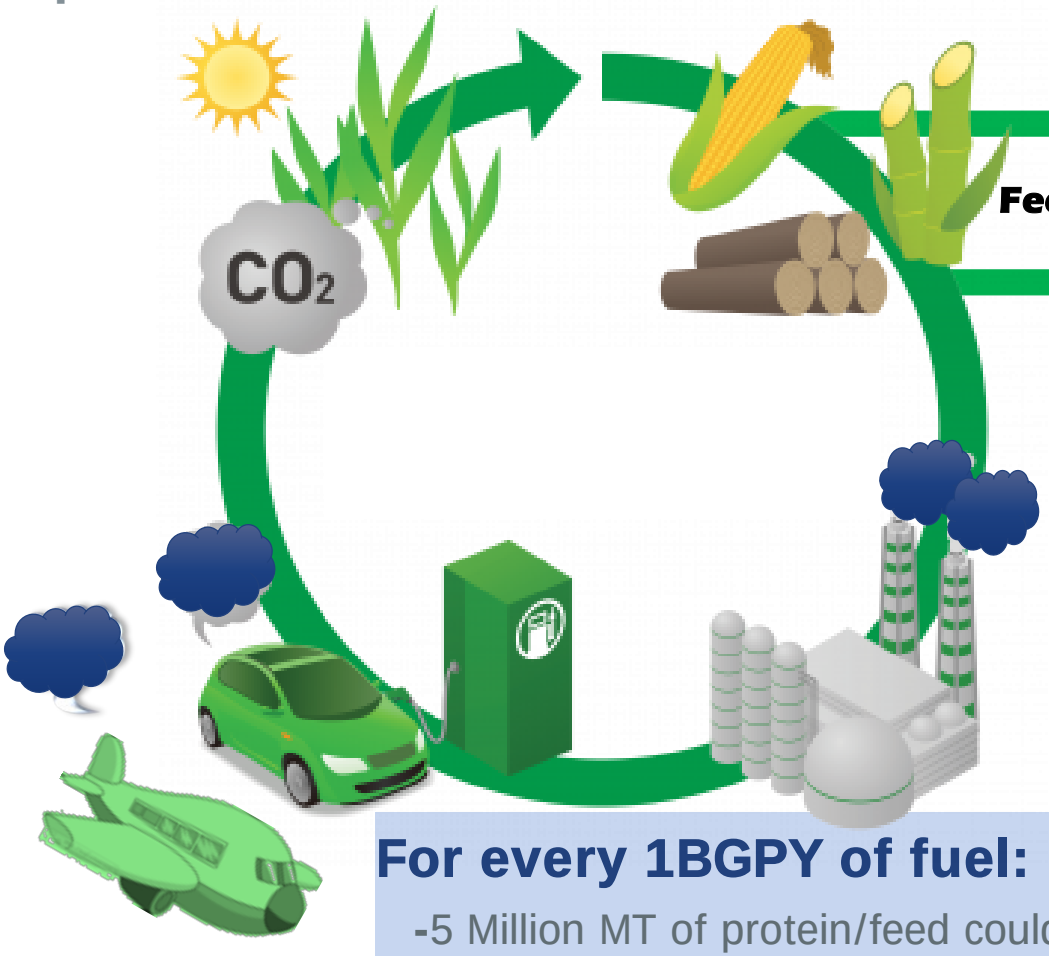
FORWARD-LOOKING STATEMENTS

Certain statements within this presentation may constitute “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. Such statements relate to a variety of matters, including but not limited to: Gevo’s technology and capabilities to produce renewable fuels, market demand for renewable fuels, low-carbon sustainable corn cultivation and sustainable farming practices, Gevo’s solution to reduce green house gas emissions, the use of corn as a feedstock and other statements that are not purely statements of historical fact. These forward-looking statements are made on the basis of the current beliefs, expectations and assumptions of Gevo’s management and are subject to significant risks and uncertainty. All such forward-looking statements speak only as of the date they are made, and Gevo assumes no obligation to update or revise these statements, whether as a result of new information, future events or otherwise. Although Gevo believes that the expectations reflected in these forward-looking statements are reasonable, these statements involve many risks and uncertainties that may cause actual results to differ materially from what may be expressed or implied in these forward-looking statements. For a discussion of the risks and uncertainties that could cause actual results to differ from those expressed in these forward-looking statements, as well as risks relating to the business of the company in general, see the risk disclosures in Gevo’s Annual Report on Form 10-K for the year ended December 31, 2017 and in subsequent reports on Forms 10-Q and 8-K and other filings made with the Securities and Exchange Commission by Gevo.

This presentation is based on information that is generally available to the public and does not contain any material, non-public information. This presentation has been prepared solely for informational purposes and is neither an offer to purchase nor a solicitation of an offer to sell securities.

THINKING ABOUT THE CYCLE

More is possible!



~5kg high protein feed/hydrocarbon gallon

100% of the nutritional value of corn is captured in the feed

Avg ~0.8 kg CO2 captured/gallon of Jet (range of 0-4kg/gal)

For every 1BGPY of fuel:

-5 Million MT of protein/feed could be produced

-800Kt to 4 million MT of carbon could be capture in soil

FACTS ON GEVO'S SUSTAINABLE AVIATION FUEL

- Gevo's Alcohol to Jet Synthesized Paraffinic Kerosene (ATJ-SPK) pathway was approved by ASTM in April 2016
  - ASTM certified
  - Blend limit for ATJ-SPK is 50%
  - Drop-in alternative to conventional aviation fuel
  - No Sulfur, no particulates, and an undetectable freezing point
  - Higher energy density
- Gevo has demonstrated the use of 50/50 ATJ on an F/A -18 "Hornet" in supersonic flight in 2014
- Gevo flew the first flight ever utilize cellulosic feedstock for ATJ-SPK

GEVO'S FLY GREEN DAY AT O'HARE

- Worked with BP to supply O'Hare (for the first time) with Gevo's ATJ
  - Blended, certified, pipelined to O'Hare Fuel Farm via commercial infrastructure
- First time renewable jet was supplied to O'Hare using on & off airport infrastructure
- Eight airlines and FedEx participated and flew the renewable fuel
  - Lufthansa
  - United Airlines
  - Etihad
  - Japan Airlines
  - Cathay Pacific Airways
  - Korean Air
  - Atlas Air
- Demonstrated and set the precedent that commercial supply logistics is possible

FLY GREEN
Fueled by Gevo

GEVO'S AND VIRGIN AUSTRALIA FLY GREEN IN BRISBANE

- Initial portion of a 12-18mo project

- Partnership between Virgin Australia, Gevo, Queensland Gov't, Caltex, & Brisbane Airport
- First time renewable jet was supplied in Australia using the general fuel supply system
- Biojet has now been used to to fuel 195 domestic and international flights out of Brisbane

- We (Gevo) feel Australia has tremendous long term potential in SAF
  - Proved out commercial logistics to hydrate and on-wing
  - Better understanding of associated costs
  - Provide momentum for future project development

GEVO'S AND AVFUEL FLY GREEN AT VAN NUYS

- Business Jets Fuel Green: A Step Toward Sustainability
  - Van Nuys is one of the worlds busiest general aviation airports
- Renewable jet fuel has a market outside airlines
  - Demand in general aviation and business travel
- A fully collaborative effort between:
  - Gevo
  - Avfuel Corporation
  - Bombardier Business Aircraft
  - Phillips 66
  - World Fuel Services
  - General Aviation Manufactures Association, International Business Aviation Council, Van Nuys Airport Association, National Air Transportation Association, National Business Aviation Association
- Demonstrates the general aviation industries commitment to emissions reduction and aim for carbon neutrality from 2020 forward

Thank You

Jim Andersen
Honeywell UOP

Advanced Technology for Renewable Fuels Production

CAAFI Biennial General Meeting (CBGM), Washington DC

Dec 4 2018

Honeywell UOP

UOP Renewable Technology Solutions

Inedible Fats, Oils & Grease

Petroleum Distillate

UOP Ecofining™ Process → Honeywell Green Diesel™

UOP Ecofining™ Process ⇢ Green Jet (optional)

UOP Renewable Jet™ Fuel Process → Honeywell Green Jet™

UOP Renewable Jet™ Fuel Process ⇢ Green Diesel

UOP Distillate Unionfining™ Process → Partial Green Diesel

UOP Distillate Unionfining™ Process ⇢ Partial Green Jet

Biomass

Petroleum VGO

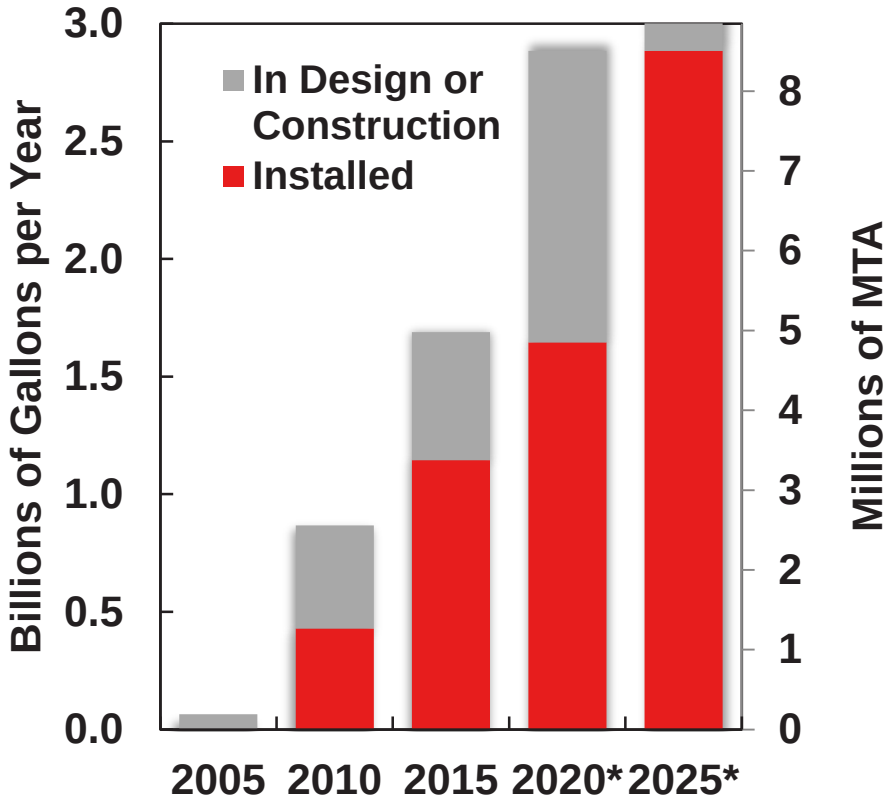
RTP® (Pyrolysis) → **UOP FCC Co-Processing** → RF Gasoline

UOP FCC Co-Processing → RF Diesel

Proven Technologies for Feedstock Flexible Drop In Fuels

Progress Producing Advanced Renewable Fuels

Worldwide Production Capacity for 100% Renewable Diesel/Jet



* Expected as of Nov 2018

- Renewable Diesel/Jet is the third largest type of biofuel produced
  - 3.7% of global biofuels demand
  - 0.2% of global diesel & jet fuel demand
  - Predominantly diesel
- Renewable Jet (HEFA SPK) is being commercially produced using Honeywell UOP technology and is in use in regular commercial flights
- Five aviation biofuels currently approved by ASTM International
  - Additional aviation biofuels are being tested under ASTM
  - Includes testing by Honeywell

Renewable Diesel/Jet is the Fastest Growing Supply of Biofuel

Operating Plants Using UOP's Renewable Fuel Technology

2013

Diamond Green Diesel

- 900,000 MTA Feed (18,000 BPD)
- First New Ecofining Unit installed at Norco, Louisiana
- Expansion to 2,400,000 MTA (48,000 BPD) in progress

2014

ENI #1

- 360,000 MTA Feed (7,200 BPD)
- First refinery retrofit to Ecofining Unit at Venice, Italy
- Expansion to 560,000 MTA (11,200 BPD) in progress

2016

World Energy / AltAir

- 150,000 MTA Feed (3,000 BPD)
- First refinery retrofit to UOP Renewable Jet Fuel Unit at Paramount, California
- Produces Green Jet and Green Diesel
- Expansion to 1,000,000 MTA (20,000 BPD) announced

2018 Expected

ENI #2

- 720,000 MTA Feed (14,400 BPD)
- Second refinery retrofit to Ecofining Unit at Gela, Italy
- Under Construction

Each owner is implementing additional projects using UOP technology

UOP Renewable Technology Solutions

Inedible Fats, Oils & Grease

Petroleum Distillate

UOP Ecofining™ Process → Honeywell Green Diesel™
UOP Ecofining™ Process ⇢ Green Jet (optional)

UOP Renewable Jet™ Fuel Process → Honeywell Green Jet™
UOP Renewable Jet™ Fuel Process ⇢ Green Diesel

UOP Distillate Unionfining™ Process → Partial Green Diesel
UOP Distillate Unionfining™ Process ⇢ Partial Green Jet

Biomass

Petroleum VGO

RTP® (Pyrolysis) → **UOP FCC Co-Processing** → RF Gasoline
UOP FCC Co-Processing → RF Diesel

Proven Technologies for Feedstock Flexible Drop In Fuels

Renewable Fuels from Co-Processing of RTP Bio-Crude

Biocrude

Vacuum Gas Oil (VGO)

LPG

Cat Gasoline

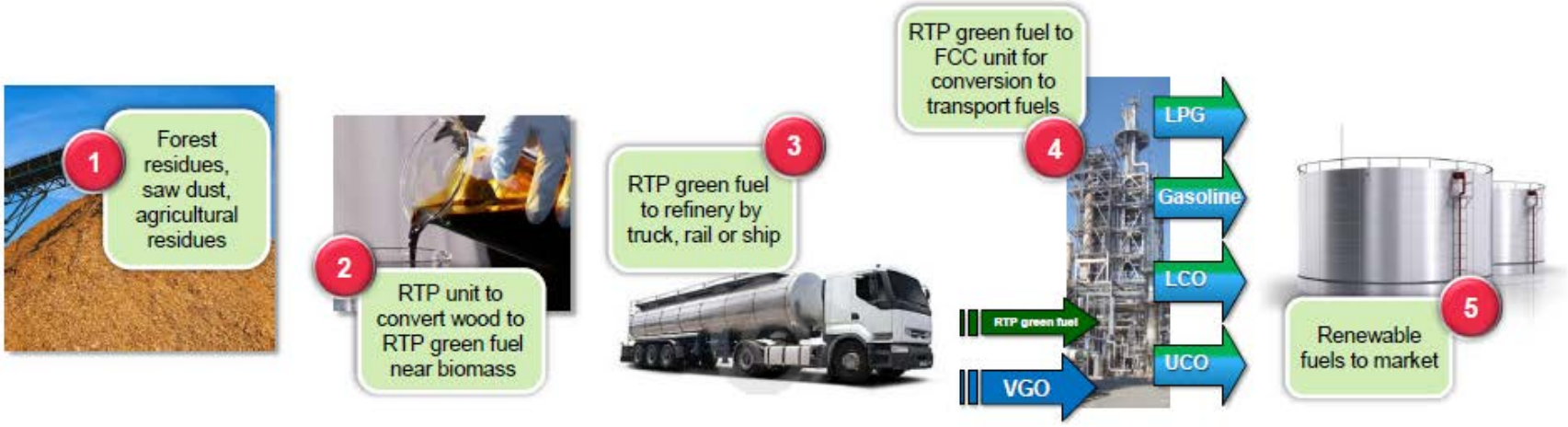
Light Cycle Oil (LCO)

Main Column Bottoms (MCB)

Partially renewable products sent downstream

Utilize existing refinery assets & infrastructure

Supply Chain Consists of Multiple Steps



Forestry / Biomass company scope

Oil Refinery scope

Envergent TECHNOLOGIES
A Honeywell Company

Honeywell UOP

UOP is Addressing Challenges in Refinery Implementation

Commercial Status

- Three commercial-scale FCC co-processing trials completed
- Multiple full-scale installations of technology scheduled in 2018/19
  - USA
  - Europe
- Regulatory recognition and verification
  - Completion of US EPA Part 80 Facility Registration for co-processing application
  - Completion of ISCC certification for recognition of biofuel in Europe

Optimistic About Future of Biofuels

Increasing Green Diesel and Green Jet activity across the globe

- North America/Europe/ Middle East/Asia
- New units as well as revamps
- DHT co-processing

Growing interest from refiners for FCC co-processing

- Numerous projects to implement tech in US and Europe underway

Driven by:

- Climate change and GHG reduction commitments
- Air pollution mitigation
- Corporate social responsibility
- Continuing development of new technology pathways

The Future Of Biofuels Is Bright

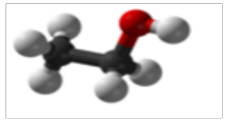
LanzaTech

No Carbon Left Behind: Alcohol-to-Jet

Alcohol-to-Hydrocarbons

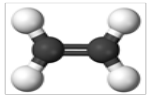
Ethanol → Dehydration → Oligomerization → Hydrogenation → Fractionation → Jet & Diesel

Pacific Northwest NATIONAL LABORATORY

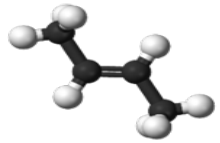


Ethanol

$-H_2O$

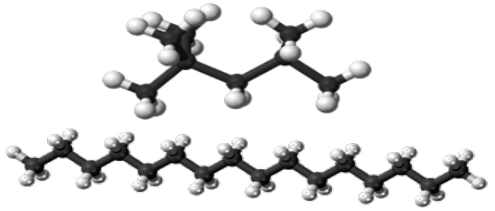


Ethylene



C_4- C_{24} Olefins

$+ H_2$



Paraffins and IsoParaffins

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

DARPA DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

FEDERAL AVIATION ADMINISTRATION

Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons

BOEING

首钢朗泽 Shougang LanzaTech

RSB Roundtable on Sustainable Biomaterials www.rsb.org

virgin atlantic

HSBC

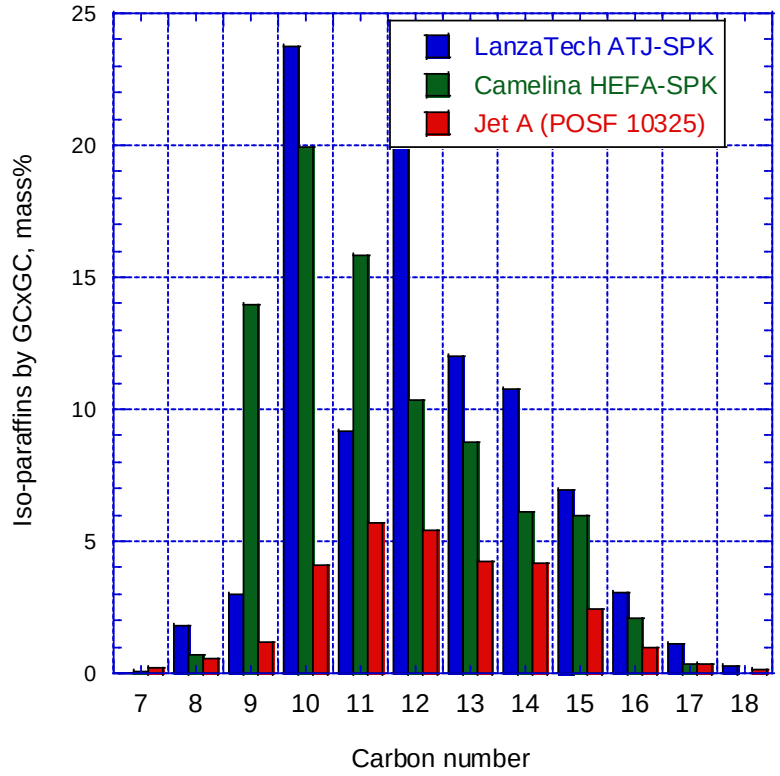
Carbon Smart™

LanzaTech

October 3, 2018

LanzaJet Property Highlights

Fuel Property	Jet A Spec	LanzaTech ATJ-SPK	50/50% v with Jet A
Freeze Point, °C	-40 max	-61	-54
Energy Density, MJ/kg	42.8 min	44.4	43.8
Thermal Stability	Baseline	Excellent	Excellent
Viscosity @ -40 °C mm^2/sec	12 max	7.0	9.3
Hydrogen %	13.4 min	15.1	14.5
Aromatics %	8 min, 25 max	Nil	8.8
Sulfur, total mass %	0.30 max	<0.001	0.02



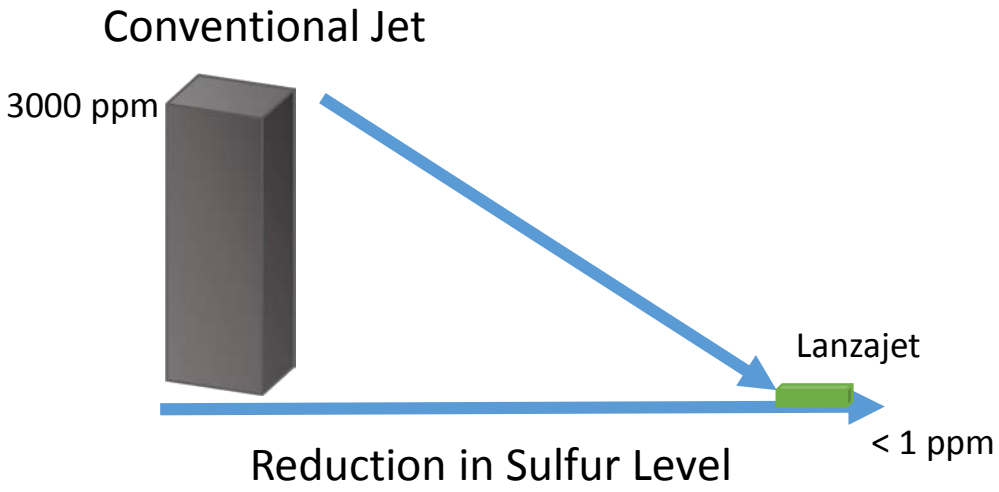
Meets or Exceeds Critical Jet Fuel Specifications
Neat fuel primarily isoparaffins with <0.2% aromatics

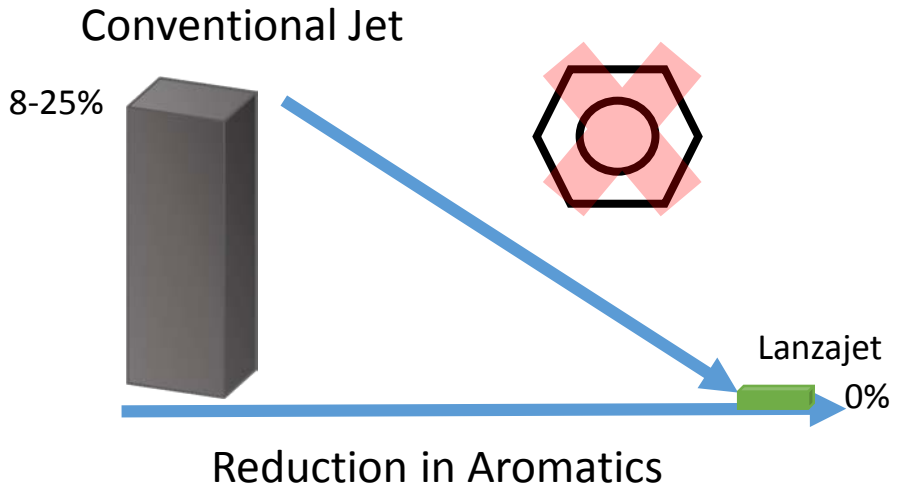
Carbon number range similar to conventional jet fuel and other SPK's

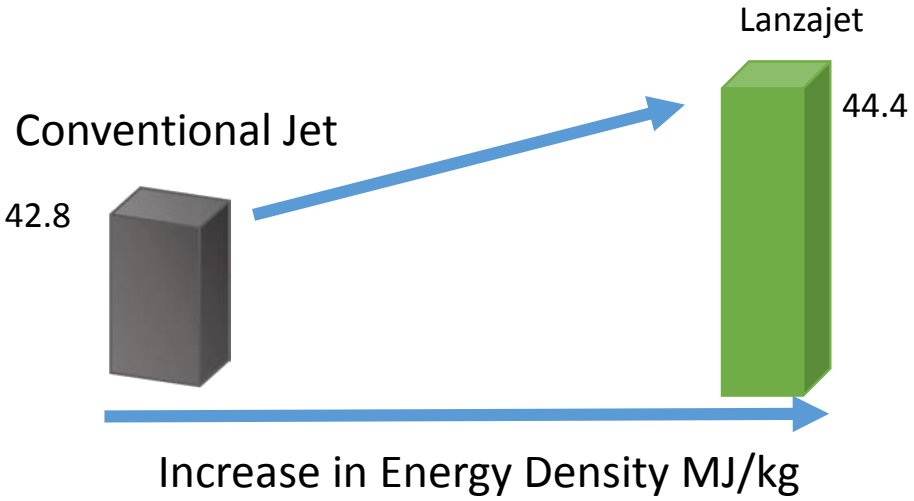
On April 1, 2018 ASTM Intl. revised D7566 ATJ SPK Annex A5

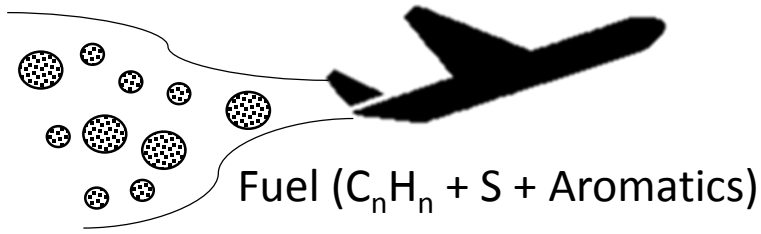
- **Added Ethanol as a feedstock**
- **Increased final blend ratio to max 50 %**

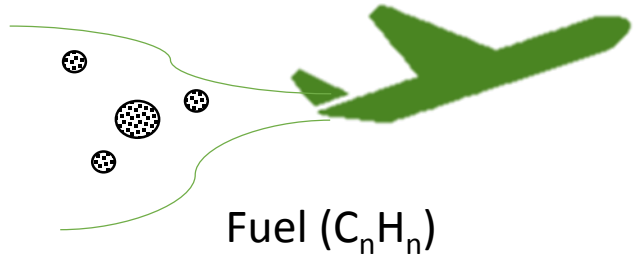
Low Carbon Jet Benefits





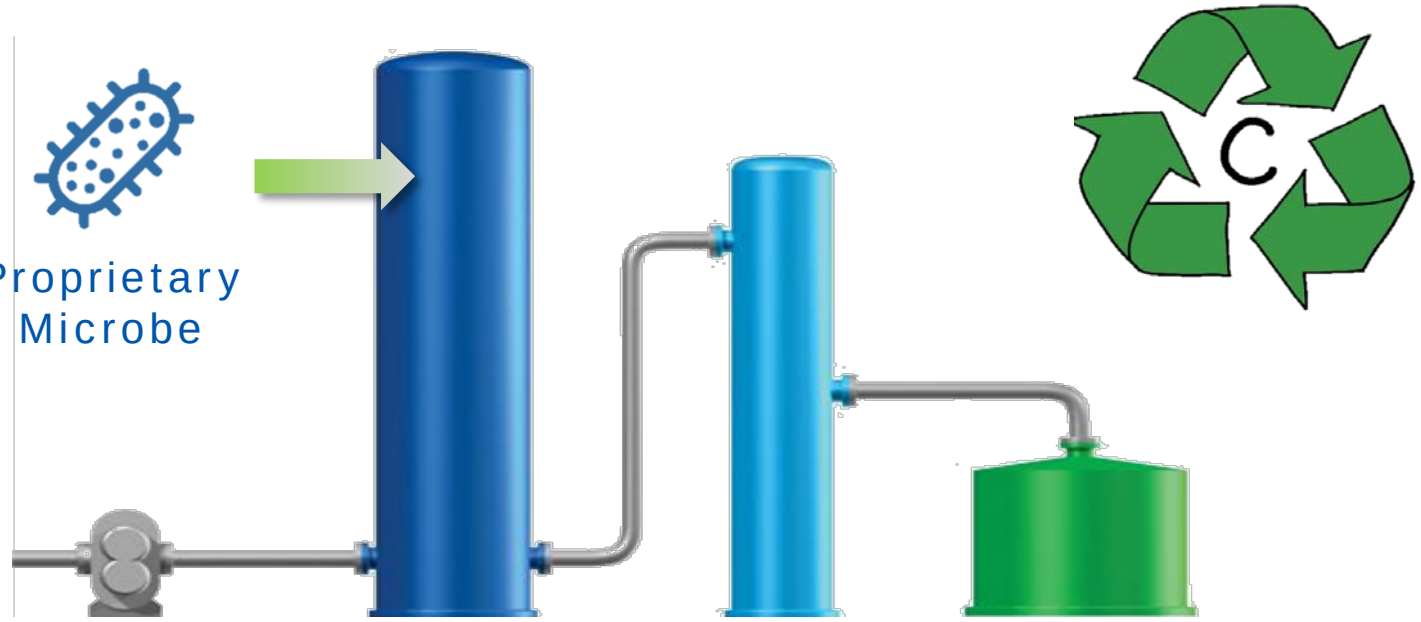


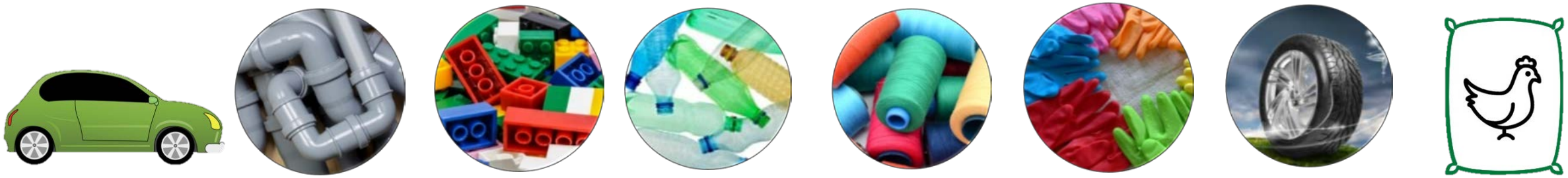




Recycling Carbon

Industrial Off Gas
Biomass, MSW Syngas





>100 tons ethanol per day

Local Input Global Impact

首钢朗泽
Shougang LanzaTech

ArcelorMittal

SWAYANA

इंडियनऑयल
IndianOil

AEMETIS

SEKISUI

Potential AtJ from Gas Fermentation

Totals/year	Relative to Today
270B Gallons AtJ	> today's aviation fuel use
~63,000 planes on the ground	~250% of commercial flights
1.7B tonne CO_2	~5% of Anthropogenic Global CO_2

Significant AtJ Potential

Path to Economic Volumes

2015
Lab Scale

Pacific Northwest NATIONAL LABORATORY

2016
Pilot Scale

Freedom Pines Biorefinery

2020
10M gpy

Freedom Pines Biorefinery

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

2022
30M gpy x3

LanzaJet

"The fight is won or lost far away from witnesses - behind the lines, in the gym and out there on the road, long before I dance under those lights."

Muhammad Ali

December 2018

Velocys Alternative Jet Fuels
CAAFI Biennial General Meeting

VELOCYS

Velocys – the renewable fuels company

Technology demonstrated at commercial scale

— Provides foundation for development of integrated biorefineries being pursued by Velocys and its partners

Commercial Fischer-Tropsch reactors in situ at ENVIA, Oklahoma City

Team with exceptional experience of designing, commissioning and operating synthetic fuel facilities

£

Traded on AIM market of London Stock Exchange (VLS.L)

Renewable fuels from alternative feedstocks

- Velocys is developing a series of renewable fuels plants in the U.S. and U.K.
- Gasification through FT pathway supports a range of feedstocks, including forestry residues, agricultural wastes, and municipal solid waste
- ~24m gpy project in Mississippi entering FEED
- Project in the U.K. currently in pre-FEED

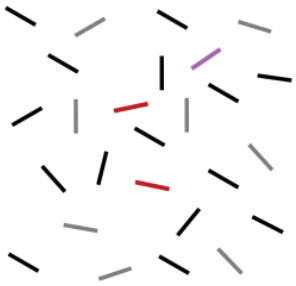
Harvest residue

MSW

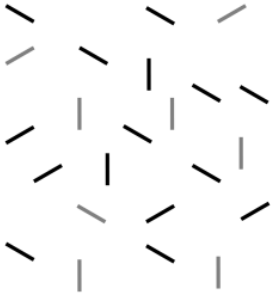
Process overview
Using established technologies

Feedstock conditioning facility	Gasifier	Syngas clean-up	Fischer Tropsch (FT)	Hydrocracker
Physical preparation of the feedstock	Thermally and chemically break the material into its component parts to produce syngas	Physically and chemically remove impurities from the syngas	Chemically react the syngas to form long chain hydrocarbons	Chemically cut the long hydrocarbons to form jet fuel and naphtha

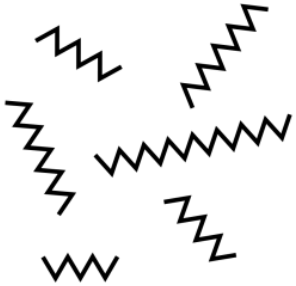
Waste Streams



Syngas



Clean syngas



FT product

Finished products

Drop-in low-GHG jet fuel with added environmental benefits

- Our route to jet fuel from waste reduces lifecycle greenhouse gas emissions by >70%
- Meets specifications for synthetic paraffinic kerosene (SPK)
  - Globally approved at up to 50% in commercial aviation (Jet A1/Jet A)
- Widespread use would improve air quality around airports
  - Over 90% reduction in emissions of particulate matter and sulphur
  - Over 20% reduction in carbon monoxide
  - Over 30% reduction in hydrocarbons

FT diesel (left) versus conventional diesel (right)

Bayou Fuels – Mississippi Project

- Velocys is developing a 24 mmgy woody biomass to middle distillate bio-refinery in Natchez, MS.
- Utilizes forestry residues and waste to achieve mid 20s CI
- Permitting underway with “FONSI” for environmental assessment
- Extensive pre-FEED engineering work combined with integrated demonstration unit has materially de-risked the project
- Currently engaged in partnering exercise, expect to commence FEED in 2019 with FID in 2020

Harvest residue

Project Partners

USDA SMBC TRI leidos PQ Corporation AECOM HALDOR TOPSOE

Renewable jet fuel from household waste

Project to build U.K.’s first commercial waste-to-fuels plant

Waste to jet fuel plant

- Over 70% reduction in greenhouse gases
- Around 30,000T/year of clean “drop-in” fuel
- Sustainable feedstock - avoids ~400,000T/year of non-recyclable waste going to landfill
- Around 100 full time operational roles

Partners bring key strengths for U.K. project

Project is aligned to the partners' core strategies

- All invested in project development
- Intend to underpin revenues through long term commercial feedstock / offtake agreements

BRITISH AIRWAYS

Market pull (renewable fuels critical to achieving carbon footprint reduction)

Technical expertise and fuels offtake capability (strategic intent to improve sustainability of fuels)

VELOCYS

Proven process combined with development and delivery of operational renewable fuels plants. Leading the UK project on behalf of the partners

U.K. Project status

Project passed second stage gate in June 2018, securing £4.9M to support next stage

Pre-FEED engineering contractor kicked off carrying out optioneering studies

Site selection in progress

Developing feedstock sourcing strategy

Understanding financing requirements through active engagement

Velocys Roadmap

Building a Portfolio

- Velocys sees a pathway for a series of bio refineries that deliver over 200mm gallons of renewable fuels (middle-distillates) in less than 10 years