



The BDO Zone Initiative

**Accelerating biomass-based manufacturing
and clean energy economic development**

**2022 North American Biochar & Bioenergy Conference: “Decarbonizing our
Economy - Bioenergy and Biochar”**

Jordan Solomon
President & CEO, Ecostrat
Chairman, BDO Zone Initiative



BD | THE BIOECONOMY DEVELOPMENT
OZ | OPPORTUNITY ZONE INITIATIVE

BD OZ INITIATIVE

The BDO Zone Initiative is a risk-rating and certification program that enables regions to leverage local biomass assets to attract new bio-based manufacturing plants-- and create jobs.

A BDO Zone rating is a qualified regional assessment of biomass feedstock and infrastructure attributes with respect to development potential of new biofuel, renewable chemical, biogas or bioproduct manufacturing plants.



www.bdozone.org



BDO Zone Ratings Objectives...

Use internationally recognized risk metrics to credibly **quantify and signal key biomass feedstock and infrastructure “success” characteristics** valued by biobased developers and investors around the world.

Connect ‘A’ and ‘AA’ rated communities with bio-based project developers looking to build new plants in BDO Zones.

Help get biomass-based manufacturing plants built in the places they are most likely to succeed.

BDO Zone Ratings Due Diligence

- BDO Zones undergo rigorous and extensive due diligence using a standardized framework of over 100 transparent and validated risk indicators.

The 3 Pillars of BDO Zone Designations



- “A” and “AA” BDO Zone Ratings identify the optimal zones in the country for new biobased development.

Recognized, Credible, Transparent, Standards-based Ratings Framework



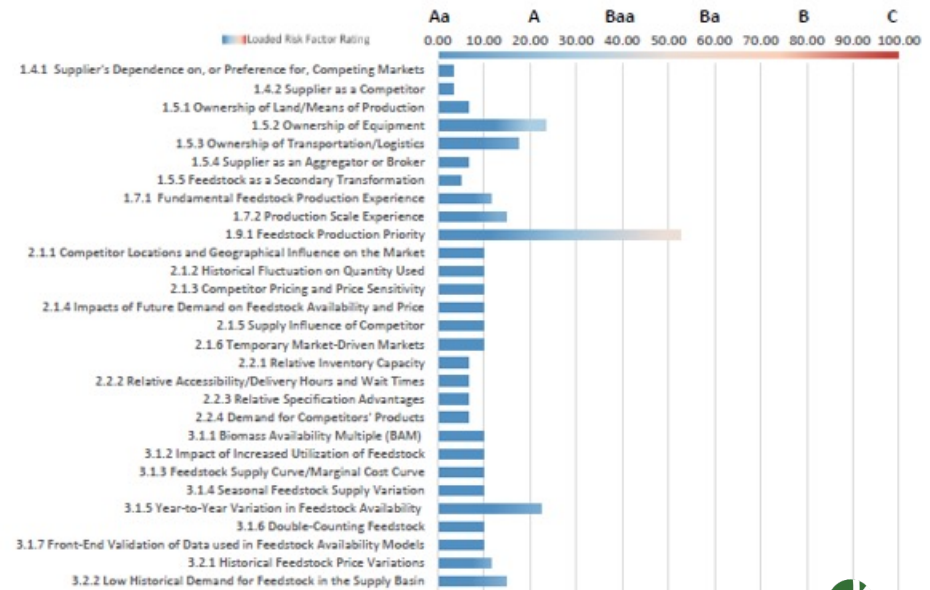
Download PDF at
www.ecostrat.com/standards

- BDO Zone Ratings are issued within the framework of the *Standards for Biomass Supply Chain Risk*.
- Accredited National Standard in March 2021 by CSA and SCC (CSA W209:21). ANSI accreditation planned for 2023.
- 6 years of development by Idaho National Labs, Ecostrat, 150-member industry stakeholder group, and a 65 member, \$60B capital market ratings review committee.
- >\$6MM funded by US Department of Energy (USDOE)/ Bioenergy Technologies Office (BETO), Natural Resources Canada (NRCan), Standards Council of Canada (SCC).

Risk Ratings Protocols and Scoring Metrics: Probability of Risk Occurrence x Impact



Figure 2 - Risk Indicators (sorted numerically)



BDO Zone Investment Coalition

April 22, 2021: **Announced \$1 Billion** for deployment into bio-based investment in BDO Zones



The BDO Zone Investment Coalition is a group of leading biobased capital markets¹ with a collective goal of investing \$1 billion in BDO Zones to build new biofuel, renewable chemical, biogas manufacturing plants.

BSCR Risk Ratings Review Committee Members



¹ Made up 16 members of the BSCR Review Committee

See all BDO Zone Investment Coalition members: www.bdozone.org/us/support
See all 65 BSCR RC members: ecostrat.com/standards/participants

The BDO Zone Summit- August 17, 2021

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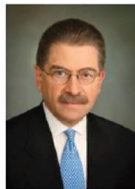
PROGRAM AGENDA

1:00 OPENING REMARKS

How BDO Zones help communities leverage biomass assets to create jobs. Why BDO Zone Designations drive and unlock bio-investment and get new plants built faster.



Jordan Solomon
President & CEO
Ecostrat
Chairman of the BDO Zone Initiative



Mark Riedy
General Counsel & Co-Founder
Alternative Fuels & Chemicals
Coalition (AFCC)



Wes Jurey
CEO & Founder
Agricultural Technology Innovation
Partnership (ATIP) Foundation

1:10 COMMUNITY PANEL

Real communities speak about opportunities and barriers to attracting biobased investment and deal-flow. Grassroots support for BDO Zone Designations from local communities and EDAs. Moderated by Wes Jurey, ATIP Foundation.



Donna Gambrell
President & CEO
Appalachian Community
Capital



Sumesh Arora
Director of Energy &
Natural Resources Division
Mississippi Development Authority



Greg Norton
President
Golden State National
Resources Corporation



Mike McArthur
Executive Director
Community Renewable
Energy Association



John Lester
General Manager
Clarksville Connected
Utilities

1:40 CAPITAL MARKETS PANEL

Barriers to investing in rural and distressed communities. Why are BDO Zone designations meaningful for capital markets? How much capital is "investment ready" to stand up biobased plants across the country? Moderated by Jordan Solomon, Ecostrat.



Justin Goldstein
Vice President, Investment
Banking Division
Goldman Sachs



David Livingstone
Managing Director
Citigroup



Max Vernier
Head of Bioenergy
Live Oak Bank



Scott Chabina
CEO & Founder
Chabina Energy Partners

2:00 PROJECT PANEL

Why BDO Zone Designations help create efficiencies for project developers. Why they help projects succeed. How they make developers develop more biobased projects faster. Moderated by Mark Riedy, AFCC.



Nick Andrews
CEO & Founder
USA Bioenergy



Chris Whitworth
Project General Manager
Northwest Advanced Biofuels



Seth Ginther
Executive Director
US Industrial Pellet
Association



Patrick Serfass
Executive Director
American Biogas Council

2:20 USDA REMARKS



Dr. Karama Neal
Administrator, Rural Business-
Cooperative Service
USDA Rural Development

View the BDO Zone Summit here:

<https://bdozone.org/the-bdo-zone-summit-2021/>



Barnwell County, SC BDO Zone 'A' Rating

- 'A' rated BDO Zone for woody biomass.
- Geographic area: 75 mile radius from City of Barnwell, South Carolina, USA.
- 12.1 million green tons per year (gt/yr) of generated in the region (6.8M gt/yr of Sawmill Residuals and 5.3M gt/yr of Forest Residues).
- Strong supply chain attributes and well-developed operating infrastructure for new plant development.
- Over 24 sawmills and 84 logging companies currently operate in the Zone.
- Forest residues underutilized by current markets and widely available.
- Ratings upgrade to 600,000 bone dry tons slated for Q3 2022

Bioeconomy Development Opportunity Zone Risk Rating Report | BDO ZONE Designation: Barnwell County, SC Date of Issue: Nov-16-2021

BDO ZONE Rating: A

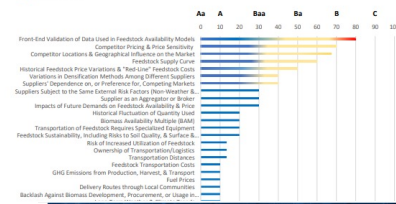
Bioeconomy Development
Opportunity Zone Risk Rating



Barnwell County, SC Bioeconomy Development Opportunity Zone is rated "A". Long-term outlook on feedstock price and quantity of Forest & Sawmill Residuals is deemed stable. Key risks are likely addressable.

Bioeconomy Development Opportunity Zone Risk Rating Report | BDO ZONE Designation: Sibson Springs, AL Date of Issue: 08-31-2021

Figure 1 - Risk Indicators (sorted by risk level)



Bioeconomy Development Opportunity Zone Risk Rating Report | BDO ZONE Designation: Barnwell County, SC Date of Issue: Nov-16-2021



With the lone exception of Pine Clean Chip, prices for all residual types increased for the first quarter of 2022 through the end of the available data (Q4 2021 or Q1 2022). From 2017, Pine Clean Chip prices dropped in price by roughly 2%, from \$53 to \$52 per ton generation site. During the same time period, Hardwood Sawmill Chip prices experienced a 3% increase in price, from \$49 to \$50.50 per ton FOB generation site. Pine Clean Chip Hardwood Chip prices were fairly constant through the available data.

Average Sawmill prices have increased by 68%, from \$12.85/ton in 2010 to \$21.28/ton generation site in the first quarter of 2021. White-Tree Chips experienced a 26% increase average price during that time span, from \$19.5 to \$24.21/ton FOB generation site. Fuel saw a 20% increase in average price, from \$11.28 to \$13.20/ton FOB generation site. The 10% overall increase observed in Sawmill's average cost is misleading. While these experienced a fairly small percent increase, from \$23.89 to \$26.14/ton FOB generation. Shavings prices were the most volatile during the past decade. Particularly from 2011 to 2021, Shavings average prices spiked and fell regularly. They have been increasing fairly consistently since then.

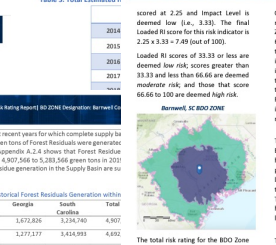
Internal data from previous Eoat studies conducted in the region confirm that Clean prices have increased in the short-term. Vendors in the region previously sold Clean & Softwood FOB generation site in August 2019, representing an 17% increase in price 9 months to today's price of \$35/ton FOB generation site.

Bioeconomy Development Opportunity Zone Risk Rating Report | BDO ZONE Designation: Barnwell County, SC Date of Issue: Nov-16-2021



Figure 6: Estimated Historical Forest Residue Generation in the Supply Basin

Bioeconomy Development Opportunity Zone Risk Rating Report | BDO ZONE Designation: Barnwell County, SC Date of Issue: Nov-16-2021



The total risk rating for the BDO Zone is the average of all Loaded RI scores. The BDO Zone score for Barnwell, SC is 2.25 out of 100, resulting in an "A" designation. All scoring and rationale for each Risk Indicator is provided in Appendix B.

Analyst Notes

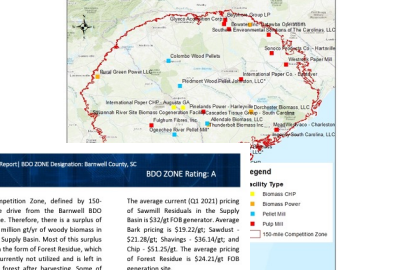
There is an abundance of woody biomass generated in the Supply Basin, defined by a 75-mile drive from the Barnwell BDO Zone. 12.1 million green tons per year (gt/yr) of woody biomass is generated, including 6.8 million gt/yr of Sawmill Residuals and 5.3 million gt/yr of Forest Residues.

We estimate that 5.4 million gt/yr of woody biomass generated in the Supply Basin are currently consumed

Bioeconomy Development Opportunity Zone Risk Rating Report | BDO ZONE Designation: Barnwell County, SC Date of Issue: Nov-16-2021

BDO ZONE Rating: A

Map 4: Competitors within 150-mile Drive Distance



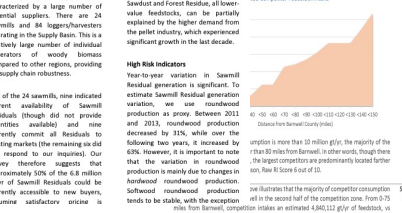
Bioeconomy Development Opportunity Zone Risk Rating Report | BDO ZONE Designation: Barnwell County, SC Date of Issue: Nov-16-2021

scored at 2.25 and Impact Level is deemed low (i.e., 3.33). The Total Loaded RI score for this risk indicator is 2.25 x 3.33 = 7.49 (out of 100).

Loaded RI scores of 33.33 or less are deemed low risk, scores greater than 33.33 and less than 66.66 are deemed moderate risk, and those that score 66.66 to 100 are deemed high risk.

The average current (Q1 2021) pricing of Sawmill Residuals in the Supply Basin is \$22.61/generator. Average Bark pricing is \$19.22/gt; Sawdust - \$12.26/gt; Shavings - \$36.14/gt; and Chip - \$51.54/gt. The average pricing of Forest Residue is \$24.21/gt FOB generation site.

Historical pricing trends vary depending on biomass type. Chip and Shavings pricing remained relatively constant over the past decade, despite year-over-year variation. Bark prices increased slightly over the same period, from an average of \$15.81/gt in 2010 to \$18.15/gt in 2020. Sawdust average pricing increased significantly, from \$2.81/gt in 2010 to \$20.02/gt in 2020. Similarly, Forest Residue average pricing has been increasing steadily over the last decade, from \$16.40/gt in 2011 to \$23.56/gt in 2021. Pricing increases of Bark, Sawdust and Forest Residue, all lower-value feedstocks, can be partially explained by the higher demand from the pellet industry, which experienced significant growth in the last decade.



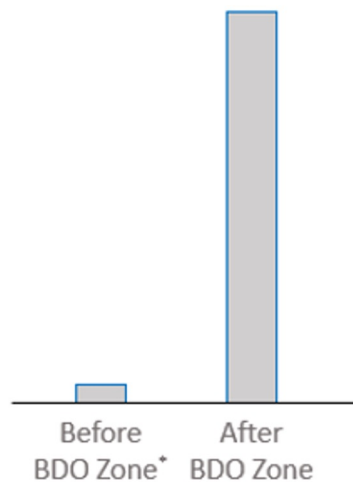
Year-over-year variation in Sawmill Residual generation is significant. To estimate Sawmill Residual generation variation, we use production statistics as proxy. Between 2011 and 2013, roundwood production decreased by 31%, while over the following two years, it increased by 63%. However, it is important to note that the variation in roundwood production is mainly due to changes in hardwood roundwood production. Softwood roundwood production tends to be stable, with the exception of the first 10 miles from Barnwell, where it is the second half of the competition zone. From 75 miles from Barnwell, competition makes an estimated 4,800,112 gt/yr of feedstock vs 5,807,054 gt/yr from 75-150 miles. Green generation in the first 75 miles is estimated as 7,281,271 gt/yr, which total means across the competition zone is an estimated 12,134,163 gt/yr. In sourcing from within 75 miles of a facility located in Barnwell County, a potential facility could mitigate much of the risk associated with RI 2.1. As a result, the Bark RI Score is reduced by 25% (matched Salween 4.43).

Impact Level: 1 Impact Level is deemed High. Score 1.98

Loaded RI Score, Loaded RI Score (Divided Salween x Impact Level) is 44.98 out of 100. Score 1.98

Impact of BDO Zone Rating: 10X increase in bioproject dealflow for City of Melville

Potential Bio-development Opportunities in Melville



In the 11-month period after issue of the BDO Zone designation, the City of Melville generated a **1000% increase in inquiries and discussions related to wheat straw utilization (versus the past 12 months)** by bio-based project developers, investors, other EDAs, research colleges and municipalities.

Melville's View

- Increased ability to reject investments that don't match up with their sustainability pillars – in part due to **increased deal flow**
- Looking at **growth and potential partnerships** in a way they couldn't previously; business economic development conversations were very limited prior to designation

Goals of Potential Projects

- 1 or more biobased manufacturing plant
- \$250M investment target
- 110 direct jobs
- 150 to 200 indirect jobs
- Long-term tax incentives partnerships possible

"I haven't seen this kind of activity in the seven years I've been here."

Chris Bruce, Director of Community Services, City of Melville

* In year prior to BDO Zone designation

BDO Zone Rating Economic Development Activities



Post-Rating Issue

- ☐ All ratings published and downloadable on bdozone.org and the county's website
- ☐ Press release to over 50 bio-based organizations and sector publications worldwide

TheDigest	World Biogas Association	Biorenewable Deployment Consortium (BDC)
Canadian Biomass Magazine	Wood Bioenergy Magazine	Bioenergy Insight
Biofuels International Online	Biodiesel Magazine	Waste Today
American Biogas Council	Clean Energy Business Network	Biomass Magazine
Canadian Biogas Association	Renewable Energy World	Renewable Energy Magazine
BioCycle Connect	Biobased Diesel Daily	World Bioenergy Association
Biomass Energy Network	Bioenergy International	Biogas World
Biomass International	Advanced Biofuels USA	Pellet Mill Magazine

For complete list of publications contact bdozone.org

- ☐ Inbound inquiries directed to BDO Zone Local Development Leader (LDL)
- ☐ BDO ZoneCONNECT webinar series connect 'A' and 'AA' rated BDO Zones with hundreds of developers and investors worldwide

BDO Ratings supercharge bio-based economic development: BDO ZoneCONNECT connects BDO Zones with hundreds of developers and investors worldwide

'Bio-Business Development' Webinars

Viewed by >1000 bio-project developers and investors worldwide

Access to TheDigest's >5 million unique online bioeconomy sector readers, 140,000 streaming viewers bio-industry stakeholders and 45,000 daily newsletter subscriptions.

'Rapid Accelerator' Meetings

Private, hosted discussion groups

Private zoom meetings with 50-100 pre-qualified bio-project developers, investors and strategic partner companies actively looking to build new bio-based plants in BDO Zones.

DIGESTCONNECT

Tuesday June 21, 12-1PM ET

BDOZONECONNECT BARNWELL COUNTY, SC

- SUSTAINABLE SURPLUSES OF BIOMASS FEEDSTOCK, SUPPORTIVE OF BIOBASED DEVELOPMENT, INFRASTRUCTURE TO SUPPORT NEW MANUFACTURING
- PART OF OUR SERIES EXPLORING BIOECONOMY DEVELOPMENT OPPORTUNITY ZONES
- NETWORKING THROUGHOUT THE HOUR
- POST-PRESENTATION DISCUSSION



Kay Maxwell
VP, Marketing
SouthernCarolina
Alliance



John Fleming
Director of
Development
SouthernCarolina
Alliance



Jordan Solomon,
CEO, Ecostrat,
Co-Founder,
BDO Zones

DIGESTCONNECT

Tuesday April 5, 12-1PM ET

BDOZONECONNECT SILOAM SPRINGS, ARKANSAS MELVILLE, SASKATCHEWAN

- SUSTAINABLE SURPLUSES OF BIOMASS FEEDSTOCK, SUPPORTIVE OF BIOBASED DEVELOPMENT, INFRASTRUCTURE TO SUPPORT NEW MANUFACTURING
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RON MCCULLOUGH
CITY ADMINISTRATOR
MELVILLE,
SASKATCHEWAN



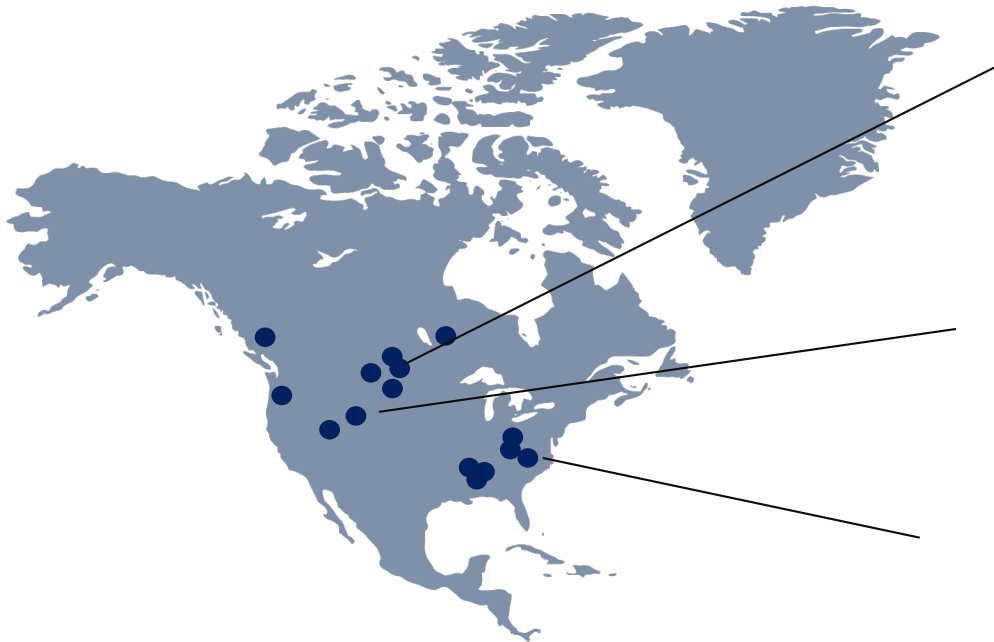
PHILLIP PATTERSON,
CITY ADMINISTRATOR
SILOAM SPRINGS,
ARKANSAS



JORDAN SOLOMON,
CEO, ECOSTRAT,
CO-FOUNDER,
BDO ZONES

>> [Click here to view Barnwell County, SC BDO ZoneCONNECT](#) <<

Where are we today? Issue of over ten BDO Zone 'AA' or 'A' ratings across North America



Melville, SK: 'A' rating for 300,000 tonnes of wheat straw issued early 2021. Expecting a plant announcement in Q4,2022.

Libby, MT: 'A' rating for woody biomass issued Q3, 2022.

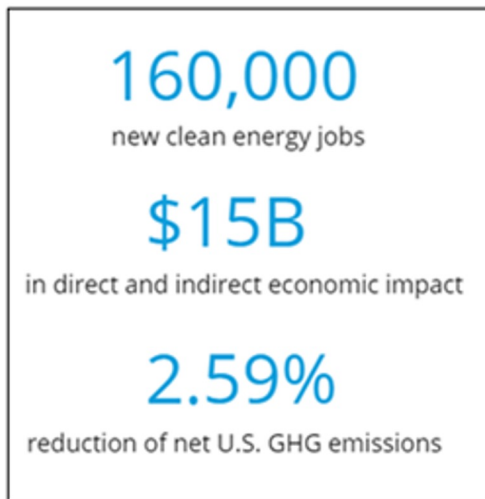
Barnwell County, SC: 'A' rating for over 600,000 tonnes of woody biomass issued Q1 2022. Barnwell is currently in discussions with >\$2B SAF project originated **24 hours after promotion** on BDO ZoneCONNECT.

Additional completed and ongoing BDO Zones in WV, VA, OR, UT, MI, BC, SK, ON, and more.

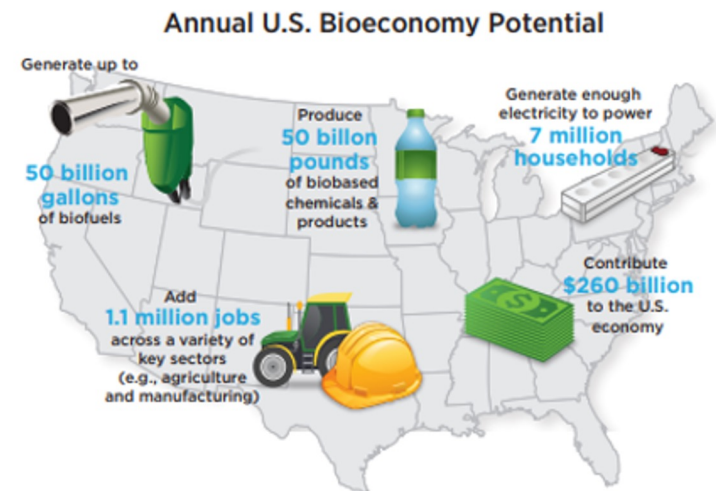
BDO Zones: Economic and GHG Impact

The BDO Zone Initiative can ‘move the needle’ on jobs, decarbonization, and social justice

‘1000 BDO Zones in 4 Years’ Plan



- National economic impact potential is estimated at **160,500 direct, indirect and induced jobs and over \$15B annually in direct and indirect economic benefits.**
- Total annual GHG reduction impact is **the equivalent of removing 32,608,695 cars off the road or 11.8% of all passenger cars in the US.**
- Economic impact of a single new bio-based plant can be transformative for distressed communities: Every new SAF plant is expected to provide, on average, 321 jobs and \$29M/y to the local economy, as well as 300,000 mt CO₂e/y of greenhouse gas (GHG) reduction (CAAFI).





BDO Zone Ratings: The Bottom Line...

BDO Zone Ratings:

Enable communities to powerfully signal key economic development “success” characteristics valued by biobased developers and investors.

Connect ‘A’ and ‘AA’ rated communities “one-on-one” with hundreds of project developers around the world.

Help get biomass-based manufacturing plants built faster and create jobs.

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