Community BioRefineries
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Community BioRefineries,

"Production and Blending of Alcohol-to-Jet (ATJ) Sustainable Aviation Fuel (SAF) from Biobutanol: Strategic Role of Community BioRefinery as a Producer."

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This report positions Community BioRefinery as a primary biobutanol producer, exploring pathways for integrating our output into the SAF supply chain or, as a renewable gasoline and/or biodiesel additive to meet federal green mandates. Given the high costs associated with full SAF production, this analysis evaluates two primary options: partnering with specialized ATJ blenders for SAF production or direct sales of biobutanol to refineries for use as a renewable gasoline blend.

Report Overview

Abstract:
The Community BioRefinery's role as a biobutanol producer is assessing pathways for our product to fulfill renewable energy (fuels) mandates. With our bio-refinery capability of producing 3 million gallons of biobutanol annually, we could partner with ATJ blending facilities to convert this output into SAF that meets ASTM D7566 standards; or alternatively, supply refineries directly for use as a renewable gasoline, diesel blend. The latter could enable us to meet federal renewable fuel mandates without incurring the high costs associated with full SAF production.

1. Our Role in Biobutanol Production
Community BioRefinery is strategically positioned to serve as a reliable producer of biobutanol, an increasingly valuable feedstock for both SAF and renewable gasoline/diesel. Through advanced fermentation and separation processes, we produce high-quality biobutanol from renewable biomass sources, including feedstocks, cheese waste, sweet sorghum, sugarcane, and lignocellulosic materials. With an annual production capacity of 3 million gallons, possibly expandable, our facility is well-equipped to provide consistent supply to support either SAF or renewable gasoline/diesel production.

2. Partnership Potential with ATJ Blenders for SAF Production
For SAF production, we would rely on established blending facilities to handle the complex ATJ conversion stages, including dehydration, oligomerization, and hydro processing. Partnering with leading ATJ blenders such as Gevo, Inc., LanzaTech, and Virent would allow CBR to focus on producing biobutanol while leveraging their expertise and infrastructure to convert our feedstock into ASTM D7566-compliant SAF.

This model aligns well with a business-to-business approach, where Community BioRefinery supplies biobutanol and ATJ blenders manage the additional processing required to achieve SAF certification. This partnership could maximize our impact in the SAF market while minimizing the capital costs associated with full SAF production infrastructure. The other side of that coin is that CBR would be partnering (at least in part) with a direct competitor with a “colorful” business history and potentially become entangled in otherwise avoidable negative business issues.

3. Cost Considerations for Full SAF Production
The capital and operational costs associated with a full SAF production setup are considerable. For reference:

- **CAPEX** for establishing ATJ blending infrastructure ranges from $40 million to $60 million.
- **OPEX** for feedstock, hydrogen, catalysts, labor, and maintenance is estimated at $46 million to $50 million annually.

Given these high costs, direct production of SAF at Community BioRefinery may not be feasible without substantial investment, not originally anticipated. Partnering with ATJ blending facilities offers a more cost-effective alternative to achieve SAF output.

4. Alternative Pathway: Supplying Biobutanol for 'Traditional' Renewable Biofuels

An alternative option is to supply biobutanol directly to petroleum refineries as a renewable additive for gasoline/diesel, helping them meet federal mandates for renewable content. This pathway positions Community BioRefinery as a supplier to refineries that are seeking to meet renewable fuel standards without incurring the additional steps required for SAF production.

- **Federal Green Mandates**: By supplying biobutanol as a renewable gasoline/diesel blend, we align with federal requirements for renewable fuel percentages, potentially opening a steady market for our output.
- **Cost Efficiency**: This approach allows us to avoid the high costs of SAF conversion while still capitalizing on the growing demand for renewable fuels, enhancing our financial sustainability.
- **Refineries are "chomping at the bit"** for a reliable source of bio-butanol to simplify their own biofuels efforts.

5. Summary of ASTM D7566 Compliance Requirements for SAF

Should we pursue the SAF pathway with an ATJ blending partner, ASTM D7566 compliance will be essential. The standard requires:

- **Specific Hydrocarbon Profile**: C8 to C16 hydrocarbon range and low levels of oxygen, sulfur, and nitrogen.
- **Physical Properties**: Standards for freezing point (-47°C or lower), energy density, flash point, and thermal stability to ensure performance equivalence with Jet-A fuel.
- **Fuel System Compatibility**: SAF must be miscible with Jet-A and compatible with all aircraft fuel system components. (A potential reason that the ethanol-based SAF efforts may eventually be scrapped.)

Every SAF batch must undergo rigorous quality testing to meet these standards, a step that ATJ blenders are better equipped to handle.

6. Projected Annual SAF and Blended Fuel Output with ATJ Partnership

With a biobutanol production capacity of ≥3 million gallons annually, partnering with an ATJ blender could yield:

- **≥1.5 million gallons of SAF** (assuming a 50% conversion yield).
- **≥7.5 million gallons of blended jet fuel** at a 20% SAF blend ratio, aligning with industry sustainability goals.

7. Conclusion and Next Steps

The Community BioRefinery has two viable pathways to explore:

1. **Partnership with ATJ Blenders for SAF Production**: Allows us to provide biobutanol feedstock for SAF, enabling compliance with ASTM D7566 through specialized blending facilities without additional capital costs.
2. **Direct Sales of Biobutanol to Petroleum Refineries**: This pathway positions us as a renewable gasoline supplier, meeting federal green mandates and supporting renewable fuel goals with fewer cost burdens.

Both approaches support the renewable energy market, though each has distinct financial and logistical implications. We look forward to discussing these options in detail to identify the best strategy for Community BioRefinery moving forward.

For more in-depth information please see our website. Community BioRefineries