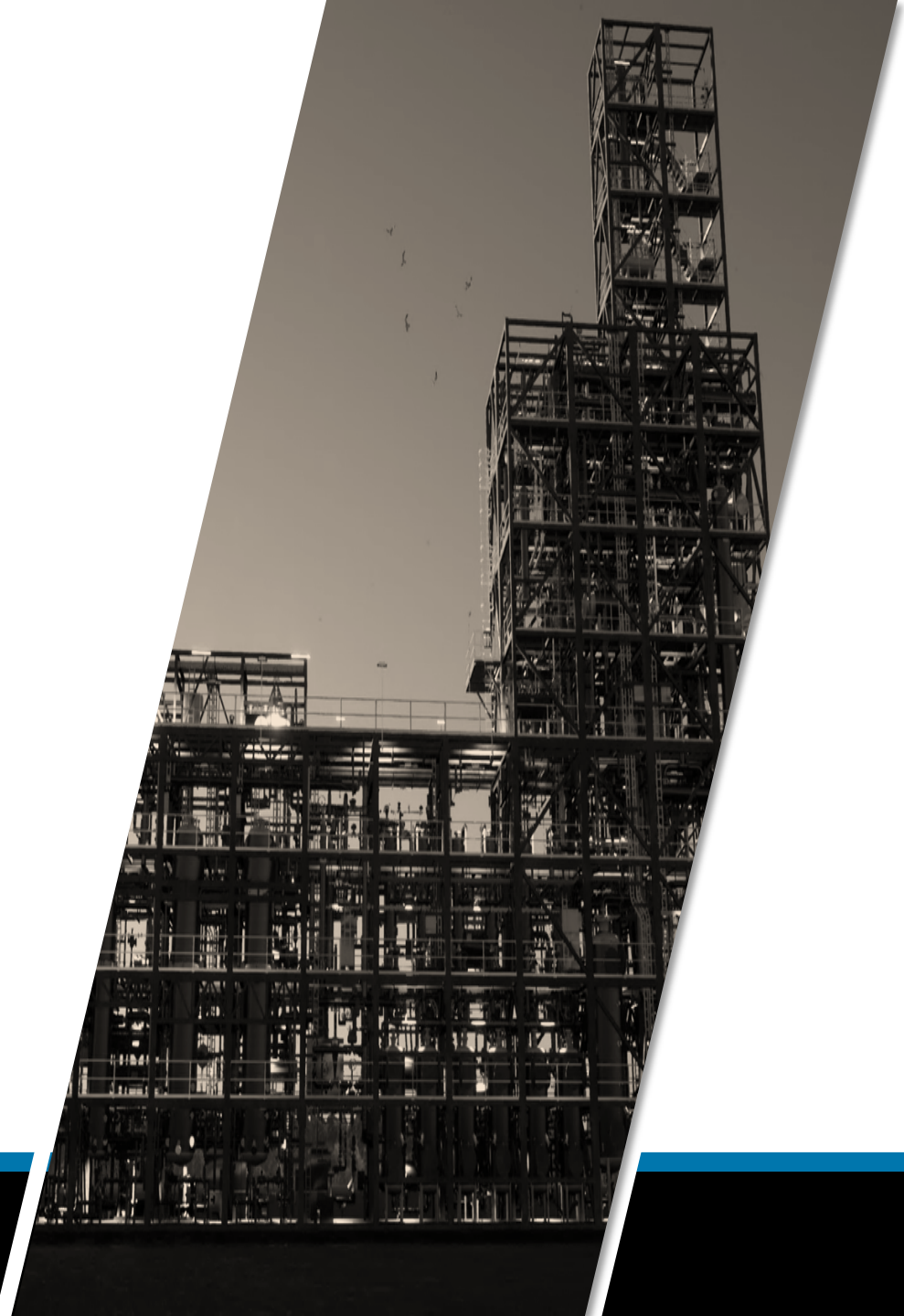
LanzaJet

Overview for New York Energy Forum

Alex Menotti
Vice President, Government Affairs, Policy, and Sustainability
March 9, 2023



Non-Confidential

Catalyzing a New Global SAF Market for Commercial Aviation

	US	World
Jet Fuel Consumption (Pre-Covid)	**~21B+** Gallons / year	**~96B+** Gallons / year
Sustainable Aviation Fuel Production (2022)	**~16M+** Gallons / year	**~119M** Gallons / year

+

- **New Goals**
- **New Mandates**
- **New Incentives**
- **New Scale in Technology & Production**

Catalyzing a New Global Market

Sources: World = IATA, US = Various including Regulatory Incentives, including RFS

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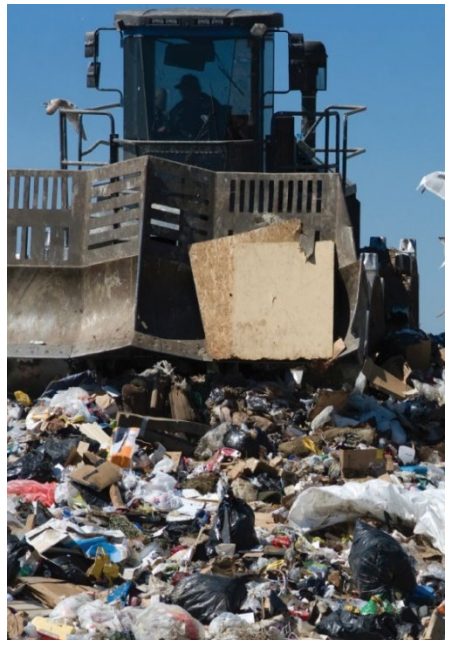
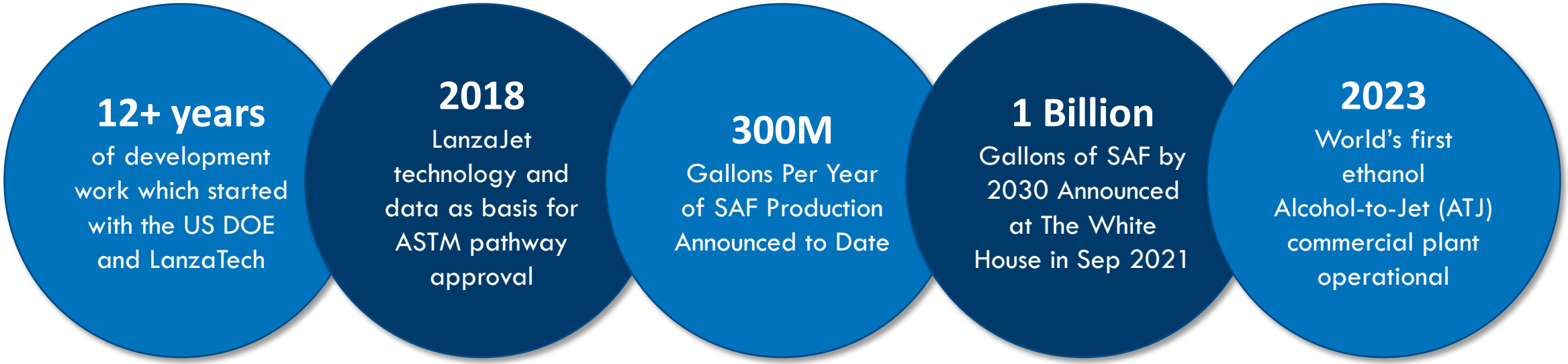
Ethanol-to-Jet: Foundation for Fully Scalable SAF Industry




Every Waste Resource Including CO2 Can be Utilized
In the Integrated LanzaTech-LanzaJet Solution

LanzaJet's Record of Accomplishments & Commitments



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Supported by World-class Investors and Funders

- ✓ Funding commitments
- ✓ Commercial-scale projects commitments
- ✓ Offtake commitments
- ✓ Knowledge, support, and secondees commitments
- ✓ Feedstock supply flexibility commitments
- ✓ Innovation commitments

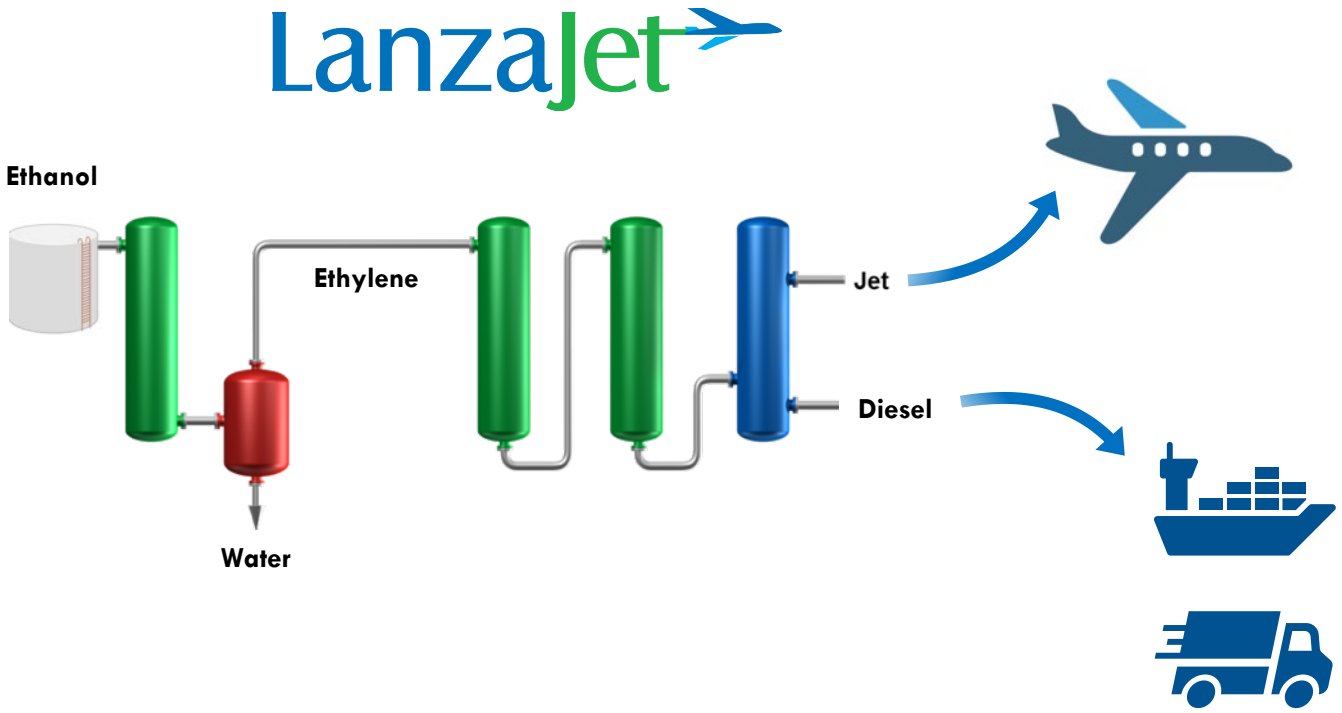
Existing Ethanol Industry + Developing Waste-based Supply Chain

A **Leveraging & Transitioning Existing Ethanol Supply**

- Existing low-CI ethanol production
- Cellulosic ethanol
- Waste-based ethanol

B **Building New Waste-Based Ethanol Supply**

- Industrial / landfill off-gasses
- Agricultural waste and residues
- Municipal Solid Waste (MSW)
- Corn fiber cellulose / sugarcane bagasse
- Direct Air Capture (DAC) – CO_2 + H_2



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An Abundance of Low Carbon Sources Exists

Illustrative Sources of Low-CI Ethanol

North America

- Energy crops
- Ethanol mill CO_2
- Ag waste
- Woody Waste
- Landfill biogas
- Refinery Offgas

UK & Europe

- Woody waste
- Industrial & refinery offgases
- Municipal solid waste (MSW)

Australia & NZ

- Waste from energy crops
- NZ: Woody waste

Canada

- Woody waste
- Refinery offgasses

India

- Energy crops
- Ag waste
- Industrial & refinery offgasses
- MSW

Asia & SE Asia

- Energy crops
- Ag waste
- Industrial & refinery offgasses
- MSW

Active Development Efforts

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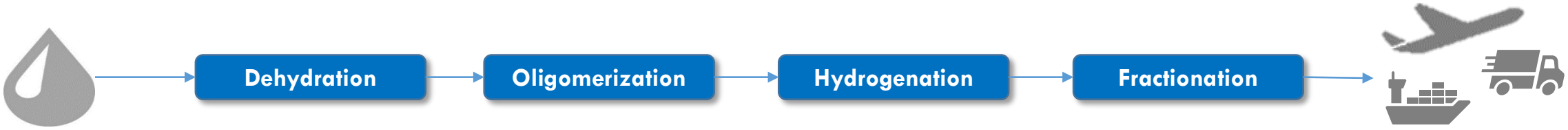
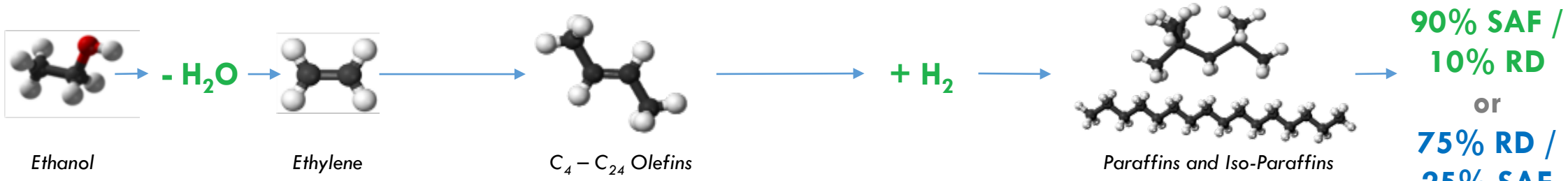
Converting Ethanol to Drop-in SAF and Renewable Diesel (RD)





Stakeholders in our Technology Development

首钢朗泽 Shougang LanzaTech · U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy · Pacific Northwest NATIONAL LABORATORY · RSB · FEDERAL AVIATION ADMINISTRATION · BOEING · GE · virgin atlantic · HSBC · DARPA DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

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Meeting & Exceeding ASTM Jet Fuel Specifications

Fuel Property	Jet A Spec	LanzaJet 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

- US DOE supported technology development program
- Meets and exceeds ASTM Specifications (D7566), approved in 2018 as a pathway
  - Added Ethanol as a pathway + feedstock
  - Increased final blend ratio to max 50%
- Clean burning: No sulfur, 95% less particulates
- Blend up to 50% with fossil jet fuel as allowed under ASTM
- Renewable diesel co-product for road, marine, and stationary
- Produce from ANY source of ethanol

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Completed World First Carbon Capture and Utilization Transatlantic Flight

Airline: Virgin Atlantic

Route: Orlando to London

Date: October 3, 2018

Completed Boeing delivery flight

Airline: ANA

Route: Seattle to Tokyo

Date: October 30, 2019

EPIC FUELS · BOEING · ANA · MITSUI & CO.

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World's First ATJ Biorefinery Fully Erected

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Freedom Pines Fuels Sets Standard as First of Many Global Projects

Pilot Plant
Georgia, USA

2014 – 2017

10M GPY
(29 KMTA)
(38 M LPY)

LanzaJet Freedom Pines Fuels
Georgia, USA

2023

30M – 120M+ GPY Each
(90 – 250+ KMTA)
(113 – 450+ M LPY)

FLITE
Central Europe

Vattenfall, SAS, Shell, and LanzaTech
Sweden

#1: Dragon (LT)
#2: Speedbird (BA)

IOC
India

Marquis SAF
Illinois

Suncor

Mitsui

Shell

Others
Various

2024 – 2026

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LanzaJet Leads the Industry with Fully Scalable Technology

✓ We start ethanol as a great building block

- Sustainably developed with low CI
- Enabling transition to 2G feedstock
- Flexible sources based on region of the world
- Significant volumes globally accessible and under development

✓ Use our proven and leading ATJ technology

- Developed over 12 years with the US Dept of Energy
- Low capital cost
- High carbon conversion
- Highest product selectivity available for SAF
- ASTM approved pathway using Lanza pilot plant and data

✓ Produce low-carbon, drop-in sustainable fuels

- Sustainable Aviation Fuel (SAF) and renewable diesel
- Commercial flights completed (ANA and Virgin)
- Commercial scale-up underway with 1B GPY (300M tons) production planned by 2030 with first biorefinery starting in 2023

LanzaJet

To preserve the world and the opportunity for future generations to fully experience it and thrive.

LanzaJet's Vision engineered by LanzaJet Employees

Someday is Now.

LanzaJet