Diversifying CO_2

Biomass and RNG emerge as strategic plays

With millions of tons of untapped biogenic CO_2 on the table, biomass power and RNG are moving into focus as strategic supply plays.

Molly Burgess speaks to **Bex Carbon** and **Bruce Woerner** about the market outlook

The North American carbon dioxide market has faced fragility for several years, with supply shortages and tightness impacting businesses across the supply chain.

At **gas**world's North American CO_2 Summit in Denver last year, attendees were warned that 2026 is expected to bring further tightening with scheduled plant closures and slow progress in bringing new capacity online.

This shortfall could impact industries relying heavily on CO_2, including food and beverage production, healthcare, and manufacturing, potentially leading to higher costs and supply chain disruptions.

In the US, ethanol production remains the largest source of biogenic CO_2, with fermentation producing high-purity streams well suited to capture and liquefaction. However, plant closures, seasonal downtime, and the geographic concentration of ethanol facilities have repeatedly created supply strains in the merchant CO_2 market.

As a result, the industry is increasingly exploring alternative sources of biogenic CO_2 to diversify supply and improve regional balance, particularly renewable natural gas (RNG) facilities and biomass power plants. While RNG sites offer incremental opportunities, biomass power plants are emerging as one of the largest untapped sources of recoverable biogenic CO_2 in the US.

Bex Carbon, a Maine-based carbon capture and utilization business, frames the diversification opportunity as a "marriage of two market needs" – underserved regional CO_2 markets and biomass power plants seeking additional revenue streams in a policy landscape that increasingly favors firm renewable generation.

RNG sites – or biomethane in Europe – represent circular economy hubs, turning organic materials, including wood waste, food waste, or animal feedstock, into valuable products. Additionally, the capture of biogenic CO_2 can be used to lower the carbon intensity of RNG production, creating a price premium on the RNG itself.

Another important source of biogenic CO_2 is biomass power generation. Although emissions from biomass facilities represent a meaningful volume of biogenic CO_2, the streams are generally more dilute and dispersed than those from ethanol fermentation, and their contribution to the merchant CO_2 market is typically smaller.[1]

While ethanol still dominates merchant supply, biomass power represents the second-largest source of biogenic CO_2 in the US – yet only a small fraction is currently captured for commercial use.

The US opportunity

Today, biogenic carbon capture and utilization is more advanced in Europe than it is in the US. There are more policies in Europe to support this form of "upcycling," though the US is now starting to catch up.

In terms of scale, according to data from the RNG Coalition, there are currently 474 operational RNG facilities in North America, which could add 2.25 million tons of CO_2 a year to the market.

The RNG Coalition further suggests that an additional 440 RNG facilities are currently in development, and these have the potential to add 2.1 million tons of CO_2 per year to the market. [2]

Currently, less than 0.5% of sites have captive on-site reuse, highlighting the scale of the opportunity from here.

While RNG sites offer incremental volumes and regional opportunities, biomass power facilities provide larger single-site capture potential and baseload operating profiles that may better align with long-term merchant CO_2 demand.

Unlike ethanol, which is concentrated in the Midwest, many biomass plants are in coastal and southeastern states – regions that often rely on transported CO_2 and experience higher pricing volatility. For developers, this creates an opportunity to serve underserved markets rather than compete head-to-head in saturated regions.

Strategic CO_2 growth

"Biomass power generates millions of tons of CO_2 a year, and it's biogenic," Robert Cleaves, founder of Bex Carbon, tells **gas**world. "When CO_2 is cost-effectively captured and liquefied and sold to the market, then there's also a revenue source for biomass plants that didn't exist before."

Bex Carbon partners with existing plants to build liquid CO_2 (LCO_2) facilities at biomass power plants, utilizing their flue gas and waste heat.

"We focus on underserved markets, such as the West Coast and areas of the Southeast and New England, partnering with facilities that have reliable long-term contracts."

Cleaves says the size of the company's investment – and the CO_2 production capacity – is designed to match market need. He described them as modest in comparison to conventional sources.

The average CO_2 plant in the US produces around 325 tons per day in 2025 – meaning these RNG add-on plants are significantly smaller.

Cleaves adds, "From a biomass power perspective, we do not want to turn these power plants into CO_2 production facilities. Fundamentally, they are electricity providers. If we expanded these systems to capture all the CO_2, we would end up cannibalizing energy that is currently being sold under long-term, valuable grid contracts and diverting it to CO_2 production, which isn't what owners and operators want to do."

Taking this on board, he says that Bex has found a sweet spot: aligning market demand and available energy while ensuring that these power plants meet their overall business objectives.

The distributed model also mitigates portfolio risk. Rather than concentrating capital in a single large facility, smaller plants reduce exposure to catastrophic outages and align more closely with regional demand centers.

For investors, this avoids placing all their CO_2 capacity in one asset while allowing projects to scale incrementally alongside market demand.

"Investors are interested in the distributed model, because they don't have to put all their CO_2 eggs in one carbon basket," Cleaves adds. "So, we like smaller plants that are more distributed, rather than larger plants that are more concentrated."

Route to market

In terms of commercial strategy, Bex says it does not intend to compete with established industrial gas majors. Instead, the company is seeking to build relationships with the gas producers and distributors and function as a complementary supplier.

"We want to work with the major producers and distributors," Cleaves explains. "Customers prefer a company with 200 rail cars, 500 trucks, and 20 plants. Our model is to integrate with that network, not to compete with or replace it.

"We see ourselves as an extension of the opportunity for the major producers and distributors to have one more reliable biogenic source at their disposal."

Bex explains that it is taking an innovative approach that combines durable technology with consistent feedstocks to provide additional sources of biogenic CO_2 to the industrial gas companies.

Reliability

In the CO_2 market, reliability matters, which is why a more diversified supply chain is needed. Ethanol plants, the number one source of CO_2, remember, have annual or

semi-annual shutdowns, meaning supply is periodically paused. These outages often occur in the summer months, which coincide with peak CO_2 demand, creating market tightness.

Looking at biogenic CO_2 capture, Cleves believes these plants are more reliable.

"What we're finding is that, over the life of one of these power plants, they operate at about a 90% capacity factor, which is quite strong. In fact, we recently saw a plant running at around 95%, so the reliability can be very, very high – resulting in a consistent CO_2 supply," he says.

"That's particularly important for our industrial gas customers, who ask, 'Can we rely on you to be operating?' Our answer is: look at the track record. These plants have a strong incentive to keep running because of their long-term utility contracts. That reliability is really the key to our ability to get these projects financed."

Despite this positivity from Bex – and other companies who are active in the same space – there still remains some skepticism as to when these plants will make a notable difference to the CO_2 market.

Bruce Woerner, of Woerner CO_2 Consulting, explains, "I know there's a lot of skepticism from the majors. They talk to 50 companies about CO_2, who claim they're going to build multiple plants, and most of them never materialize.

"With that said, the biggest challenge for us is proving that we're real and that the economics are as favorable as we say – and I don't blame them for questioning that at this early stage."

With this, too, there has to be some realism, which Woerner also acknowledges.

"I don't see LCO_2 plants at RNG sites capturing 40% of CO_2 supply like ethanol does, but there is strong demand, and we reach three, five, or even seven percent in the right markets; that's a win."

Purity

Tied with reliability is CO_2 purity, which is particularly important when serving the food and beverage markets and is often raised as a question when it comes to alternative sources.

In reference to purity, Woerner points to three power plants in the US that produced CO_2 for 20 years or more – one in Oklahoma, one in Maryland, and one in Massachusetts.

"There are real examples. It can be done," he says. "We're using amine technology, which has been around for 50 to 75 years and is very well proven to clean it up."

He adds that the CO_2 can be refined to ISBT food-grade standards, meeting the specifications required by beverage producers.

Utilizing wood waste as the feedstock also makes the purity more reliable.

"There really aren't many bad actors because they're using waste wood," Woerner adds. "There's nothing in there like tires, cement plants, or other problematic materials, and the feedstock is consistent; they're using the same input day in and day out."

The right location

There are several considerations when deciding where to set up these plants, plus, a combination of policy support plus environmental benefits.

Notably, in the US, Oregon, Washington, Georgia, Alabama, California, and Maine have some of the largest and most active forestry and logging industries. In many of these regions, installing these power plants – with additional CO_2 production – provides a double edge of benefits.

"We have a customer we're working with right now in California that uses what's called high-hazard fuel. If that material is left in the forest, it can have negative impacts on the environment, air quality, and the health of forests and rural communities," Cleaves explains.

High-hazard fuel, when left in the forest, acts as kindling for destructive forest fires that spread and wipe out entire regions.

"By adding CO_2 capture and utilization, the industrial gas companies and the sector at large are helping to promote what we believe is a strong public good: keeping our forests healthy."

While unable to share finer details, Bex said it is currently focusing on both costs.

"We know there's a lot of ethanol in the Midwest, even though there are some biomass plants; the Midwest will exclude those, but there are a lot of opportunities on both coasts," Cleaves says.

Next steps

While this opportunity is now certainly being explored by Bex and other companies alike, there is still a lot of work that needs to be done. Jacqui Baker is Director of Regulatory at Bex Carbon and shares how its progress is tracking.

"There are some long-lead items when it comes to ordering certain pieces of technology. We're expecting a 12–18-month physical build time, working with an engineering, procurement, and construction partner on the full scope of delivery.

"Overall, we're looking at a two- to three-year timeline, depending on how the plant feasibility progresses, and whether it becomes more complex or whether it's a straightforward addition."

In terms of complexity, however, Baker says the installation is more about how the add-on CO_2 plant connects - where it is physically placed, what the ductwork looks like, and those kinds of detailed engineering considerations.

"It's not anything outside the scope of a standard FEED study or typical engineering work. However, biomass plants themselves are often configured differently in terms of their physical layout, which means each integration requires careful, site-specific design."

While these projects will take time to materialize, they reflect a broader shift in the North American CO_2 market. With supply tightness and regional volatility continuing to challenge the sector, attention is moving toward smaller, distributed sources that can complement, rather than replace, existing hubs.

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Supporting policies

While credits, incentives, and policies can vary state-by-state, there are several levers that can support power plants with biogenic CO_2 capture technology. Here are three:

Section 45Q

45Q provides a per-ton tax credit for captured CO_2, including certain utilization pathways. Eligibility depends on an approved lifecycle analysis (LCA) demonstrating emissions reductions under IRS guidance. Durable uses may qualify; short-duration applications, such as beverage carbonation, generally do not.

US Department of Energy support programs

DOE carbon management and carbon dioxide removal funding can help de-risk FEED studies and early-stage integration at biomass facilities, lowering upfront capital exposure.

State carbon intensity programs

In states such as California, the California Low Carbon Fuel Standard can generate tradable credits where captured biogenic CO_2 contributes to lower-carbon fuel pathways.

More broadly, renewable portfolio standards and forest management policies in biomass-heavy states largely benefit power plants, creating the platform for add-on CO_2 capture and liquefaction projects, as identified by Bex Carbon.

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