

**S&P Global**  
Market Intelligence

**Green Plains Inc.** NasdaqGS:GPRE

*Earnings Call*

*Thursday, October 31, 2024 1:00 PM GMT*

CALL PARTICIPANTS	2
PRESENTATION	3
QUESTION AND ANSWER	9

# Call Participants

---

## EXECUTIVES

**Devin Mogler**

*Senior Vice President of Corporate  
& Investor Relations*

**James E. Stark**

*Chief Financial Officer*

**Leslie van der Meulen**

*Executive Vice President of Product  
Marketing & Innovation*

**Phil Boggs**

*Executive Vice President of  
Investor Relations & Finance*

**Todd A. Becker**

*President, CEO & Director*

## ANALYSTS

**Craig Irwin**

*ROTH MKM Partners, LLC,  
Research Division*

**Jordan Levy**

*Truist Securities, Inc., Research  
Division*

**Kevin Estok**

*Jefferies LLC, Research Division*

**Kristen Owen**

*Oppenheimer & Co. Inc., Research  
Division*

**Matthew Robert Lovseth Blair**

*Tudor, Pickering, Holt & Co.  
Securities, LLC, Research Division*

**Salvator Tiano**

*BofA Securities, Research Division*

**Saumya Jain**

**Unknown Analyst**

# Presentation

---

## Operator

Good morning, and welcome to the Green Plains Inc. Third Quarter 2024 Earnings Conference Call.  
[Operator Instructions]

We will now turn the call over to your host, Phil Boggs, Executive Vice President, Investor Relations and Finance. Mr. Boggs, please go ahead.

## Phil Boggs

*Executive Vice President of Investor Relations & Finance*

Thank you, and good morning, everyone. Welcome to Green Plains Inc. Third Quarter 2024 Earnings Call. Participants on today's call are Todd Becker, President and Chief Executive Officer; Jim Stark, Chief Financial Officer; and several other members of Green Plains senior leadership team.

There is a slide presentation available, and you can find it on our Investor page, under the Events & Presentations link on our website.

During this call, we will be making forward-looking statements, which are predictions, projections or other statements about future events. These statements are based on current expectations and assumptions that are subject to risks and uncertainties. Actual results could materially differ because of factors discussed in today's press release and the comments made during this conference call and in the Risk Factors section of our Form 10-K, Form 10-Q and other reports and filings with the Securities and Exchange Commission. We do not undertake any duty to update any forward-looking statement.

Now I'd like to turn the call over to Todd Becker.

## Todd A. Becker

*President, CEO & Director*

Thanks, Phil. Good morning, and thanks for joining our call today.

We reported \$83.3 million in EBITDA for the third quarter, inclusive of a \$30.7 million gain on the sale of the Birmingham unit train terminal. Our EBITDA from normal operations was \$53 million, and our stand-alone consolidated crush margin was \$58 million.

Before I get too deep into the numbers, I'm sure you saw the announcement this morning regarding Jim Stark retiring from Green Plains and the promotion of Phil Boggs as Chief Financial Officer. These 2 guys are really well known to all of you, which should make for a seamless transition.

When Jim returned to Green Plains and was subsequently named CFO, I always knew this day would come, as his goal was to get back to Nebraska and spend more time with his grandkids. One of the things that was part of the succession planning was to set Phil up for success, and Jim lived up to his end of the bargain and more.

Jim and I spent many years together at Green Plains, and he is one of the many who will have made a long-standing impact on the company, and I'm proud to have worked with him.

I'll let Jim tell you a bit more, but he'll be exiting the public company world to focus on the next stage of his career with smaller private companies and spend more time with his family. Thanks again, Jim, for your dedication and loyalty.

So let's get back to the quarter. Our ethanol operating rate reached nearly 97%, and we also delivered a record quarter of ultra-high protein production as well as maintaining a strong corn oil yield in line with our record rates achieved in the second quarter. Our operating results are demonstrating the success of years of planning and execution to deliver improved operational performance across our platform, and we believe we have room to continue improving on these operating rates. The mid- to high-90s run rate

should be the new normal for our platform, as we still have some more improvements underway to get there and are finishing up some of those in the fourth quarter as well.

Earlier this month, we completed an extended shutdown at our Mount Vernon location, as we indicated earlier, location performing some of the needed maintenance to bring the plant back to its full run rate capabilities. We are now beginning to scale up production and expect to reap the reward of additional capacity in the next couple of weeks.

We are in the process of upgrading Obion in the next coming months and anticipate that plant being able to increase its efficiency and production as well over the next several quarters.

The operations team has done a fantastic job safely maximizing the platform, and we continue to find new opportunities to increase throughput and improve production metrics.

Margins were solid during the quarter, as we indicated on the prior call, driven by demand of continued strong exports and favorable natural gas and corn prices, even though we did see some rapid compression late into the quarter.

We continue to experience tailwinds for ethanol exports, with totals through August of 1.2 billion gallons and on pace for a record year of 1.8 billion to 1.9 billion gallons, as other countries ramp up their blend mandates in low-carbon programs. We believe this will continue to grow, led by Canada, where they are rapidly expanding blends and represent over 1/3 of where all of our exports go. Overall, we significantly outperformed the prior quarter and were up prior year as well.

We will cover protein, carbon and corn oil on this call as well, but I would be remiss not to start with clean sugar. While it may have taken longer than we all wanted, the ongoing start-up and commissioning of our CST project in Shenandoah was a key focus during the quarter. As we had indicated earlier this week, we have worked through some of the -- most of the challenges, and we have begun to supply product to customers for validation. We also believe we will be executing our first bulk commercial sales and shipping low-CI dextrose to customers during the fourth quarter.

The production process will continue to be debottlenecked, ramping up over the coming year, and interest remains very strong despite the delays. Having up to a 40% carbon intensity advantage, it's worth the wait for many of these customers.

As we always said, this technology developed by Fluid Quip is massively disruptive to an industry supply oligopoly that has existed for decades, and no one thought we could make clear, clean, low-carbon dextrose, but here we are. It was a Herculean effort across Green Plains and Fluid Quip to get to this point. We still have plenty to do to scale from here, but this is one of the many steps to realizing the true value of this technology, and I'll spend a little bit more time on this later in the call.

During the quarter, we completed the sale of the Birmingham unit train terminal and used the proceeds to retire the remaining high-priced debt related to Green Plains Partners. This was an important step, enabling the additional simplification and efficiency gains anticipated when we first began the process of acquiring Green Plains Partners.

The board of directors continues to progress the strategic review process, working with its financial advisers, BMO and Moelis, as outlined in the press release.

And now I'll hand the call over to Jim to provide an update on the overall financial results. I'll come back on the call to provide an updated policy outlook and discuss our progress on all of our initiatives in more detail. Jim?

**James E. Stark**  
*Chief Financial Officer*

Thank you, Todd, and good morning, everyone.

Green Plains consolidated revenues for the third quarter were \$658.7 million, which was \$234 million, or approximately 26%, lower than the same period a year ago. As it has been the last couple of quarters, the

lower revenue is attributable to lower prices experienced for ethanol, dry distillers grains and renewable corn oil in the third quarter of '24 as compared to the same period a year ago.

As Todd mentioned, we also saw a drop in our commodity inputs, with corn and natural gas down significantly year-over-year, resulting in a stronger margin opportunity in the quarter compared to the prior quarter and prior year.

Our plant utilization rate was 97% during the quarter, compared to a 94% run rate in the same period last year. The year ago quarter of 2023 included production gallons from the Atkinson plant that was sold in third quarter of last year. So utilization actually increased despite production gallons declining slightly year-over-year.

For the trailing 4 quarters, we have averaged a 94% utilization rate, and we anticipate our plants to continue to perform in that mid-90% range of our stated capacity for the fourth quarter, barring any events outside of our control.

For the quarter, we reported net income attributable to Green Plains of \$48.2 million, or \$0.69 per diluted share. That compares to a net income of \$22.3 million, or \$0.35 per diluted share, for the same period in 2023.

I want to point out that the diluted share count for the third quarter for both the current and prior year third quarters include the dilutive effects of the 2027 converts due to the accounting treatment of the as-if-converted method so long as the effect would not be anti-dilutive, for which it was not.

EBITDA for the quarter was \$83.3 million, inclusive of that \$30.7 million gain on the sale of the Birmingham unit train terminal, compared to \$52 million in the prior year period.

Like-for-like, adjusted EBITDA for Q3 of '24 was \$53.3 million, compared to \$42.9 million for Q3 of '23, when you adjust out onetime items for both periods.

Depreciation and amortization expense was higher by \$2.2 million versus a year ago, at \$26.1 million. This includes a onetime \$3.5 million impairment charge related to R&D intangible assets that were taken in Q3.

We realized \$58.3 million in consolidated crush for the quarter, and that compares to \$52.9 million for the prior year of 2023.

Also in the third quarter, our SG&A costs for all segments was \$26.7 million. That's \$8.6 million lower than the prior year, due to lower personnel costs and adjustments to incentive accruals.

Interest expense of \$10.1 million for the quarter, which includes the impact of debt amortization and capitalized interest, was \$0.5 million higher than the prior year's third quarter. This increase was primarily due to loan fees associated with the payoff of the Green Plains Partners debt retired in the third quarter of 2024.

Paid income tax for the quarter was a benefit of \$0.8 million, compared to a tax benefit of \$7.8 million for the same period in 2023. At the end of the quarter, the federal net loss carryforwards available to the company was \$10.8 million, which may be carried forward indefinitely. The NOLs are down significantly from our Q2 2024, as the NOLs were used to offset the gain on the sale of the Birmingham unit train terminal and the profitability we had within the quarter. Our normalized tax rate for the quarter was around 25%.

Our liquidity position at the end of the quarter improved from the prior quarter due to strong results from operations. Our liquidity included \$252 million in cash, cash equivalents and restricted cash, along with approximately \$228.5 million available under our working capital revolver.

For the third quarter, we allocated \$28 million to capital across the platform, including \$9 million to our clean sugar initiative, about \$8 million to other growth initiatives and approximately \$11 million towards maintenance, safety and regulatory capital.

On a year-to-date basis, we have incurred capital expenditures of about \$67.8 million, and we anticipate CapEx for the total year '24 will be in that range of about \$90 million to \$100 million. Again, as a reminder, this range excludes the approximately \$110 million in carbon capture equipment needed for our Nebraska initiatives, as we have financing lined up to cover those needs.

In closing, my time with Green Plains has been immensely rewarding. I'm grateful for the opportunities I've been given to grow professionally and personally during my 14 years here. I cannot thank Todd and the board enough for allowing me to rejoin Green Plains at the executive level at the beginning of 2022 to be closer to my family and grandkids.

I have complete confidence that Phil Boggs will excel in his well-deserved new position as CFO and the finance and accounting team will continue to support him and the management team as the company moves forward.

I look forward to my next chapter, and I appreciate knowing and working with all of you on this call over the last nearly 16 years of my public company career in the renewable fuels industry.

Now I'll turn the call back over to Todd.

**Todd A. Becker**

*President, CEO & Director*

Thanks, Jim. And again, thank you, and good luck in the future.

So let's talk carbon. Our Advantage Nebraska strategy to decarbonize our 287 million-gallon footprint in the state remains on track. And along with our pipeline partners, we have made great progress again this quarter.

Of note, Wyoming, which is 1 of 3 states with primacy for issuing Class VI permits, approved the first sequestration well for the Trailblazer project in September, and we expect additional well approvals for the project to follow in the coming months.

The long lead time carbon compression equipment has been ordered and is on schedule for delivery in Q2 of 2025, and we expect to begin construction on these facilities in the next month or so, keeping us on track for the second half of 2025 operations and cash flows.

This is another game-changing and differentiating project for Green Plains shareholders, that we will be one of the earliest and largest platforms sequestering carbon. Our carbon earning estimates remain intact, with the expectation we will generate \$130 million or so per year starting in the second half of 2025, assuming 45Z values and a \$70 ton carbon credit, or LCFS credit, even after discounting the value of the tax credits.

Nebraska as an asset alone with this type of base earnings is not at all reflected in our share price of our company, in my opinion, in our opinion as well. During the quarter, we saw a decarbonized ethanol production facility exchange hands for the price over \$3 per gallon. So you could do the math. The value of our 287 million gallons in Nebraska would be higher than our current market cap from those plants alone.

While the Summit Carbon Solutions project continues to make progress with permitting and right of way, we anticipate the Nebraska pipeline will be on prior to that, giving us some of the largest volumes of low-CI ethanol gallons during the existing 45Z runway of 2025 to 2027, with a 12-year 45Q credit available if it is not extended. And what some misunderstand is that 12-year credit is from the date when the facility is placed in service, not from when the IRA was enacted. And I think that's a really important point when we look at the availability of our long-term cash flows.

We do believe that 45Z will be extended beyond 2027 when the new Congress considers a broader tax package next year. Regardless of how this election plays out, there is bipartisan support for this measure and support across a diverse set of industries, but we're still waiting for proposed regulations to come out.

Now on to distillers corn oil. We have seen some stabilization in oil prices, as the market has tightened up as evidenced by the rise in palm and soy oil prices during the quarter. We look forward to 2025, as we know DCO becomes an advantaged feedstock, and we continue to push record yields as a platform, with more to come in the future. When you add corn oil and carbon, those 2 account for over \$220 million of combined EBITDA contribution beginning in the last half of 2025.

In protein, as noted on the top of the call, we had record production of ultra-high protein during Q3 at our Green Plains plants, and we will continue to grow from there in the future. Our commercial and operations team have continued to execute and improve our processes to maximize the flexibility and efficiency at each of the locations. Our Tharaldson JV also ramped up production during the quarter and continues to get to max run rates.

Commercially, we continue to open up new markets and win new customers for our 50 Pro ultra-high protein product, both in the U.S. and internationally. We now ship to many Asian destinations and started commercial shipments to our strategic customers in Latin America. With JV production, we now also have a better access to customers in the Western U.S., opening another new market for us from a transportation standpoint. The team is making great progress increasing our sales to our pet and aquaculture customers.

While operationally we've been improving, margins are somewhat lower than expected due to the availability of cheap competing products. We believe this will work itself out in due time and continue to believe that adding optionality and flexibility to our biorefinery platform to maximize what can be achieved with a kernel of corn positions us for long-term success.

For our 60 Pro Sequence product, we have been making additional upgrades to our production capabilities and continue to refine and improve our product. Our upgrade at Wood River is expected to be online in the first quarter next year to allow that plant to better and more efficiently and cheaper produce more Sequence.

More important, we just completed a new run at Central City, and we were up to spec of Sequence in less than 6 hours, with little disruption to daily operations as we continue to ship and sell Sequence to customers.

There is a lot of interest in this ingredient, but we are limiting volumes until we finish these upgrades during the first quarter of 2025. We also have some really exciting potential process breakthroughs for 60 Pro on deck for early next year. So stay tuned.

Lastly, we will wait and see how the margin structure shakes out this quarter once the corn crop is fully harvested. The forward-looking ethanol margins is a bit of an unknown, as usual, but we know export and demand overall does not support this margin structure tone, as evidenced by yesterday's EIA report showing stocks now under 20 days of production and the crush yesterday finally improving \$0.04 per gallon on this news.

If you compare year-over-year at this time last year relative to much similar numbers, margins were significantly higher, and hopefully yesterday began the march to start to match some of those numbers, but we have a little bit of a ways to go.

With regard to sugar, our outstanding operational and engineering teams worked tirelessly to prove out this groundbreaking technology at commercial scale, and we have been consistently producing at the facility, with product already sent to key customers for formulation testing.

We will continue to work over the coming quarters to optimize the Shenandoah facility to increase production volumes, including addressing additional bottlenecks. The learnings from our York Innovation Center pilot and now building and operating this commercial-scale facility in Shenandoah puts us in a much better place for when we decide to execute on [ Serial 2 ].

The critical piece here is what we have proven is the technology at scale, and now it's a matter of building out that infrastructure and reshaping an industry that has never been disrupted.

Our Q3 performance demonstrated the capabilities of our platform, with strong run rates and yields, allowing us to capture the positive margin environment. We intend to keep checking off milestones of our decarbonization strategy and as we wrap up the Clean Sugar Technology to improve shareholder value. Thanks for joining the call today, and we can start the Q&A session.



## Question and Answer

---

### Operator

[Operator Instructions] Your first question comes from the line of Jordan Levy, with Truist Securities.

### Jordan Levy

*Truist Securities, Inc., Research Division*

Jim, thank you for everything, and best of luck on the next ventures. Phil, congratulations on the new role.

Todd, you mentioned it on the call, but your equity value here is certainly not reflecting the value of Advantage Nebraska on the CCS side and maybe even more so the other initiatives in protein and sugar. Can you just talk to outside of the strategic review process you have what you think the market needs to see from you all to get more value reflected there on what the work you guys are doing?

### Todd A. Becker

*President, CEO & Director*

I think that, obviously, the milestones. There's a couple of big events. The milestones in carbon are going to be really critical, and we should be able to break ground here in the next 30 to 45 days on that project. And I think once we do that, you're going to start to see a quick ramp-up in the interest -- in the credits that we are going to produce, both 45Z voluntary and/or LCFS credits for California.

I think what's really important is that those are programs that are in place. And I think that once that starts to kick off, just from that alone the value of our company will begin to adjust higher, if not sooner than that.

Obviously, we've gone through some ups and downs as an industry. I think broadly as an industry as well, whether it's going to be in ag or renewable fuels or ethanol or anything in between, we've seen compressions across the board in overall values as an industry. And I think a little bit of that is overblown, especially the value of our asset base. If you look at a per gallon value of our asset base today, it's just significantly too low.

But we've had a few challenging quarters. And I think what we were able to show this quarter in a normal margin environment, we can certainly deliver free cash flows.

I think when we look at things like sugar that was delayed, it's not going to be an immediate impact to earnings. But what it is, we believe and we always have believed is that our CST technology developed at Fluid Quip and now producing at Green Plains is a game-changer, but it's a longer-term process that will take place, but we have significant interest in those products.

So I think, just overall, it's a little bit of everything. We've had ups and downs as a company. And I think the margin environment continues to be very, very volatile in this industry, and we're just going to have to watch that closely. But our financial position remains strong. Our per gallon, just generally on a generic per gallon valuation, is too low relative to replacement and relative to other transactions. And I think, just overall, it's just a step process to get ourselves revalued back into where we need to be.

### Jordan Levy

*Truist Securities, Inc., Research Division*

Appreciate that. And then maybe just kind of building on the CST side that you mentioned, I don't think it's quite as well of an understood market certainly as ethanol, but even as much as protein. But maybe just help differentiate the long-term value you see from that business from some of the more near-term challenges we've seen in protein, and maybe just give a little more detail on how you view the sugar dextrose market evolving.

### Todd A. Becker

*President, CEO & Director*

That market and demand remains strong for dextrose overall, but even more so for low-carbon dextrose, as CPG companies continue to remain focused on lowering the carbon score of their products. And that's where we see interest in everything from pancake syrup to industrial chemicals and everything in between. I think that's a misunderstanding that that's -- a lot of that happens in fermentation. Our sweeteners are used in many other areas, and that's really what we're producing.

We have started to receive our certifications. And now that we are producing product, our goal now is to get our food-grade certification so we can begin to sell into the consumer markets as well. I think that's just the first step of many steps that we want to do to monetize this product.

The margins remain strong. If you make dextrose instead of alcohol, your margin is significantly higher. And I think that's still proven by results that you see from the others in the space that make dextrose in wet mills. Those margins continue to remain strong, especially on that product.

So we have an interesting technology. We have interest in the technology from around the world right now, and Fluid Quip continues to get calls in, in the work that they've done. And what we're proving out in the United States, where we're really going to focus our efforts, is that there's significant demand. People have waited for us, and it's from food all the way through chemicals. And I think you'll start to see us deliver on some commercial volumes to customers and also some offtakes as well during the kind of next 30 to 90 days. So we're really excited about that. The team has worked really hard.

But the margins have maintained themselves throughout this whole process and have not compressed relative to everything else that we have seen. And we're really excited about it. It's a long game on this one, but owning and controlling this IP and this technology and proving at commercial scale that we can make low-carbon dextrose and sweeteners, this has never been done before in the history of agriculture at this type of scale and this type of level, where you can take a dry-grind facility and make dextrose to be used in food and industrial products. So it's really exciting, and it's a great testament to our team.

### **Operator**

Your next question is from the line of Laurence Alexander, with Jefferies.

### **Kevin Estok**

*Jefferies LLC, Research Division*

This is Kevin Estok on for Laurence. I've got 2 questions, one on clean sugar and one on ethanol margins. I guess, I know that you said that margins don't really reflect current conditions. And I guess just given the direction that ethanol prices have moved in the last, like, several weeks, months, I mean, could you foresee producers possibly lowering rates, like temper production, to sort of lift pricing? I'd just be curious how your outlook has changed for margins and prices since the last earnings. And I guess, I think you said last call that the corn basis was coming down into Q3. Did that play out as expected?

### **Todd A. Becker**

*President, CEO & Director*

Look, this is a little bit of a wait and see on margins this quarter. I think what we saw was a compression late in the quarter, you all saw that, you've all talked about that, late in the third quarter, and it continued a little into October. But I think as we leave October, and these numbers that we saw yesterday prove that what we produce is being absorbed, with [ draws at a \$10.80 ] run rate yesterday. And I think the market is going to have to adjust to that.

I think we were dragged down by this weakness in oil and gasoline prices that we saw in the quarter, and ethanol took a hit as well. But overall, I think hopefully we're going to -- we're bottoming out here, and again, we saw some increase yesterday, and we'd like to see that continue and see what happens over the next coming weeks.

But we still have turnarounds in the industry, and we still have some other areas where I think we're going to take some stuff offline naturally. But I don't know yet today that we're at a point where anybody is going to significantly reduce production. And as we go into next year, if we can maintain these stocks and

get through the first quarter and get into driving season again, I think that will be a very positive for next year margins. And we do believe exports will remain strong through the rest of the year and hit those numbers.

So generally speaking, we're using what we're producing, but it would be nice if we can get even a larger draw. But with [ stated ] demand less than 20, typically, we see an expansion back into normal margin structures.

On the corn basis, we've definitely come out of harvest firmer than I think anybody really thought. The farmer was able to put some of this away. But we are -- the corn basis in Q3 was at least \$0.50 a bushel better than the prior 3 years. So we saw that market come down, which obviously helped the margin structure for everybody in the industry, including ourselves.

And as we come out of harvest, basis is still lower in areas than traditional last couple of years, but it's definitely firmer than we thought. But we're not having any trouble buying corn. It's just a matter of -- at these flat prices, with futures pushing towards \$4, the basis is going to remain firm, I think, throughout the year.

**Kevin Estok**

*Jefferies LLC, Research Division*

Understood. And then just on clean sugar, as you announced earlier this week, the first commercial Clean Sugar Tech [indiscernible], samples going to customers. Just curious what your feedback has been from those customers, whether or not you've received feedback on those samples. And I guess, just curious about the geographic makeup. I mean, are most of them North American customers? Any color there would be helpful.

**Todd A. Becker**

*President, CEO & Director*

I'll answer your last question first. They're all North American customers today. It's really where sugar is going to -- our dextrose is going to travel.

But we are seeing global demand for the technology from customers that want to talk to Fluid Quip about bringing their technologies to other countries. And again, we're not opposed to that. And I think it's going to be a very big value creator for them and for Green Plains as well.

Relative to customer feedback, look, they've seen product already out of our York Innovation Center that is structurally similar to what we're producing in Shenandoah. And the product we'll have in Shenandoah will be even better.

So for us, it's really a matter of time now. You have to make product before you can get food-grade certification started, the process, and that's where we're at today, is we're going to start that process. But you saw we had GMP approvals. We've got other approvals pending. And I think you'll start to see that our product will become a very well accepted product. Our first goal is to ship our products into industrial markets today because they're not food-grade markets, although they do need some of their own certifications.

But early feedback on stuff that we have shared has been good. But again, we're just starting to ship it out now. So it's going to take a little bit of time. This is a long game, but owning and controlling this IP and this technology that is such a disruption and game changing, and we have proven now that it works and it works at scale. But there's still some things we're going to have to continue to work through in Shenandoah. But as we think about #2, it will be better engineered and better constructed in terms of cost and cost per pound and cost per ton and those type of things.

I think we're on a -- it's just a long path, but this is absolutely a disruptive technology that has never -- this has never been done before in history, and we're very proud of the team that has done it. So thanks.

**Operator**

Your next question is from the line of Saumya Jain, with UBS.

**Saumya Jain**

I guess I just wanted any color on how the partnership with Shell is progressing and if you guys have any updates on Tharaldson as well.

**Todd A. Becker**

*President, CEO & Director*

I'll let Leslie comment on our SFCT partnership. There's some exciting things going on there. Leslie, do you want to comment on that to start?

**Leslie van der Meulen**

*Executive Vice President of Product Marketing & Innovation*

Sure. So the process has successfully started up in York, and the first cellulosic ethanol has been produced. The process will now switch to really a one-of-a-kind opportunity. The DCO, or what we call the second-gen DCO, is the next in line to line out. So that's basically the previously unattainable corn oil. And then the last piece is going to be the alignment of protein. Once that all is up and running, then the process will switch to campaign mode, and that's when we'll be producing more products for validation efforts on the protein side.

**Todd A. Becker**

*President, CEO & Director*

Thanks, Leslie. And then also then -- what was the second question that you had?

**Saumya Jain**

Any update on Tharaldson?

**Todd A. Becker**

*President, CEO & Director*

Tharaldson start-up. Obviously, it took a little bit longer than we wanted, construction took a little bit longer. And we continue to debottleneck there, but we're starting to push towards the upper end of the rates that are available of the production capacity there.

Bringing on that much protein on the market, we had to wait for customer approvals, but the quality of the protein is excellent. The toxin levels at Tharaldson are the lowest in the country, which is nice because there are certainly customers that wanted North Dakota product because of the absolute zero toxin in corn that is there. And so that's getting -- opening us new markets as well as the West Coast, where we really did not have a freight advantage out of our terminals or out of our facilities to get to the West Coast. We're seeing some new demand out of there as well.

So again, these are long games, but I think as we go to max production over the next several quarters, we're just excited about the fact that we have a really great product and as Sequence starts to kick in, in 2025. So more on that next quarter.

**Operator**

Your next question is from the line of Andrew Strelzik, from BMO Capital Markets.

**Unknown Analyst**

This is actually Ben on for Andrew. I just want to say congratulations, Jim, and to Phil as well. Jim, I wish you all the best of luck there.

So my question has to do with carbon capture. Can you just walk through the key milestones that we should be tracking in order to hit the second half '25 \$70 a credit target?

**Todd A. Becker***President, CEO & Director*

So what we're watching very closely, obviously, is the lead time -- our equipment order. That is all on track. And we've been talking to the manufacturer, and they believe they are on track for our second quarter delivery.

We expect to break ground on the structure in the next several weeks, or less than a month from now, and that will really be the first milestone. I think that will be important to everybody. Most of the engineering has been done already.

We have the credits -- the permits to operate in all the counties where we are located. Nebraska is very different than other states relative to carbon capture and approvals and permits. And so very supportive from the state. So we'll wait to see when Trailblazer starts to build their laterals as well. And so we'll know at that point. I think we'll watch that closely.

We do have some [ air ] permits just to start construction, which we expect to receive shortly. Those are just permits from the state as we receive on every other construction project that we do, and there doesn't seem to be any delays receiving those relative to the start of construction.

So then it's really up to our partner to make sure the pipeline is in service and the laterals are built and the continuation of Class VI wells in Wyoming. All of this has been laid out in the past. And I think each of those are going to be really important.

I think what also is important is the rules on 45Z as they roll out early next year sometime. And we believe those will be positive relative to what we've seen in the past and expect certainly by the third quarter of next year to have those full rules outlined by the time we're sequestering carbon so we can earn the 45Z tax credit and then on top of that the voluntary credits or the LCFS credits.

So it's just a step-by-step process. But at this point, the equipment is in construction and in manufacture. So this is -- we're on path to somewhere in that third quarter begin to compress carbon. And when we turn it on, we're basically turning it on at a full rate. And we have no reason to believe that our partner won't be operational as well.

So we're -- I mean, I think that when you look at that and the interest that we have not only in the low-carbon ethanol, which I think -- don't underestimate the interest in low-CI ethanol, both domestically and globally, especially as we start to see what we believe will be better outcomes in Europe on CORSIA modeling, is what we're hearing as well, as well as some of the other things that are happening relative to modeling in carbon markets.

But I think what's also really important is our door is also being knocked for getting those carbon credits and also providing us with payments relative to those credits. So I think the value of it is just very well misrepresentative in our current share price, and I think that's going to have to change because the value of these assets are just too high in the future, especially relative to the future cash flows of when you add that, corn oil in Nebraska, add on top of that protein in both of those plants, add on top of that those are some of the best plants that we have, generally speaking, long term, the value of that asset base is underrepresentative in our share price.

But I think one thing that's really important here is that, which is missed and we don't talk about it much, is we think by the end of the year or early into the first quarter we will have 9 of our 10 plants approved for D3 RIN generation for 1% or 2% of our capacity. And that D3 RINs, because we are -- you add certain things into fermentation when you talk about 8 million or 9 million gallons and the spread between D3 and D6 RINs is \$2.50 to \$3 a gallon, that is not represented at all in our capabilities as a company.

On top of that, the Corn Kernel Fiber program in California is not represented either. And we think in 2025, that also gets added to carbon earnings.

So there's a lot more going on here than just sequestering carbon, especially around D3 RIN generation with our ability to make 1% or 2% of cellulosic or next-generation ethanol, as well as what's going to happen with SFCT in the future.

So it's a step-by-step process, but I think each of those milestones will be met in carbon, and it's just now a path to turning it on in the third quarter of next year.

**Operator**

Your next question is from the line of Salvator Tiano, with Bank of America.

**Salvator Tiano**

*BofA Securities, Research Division*

Firstly, I wanted to check a little bit on any update on Blue Blade Energy. I think the plan was you test the SAF technology, and if it works you would start construction on the pilot plant this year, 2024. So where do we stand on that?

**Todd A. Becker**

*President, CEO & Director*

I think from the Blue Blade standpoint, what we've done is we had a partnership, and we looked at several different catalysts -- we looked at a catalyst that we had control of. And at this point, we've decided not to proceed with that catalyst. I think there's other things with the other technologies that are out there that are much quicker to get to market.

When you bring a new technology to market, as we learned in clean sugar and even in Sequence and other proteins, it just takes a long time to scale up. And since there are other technologies, much like a UOP Honeywell or others that are out there, we think that that's a much faster path to market for alcohol-to-jet.

Our focus from that standpoint is we want to be a provider of low-carbon fuels, energy and ingredients, and that's where we're spending our time. Before anything happens in sustainable aviation fuel with alcohol-to-jet, you have to be able to decarbonize the alcohol. And being a significant advantage for Green Plains is we will have some of the largest quantities in the United States and globally on decarbonized alcohol middle of next year. And that's really where we're going to focus our efforts today.

I think for Green Plains to build an alcohol-to-jet plant is probably not something we'd focus on today because I think we can earn a significant return for our shareholders by just making sure that we're a great supplier of low-carbon ingredients and fuels.

**Salvator Tiano**

*BofA Securities, Research Division*

Perfect. And I wanted to ask also what's kind of your view for ethanol exports next year and essentially demand from some key end markets or key producing markets like Brazil and India, given what's happening in sugar production, among others?

**Todd A. Becker**

*President, CEO & Director*

We think this train is going to continue down the road relative to us finding our path into global markets as they have increased their blend rates. You saw Brazil did that. You saw other countries have done that. We are going to -- we're hitting some of the European markets as a country as well. The EU is very strong, and we continue to think that will continue to gain momentum, especially if we see positive news out of CORSIA for U.S. ethanol and the way they model that relative to 20-year-old modeling that's been in place. I think they've realized that we grow more corn per acre than 20 years ago, and that reduces our overall carbon scores.

Generally speaking, the demand remains robust globally. And I think that's going to continue because I think we are a value molecule. We're \$0.40 or \$0.50 less than wholesale gasoline today, at a minimum,

plus in the United States with the RIN. But globally, we are very, very competitive as a molecule, and I think we've shown that we can ship significant quantities. And I don't believe next year will be any different than this year. And I think we need that.

And I think we also continue to see blends increase in the United States, especially as we go through quarter after quarter of a driving demand, which doesn't seem to be going down right now. We've seen good driving miles in the last couple of months, and we saw great demand this week relative to the blend rate.

So if you add all that up together and if we can keep these stocks at check as we move into the end of the year, I think we have a really good shot at a good margin environment in 2025.

### **Operator**

Your next question is from the line of Kristen Owen, with Oppenheimer.

### **Kristen Owen**

*Oppenheimer & Co. Inc., Research Division*

A couple here that I wanted to ask on. First is the protein margins. You touched on this being a little bit lighter than what you were hoping for, that spread over traditional soybean meal not quite where you want it to be yet. But as we look at some of the soybean crush capacity and the transition in the policy in 2025, how are you thinking about the premium for ultra-high protein as we come into this transition year next year?

### **Todd A. Becker**

*President, CEO & Director*

It's really going to depend on what market we go to. When we are sending our product internationally as we continue to grow those markets, we see -- we realize the full spread, and more, many times, or at least within, plus or minus, 5 or 10 points of that.

Our pet food demand remains strong. We've just renewed with our long-term customer and increased volumes during the first quarter of next year on our 50 Pro product and continue to get full access to that, with a new plant coming on next year as well.

But I think, look, there's a lot of protein coming. We've seen a lot of protein hit the market already, and we've settled out at these type of spreads. Demand remains really good. We'll have to wait and see what happens out of South America.

Look, 14 million or 15 million tons sounds like a lot. And if it all comes at once, it is a lot of soy meal hitting the market. But when ethanol came on, we brought 40 million tons of distillers onto the market as well. And so I think we are going to absorb much of that. It may take a few more quarters or at least another year or so.

But look, we still earn a margin. It's not like we don't earn a margin and a return on our investment. It's just that we've seen some compression relative to the soy against corn. And I think that's probably -- that is most likely stabilizing at this point. I don't think we're going to see much more compression against those spreads. And we continue to make our product and sell everything that we produce.

And one of our past and one of our things that we've always talked about is our way to get out of that is we can make 60% protein products and higher even. And we're working on even some of those products today, and Leslie's team is making great progress. And we're learning how to reduce the cost of producing Sequence, which I think drives a bigger margin contribution as well as we go into next year with the improvements we're making and some of the other technology improvements we made and the cost of production coming down.

So it's a little bit of learning, but I think in the next 18 months a lot of this protein will just get absorbed into the market. There's not a bunch more soy crush capacity to come on, and it seems to be coming on

in a more methodical pace. And you start to see investments being made in export capacity as well to get some of this protein out of the country.

**Kristen Owen**

*Oppenheimer & Co. Inc., Research Division*

Okay. That's helpful. I was actually thinking there's some soybean crush capacity that's not coming on and potentially flowing. So that could be a tailwind for your margins next year as well.

**Todd A. Becker**

*President, CEO & Director*

Yes, we've seen some of that, where projects were abandoned because of the cost versus the overall margin structure. And we believe that's happening as well, that it will come on slower or not come on at all. And I think that will be helpful overall. And then we get into next year and let this RD market settle out and see where that settles out from the oil standpoint as well.

**Kristen Owen**

*Oppenheimer & Co. Inc., Research Division*

Super. So then my follow-up question, as you said, the \$250 million to \$300 million run rate value of carbon just from those Nebraska assets probably not baked into most folks' models at this point in time. Help us understand now that that is becoming much more within the next 12 months' time frame, help us understand the mechanics of those credits, how you think about monetization of them, like what sort of tolling fees you might have to pay to use that pipeline. Just give us a little bit more granularity so that we can build that into our forecasts.

**Todd A. Becker**

*President, CEO & Director*

So let's start from the pipeline standpoint. We have an agreement with Trailblazer on transport and injection, and that's just a fixed fee. And there's no sharing of our upside in our credit values from the revenue side. So we just pay a standard transport midstream relationship that we have with Tallgrass -- with Trailblazer, owned by Tallgrass. And that's really -- it's very simple.

And then what we generate is revenue from 45Z, 45Q and either voluntary credits or LCFS credits. And that's the revenue side of the equation. And I think we've outlined in the past our carbon score reductions at Central City, Wood River and York, which will be on the pipelines to start. And I'll get into York in a second.

But when we look at the revenue side of the reduction, which is \$0.02 per gallon per point from our starting point is everything below 50 carbon score, that's on the revenue side with the 45Z.

On top of that, we'll be generating over 800,000 tons of high-quality carbon credits that either will flow into California from the fuel standpoint, and we'll monetize LCFS and/or from voluntary markets.

So monetizing the 45Z and monetizing the carbon credit will be something that there are well-developed markets to do that. We've seen those trades in that 90%, 95% of face value happen, and that's in our numbers as well. So we're going to sell those credits and monetize them and not use them internally unless we need to down the road from a standpoint of then we can realize 100% monetization of those credits.

So we add all of that revenue up. We discount it by somewhere between 5% and 10% to get to our net revenue; deduct our transport fees, a little bit of operational cost for the facility to get to an EBITDA number.

Now when we look at York, York is today is a 45Q plant because they start with a higher carbon score. But we are on deck to lower their carbon score through low-energy distillation, that we would expect that we will try to get that into service within the first 6 to 12 months of their operations so that we can have that



plant qualify for 45Z as well, which is upside to those numbers once we're able to do that. And we'll do other things to reduce our carbon scores overall to give upside to those numbers.

So it's 287 million gallons generating 800,000 tons or more of carbon credits. And we today have interest from companies and the broker markets to take our credits to market and/or come up with some structure to monetize those credits the day we start. And we can actually start selling credits before we even start to sequester carbon, knowing that we will be sequestering carbon at a certain date, and we have interest in that as well.

So generally speaking, the demand for the alcohol remains strong from alcohol-to-jet players, and the demand for the credit remains strong from the tax credit markets all the way up from the Big Tech companies that need to buy offsets, and they can use our tax credits, all the way down into just monetizing into the LCFS market.

Is that helpful for you?

Did we lose everybody?

**James E. Stark**  
*Chief Financial Officer*

No. We must have lost her. Operator, time for the next call?

**Operator**

Your next question is from the line of Matthew Blair, with TPH.

**Matthew Robert Lovseth Blair**  
*Tudor, Pickering, Holt & Co. Securities, LLC, Research Division*

Congrats, Jim and Phil, on your respective moves here. I wanted to ask about the election risk to the IRA and the associated credits like 45Z and Q. I think the Wall Street Journal had a story yesterday talking about how a potential candidate for Treasury Secretary was talking about scrapping the entire IRA. What do you make of that? How much does that concern you? And is there anything you can be doing today to potentially mitigate some of that risk?

**Todd A. Becker**  
*President, CEO & Director*

I'll let Devin comment on that first, and I'll close off after that.

**Devin Mogler**  
*Senior Vice President of Corporate & Investor Relations*

Sure. So thanks for the question, Matthew. We saw that article, and there's been a lot of talk in this campaign if Republicans sweep of trying to eliminate the entire IRA. You'll recall that they tried to do this with the debt ceiling lift back in April of '23, and there were 7 Republican House members, all of whom had voted against the IRA, who blocked that from happening as it relates to 45Z.

So there remains bipartisan support for not only preserving but extending 45Z. Several bills have been introduced with both Republican and Democratic support to extend that credit. And you've got to remember that there's now multiple industries that are interested in this. It's not just biodiesel and renewable diesel and ethanol. It's also sustainable aviation fuel because the 40B credit rolls into the 45Z.

So we believe that regardless of the election outcome there will be support for that program. And while some aspects of the IRA may be curtailed if Republicans control all 3 corners, we think the prospects are bright for having that extended to have a much longer runway.

**Todd A. Becker**  
*President, CEO & Director*

And one last thing, Matthew, is the 45Q -- let's just say, worst-case scenario, the 45Q is the remaining program. If that were to happen, which we do not believe that will happen, that is not part of the IRA. It's expanded during the IRA, but it's not part of the IRA. And I think that that's an important point as well. And it's a 12-year program that starts when you start sequestering carbon. It doesn't go away from 2 years ago to 10 years from now. It goes away 12 years after you start to sequester carbon. It's been permanent for a long time in the program, and it's a direct-pay program as well for the first 5 years.

So while we certainly would not like that to be the program, because I think there's much more opportunities around 45Z, if that were worst-case scenario, then we'd have less revenues around carbon, but it would still be a significantly profitable project. Instead of paying off in less than a year, it maybe would pay off in a year and 4 months. And it's really not that much of a big difference for us. But it certainly is nicer to have the 45Z, and we do believe that will stay intact.

**Matthew Robert Lovseth Blair**

*Tudor, Pickering, Holt & Co. Securities, LLC, Research Division*

That's helpful. And then earlier in the call there was some talk about Mount Vernon and Obion increasing capacity. What's the total capacity increases that you're expecting? And does that shift anything on your product slate? Would you expect to increase your exports as a result of that new capacity?

**Todd A. Becker**

*President, CEO & Director*

So Mount Vernon is complete. We've redone all the full conveyor systems among other bins and tanks and systems and processes, and that was needed. We're starting to ramp that plant back up as we speak, and that should add about 20 million gallons of yearly production run rate capacity there. And when we add gallons, we add pounds of corn oil, and we add tons of protein on top of that. That has a protein system down there as well. So it's going to be all 3 components there.

In Obion, we're waiting for final construction of the RTO, instead of a TO, thermal oxidizer, to a regenerative thermal oxidizer, and that will allow the plant then to get back to the traditional run rate. That is another 20 million to 25 million gallons of opportunity per year as well. And that project should be completed in the first quarter of next year. That plant should be running at a much higher rate, but because of the longer-term effects of this piece of equipment, we haven't been able to. And then we brought protein on. And now combined, it's just overloading all of the systems, and we're going to be able to get that back in line sometime hopefully early in the first quarter of next year as well.

So the 2 of those combined should add 40 million to 50 million gallons -- about 40 million gallons of additional capacity that we bring online, but it doesn't necessarily change where we ship. It's just shipping more product to the same markets, and those markets are ready to absorb everything we bring on.

**Operator**

Your next question is from the line of Craig Irwin, with ROTH Capital Partners.

**Craig Irwin**

*ROTH MKM Partners, LLC, Research Division*

First, I would say congratulations, Phil, on the promotion. Jim, going to miss you. It's been great working with you this last many years.

My question is around clean sugar. I wanted to ask for a little bit more color. Todd, do you feel some of the projected economics that you've talked about these last couple of years are starting to be confirmed by the plant start-up? And then if we rewind about a year, there was some optimism that we could start seeing additional facilities once this plant was up and running. What do you expect to see out of Shenandoah? What do you need to see out of this plant to make a go decision to invest in the next facility? And can you remind us maybe on the CapEx and project returns that we should be thinking about?

**Todd A. Becker**

*President, CEO & Director*

Thanks. And we have significant optimism for this product, the production process. There's definitely things that we will do different in a much larger facility than we did here relative to some of the equipment that we had outlined in the past, where we had some early issues that we worked through and have fixed some of those issues. But I think the engineering on plant #2 would be different than plant #1 just in terms of improving the capabilities of the asset.

The econs are very similar to when we started this 5 years ago. We said it's \$0.67 to \$0.87 a gallon uplift relative to making alcohol, and those still exist today, even relative to sugar prices and sweetener prices that are out there, on top of lower corn and input costs. So from that standpoint, nothing's changed economically on how we think about a full-blown build of a clean sugar facility at a plant, either ours or even potentially stand-alone, with support of a Gen-1 ethanol plant.

So additional facilities, more to come on that. I think what we want to do is -- like I said, it's only been a week we've been at it. Give us a little more time. But I think what has been proven is that we can make the product. We can -- we're shipping the product. It's in rail cars. It will be shipped in trucks. It will end up on people's doorsteps for them to analyze. We still have to get food-grade certification. And we'd like to run it just a little bit longer than a week or 2 and continue to optimize and continue to drive better and better product quality, because I think we can continue to do that. It's not just around 95 dextrose equivalent. There's 63 and 48. And I think that we want to make sure we can make all of those as well. And then we want to make sure we get into the food market.

So it will be a little bit before we decide on plant #2, but I can tell you based on early returns we're very optimistic that that technology will be radically transformed, not just what we can do at a dry mill, but the industry in general over the long term, not necessarily in the next 6 to 12 months.

But CapEx, still working through that. We've seen some stuff come down and some stuff go up. Labor is still a challenge when you build anything. And long lead time on electrical gear and switches and those type of things remain a significant challenge with all the data center demand that exists in the United States and other things that are happening around nuclear and those type of things.

But when we look at CST and we look at clean sugar and we look at what we can make out of a dry-grind facility when everybody said, "You can't do that," I'm going to tell you this right now, we are absolutely 100% doing it. It's an amazing technology from Fluid Quip. It still has some work to do relative to what we would do maybe in Serial #2, but we are really, really optimistic about the future of this technology as a whole.

**Craig Irwin**

*ROTH MKM Partners, LLC, Research Division*

So my follow-up question, I guess, is a 2-part question, right? Can you maybe share with us the -- well, the housekeeping side is really sales mix on High Pro products, 50 versus 60 Pro. Do you have an estimated mix exiting the year and then comments around what you think is reasonable for Green Plains to target in 2025?

And then the second part is the blue sky economics out of High Pro, one of the more exciting parts of the story was always the collaboration with Novozymes for some tailored products that might have improved nutritional profile and make it an even better match for many of the markets that you're pursuing. Do you have an update on the Novozymes partnership? Is there anything we should look for there over the next number of quarters?

**Todd A. Becker**

*President, CEO & Director*

I'll start with that, and I'll have Leslie talk about some of the things that we're doing around product quality and nutritional quality and working with other customers on that.

But we have re-signed our agreement with Novozymes and our partnership. We did it quietly, as we're working together on several products and several opportunities. We are -- it's an amazing partnership between Green Plains and Novozymes and what we've been able to accomplish together, and especially around development of higher proteins and different nutritional characteristics that we continue to work on. So that has been renewed.

On top of that, we talked about our pet food customer has begun to renew for 2025 as well, as we just finished the first quarter at higher volumes in 2025.

And so we're really excited to work together on all different types of recipes with Novozymes, inclusive of generating these D3 RINs as well.

Everything evolved in all of these technologies. When we started out, we thought we'd put protein everywhere. And along came the IRA, and now we're going to invest capital into carbon sequestration with significant returns. And someday, I'm absolutely confident we'll continue to build protein systems as we absorb this protein into the market. Because what we have is, depending on the species, it's a very special product that does really interesting things relative to that.

We continue to work with some of the largest pet food customers in the world on 60 Pro inclusions in 2025, and we believe we are going to get a significant lift relative to demand from this year to next year. Today, we are making 60 Pro product. We are shipping 60 Pro product around the world. As we always say, it always take longer than we ever really want it to take. But when you kind of look at what we've been able to accomplish so far and where we've been able to ship this product, our team has done a great job finding homes for the product. And we are still working with those same large pet food customers on getting 60 Pro in large volumes into their systems.

What we want to make sure though, and Leslie may talk about that, is that what we send them is the same every day out of every location. And that's why we wanted to make sure that we got -- we did a little bit of CapEx in Wood River and Central City and wanted to make sure that we are able to ship that product consistently.

We are developing new markets in Asia and South America. We expect volumes to ramp up as we get through Jan and June and then really ramp up in July through Dec of next year. We have very large volumes that we expect to kick in, in July of next year. And we have other customers that we can sell more volumes of Sequence without negatively impacting anything else that we do. It's only positive impacts.

So overall, everything always takes longer, as we always know, but the demand for our product remains strong, and we expect to make significant inroads in the 60 Pro market next year.

Leslie, do you want to talk a little bit about some of the things we're doing on quality?

**Leslie van der Meulen**

*Executive Vice President of Product Marketing & Innovation*

Sure. As Todd mentioned earlier, I think you're kind of looking at a bookend, where we're looking at consistency on the product side, really making sure that that is where our customers can actually go to increased inclusion levels, and then the other side, which was already mentioned, is really the cost reduction. So that's been an opportunity for us to really tailor the use of our biological system to fine-tune it. On top of that, the team has been working on increased protein concentrations, which is, again, almost a third-generation product that we're working on. But I think the main focus has been between that consistency and the OpEx reduction side.

**Craig Irwin**

*ROTH MKM Partners, LLC, Research Division*

Excellent. Congratulations on the really strong crush margins this quarter. It's good to see those come through.

**Operator**

I would now like to hand today's call back over to Todd Becker, CEO, for any closing remarks.

**Todd A. Becker**

*President, CEO & Director*

Thanks, everybody, for jumping on the call and participating in today's call.

Our teams continue to execute at a high rate. We look forward to sharing our continued progress with you in coming months.

We also want to make sure that we provide you with the information you need to make the best decisions around our company. And as you can see with our carbon strategy, which is very unique and very advantaged and very early in the cycle, is going to be providing significant what we believe shareholder value creation.

On top of that, all of our products are starting to kick in. And obviously, when strong margin environments exist in the base product of fuel, which we believe will start to ramp back up as we get into 2025, I think we're well positioned to capitalize on all that we've invested and all the strategic advantages that we have as a company.

And again, we wish Jim best of luck and Phil best of luck in his new role. And we really appreciate your support, and we look forward to talking to you next quarter. Thank you for everybody being on the call.

**Operator**

This concludes today's call. Thank you for joining. You may now disconnect.

Copyright © 2024 by S&P Global Market Intelligence, a division of S&P Global Inc. All rights reserved.

These materials have been prepared solely for information purposes based upon information generally available to the public and from sources believed to be reliable. No content (including index data, ratings, credit-related analyses and data, research, model, software or other application or output therefrom) or any part thereof (Content) may be modified, reverse engineered, reproduced or distributed in any form by any means, or stored in a database or retrieval system, without the prior written permission of S&P Global Market Intelligence or its affiliates (collectively, S&P Global). The Content shall not be used for any unlawful or unauthorized purposes. S&P Global and any third-party providers, (collectively S&P Global Parties) do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Global Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON "AS IS" BASIS. S&P GLOBAL PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Global Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs or losses caused by negligence) in connection with any use of the Content even if advised of the possibility of such damages. S&P Global Market Intelligence's opinions, quotes and credit-related and other analyses are statements of opinion as of the date they are expressed and not statements of fact or recommendations to purchase, hold, or sell any securities or to make any investment decisions, and do not address the suitability of any security. S&P Global Market Intelligence may provide index data. Direct investment in an index is not possible. Exposure to an asset class represented by an index is available through investable instruments based on that index. S&P Global Market Intelligence assumes no obligation to update the Content following publication in any form or format. The Content should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. S&P Global Market Intelligence does not act as a fiduciary or an investment advisor except where registered as such. S&P Global keeps certain activities of its divisions separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain divisions of S&P Global may have information that is not available to other S&P Global divisions. S&P Global has established policies and procedures to maintain the confidentiality of certain nonpublic information received in connection with each analytical process.

S&P Global may receive compensation for its ratings and certain analyses, normally from issuers or underwriters of securities or from obligors. S&P Global reserves the right to disseminate its opinions and analyses. S&P Global's public ratings and analyses are made available on its Web sites, [www.standardandpoors.com](http://www.standardandpoors.com) (free of charge), and [www.ratingsdirect.com](http://www.ratingsdirect.com) and [www.globalcreditportal.com](http://www.globalcreditportal.com) (subscription), and may be distributed through other means, including via S&P Global publications and third-party redistributors. Additional information about our ratings fees is available at [www.standardandpoors.com/usratingsfees](http://www.standardandpoors.com/usratingsfees).

© 2024 S&P Global Market Intelligence.