



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

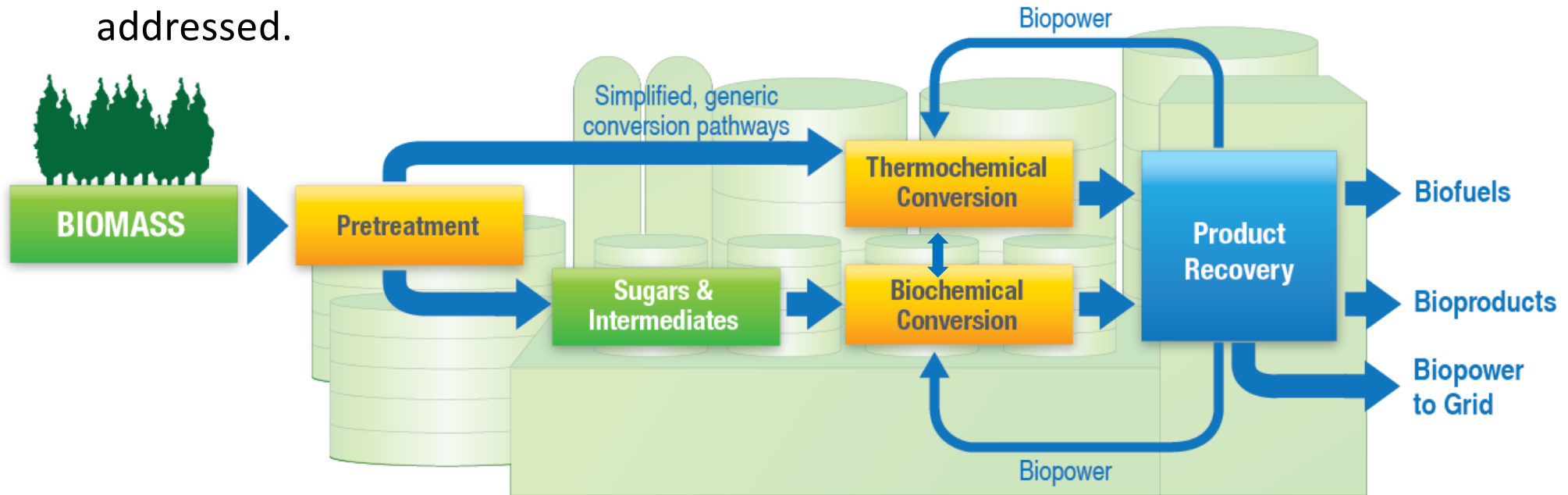
DOE Perspective on Aviation Biofuels

Aviation Sustainability Center (ASCENT) - FAA
Center of Excellence for Alternative Jet Fuels and
Environment

Zia Haq
Siva Sivasubramanian
Mark Shmorhun
Mohan Gupta
U.S. Department of Energy
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Biofuels Conversion Technologies

- DOE is focusing on advancing renewable gasoline, diesel, and jet fuels technologies, in addition to bioproducts and biopower.
- Technical, construction, operational and financial/market risks need to be addressed.



Key Challenges

Biomass	Pretreatment	Conversion	Product
<ul style="list-style-type: none"> • Reliable supply • Consistent quality • Affordable delivery 	<ul style="list-style-type: none"> • Biomass feeding, sizing and moisture • Solids handling • Material of construction 	<ul style="list-style-type: none"> • Products Yields • Material of construction • Catalysts • Fermentation organisms 	<ul style="list-style-type: none"> • Separations • Catalytic upgrading • Recycle loops

Estimated Production of HTL Bio-Crude from Waste Streams is Equivalent to 147 MM BBL (26.0%) of 2015 Jet Fuel Consumption in the U.S.

Feedstocks	Estimated Annual HTL Bio-Crude ¹	2015 Consumption ²	
		Jet Fuel	Diesel
Manure	63.33 MM BBL	11.21%	4.34%
Fattened Cattle Manure	17.62	3.12%	1.21%
Dairy Cow Manure	23.78	4.21%	1.63%
Swine Manure	21.93	3.88%	1.50%
Publicly Owned Treatment Works (POTW)	33.55 MM BBL	5.94%	2.30%
POTW (Primary + Secondary Sludge)	33.55	5.94%	2.30%
Food Waste	22.38 MM BBL	3.96%	1.54%
Food Waste	22.38	3.96%	1.54%
Fats, Oils, and Greases (FOG)	27.61 MM BBL	4.89%	1.89%
Animal Fats (Livestock + Poultry)	14.79	2.62%	1.01%
Brown Grease	7.71	1.37%	0.53%
Yellow Grease	5.11	0.90%	0.35%
Total	146.87 MM BBL	26.00%	10.07%

Jet Fuel Consumption
(2015):

565 MM BBL

Estimated Annual
HTL Bio-Crude
Production:

147 MM BBL
(26% of 2015 Jet
Consumption)

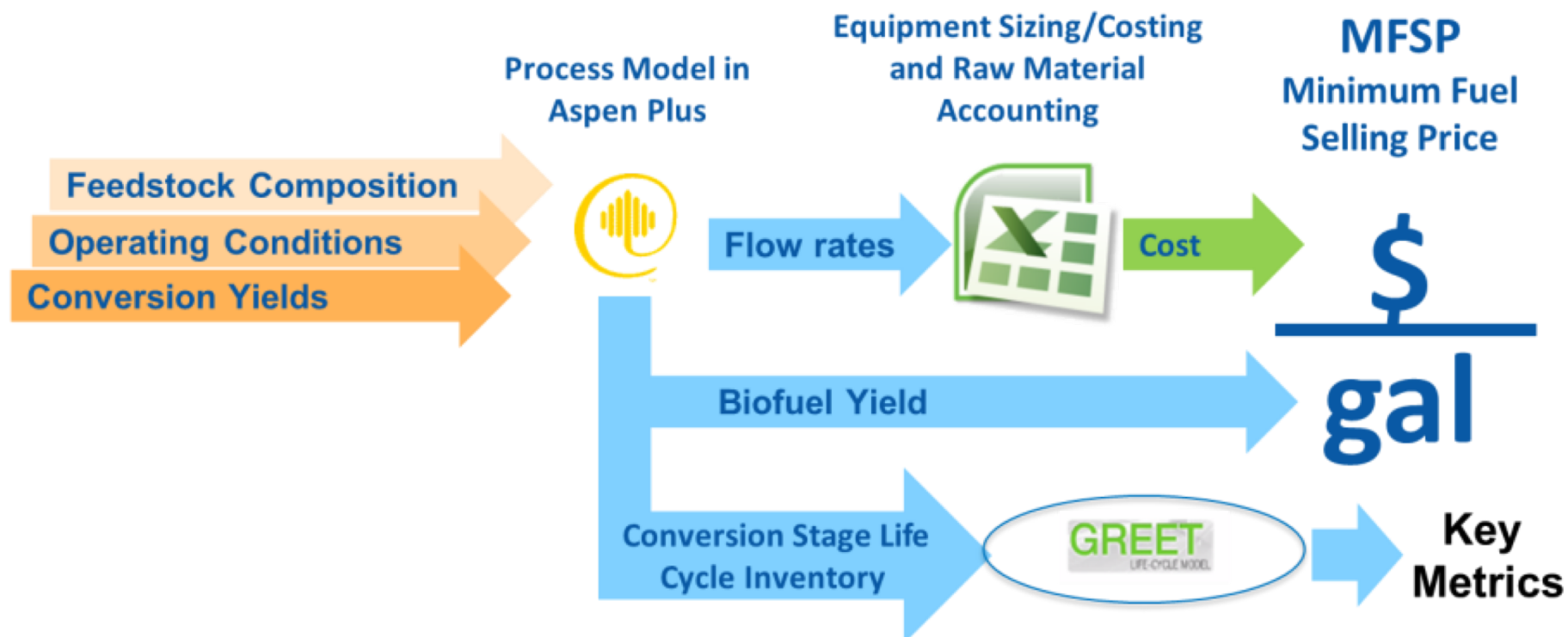
¹ Estimated annual bio-crude production assessment for each waste feedstock in the conterminous United States. Values from "Waste-to-Energy Biofuel Production Potential for Selected Feedstocks in the Conterminous U.S." by Skaggs, Richard L., et al.

² Jet Fuel and Diesel total from Table 3.5 of EIA Monthly Energy Review. Diesel consumption is taken from Distillate Oil consumption which consists of fuel oil and diesel fuel.

Key Wet and Gaseous Feedstocks Messages

- Wet and gaseous feedstocks constitute significant resources that already exist in distributed form. In many cases, collection systems are already in place.
- They frequently constitute a clear and present disposal problem
 - This issue has garnered serious Congressional attention
 - A.B. 1383 is a significant driver in California
 - The anthropogenic streams are only going to get larger as population grows
- These feedstocks require conversion solutions that are both geographically proximal to their sources, and tailored to the unique streams.
- While market challenges remain, these resources could present leading-edge niche opportunities for the bioeconomy of the future

Strategic TEA - Approach



- Modeling is rigorous and detailed with **transparent assumptions**.
- Baseline assumes n^{th} -plant equipment costs.
- Perform **pioneer plant** evaluations to understand the near-term cost of jet fuel production pathways.
- Quantify the underlying uncertainties through **sensitivity analysis**.
- Prioritize TEAs based on programmatic requests and data availability.

NREL: Strategic Support - Public DOE BETO Biofuels TEA Database

MOTIVATION: Support transparency of and ease of access to DOE BETO supported public techno-economic analysis data.

GOAL: Develop and publicly release a biofuels cost data base that summarizes key inputs utilized in conversion TEAs.

APPROACH:

- Currently contains over 40 DOE BETO funded conversion TEA studies, including design reports and publications.
- Reviewed by lead analysts to ensure consistency as well as modify format per suggestions (NREL/PNNL).
- Available for download on the Biomass KDF:
<https://bioenergykdf.net/content/beto-biofuels-tea-database>
- Will be updated yearly with new BETO funded TEAs.