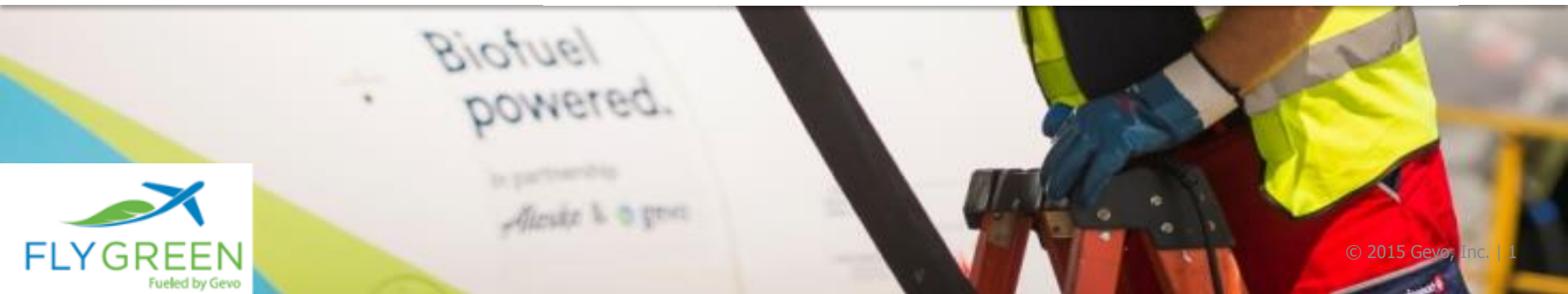




Alcohol to Jet

IATA Alternative Fuel Symposium
17 November 2017





Alcohol to Hydrocarbons



sustainable is attainable

- No Sulfur
- No Aromatics
- Lower Freeze Point $> -80^{\circ}\text{C}$
- Higher Overall Energy Density thru
 - Higher Heat of Combustion
 - Lower Physical Weight
- Lower Particulate Emissions

Renewable Jet from Cellulosic Sugars



NARA – Northwest Advanced Renewables Alliance (Gevo is the technology supplier for fermentation and Renewable Jet) has successfully completed a demonstration project to convert wood waste to jet fuel.

NARA SUPPLY CHAIN

Northwest Advanced Renewables Alliance



FRP

FOREST RESIDUES PREPARATION

Primary feedstock targets include forest residues from logging and thinning operations. We are also considering mill residues and discarded woody material from construction and demolition, in regions where these materials are underutilized.



T

TRANSPORTATION

Feedstocks are transported from the collection site to a conversion facility. Chipping can take place at the loading or in a preprocessing facility.



PT

PRE-TREATMENT

Wood chips are treated to make the sugar polymers (polysaccharides) accessible to degrading enzymes. These processes allow the lignin to be available for separation.



EH

ENZYMATIC HYDROLYSIS

Specific enzymes are added to hydrolyze (break) the polysaccharides and generate simple sugars (monosaccharides).



F

FERMENTATION

Specialized yeast convert the monosaccharides into isobutanol.



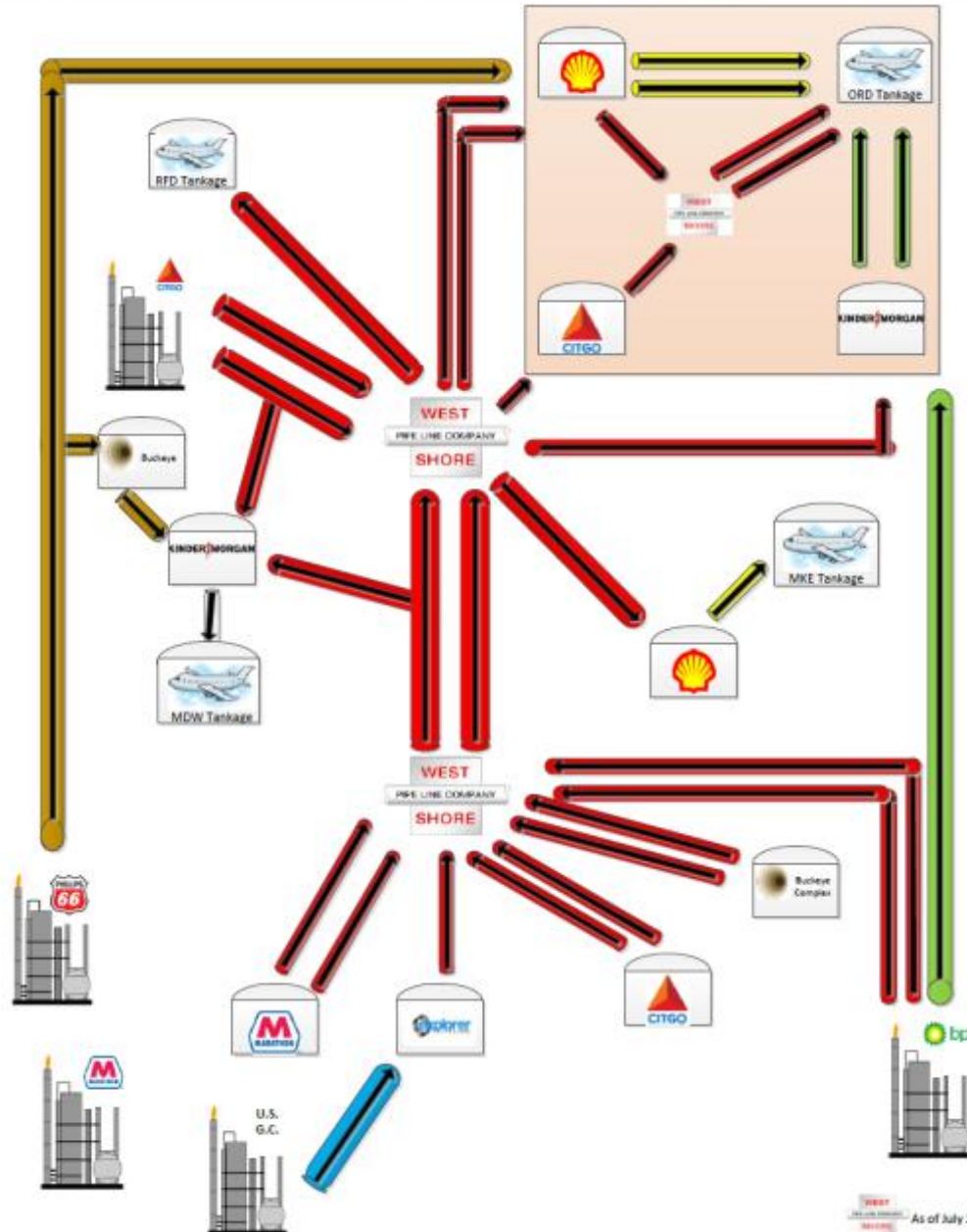
BCP

BIOJET & CO-PRODUCTS

Aviation fuels can be generated from the platform molecules derived from wood sugars. Lignin can be used to generate co-products such as agglomerates, structural materials and bio-based plastics. As an alternative, lignin can be burned to produce renewable energy.

First Commercial Volume Cellulosic Gevo ATJ Renewable Jet Fuel Flown on a commercial passenger flight
Alaska Airlines Flight 04
Seattle, WA to Washington D.C.
November 14th, 2016



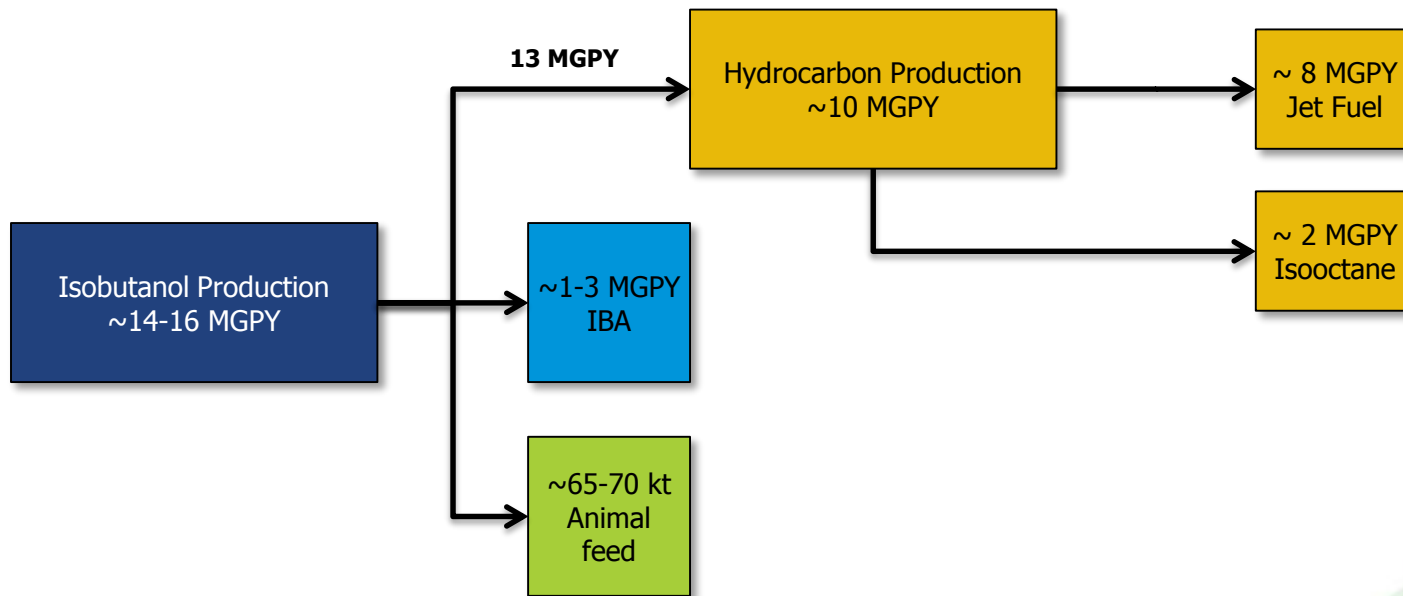


- We are seeing a view of the future where low carbon fuels can be substituted for petro-based fuels without sacrificing performance in the plane or through the infrastructure.
- With any supply chain system that is made up of multi stakeholders you need to have alignment from being to end
- Renewable jet fuel was supplied at Chicago O'Hare using the existing airport hydrant fueling infrastructure, supplied via pipeline off airport, and tankage on/off airport.



- Strategy: Leverage installed assets at Luverne and adding the capability to produce 7-10 MGPY of hydrocarbons.
- Luverne is a proving ground for products and supply chain development.
- Completed FEL2 (Front-end loading) engineering for construction which includes robust planning and design.
- Working on finalizing off take agreements and securing financing

Potential Buildout Overview





FLY GREEN

Fueled by Gevo

Thank you

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