



BDO Zone Ratings

**An economic development tool to attract, de-risk accelerate
new SAF manufacturing**

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



CAAFI Webinar Feb 1, 2023



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

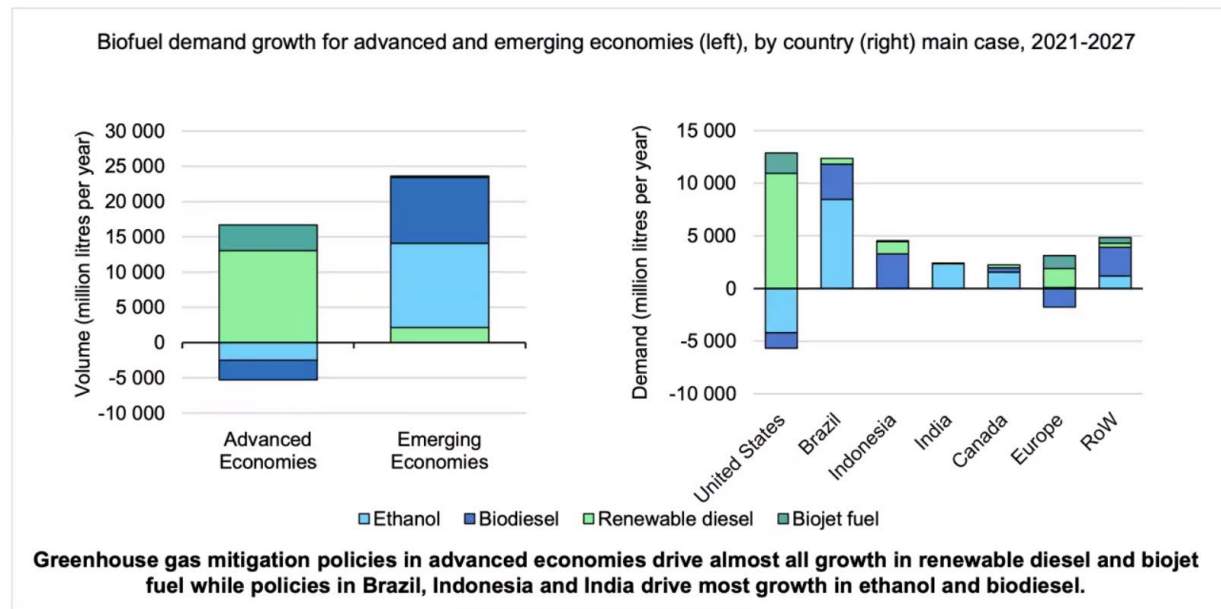
BDO Zone ratings demonstrate the maturity of local biomass supply chains and infrastructure and whether they are developed enough to support bio-based manufacturing without excessive risk.

The **BDO Zone Initiative** enables regions to leverage local biomass assets to attract new bio-based manufacturing plants-- and create jobs.

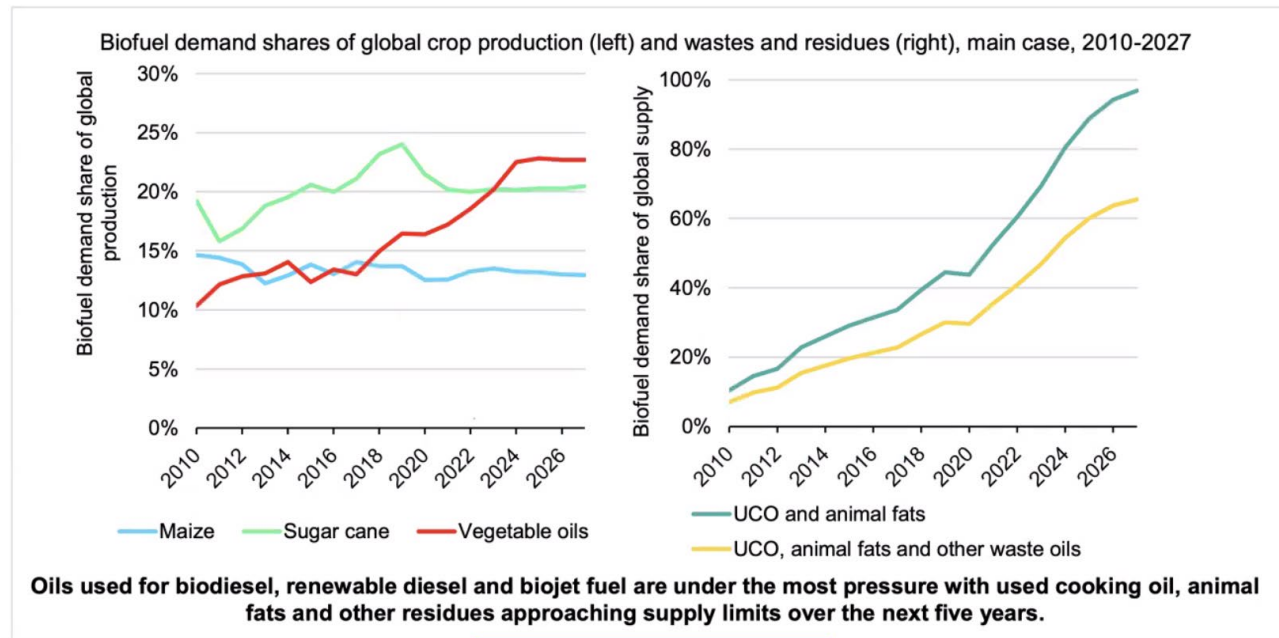


www.bdozone.org

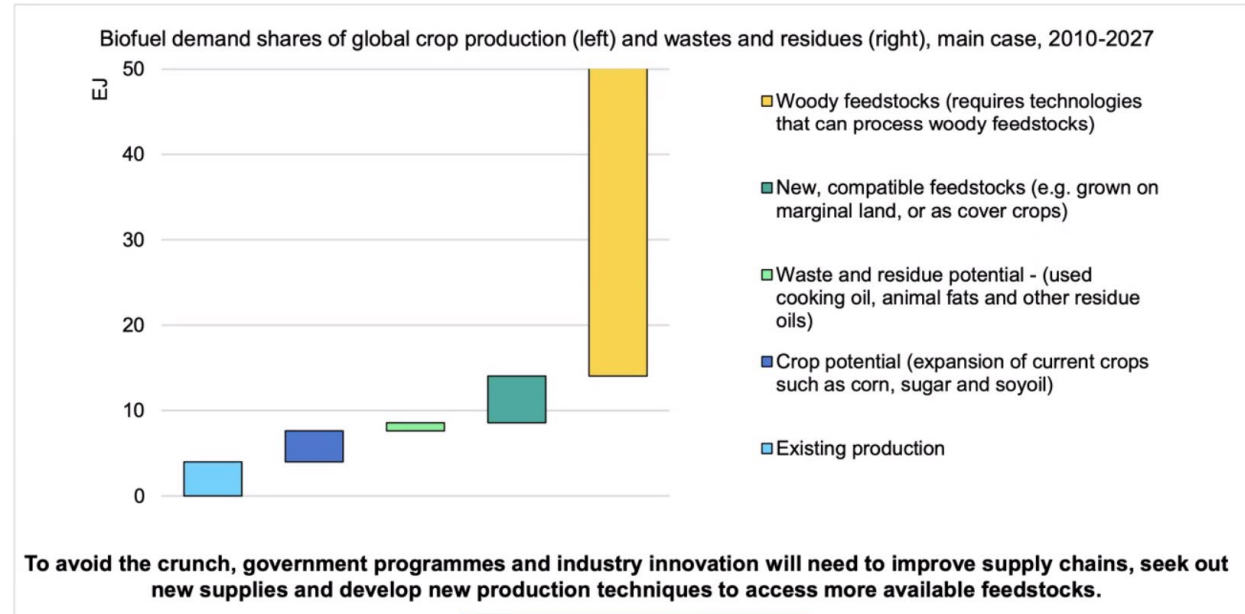
Liquid biofuels demand grows 20% over the next five years



Biofuel producers face a looming supply crunch...



... but there remains ample feedstock potential



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 optimal zones in each state for new biobased development.

Recognized, Credible, Transparent, Standards-based Ratings Framework



- BDO Zone Ratings are issued within the framework of the *US Standards for Biomass Supply Chain Risk*.
- 6 years development by US Department of Energy (USDOE)/ Idaho National Labs, Ecostrat, and a 65 member, \$60B capital market ratings review committee.
- >\$6MM funded by USDOE's Bioenergy Technologies Office (BETO).

Download at
www.ecostrat.com/standards



Bon Wier, TX BDO Zone 'AA' Rating

- First ever 'AA' rated BDO Zone
- Rated for 2 million gt/y of woody biomass 75 mile radius ex Bon Wier, Texas, USA.
- Strong growth to drain ratio. Strong harvest and delivery infrastructure. Broad access to additional supply beyond Zone.
- BDO Zone Rating supported by USA Biofuels and Citi Bank for \$1B capital raise for SAF project.

Bioeconomy Development Opportunity Zone Risk Rating | BDO Zone Designation: Bon Wier, TX
Date of Issue: October 19, 2022
BDO Zone Rating: 'AA'

Bioeconomy Development Opportunity Zone Risk Rating

'AA'

The Bon Wier, Texas Bioeconomy Development Opportunity Zone is rated 'AA'. Long-term outlook on feedstock quantity is deemed stable. Key supply chain risks are related to cyclic lumber markets and are likely addressable.

Bioeconomy Development Opportunity Zone Risk Rating | BDO Zone Designation: Bon Wier, TX
Date of Issue: October 19, 2022
BDO Zone Rating: 'AA'



| Indicator Name | Risk Level |
|--|------------|
| Complete combustion & biological stability of the feedstock | Aa |
| Feedstock availability: A high school diploma, which is 35% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Low school diploma, which is 45% lower than the rate for the state of Texas | Aa |
| Feedstock availability: High school diploma, which is 55% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 65% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 75% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 85% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 95% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 100% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 105% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 115% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 125% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 135% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 145% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 155% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 165% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 175% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 185% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 195% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 205% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 215% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 225% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 235% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 245% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 255% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 265% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 275% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 285% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 295% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 305% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 315% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 325% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 335% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 345% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 355% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 365% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 375% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 385% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 395% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 405% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 415% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 425% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 435% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 445% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 455% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 465% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 475% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 485% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 495% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 505% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 515% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 525% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 535% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 545% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 555% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 565% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 575% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 585% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 595% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 605% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 615% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 625% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 635% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 645% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 655% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 665% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 675% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 685% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 695% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 705% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 715% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 725% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 735% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 745% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 755% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 765% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 775% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 785% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 795% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Professional degree, which is 805% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 815% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 825% lower than the rate for the state of Texas | Aa |
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| Feedstock availability: Master's degree, which is 885% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 895% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 905% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 915% lower than the rate for the state of Texas | Aa |
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| Feedstock availability: Professional degree, which is 945% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Master's degree, which is 955% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Bachelor's degree, which is 965% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Associate's degree, which is 975% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Graduate degree, which is 985% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Postgraduate degree, which is 995% lower than the rate for the state of Texas | Aa |
| Feedstock availability: Doctoral degree, which is 1000% lower than the rate for the state of Texas | Aa |

Bioeconomy Development Opportunity Zone Risk Rating | BDO Zone Designation: Bon Wier, TX
Date of Issue: October 19, 2022
BDO Zone Rating: 'AA'

BDO Zone Assets

- **116 Mg/yr of woody biomass assessed within the BDO Zone.**
- **Strong growth: 5.3% of standing inventory harvested annually.**
- **Relatively low demand:** Within the BDO Zone, total demand for pine pulpwood is **"5 Mg/yr"**.
- **Forestry labor market is healthy. No anticipated labor or skill shortages.**

BDO Zone Liabilities

- **Significant variation in mill residue. Mill-produced biomass ranged from 170,000 to 500,000 gt/yr between 2007 and 2021.**
- **Multiple suppliers subject to the same external risk factors: slow lumber markets can negatively impact sawmill residual and forest residue generation.**

BDO Zone Risk Rating

The Bon Wier, Texas Bioeconomy Development Opportunity Zone is rated **'AA'** or very low risk. Risk Rating Grades are defined as follows: AA (very low), A (low), Baa (low-moderate), Ba (moderate), B (moderate-high), or C (high).

Scoring and Rating Methodology

In assessing the biomass supply chain risk for the Bioeconomy Development Opportunity (BDO) Zone in Bon Wier, Texas, 51 Risk Indicators from the US Standards for Biomass Supply Chain Risk (USBC) were applied. These BDO Zone Risk Indicators are the subset of BSCR Risk Indicators applicable to gauging feedstock risk within a BDO Zone. Feedstock quantity is expressed in green tons per year (gt/yr). Feedstock cost is expressed in US dollars, at the site-of-generation. Maximum transport distance is based on a 75-mile drive distance supply zone. The BDO Zone rating is based on an aggregation of the scores assigned to each BDO Zone Risk Indicator (RI) assessed in this report. First, each BDO Zone Risk Indicator is given a **Raw RI score** based on the research and analysis conducted on the feedstock supply chain in the region. Raw RI

Scores are scaled between 1 (low risk) and 40 (high risk).

Next, each Risk Indicator is discounted, or "notched", based on the degree to which the uncertainty drivers are deemed to be addressable, and whether there is a reasonable expectation that mitigation measures could be put in place within the price parameters for this rating. The Notched Salience score corresponds to the likelihood of each Risk Indicator's described risk materializing given the implementation of reasonable mitigation measures. To arrive at the Notched Salience score, Raw RI scores are reduced based on the efficacy of the likely mitigation measures. If applicable, notching occurs at one of three levels: 20%, 50%, or 75%.

Finally, the potential impact of each Risk Indicator on the supply chain is assessed and scored on a 10-point impact level scale, as either low (2.25), moderate (8.40), or high (8.99). Impact level scores are based on the assumption that key measures were implemented to mitigate uncertainty drivers in the BDO Zone but failed to do so. The **Loaded RI score** for each Risk Indicator is then calculated as the product of Notched Salience and

| Impact Level: RI Impact Level is deemed low. | Score |
|--|-------|
| Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33 out of 100. | 3.33 |
| | 3.33 |

| in feedstock within the Bon Wier BDO Zone includes, pulpwood, and sawmill residuals (solid swifter) in the Zone was estimated at | Score |
|--|-------|
| | 2 |

| in Opportunity Zone Risk Rating BDO Zone Designation: Bon Wier, TX 5/2022 'AA' | Score |
|--|----------|
| | Unouched |

| with a long history of operation and a history of tolerable variance in its Zone. | Score |
|---|-------|
| | 9.99 |

| aluminum were to crash due to the shutdown of local mills, the alternative is that it can divert the harvests to bioenergy production while maintaining miller grade trees. Bioenergy production thus provides a major stabilizing ring lumber-reduced crisis. Because of this, Raw RI Score is 1 out of 10. | Score |
|--|-------|
| | 9.99 |

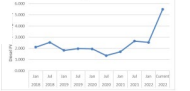
| ishment. De-risking measures are not necessary for risk indicators with any are already the lowest risk. | Score |
|--|-------|
| | 8.99 |

| level is deemed high. | Score |
|-----------------------|-------|
| | 8.99 |

| Notched Salience × Impact Level) is 5.99 out of 100. | Score |
|--|-------|
| | 7 |

| RI can impact feedstock cost of harvest and collection over time. scenarios should be run. | Score |
|--|-------|
| | 7 |

| from the US Energy Information Administration's Diesel database show rise, hard to predict, and currently rising significantly.** | Score |
|---|-------|
| | 7 |



Raw RI Score is 7 out of 10.

| Notched Salience: Given the large availability multiples in the region, access to increasing multiples of industrial feedstock with moderate increase to transportation costs, as well as access to fiber risk. | Score |
|---|-------|
| | 1.25 |

** US 10-months Diesel Quarterly as Diesel Prices: https://www.eia.gov/commodity/data/energy/diesel_prices/PDF/20220828_FTR_B2L02D01_FTR_B2L02D01.pdf

Population
Newtown County has a population of median age and the Rural 12-county area has a population of approximately 386,000.

Education
Stephen F. Austin State University/Angelina College provides a university education. In the Bon Wier BDO Zone, 79% of the population has a high school diploma, which is 35% lower than the rate for the state of Texas.

Bon Wier, TX 'AA' BDO Zone Rating supports capital raise

Date of issue: October 2022



Bon Wier, TX Rated AA for 2Mgt/y of woody biomass

The 'AA' BDO Zone Rating for Bon Wier, TX supports the siting decision and \$1B capital raise for USA BioEnergy's development of an advanced biorefinery.



"Citi and USA BioEnergy have worked closely together for more than two years to develop an efficient, achievable plan and we look forward to delivering on this vision."

David Livingstone, Managing Director, Citigroup, BDO Zone Press Release Oct 19 2022



"USA BioEnergy is committed to delivering over 100M gallons of sustainable aviation fuel into LAX annually. Airlines using our sustainable aviation fuel will eliminate over 50M metric tons of greenhouse gas emissions over a 20-year period."

Nick Andrews, CEO, USA BioEnergy, BDO Zone Press Release Oct 19 2022

BDO Zone Investment Coalition

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



The **BDO Zone Investment Coalition** is a group of leading 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



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

¹ Made up 16 members of the BSCR Review Committee

The BDO Zone Summit- August 17, 2021

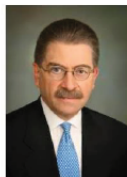
PROGRAM AGENDA

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
CEO & Founder
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/>

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.

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

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
 Southern Carolina
 Alliance



John Fleming
 Director of
 Development
 Southern Carolina
 Alliance



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

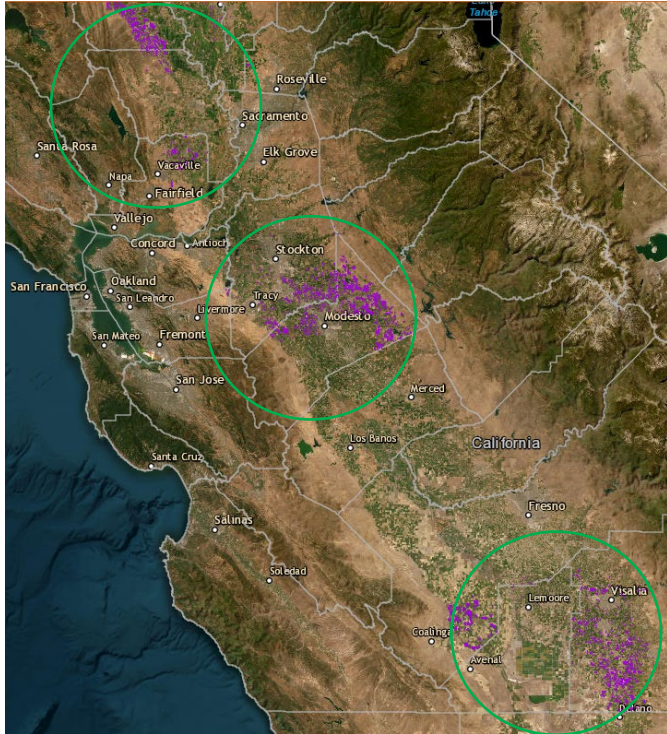
In a nutshell, BDO Zone Ratings are powerful economic development tools that...



- ✓ **Pre-vet, quantify and signal** key regional biomass feedstock and infrastructure “success” characteristics.
- ✓ **Connect BDO Zones** with bio-based project developers and investors around the world.
- ✓ **Link BDO Zones with \$1B** of private capital to get new plants built.
- ✓ **Drive new biobased manufacturing to regions that are able to support it-- and create new markets for biomass producers.**

CASE STUDY: BDO Zones to drive new almond biomass-based market development in CA

2-3 BDO Zones in CA for almond shells, tree prunings and husk



- **>3M tonnes surplus per year** of almond shells, husk and tree prunings.
- **Markets for almond shells and tree prunings have decreased** in CA: biomass-to-electricity plants closed due to competition from lower cost solar and wind power.
- **Almond biomass presents ideal technical specs** for many biofuel, renewable chemical and RNG applications: low MC, LCFS qualifying.
- **Feedstock cost is currently lower** than in US Southeast (dry basis).
- **30,000 direct and indirect jobs** in the Central Valley from cellulosic ethanol production alone -- *not including SAF and renewable chemical*.
- **Significant revenue capture benefits for almond growers:** biofuel and renewable chemical producers are able to pay more for feedstock than power producers.



Want to know more?

Contact:

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Jordan Solomon, Chairman BDO Zone Initiative, jordan.solomon@ecostrat.com