



Green Plains

2022 Annual Report



Who We Are

Green Plains is a leading ag-tech company using innovative processes to transform annually renewable crops into sustainable, high-value ingredients.

We are rapidly transforming into the biorefinery platform of the future, harnessing the potential of our resources, technology and people.

Forward-Looking Statement

This Annual Report contains “forward-looking statements” within the meaning of the federal securities laws. See the discussion under “Cautionary Statement Regarding Forward-Looking Statements” in our 2022 Form 10-K for matters to be considered in this regard.



11 Biorefineries

Strategically located throughout the United States



330 Million

Bushels of corn processing capacity



Nearly 900

Dedicated employees

Letter from Our Chief Executive Officer

Green Plains achieved key milestones in 2022 across all four pillars of our transformation – protein, renewable corn oil, sugar and carbon. Maximized Stillage Co-products™ technology is installed in five of our plants with 75% of 2023 high-protein production volume spoken for already; we have set new records in renewable corn oil extraction for the burgeoning renewable diesel industry; we broke ground in Shenandoah, Iowa, on the first-of-its-kind commercial-scale dry mill dextrose facility, with potential co-location partners and customers already inquiring about collaboration opportunities; we announced a partnership to explore synthetic methane production, while continuing to evaluate options for carbon capture.

This overview doesn't even begin to detail the elements of all these milestones that make them exciting, or their significance to our overall transformation into a value-added, customer-facing producer of sustainable ingredients that matter.

Our teams are busy executing on our transformation, working hard to continue hitting important targets to achieve our 2025 objectives we laid out in 2021. We created a transformation office to ensure we maintain critical mass, organizing and communicating the required initiatives appropriately. We believe this structured oversight of our transformation helps enhance shareholder value, as it enhances our transformation progress.

Our 2022 achievements position us to continue executing on our vision to maximize the value of Green Plains. Each of our critical initiatives are on track, and we are increasingly confident that we will achieve our 2024 and beyond transformational goals and financial guidance.

2022 Financial Highlights

Credit to our operations team for achieving a 91% plant utilization rate in 2022, our best operational performance since 2014. Running our plants efficiently enables us to produce more of our higher-value ingredients, adding to our financial performance in 2022 and going forward. In addition to achieving business milestones, we continued to mature our capital structure through the completion of a five-year \$350 million sustainability-linked revolving credit facility tying the financial structure of the company to sustainability initiatives we first outlined in our 2020 Sustainability Report.



Our 2022 achievements position us to continue executing on our vision to maximize the value of Green Plains.

We ended the year with \$500.3 million in cash, cash equivalents, and restricted cash along with approximately \$235 million available under our working capital revolver. Our balance sheet remains in a solid position as we continue our transformation to Green Plains 2.0. Total capex for 2022 was \$212 million, the lion's share of which was the buildouts of Fluid Quip Technologies' MSC at Central City, Mount Vernon and Obion.

To date, we have invested approximately \$330 million dollars of our shareholders' capital across our platform in the deployment of MSC, including for our turnkey joint venture with Tharaldson Ethanol in Casselton, North Dakota, which broke ground in 2022. We anticipate this MSC deployment to be operational in late 2023 or early 2024.

On Transformation

As I highlighted earlier, we hit our stride in the transformation of Green Plains in 2022. We entered 2023 with 330,000 tons of high-protein ingredient production capacity and more engagement from our customers across species than I've seen in my 35-year career. In fact, we expanded protein sales to customers in North America, South America and Asia Pacific.

We achieved 60% protein concentration, as fed, at a trial at Green Plains Wood River in the second quarter of 2022, using the MSC system combined with biological solutions exclusive to Green Plains.

Our MSC systems are the catalyst behind our increased renewable corn oil yields, as well, expanding supply of our lower-carbon renewable diesel feedstock.

Our endeavor in protein has set us up well for dextrose and we can apply those lessons to optimize the execution of our strategy in Shenandoah. We are deploying a truly game-changing technology that allows a dry mill to convert a portion of the starch from a kernel of corn into a dextrose product with a lower carbon intensity than dextrose produced at traditional wet mill corn processing facilities.

We are building a revolutionary biocampus in Shenandoah, on a path to complete our first true biorefinery of the future that can separate the high-value protein ingredients and convert starch to dextrose, all while sequestering biogenic carbon dioxide.

Decarbonization is truly the linchpin of our transformation, enhancing opportunities for our sustainable ingredients as we attract customers in corn oil, protein and dextrose markets looking for low-carbon intensities and environmentally responsible suppliers. We continue to explore opportunities to decarbonize, including carbon capture and sequestration, synthetic methane production and combined heat and power systems.

48.3 Million

metric tons of carbon reduction to date⁽¹⁾

11 biorefineries, **2** fuel terminals,
2 Fluid Quip locations, and
1 corporate office

100%

of corn purchased from non-deforested, US-domestic sources⁽²⁾

301,868,000

bushels of corn processed in 2022

872,133,000

gallons of renewable biofuel sold in 2022

281,730,000

pounds of renewable corn oil sold in 2022

2,280,000

tons of animal feed sold in 2022

⁽¹⁾ Estimated CO₂ amount to have been kept out of the atmosphere due to Green Plains-produced low-carbon fuel between 2007 and 2022.

⁽²⁾ Based on compliance with RFS regulations (40 CFR § 80.1401), which requires the use of "renewable biomass" as an ethanol feedstock and by definition means that planted crops cannot come from deforested land. Additionally, we use U.S. corn and have not imported corn from international markets where deforestation might be prevalent.

Beyond our existing ingredients, new markets are within reach for lower-carbon ethanol, such as sustainable aviation fuel (SAF). Early in 2023, we announced a joint venture with United Airlines and Tallgrass to develop a novel Pacific Northwest National Laboratory ketone technology for alcohol-to-jet SAF production. The joint venture – Blue Blade Energy – is the first of its kind in the SAF space, capitalizing on the four key components of feedstock, technology, infrastructure and demand. Beyond a standard offtake agreement, Green Plains and Tallgrass envisioned a true partner that would participate in the development of the technology, not simply use the fuel. We found that partner in United and are eager to develop this novel catalyst together, establishing pilot and production facilities in phases.

In addition to the progress under our transformation pillars, we completed our plant modernization and upgrade program, returning our platform to full utilization rate capability.

To enhance our governance, we put forth a recommendation to our shareholders at last year’s annual meeting to declassify the Board of Directors. The proposal passed overwhelmingly, enhancing shareholder rights and demonstrating our commitment to sound corporate governance practices. This year’s election will be the first to elect board members to one-year terms.

Looking to the Future

We’ve entered 2023 with renewed energy, bolstered by the significant progress realized in 2022. Thank you for the support you’ve given us along the way, and for believing as thoroughly as we do in our transformation. We look forward to continued progress and increased value for you, our shareholders.



TODD BECKER,

President and Chief Executive Officer

“

Decarbonization is truly the linchpin of our transformation, enhancing opportunities for our sustainable ingredients as we attract customers in corn oil, protein and dextrose markets looking for low-carbon intensities and environmentally responsible suppliers.



Selected Financial Data

Statement of Operations Data

(in thousands, except per share information)

	Year Ended December 31,		
	2022	2021	2020
Revenues	\$3,662,849	\$ 2,827,168	\$ 1,923,719
Costs and expenses	3,761,797	2,801,660	2,046,415
Operating income (loss) ⁽¹⁾	(98,948)	25,508	(122,696)
Total other income (expense) ⁽²⁾⁽³⁾	247	(68,509)	(38,434)
Net loss	(103,377)	(44,146)	(89,654)
Net loss attributable to Green Plains	\$ (127,218)	\$ (65,992)	\$ (108,775)
Earnings per share:			
Net loss attributable to Green Plains - basic and diluted	\$ (2.29)	\$ (1.41)	\$ (3.14)

Other Data: (Non-GAAP)

Adjusted EBITDA (unaudited and in thousands)	\$ (822)	\$ 87,378	\$ 36,748
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Balance Sheet Data

(in thousands)

	December 31,		
	2022	2021	2020
Cash and cash equivalents	\$ 444,661	\$ 426,220	\$ 233,860
Current assets	928,750	1,117,749	642,353
Total assets	2,123,131	2,159,755	1,578,917
Current liabilities	486,922	471,804	452,556
Long-term debt	495,243	514,006	287,299
Total liabilities	1,062,065	1,057,736	802,253
Stockholders' equity	1,061,066	1,102,019	776,664

The following table reconciles net loss to adjusted EBITDA for the periods indicated:

(in thousands)	Year Ended December 31,		
	2022	2021	2020
Net loss	\$ (103,377)	\$ (44,146)	\$ (89,654)
Interest expense ⁽³⁾	32,642	67,144	39,993
Income tax expense (benefit), net of equity method income tax expense	4,747	1,845	(43,879)
Depreciation and amortization ⁽⁴⁾	92,698	91,952	78,244
EBITDA	26,710	116,795	(15,296)
Other income ⁽²⁾	(27,712)	—	—
Loss (gain) on sale of assets, net	—	(29,601)	20,860
Proportional share of EBITDA adjustments to equity method investees	180	184	7,093
Noncash goodwill impairment	—	—	24,091
Adjusted EBITDA	\$ (822)	\$ 87,378	\$ 36,748

⁽¹⁾ Fiscal year 2022 includes an inventory lower of cost or net realizable value adjustment of \$12.3 million. Fiscal year 2021 includes the \$29.6 million net gain on sale of assets primarily from the sale of the Ord, Nebraska ethanol plant. Fiscal year 2020 includes the goodwill impairment charge of \$24.1 million, the \$22.4 million loss on sale of assets, net from the sale of the Hereford, Texas ethanol plant and the \$1.5 million gain from sale of GPCC.

⁽²⁾ Other income for the fiscal year 2022 includes a grant received from the USDA related to the Biofuel Producer Program of \$27.7 million.

⁽³⁾ Interest expense for fiscal year 2021 includes a loss on extinguishment of convertible notes of \$22.1 million and a loss on settlement of convertible notes of \$9.5 million.

⁽⁴⁾ Excludes the amortization of operating lease right-of-use assets and amortization of debt issuance costs.

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(D) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2022

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from ____ to ____

Commission file number 001-32924

GREEN PLAINS INC.

(Exact name of registrant as specified in its charter)

Iowa

84-1652107

(State or other jurisdiction of incorporation or organization)

(I.R.S. Employer Identification No.)

1811 Aksarben Drive, Omaha, NE 68106

(402) 884-8700

(Address of principal executive offices, including zip code)

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, par value \$0.001 per share	GPRE	The Nasdaq Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.

Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	<input checked="" type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>		
Smaller reporting company	<input type="checkbox"/>	Emerging growth company	<input type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

The aggregate market value of the company's voting common stock held by non-affiliates of the registrant as of June 30, 2022 (the last business day of the second quarter), based on the last sale price of the common stock on that date of \$27.17, was approximately \$1,413.2 million. For purposes of this calculation, executive officers and directors are deemed to be affiliates of the registrant.

As of February 7, 2023, there were 59,292,283 shares of the registrant's common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for the 2023 Annual Meeting of Shareholders are incorporated by reference in Part III herein. The company intends to file such Proxy Statement with the Securities and Exchange Commission no later than 120 days after the end of the period covered by this report on Form 10-K.

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Commonly Used Defined Terms

Green Plains Inc. and Subsidiaries:

Green Plains; the company	Green Plains Inc. and its subsidiaries
FQT	Fluid Quip Technologies, LLC
Green Plains Cattle; GPCC	Green Plains Cattle Company LLC
Green Plains Central City; Central City	Green Plains Central City LLC
Green Plains Commodity Management	Green Plains Commodity Management LLC
Green Plains Finance Company	Green Plains Finance Company LLC
Green Plains Grain	Green Plains Grain Company LLC
Green Plains Mount Vernon; Mount Vernon	Green Plains Mount Vernon LLC
Green Plains Obion; Obion	Green Plains Obion LLC
Green Plains Partners; the partnership	Green Plains Partners LP and its subsidiaries
Green Plains Shenandoah; Shenandoah	Green Plains Shenandoah LLC
Green Plains Trade	Green Plains Trade Group LLC
Green Plains Wood River; Wood River	Green Plains Wood River LLC

Accounting Defined Terms:

ASC	Accounting Standards Codification
EBITDA	Earnings before interest, income taxes, depreciation and amortization
EPS	Earnings per share
Exchange Act	Securities Exchange Act of 1934, as amended
GAAP	U.S. Generally Accepted Accounting Principles
JV	Joint venture
LIBOR	London Interbank Offered Rate
Nasdaq	The Nasdaq Global Market
R&D Credits	Research and development tax credits
SEC	Securities and Exchange Commission
Securities Act	Securities Act of 1933, as amended
SOFR	Secured Overnight Financing Rate

Industry and Other Defined Terms:

ATJ	Alcohol-to-Jet
BlackRock	Funds and accounts managed by BlackRock
BTU	British Thermal Units
CARB	California Air Resources Board
The CARES Act	Coronavirus Aid, Relief, and Economic Security Act
CI	Carbon Intensity
COVID-19	Coronavirus Disease 2019
CST	Clean Sugar Technology™
DOE	Department of Energy
DOT	U.S. Department of Transportation
E10	Gasoline blended with up to 10% ethanol by volume
E15	Gasoline blended with up to 15% ethanol by volume
E85	Gasoline blended with up to 85% ethanol by volume

EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
FDA	U.S. Food and Drug Administration
FFV	Flexible-fuel vehicle
GHG	Greenhouse Gas
ILUC	Indirect land usage charge
LCFS	Low Carbon Fuel Standard
MMBTU	Million British Thermal Units
Mmg	Million gallons
Mmgy	Million gallons per year
MSC™	Maximized Stillage Coproducts produced using process technology developed by Fluid Quip Technologies
MTBE	Methyl tertiary-butyl ether
MVC	Minimum volume commitment
RFS	Renewable Fuel Standard
RIN	Renewable identification number
RVO	Renewable volume obligation
SAF	Sustainable Aviation Fuel
SRE	Small refinery exemption
TTB	Alcohol and Tobacco Tax and Trade Bureau
U.S.	United States
USDA	U.S. Department of Agriculture

Cautionary Statement Regarding Forward-Looking Statements

The SEC encourages companies to disclose forward-looking information so investors can better understand future prospects and make informed investment decisions. As such, forward-looking statements are included in this report or incorporated by reference to other documents filed with the SEC.

Forward-looking statements are made in accordance with safe harbor provisions of the Private Securities Litigation Reform Act of 1995. These statements are based on current expectations which involve a number of risks and uncertainties and do not relate strictly to historical or current facts, but rather to plans and objectives for future operations. These statements include words such as “anticipate,” “believe,” “continue,” “estimate,” “expect,” “intend,” “outlook,” “plan,” “predict,” “may,” “could,” “should,” “will” and similar words and phrases as well as statements regarding future operating or financial performance or guidance, business strategy, environment, key trends and benefits of actual or planned acquisitions.

Factors that could cause actual results to differ from those expressed or implied are discussed in this report under “Risk Factors” or incorporated by reference. Specifically, we may experience fluctuations in future operating results due to a number of economic conditions, including: competition in the ethanol industry and other industries in which we operate; commodity market risks, including those that may result from weather conditions; financial market risks; counterparty risks; risks associated with changes to government policy or regulation, including changes to tax laws; risks related to acquisitions and disposition activities and achieving anticipated results; risks associated with merchant trading; risks related to our equity method investees; disruption caused by health epidemics, such as the COVID-19 outbreak; and other factors detailed in reports filed with the SEC. Additional risks related to Green Plains Partners LP include compliance with commercial contractual obligations, potential tax consequences related to our investment in the partnership and risks disclosed in the partnership’s SEC filings associated with the operation of the partnership as a separate, publicly traded entity.

We believe our expectations regarding future events are based on reasonable assumptions; however, these assumptions may not be accurate or account for all risks and uncertainties. Consequently, forward-looking statements are not guaranteed. Actual results may vary materially from those expressed or implied in our forward-looking statements. In addition, we are not obligated and do not intend to update our forward-looking statements as a result of new information unless it is required by applicable securities laws. We caution investors not to place undue reliance on forward-looking statements, which represent management’s views as of the date of this report or documents incorporated by reference.

PART I

Item 1. Business.

References to “we,” “us,” “our,” “Green Plains,” or the “company” refer to Green Plains Inc. and its subsidiaries.

Overview

Green Plains is an Iowa corporation founded in June 2004 as a producer of low-carbon fuels. We have since grown to be a leading biorefining company maximizing the potential of existing resources through fermentation and patented agricultural technologies. Our eleven biorefineries process up to 330 million bushels of corn annually into a suite of sustainable ingredients, including low-carbon biofuels, renewable feedstocks for advanced biofuels and high-protein ingredients for animal diets. We are a leading ag-tech innovator undergoing a transition from a commodity-processing business into a value-added agricultural technology company creating sustainable, high-value ingredients from existing resources. To that end, we are currently executing on a number of initiatives directed at producing additional value-added low-carbon ingredients, such as Ultra-High Protein, dextrose, renewable corn oil, and more.

We are developing and implementing proven agricultural, food and industrial biotechnology systems that allow for product diversification and new market opportunities, rapidly expanding installation and production across our facilities, and offering these technologies to the broader biofuels industry.

Green Plains Partners LP, a master limited partnership, is our primary downstream storage and logistics provider since its assets are the principal method of storing and delivering the ethanol we produce. As of December 31, 2022, we own a 48.8% limited partner interest, a 2.0% general partner interest and all of the partnership’s incentive distribution rights. The public owns the remaining 49.2% limited partner interest. The partnership is consolidated in our financial statements.

We group our business activities into the following three operating segments to manage performance:

- *Ethanol Production.* Our ethanol production segment includes the production of ethanol, distillers grains, Ultra-High Protein and renewable corn oil at eleven ethanol plants in Illinois, Indiana, Iowa, Minnesota, Nebraska and Tennessee. At capacity, our facilities are capable of processing approximately 330 million bushels of corn per year and producing approximately 958 million gallons of ethanol, 2.7 million tons of distillers grains and Ultra-High Protein and 310 million pounds of renewable corn oil, a low-carbon feedstock for biodiesel and renewable diesel. We are one of the largest ethanol producers in North America.
- *Agribusiness and Energy Services.* Our agribusiness and energy services segment includes grain procurement, with approximately 25.3 million bushels of grain storage capacity, and our commodity marketing business, which markets, sells and distributes the ethanol, distillers grains, Ultra-High Protein and renewable corn oil produced at our ethanol plants. We also market ethanol for a third-party producer as well as buy and sell ethanol, distillers grains, Ultra-High Protein, renewable corn oil, grain, natural gas and other commodities in various markets.
- *Partnership.* Our master limited partnership provides fuel storage and transportation services through owning, operating, developing and acquiring ethanol and fuel storage tanks, terminals, transportation assets and other related assets and businesses. The partnership’s assets include 27 ethanol storage facilities, two fuel terminal facilities and approximately 2,500 leased railcars.

Business Strategy

We believe that global demand for protein for human consumption will continue to rise, requiring larger amounts of high protein feed for animals and aquaculture. Our transformation capitalizes on this market insight, in an effort to capture higher coproduct returns.

As part of our transformation to a value-added agricultural technology company, we began producing Ultra-High Protein using FQT’s MSC™ technology in 2020 and are deploying this technology across various locations to help meet growing demand for protein feed ingredients and low-carbon renewable corn oil. As of December 31, 2022, we have completed or began commissioning this technology at five of our locations. Installation at additional biorefineries is expected over the course of the next few years, both at our other locations and across the broader industry. The biorefineries producing Ultra-High Protein, a feed ingredient with protein concentrations of 50% or greater and yeast concentrations of 25%, also increase

the production of renewable corn oil and produce other higher-value products, such as post-MSC distillers grains.

In September 2022, we broke ground at our biorefinery in Shenandoah, Iowa, as the first location to deploy FQT's CST™ at commercial scale, which is expected to be operational in late 2023. CST™ allows for the production of both food and industrial grade low-carbon glucose and dextrose at a dry mill ethanol plant to target applications in food production, renewable chemicals and synthetic biology. We also anticipate modifying additional biorefineries to include CST™ production capabilities to meet anticipated future customer demands.

Ethanol has become a valuable blend component that comprises approximately 10.1% of the domestic surface transportation gasoline supply with the potential to grow with higher blending rates. Additionally, government incentives to produce SAF through ATJ pathways could provide additional demand for low-CI ethanol for conversion to SAF.

In February and April 2021, as part of our carbon reduction strategy, we committed our Nebraska, Iowa and Minnesota plants to the Summit Carbon Solutions Midwest Carbon Express project to capture and store biogenic carbon dioxide produced through the fermentation process. These eight biorefineries have entered into twelve-year carbon offtake agreements, which will lower GHG emissions through the capture of carbon dioxide at each of the biorefineries, significantly lowering their CI. According to Summit Carbon Solutions, the anticipated completion date for this project is 2024. In addition, we are exploring innovative options for carbon use, such as synthetic methane production, with global partners. Reducing the CI of our fuel ethanol could allow us to benefit from state and federal clean fuel programs, including LCFS and federal tax credits under the Inflation Reduction Act, and could position our low-carbon ethanol as a potential feedstock for ATJ pathways to produce SAF.

Competitive Strengths

We are focused on managing commodity price risks, improving operational efficiencies and optimizing market opportunities to create an efficient platform with diversified income streams. Our competitive strengths include:

Disciplined Risk Management. Risk management is a core competency and we use a variety of risk management tools and hedging strategies in an effort to maintain a disciplined approach. Our internally developed operating margin management system allows us to monitor commodity price risk exposure in the spot market and on the forward curve at each of our operations and seeks to lock in favorable margins, when available, or if appropriate, temporarily reduce production levels during periods of compressed margins.

Technology Integration. Over our history, we have incorporated new technologies like renewable corn oil extraction and Selective Milling Technology™ into our manufacturing processes that have enabled us to run more efficiently and improve our financial results. We completed a modernization and upgrade initiative at four facilities in 2021 and two facilities in 2022, resulting in improved operational reliability and reductions in natural gas, electricity and water usage, decreasing our carbon footprint. Through our ownership of FQT and other partnerships, we are currently undergoing a number of initiatives to further improve margins.

Our transformation into a sustainable ingredient producer continues centering around FQT's MSC™ and CST™ technologies. These technologies enhance our ability to produce value-added ingredients, while expanding renewable corn oil yields.

The acquisition of a majority interest in FQT secures additional intellectual property rights, including those aimed at developing and implementing proven, value-added agriculture, food and industrial biotechnology systems, CST™ and MSC™. We continue to evaluate additional technological opportunities to expand our capabilities and product offerings in the coming years.

Proven Leadership Team. Our senior leadership team has specific expertise across all of our businesses, including plant operations and management, commodity markets and risk management, quality assurance, quality control, ingredient nutrition, marketing and innovation and ethanol marketing and distribution. Our leadership team's level of operational and financial expertise is essential to successfully executing our business strategies.

Operational Excellence. Our facilities are staffed with experienced personnel who are encouraged to share operational knowledge and expertise across business segments and locations. We continue to focus on making incremental operational improvements to enhance performance using real-time production data and systems to monitor our operations and optimize performance.

Risk Management and Hedging Activities

Our margins are highly dependent on commodity prices, particularly for ethanol, corn, distillers grains, Ultra-High Protein, renewable corn oil and natural gas. Since market price fluctuations among these commodities are not always correlated, ethanol production has been and may continue to be unprofitable at times. We use a variety of risk management tools and hedging strategies to monitor real-time operating price risk exposure at each of our operations to obtain favorable margins, when available.

We use forward contracts to sell a portion of our ethanol, distillers grains, Ultra-High Protein and renewable corn oil production or buy some of the corn, natural gas, or ethanol we need to partially offset commodity price volatility. We also engage in other hedging transactions involving exchange-traded futures contracts for corn, natural gas, ethanol, soybean meal, soybean oil and other agricultural and energy commodities. The financial impact of these activities depends on the price of the commodities involved and our ability to physically receive or deliver those commodities.

Hedging arrangements expose us to risk of financial loss when the counterparty defaults on its contract or, in the case of exchange-traded contracts, when the expected differential between the price of the underlying commodity and physical commodity changes. Hedging activities can result in losses when a position is purchased in a declining market or sold in a rising market. Hedging losses may be offset by a decreased cash price for corn and natural gas and an increased cash price for ethanol, distillers grains, Ultra-High Protein and renewable corn oil. Depending on the circumstance, we vary the amount of hedging or other risk mitigation strategies we undertake and sometimes choose not to engage in hedging transactions at all.

Recent Developments

The following is a summary of our significant recent developments. Additional information about these items can be found elsewhere in this report or in previous reports filed with the SEC.

New Financing to Replace Existing Working Capital Facilities

On March 25, 2022, Green Plains Finance Company, Green Plains Grain and Green Plains Trade, all of which are wholly owned subsidiaries, together with the company, as guarantor, entered into a five-year, \$350.0 million senior secured sustainability-linked revolving Loan and Security Agreement (the “Facility”) with a group of financial institutions led by ING Capital LLC (“ING”) as Agent and ING, PNC Capital Markets LLC, Fifth Third Bank, National Association, Bank of America, N.A. and BMO Harris Bank, N.A., as Joint Lead Arrangers. This transaction refinanced the separate credit facilities previously held by Green Plains Grain and Green Plains Trade. The Facility matures on March 25, 2027. See further discussions in *Note 12 - Debt* of the financial statements.

Convertible Notes Conversion into Common Stock

On May 25, 2022, we gave notice calling for the redemption of all our outstanding 4.00% Convertible Senior Notes due 2024, totaling an aggregate principal amount of \$64.0 million. The conversion rate was 66.4178 shares of common stock per \$1,000 of principal. From July 1, 2022 through July 8, 2022, all \$64.0 million of the 4.00% Convertible Senior Notes were converted into approximately 4.3 million shares of common stock. The 4.00% notes were retired effective July 8, 2022. See further discussions in *Note 12 - Debt* of the financial statements.

During August 2022, we entered into four privately negotiated exchange agreements with certain noteholders of the 4.125% Convertible Senior Notes due 2022 to exchange approximately \$32.6 million aggregate principal amount for approximately 1.2 million shares of our common stock. Additionally, on September 1, 2022, the scheduled maturity of the 4.125% notes, approximately \$1.7 million aggregate principal amount was settled through a combination of \$1.7 million in cash and approximately 15 thousand shares of our common stock. The remaining \$23 thousand aggregate principal amount of the 4.125% notes and accrued interest were settled in cash. The 4.125% notes were retired effective September 1, 2022. See further discussions in *Note 12 - Debt* of the financial statements.

Operating Segments

Ethanol Production Segment

Industry Overview. Ethanol, also known as ethyl alcohol or grain alcohol, is a colorless liquid produced by fermenting carbohydrates found in a number of different types of grains, such as corn, wheat and sorghum, and other cellulosic matter found in plants. Most of the ethanol produced in the United States is made from corn, which can be handled efficiently and is

in greater supply than other grains. Corn contains large quantities of carbohydrates that convert into glucose more easily than most other kinds of biomass. According to the USDA, on average, a 56 pound bushel of corn produces approximately 2.9 gallons of ethanol, 17 pounds of dried distillers grains and 0.6 pounds of corn oil. Outside of the United States, sugarcane is the primary feedstock used to produce ethanol.

Ethanol is a significant component of the biofuels industry, which includes all transportation fuels derived from renewable biological materials. Ethanol is an excellent oxygenate and source of octane. When added to petroleum-based transportation fuels, oxygenates reduce vehicle emissions. Ethanol is the most economical oxygenate and source of octane available on the market and its production costs are competitive with gasoline.

Ethanol Plants. We operate eleven ethanol plants, located in six states, that produce ethanol, distillers grains, Ultra-High Protein and renewable corn oil.

Plant Location	Initial Operation or Acquisition Date	Technology	Plant Production Capacity (mmgy)
Atkinson, Nebraska	June 2013	Delta-T	55
Central City, Nebraska ⁽²⁾	July 2009	ICM	116
Fairmont, Minnesota	Nov. 2013	Delta-T / ICM	119
Madison, Illinois	Sep. 2016	Vogelbusch	90
Mount Vernon, Indiana ⁽²⁾	Sep. 2016	Vogelbusch	90
Obion, Tennessee ⁽¹⁾⁽²⁾	Nov. 2008	ICM	120
Otter Tail, Minnesota	Mar. 2011	Delta-T / ICM	55
Shenandoah, Iowa ⁽¹⁾⁽²⁾	Aug. 2007	ICM	82
Superior, Iowa ⁽¹⁾	July 2008	Delta-T / ICM	60
Wood River, Nebraska ⁽²⁾	Nov. 2013	Delta-T / ICM	121
York, Nebraska	Sep. 2016	Vogelbusch	50
Total			958

(1) We constructed these three plants; all other ethanol plants were acquired.

(2) Also produces Ultra-High Protein.

Our business is directly affected by the supply and demand for ethanol and other fuels in the markets served by our assets. Miles driven typically increase during the spring and summer months related to vacation travel, followed closely by the fall season due to holiday travel.

Corn Feedstock and Ethanol Production. Our plants use corn as feedstock in a dry mill ethanol production process. Each of our plants requires on average approximately 30 million bushels of corn annually, depending on its production capacity. The price and availability of corn are subject to significant fluctuations driven by a number of factors that affect commodity prices in general, including crop conditions, weather, governmental programs, freight costs and global demand. Ethanol producers are generally unable to pass increased corn costs to customers.

Our corn supply is obtained primarily from local markets. We use cash and forward purchase contracts with grain producers and elevators to buy corn. We maintain direct relationships with local farmers, grain elevators and cooperatives, which serve as our primary sources of grain feedstock, at nine of our ethanol plants. This allows us to purchase much of the corn we need directly from farmers throughout the year. At two of our ethanol plants, we contract with a third-party grain originator to supply the corn necessary for ethanol production. We intend to assume the responsibility for grain origination at these two locations after the existing contracts expire in November 2023. Each of our plants is also situated on rail lines or has other logistical solutions to access corn supplies from other regions of the country should local supplies become insufficient.

Corn is received at the plant by truck or rail then weighed and unloaded into a receiving building. Grain storage facilities are used to inventory grain that is passed through a scalper to remove rocks and debris prior to processing. The corn is then transported to a hammer mill where it is ground into flour and conveyed into a slurry tank for enzymatic processing. Water, heat and enzymes are added to convert the complex starch molecules into simpler carbohydrates. The slurry is heated to reduce the potential of microbial contamination and pumped into a liquefaction tank where additional enzymes are added.

Next, the grain slurry is pumped into fermenters, where yeast, enzymes, and nutrients are added and the fermentation process is started. A beer column, within the distillation system, separates the alcohol from the spent grain mash. The alcohol is dehydrated to 200-proof alcohol and either pumped into a holding tank and blended with approximately 2% denaturant as it is pumped into finished product storage tanks, or marketed as industrial or undenatured ethanol.

Distillers Grains. The spent grain mash is pumped from the beer column into a decanter-type centrifuge for dewatering. The water, or thin stillage, is pumped from the centrifuge into an evaporator, where it is concentrated into a thick syrup. The solids, or wet cake, that exit the centrifuge are conveyed to the dryer system and dried at varying temperatures to produce distillers grains. Syrup is reapplied to the wet cake prior to drying to provide additional nutrients. Distillers grains, the principal co-product of the ethanol production process, are used as mid-protein, high-energy animal feed and marketed to the dairy, beef, swine and poultry industries.

We can produce three forms of distillers grains, depending on the number of times the solids are passed through the dryer system:

- wet distillers grains, which contain approximately 65% to 70% moisture, have a shelf life of approximately three days and is therefore sold to dairies or feedlots within the immediate vicinity of our plants;
- modified wet distillers grains, which is dried further to approximately 50% to 55% moisture, have a shelf life of approximately three weeks and are marketed to regional dairies and feedlots; and
- dried distillers grains, which have been dried more extensively to approximately 10% to 12% moisture, have an almost indefinite shelf life and may be stored, sold and shipped to any market.

Ultra-High Protein. Ultra-High Protein is corn fermented protein produced by further processing of the spent grain mash from the beer column. The spent grain is processed using FQT's MSC™ technology, which contains a series of screening equipment to remove fiber from the spent grain which is sent to the distillers grain dryer. The remaining product is washed and clarified into a wet protein stream which is dried in a ring dryer to produce Ultra-High Protein meal. The product typically has protein concentration of 50% or greater and yields of approximately 3.8 pounds per bushel have been achieved.

Renewable Corn Oil. Renewable corn oil systems extract non-edible renewable corn oil from the thin stillage evaporation process immediately before the production of distillers grains. Renewable corn oil is produced by processing the syrup through a decanter-style, or disk-stack, centrifuge. The centrifuges separate the relatively light renewable corn oil from the heavier components of the syrup. We extract on average approximately 0.9 pounds of renewable corn oil per bushel of corn used to produce ethanol. For our locations that have deployed FQT's MSC™ technology, we have achieved renewable corn oil yields of 1.1 pounds of renewable corn oil per bushel and anticipate similar yields as we deploy FQT's MSC™ technology across our platform. Industrial uses for renewable corn oil include feedstock for renewable diesel, biodiesel and livestock feed additives. The syrup is blended into wet, modified wet or dried distillers grains.

Natural Gas. Depending on production parameters, our ethanol plants use on average approximately 29,000 BTUs of natural gas per gallon of production. We have service agreements to acquire the natural gas we need and transport the gas through pipelines to our plants.

Electricity. Our plants require on average approximately 0.8 kilowatt hours of electricity per gallon of production. Local utilities supply the necessary electricity to all of our ethanol plants.

Water. While some of our plants satisfy a majority of their water requirements from wells located on their respective properties, each plant also obtains drinkable water from local municipal water sources. Each facility either uses city water or operates a filtration system to purify the well water that is used for its operations. Local municipalities supply all of the necessary water for our plants that do not have onsite wells. Most of the water used in an ethanol plant is recycled in the production process.

Agribusiness and Energy Services Segment

Our agribusiness and energy services segment includes grain storage at our ethanol plants of approximately 25.3 million bushels, detailed in the following table:

Facility Location	On-Site Grain Storage Capacity (thousands of bushels)
Atkinson, Nebraska	5,109
Central City, Nebraska	1,400
Fairmont, Minnesota	1,611
Madison, Illinois	1,015
Mount Vernon, Indiana	1,034
Obion, Tennessee	8,168
Otter Tail, Minnesota	628
Shenandoah, Iowa	886
Superior, Iowa	1,770
Wood River, Nebraska	3,293
York, Nebraska	365
Total	25,279

We buy bulk grain, primarily corn, from area producers, and provide grain drying and storage services to those producers. The grain is used as feedstock for our ethanol plants. Bulk grain commodities are traded on commodity exchanges and inventory values are affected by changes in these markets. To mitigate risks related to market fluctuations from purchase and sale commitments of grain, as well as grain held in inventory, we enter into exchange-traded futures and options contracts that function as economic and designated accounting hedges at times.

Seasonality is present within our agribusiness operations. The fall harvest period typically results in higher handling margins and stronger financial results during the fourth quarter of each year.

Through Green Plains Trade, we market the ethanol we and a third party produce to local, regional, national and international customers. We also purchase ethanol from independent producers for pricing arbitrage. We sell to various markets under sales agreements with integrated energy companies; retailers, traders and resellers in the United States and buyers for export to Brazil, Canada, Philippines, India, Europe and other international markets. Under these agreements, ethanol is priced under both fixed and indexed pricing arrangements.

We market distillers grains to local, national and international markets through Green Plains Trade. The bulk of our demand is delivered to geographic regions that do not have significant local corn or distillers grains production. We sell to international markets indirectly through exporters. Access to diversified markets allows us to sell product to customers offering the highest net price.

Also, through Green Plains Trade, our renewable corn oil is sold primarily to renewable diesel and biodiesel plants and, to a lesser extent, feedlot and poultry markets. We transport our renewable corn oil by truck to locations in a close proximity to our ethanol plants primarily in the southeastern and midwestern regions of the United States. We also transport renewable corn oil by rail and barges to national markets as well as to exporters for shipment on vessels to international markets.

Through Green Plains Trade, we provide marketing services of natural gas to our ethanol plants and to other third parties including the procurement of both the pipeline capacity and natural gas. We also enhance the value by aggregating volumes at various storage facilities which can be sold to either the plants or various intermediary markets and end markets.

Our railcar fleet consists of approximately 510 leased hopper cars to transport distillers grains and Ultra-High Protein, 70 leased hopper cars to transport corn and approximately 100 leased tank cars to transport renewable corn oil. The initial terms of the lease contracts are for periods up to five years and the weighted average remaining lease terms on these cars was approximately 3 years as of December 31, 2022.

Partnership Segment

Our partnership segment provides fuel storage and transportation services through (i) 27 ethanol storage facilities located at or near our eleven ethanol plants, (ii) two fuel terminal facilities located near major rail lines, and (iii) a leased railcar fleet and other transportation assets.

Transportation and Delivery. Most of our ethanol plants are situated near major highways or rail lines to ensure efficient product movement. We are able to move product from our ethanol plants to bulk terminals via truck, railcar or barge. We also manage the logistics and transportation requirements of our customers to improve our fleet's efficiency and reduce operating costs.

Deliveries within 150 miles of our plants and the partnership's fuel terminal facilities are generally transported by truck. Deliveries to distant markets are shipped using major U.S. rail carriers that can switch cars to other major railroads, allowing our plants to ship product throughout the United States and to international export terminals.

As of December 31, 2022, the partnership's leased railcar fleet consisted of approximately 2,500 railcars with an aggregate capacity of 75.0 mmg. We expect the partnership's railcar volumetric capacity to fluctuate over the normal course of business as the existing railcar leases expire and we enter into or acquire new railcar leases.

Terminal and Distribution Services. Ethanol is transported from the partnership's terminals to third-party terminal racks where it is blended with gasoline and transferred to the loading rack for delivery by truck to retail gas stations. The partnership owns and operates fuel holding tanks and terminals, and provides terminal services and logistics solutions to markets that do not have efficient access to renewable fuels. The partnership owns and operates fuel terminals at two locations in two states with combined storage capacity of approximately 6.7 mmg and throughput capacity of approximately 480 mmgy. We also have 27 ethanol storage facilities located at or near our eleven ethanol plants with a combined storage capacity of approximately 25.1 mmg to support current ethanol production capacity of approximately 958 mmgy.

Facility Location	Storage Capacity (thousands of gallons)
Fuel Terminals	
Birmingham, Alabama - Unit Train Terminal	6,542
Collins, Mississippi	180
Ethanol Plants	
Atkinson, Nebraska ⁽¹⁾	2,074
Central City, Nebraska	2,250
Fairmont, Minnesota	3,124
Madison, Illinois	2,855
Mount Vernon, Indiana	2,855
Obion, Tennessee	3,000
Otter Tail, Minnesota	2,000
Shenandoah, Iowa	1,524
Superior, Iowa	1,238
Wood River, Nebraska	3,124
York, Nebraska	1,100
Total	31,866

(1) The ethanol storage facility is located approximately 16 miles from the ethanol plant.

For more information about our segments, refer to *Item 7. - Management's Discussion and Analysis of Financial Condition and Results of Operations* in this report.

Our Competition

Domestic Ethanol Competitors

We are one of the largest consolidated owners of ethanol plants in the United States. We compete with other domestic ethanol producers in a highly fragmented industry. Our competitors also include plants owned by farmers, cooperatives, oil refiners and retail fuel operators. These competitors may continue to operate their plants even when market conditions are not favorable due to the benefits realized from their other operations.

As of December 31, 2022, the top four producers accounted for approximately 41% of the domestic production capacity with production capacities ranging from 958 mmgy to 2,811 mmgy. Demand for corn from ethanol plants and other corn consumers exists in all areas and regions in which we operate. According to the Renewable Fuels Association, there were 116 operational plants in Illinois, Indiana, Iowa, Minnesota, Nebraska and Tennessee, which are the states where we have production facilities as of December 31, 2022. The largest concentration of operational plants is located in Iowa, Nebraska and Illinois, where approximately 51% of all operational production capacity is located.

Foreign Ethanol Competitors

We also compete globally with production from other countries. Brazil is the second largest ethanol producer in the world after the United States. Brazil primarily produces ethanol made from sugarcane, which may be less expensive to produce than ethanol made from corn depending on feedstock prices. Under the RFS, certain parties are obligated to meet an advanced biofuel standard, and Brazilian sugarcane ethanol qualifies as an advanced biofuel. Any significant additional ethanol production capacity, or reduced demand for gasoline, could create excess supply in world markets, resulting in lower ethanol prices throughout the world, including the United States.

Other Competition

Alternative fuels, gasoline oxygenates and ethanol production methods are continually under development. Ethanol production technologies also continue to evolve. We expect changes to occur primarily in the area of cellulosic ethanol, which is made from biomass such as switch grass or fast-growing poplar trees, or from biodigesters at landfills or livestock production facilities. Since all of our plants are designed as single-feedstock facilities, adapting our plants for a different feedstock or process system would require additional capital investments and retooling which could be cost prohibitive, and would require new RFS pathways to be approved by the EPA.

Regulatory Matters

Government Ethanol Programs and Policies

We are sensitive to governmental policies that impact ethanol, feedstocks for renewable fuels and decarbonization, which in turn may impact the volume of ethanol and other ingredients we produce. Legislation and regulatory rule making at the federal, state and international level can impact us across all business segments. Refer to *Item 7. - Management's Discussion and Analysis of Financial Condition and Results of Operations* in this report for detailed discussion of these topics.

Environmental and Other Regulation

Our ethanol production, agribusiness and energy services, and partnership segment activities are subject to various and extensive environmental and other regulations. We obtain and maintain various environmental permits to operate our plants and other facilities. Ethanol production involves the emission of various airborne pollutants, including particulate, carbon dioxide, oxides of nitrogen, hazardous air pollutants and volatile organic compounds. While all eleven of our plants have grandfathered pathways allowing them to operate under their current authorized capacity under the RFS mandate, operating above these capacities requires an Efficient Producer Pathway and a 20% reduction in GHG emissions from a 2005 baseline. Four of our plants currently maintain Efficient Producer Pathways to operate at increased capacities.

CARB began implementation of the California LCFS in 2011, which aims to decrease the CI of transportation fuel in the state. In 2018, CARB strengthened GHG benchmarks to 20% reduction vs 1990 levels by 2030. The most recent Scoping Plan from CARB in 2022 sets a target of 85% GHG reductions vs 1990 levels no later than 2045.

We employ maintenance and operations personnel at each of our plants. In addition to the attention we place on the

health and safety of our employees, the operations of our facilities are regulated by the Occupational Safety and Health Administration.

Exclusive Partnerships and Joint Ventures

In 2021, we formed a 50/50 JV with Tharaldson Ethanol, which will own the MSCTM technology assets added adjacent to the Tharaldson Ethanol plant in North Dakota to produce Ultra-High Protein and increase renewable corn oil yields. We anticipate these assets will be operational in early 2024.

In 2020, we acquired a majority interest in FQT. The acquisition capitalized on the core strengths of each company to develop and implement proven, value-added agriculture, food and industrial biotechnology systems and rapidly expand installation and production of FQT's MSCTM and CSTTM technology at certain locations across our platform, as well as offer certain of these technologies to partnering biofuel facilities.

Human Capital Resources

The attraction, retention and development of employees is critical to our success. We accomplish this, in part, by our competitive compensation practices, training initiatives, and growth opportunities within the company. On December 31, 2022, we had 902 full-time, part-time, temporary and seasonal employees, including 172 employees at our corporate office in Omaha, Nebraska.

Workforce Health and Safety

We take workplace safety very seriously and our robust safety program means that we are constantly evaluating our safety protocols in an effort to keep our facilities safe for our workers.

We continue to monitor the impact of the COVID-19 pandemic on our teammates and within our operations, and proactively modify or adopt new practices to promote their health and safety.

Compensation and Benefits

As part of our compensation philosophy, we believe that we must offer and maintain market competitive compensation and benefit programs for our employees in order to attract and retain superior talent. In addition to competitive base wages, additional programs include the 2019 Equity Incentive Plan, a company matched 401(k) Plan, healthcare and insurance benefits, flexible spending accounts, paid time off, bonding leave, and employee assistance programs.

Diversity and Inclusion

We are committed to our continued efforts to increase diversity and foster an inclusive work environment that supports the workforce and the communities we serve. We recruit the best qualified employees regardless of gender, ethnicity or other protected traits and it is our policy to fully comply with all laws applicable to discrimination in the workplace.

Available Information

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports are available on our website at www.gpreinc.com shortly after we file or furnish the information with the SEC. You can also find the charters of our audit, compensation and nominating committees, as well as our code of ethics in the corporate governance section of our website. The information found on our website is not part of this or any other report we file with or furnish to the SEC. For more information on our partnership, please visit www.greenplainspartners.com. Alternatively, investors may visit the SEC website at www.sec.gov to access our reports, proxy and information statements filed with the SEC.

Item 1A. Risk Factors.

We operate in an industry that has numerous risks, many of which are beyond our control or are driven by factors that cannot always be predicted. Investors should carefully consider all of the risk factors in conjunction with the other information included in this report as our financial results and condition or market value could be adversely affected if any of these risks were to occur.

Risks Related to our Business and Industry

Our margins are dependent on managing the spread between the price of corn, natural gas, ethanol, distillers grains, Ultra-High Protein and renewable corn oil.

Our operating results are highly sensitive to the spread between the corn and natural gas we purchase, and the ethanol, distillers grains, Ultra-High Protein and renewable corn oil we sell. Price and supply are subject to various market forces, such as weather, domestic and global demand, global political or economic issues, including but not limited to the war in Ukraine including sanctions associated therewith, shortages, export prices, crude oil prices, currency valuations and government policies in the United States and around the world, over which we have no control. Price volatility of these commodities may cause our operating results to fluctuate substantially. Increases in corn or natural gas prices or decreases in ethanol, distillers grains, Ultra-High Protein and renewable corn oil prices may make it unprofitable to operate. No assurance can be given that we will purchase corn and natural gas or sell ethanol, distillers grains, Ultra-High Protein and renewable corn oil at or near prices which would provide us with positive margins. Consequently, our results of operations and financial position may be adversely affected by increases in corn or natural gas prices or decreases in ethanol, distillers grains, Ultra-High Protein and renewable corn oil prices.

We continuously monitor the margins at our ethanol plants using a variety of risk management tools and hedging strategies when appropriate. Should our combined revenue from ethanol, distillers grains, Ultra-High Protein and renewable corn oil fall below our cost of production, we could decide to slow or suspend production at some or all of our ethanol plants, which could also adversely affect our results of operations and financial position.

The products we buy and sell are subject to price volatility and uncertainty.

Our operating results are highly sensitive to commodity prices.

Corn. We are generally unable to pass increased corn costs to our customers since ethanol competes with other fuels. We continue to see considerable price volatility in corn prices. Ethanol plants, livestock industries and other corn-consuming enterprises put significant price pressure on local corn markets. In addition, local corn supplies and prices could be adversely affected by, but not limited to, prices for alternative crops, increasing input costs, changes in government policies, shifts in global supply and demand, global political or economic issues, including but not limited to the war in Ukraine including sanctions associated therewith, or global or regional growing conditions, such as plant disease, pests or adverse weather, including drought, as well as global conflicts.

Ethanol. Our revenues are dependent on market prices for ethanol which can be volatile as a result of a number of factors, including but not limited to: the price and availability of competing fuels; the overall supply and demand for ethanol, gasoline and corn; the price of gasoline, crude oil and corn; global political or economic issues, including but not limited to the war in Ukraine including sanctions associated therewith, and government policies.

Ethanol is marketed as a fuel additive that reduces vehicle emissions, an economical source of octanes and, to a lesser extent, a gasoline substitute. Consequently, gasoline supply and demand can affect the price of ethanol. Should gasoline prices or demand change significantly, our results of operations could be materially impacted.

Ethanol imports also affect domestic supply and demand. Imported ethanol is not subject to an import tariff and, under the RFS, sugarcane ethanol from Brazil can be used as a means for obligated parties to meet the advanced biofuel standard.

Distillers Grains. Distillers grains compete with other protein-based animal feed products. Downward pressure on other commodity prices, such as corn, soybean meal, and other feed ingredients, will generally cause the price of competing animal feed products to decline, resulting in downward pressure on the price of distillers grains. Occasionally, the price of distillers grains will lag behind fluctuations in corn or other feedstock prices, lowering our cost recovery percentage. Additionally, exports of distiller grains could be impacted by the enactment of foreign policy.

Natural Gas. The price and availability of natural gas are subject to volatile market conditions. These market conditions are often affected by factors beyond our control, such as weather, drilling economics, overall economic conditions and government regulations. Significant disruptions in natural gas supply could impair our ability to produce ethanol. Furthermore, increases in natural gas prices or changes in our cost relative to our competitors cannot be passed on to our customers, which may adversely affect our results of operations and financial position.

Ultra High Protein. Our Ultra-High Protein has unique nutritional advantages and a higher protein concentration than soybean meal and can be included in a variety of feed rations in the pet, dairy, swine, poultry and aquaculture industries. As a value-added feed ingredient, quality control is imperative. Demand for feed products and pricing pressure from competing feed products may result in downward pressure on the price of Ultra-High Protein. Reliable production of Ultra-High Protein from both consistent operations of the biorefinery as well as the MSC™ technology is necessary to produce anticipated volumes. Inconsistency in volumes, quality or downward pressure on prices could result in adverse impact on our business and profitability.

Renewable Corn Oil. Renewable corn oil is generally marketed as a renewable diesel and biodiesel feedstock; therefore, the price of renewable corn oil is affected by demand for renewable diesel and biodiesel. Expanded demand from the renewable diesel and biodiesel industry due to the extended blending tax credit and growing LCFS markets could impact renewable corn oil demand. In general, renewable corn oil prices follow the prices of heating oil and soybean oil. Decreases in the price of or demand for renewable corn oil could have an adverse impact on our business and profitability.

We may be affected by or unable to fulfill our total transformation strategies.

In May 2018, we announced that we were evaluating the performance of our entire portfolio of assets and businesses. As part of that process, during the fourth quarter of 2018, we sold three ethanol plants, permanently closed one ethanol plant and sold Fleischmann's Vinegar Company, Inc. Furthermore, we sold our 50% interest in JGP Energy Partners during the fourth quarter of 2019. We sold a 50% interest in GPCC during the third quarter of 2019 and the remaining 50% interest in GPCC during the fourth quarter of 2020. In December 2020, we sold the Hereford, Texas ethanol plant and in March 2021, we sold our Ord, Nebraska ethanol plant.

As we continue to evaluate our portfolio, we may sell additional assets or businesses or exit particular markets that are no longer a strategic fit or no longer meet their growth or profitability targets. Depending on the nature of the assets sold, our profitability may be impacted by lost operating income or cash flows from such businesses. In addition, divestitures we complete may not yield the targeted improvements in our business and may divert management's attention from our day-to-day operations. We also undertook a number of project initiatives to improve margins, including our Project 24 initiative and Total Transformation Plan focused on expanding the products and value we can extract from a kernel of corn. The Ultra-High Protein strategy includes substantial construction projects and cost to deploy FQT's MSC™ technology, and FQT's CST™ production capabilities to meet anticipated customers' demands.

We may not achieve our construction goals on time or our budget, we may not achieve the operating yields we project, we may not achieve product market sales, margins, or pricing we project, and our operating cost goals may not be achieved due to a variety of factors. Our failure to achieve any of these, inclusive but not limited to construction, yield, sales, margin, pricing, or financial results associated with our total transformation strategies could have an adverse effect on our business, financial condition or results of operations.

Government mandates affecting ethanol could change and impact the ethanol market.

The RFS mandates the minimum volume of renewable fuels that must be blended into the transportation fuel supply each year which affects the domestic market for ethanol. Each year the EPA is supposed to undertake rulemaking to set the RVO for the following year, though at times months or years pass without a finalized RVO. Further, the EPA has the authority to waive the requirements, in whole or in part, if there is inadequate domestic renewable fuel supply or the requirement severely harms the economy or the environment. After 2022, volumes shall be determined by the EPA in coordination with the Secretaries of Energy and Agriculture, taking into account such factors as impact on environment, energy security, future rates of production, cost to consumers, infrastructure, and other factors such as impact on commodity prices, job creation, rural economic development, or impact on food prices. The EPA also has the authority to set volumes for multiple years at a time, rather than annually as required prior to 2022. The EPA has stated an intention to finalize a post-2022 set rulemaking by June 14, 2023, in compliance with a consent decree from the U.S. District Court for D.C.

Volumes can also be impacted as small refineries can petition the EPA for an SRE which, if approved, waives their portion of the annual RVO requirements. The EPA, through consultation with the DOE and the USDA, can grant them a full or partial waiver, or deny it outright within 90 days of submittal.

Our operations could be adversely impacted by legislation, administration actions, EPA actions, or lawsuits that may reduce the RFS mandated volumes of conventional ethanol and other biofuels through the annual RVO, the 2022 set rulemaking, the point of obligation for blending, or SREs. A recent Supreme Court ruling held that the small refineries can

continue to apply for an extension of their waivers from the RFS, even if they have not been awarded a continuous string of exemptions, though the current EPA, in conjunction with the RVO rulemaking for 2020, 2021 and 2022, denied all pending SREs, a stance they have reiterated in the proposed 2023, 2024 and 2025 rulemakings. There are multiple legal challenges to how the EPA has handled SREs and RFS rulemakings.

The D.C. Circuit Court of Appeals ruled that the EPA overstepped its authority in extending the one pound Reid Vapor Pressure waiver for 10% ethanol blends to 15% ethanol blends in the summer, effectively limiting summertime sales of ethanol blends above 10% to FFVs from June 1 to September 15 each year. Notwithstanding, on April 12, 2022, the President announced that he has directed the EPA to issue an emergency waiver to allow for the continued sale of E15 during the June 1 to September 15 period. As of this filing, E15 is sold year-round at approximately 2,923 stations in 31 states.

Similarly, should federal mandates regarding oxygenated gasoline be repealed, the market for domestic ethanol could be adversely impacted. Economic incentives to blend based on the relative value of gasoline versus ethanol, taking into consideration the octane value of ethanol, environmental requirements and the RFS mandate, may affect future demand. A significant increase in supply beyond the RFS mandate could have an adverse impact on ethanol prices. Moreover, changes to the RFS could negatively impact the price of ethanol or cause imported sugarcane ethanol to become more economical than domestic ethanol. Likewise, national, state and regional LCFS like that of California, Oregon, Brazil or Canada could be favorable or harmful to conventional ethanol, depending on how the regulations are crafted, enforced and modified.

Future demand may be influenced by economic incentives to blend based on the relative value of gasoline versus ethanol, taking into consideration the octane value of ethanol, environmental requirements and the value of RFS credits or RINs. A significant increase in supply beyond the RFS mandate could have an adverse impact on ethanol prices. Moreover, any changes to RFS, whether by legislation, EPA action or lawsuit, originating from issues associated with the market price of RINs could negatively impact the demand for ethanol, discretionary blending of ethanol and/or the price of ethanol. Prior actions by the EPA to grant SREs without accounting for the lost gallons, for example, resulted in lower RIN prices. Similarly, proposals to reduce annual RVO levels could also lead to lower RIN prices.

To the extent federal or state laws or regulations are modified and/or enacted, it may result in the demand for ethanol being reduced, which could negatively and materially affect our financial performance.

Future demand for ethanol is uncertain and changes in public perception, consumer acceptance and overall consumer demand for transportation fuel could affect demand.

While many trade groups, academics and government agencies support ethanol as a fuel additive that promotes a cleaner environment, others claim ethanol production consumes considerably more energy, emits more GHG than other fuels and depletes water resources. While we do not agree, some studies suggest ethanol produced from corn is less efficient than ethanol produced from switch grass or wheat grain. Others claim corn-based ethanol negatively impacts consumers by causing the prices of meat and other food derived from corn-consuming livestock to increase. Ethanol critics also contend the industry redirects corn supplies from international food markets to domestic fuel markets, and contributes to land use change domestically and abroad.

There are limited markets for ethanol beyond the federal mandates. We believe further consumer acceptance of E15 and E85 fuels may be necessary before ethanol can achieve significant market share growth. Discretionary and E85 blending are important secondary markets. Discretionary blending is often determined by the price of ethanol relative to gasoline, the value of RINs, and availability to consumers. When discretionary blending is financially unattractive, the demand for ethanol may be reduced.

Demand for ethanol is also affected by overall demand for transportation fuel, which is affected by cost, number of miles traveled and vehicle fuel economy. Miles traveled typically increases during the spring and summer months related to vacation travel, followed closely behind the fall season due to holiday travel. Global events, such as COVID-19, greatly decreased miles traveled and in turn, the demand for ethanol. Consumer demand for gasoline may be impacted by emerging transportation trends, such as electric vehicles or ride sharing. In January 2021, General Motors announced a target date of 2035 for phasing out the production of gasoline and diesel powered vehicles. Similarly, Nissan has stated that their entire fleet will be electric vehicles by the early 2030s. Most OEMs have made similar commitments to phase out internal combustion engine production. These announcements coincide with pledges to ban the sale of internal combustion engines in countries such as Japan and the United Kingdom by 2035, as well as a statewide ban in California, which several states are imitating. If realized, these bans would accelerate the decline of liquid fuel demand and by extension demand for ethanol, biodiesel and renewable diesel. We are closely monitoring legislation that may impact the future sales of electric vehicles as

well as vehicles with internal combustion engines in various states and around the world.

Additionally, factors such as over-supply of ethanol, which has been the case for some time, could continue to negatively impact our business. Reduced demand for ethanol may depress the value of our products, erode its margins, and reduce our ability to generate revenue or operate profitably.

Our business is directly affected by the supply and demand for ethanol and other fuels in the markets served by our assets. Reduced demand for ethanol, regardless of cause, may erode our margins and reduce our ability to generate revenue and operate profitably.

Our risk management and commodity trading strategies could be ineffective and expose us to decreased liquidity.

As market conditions warrant, we use forward contracts to sell some of our ethanol, distillers grains, Ultra-High Protein, and renewable corn oil, or buy some of the corn, and natural gas we need to partially offset commodity price volatility. We also engage in other hedging transactions and other commodity trading involving exchange-traded futures contracts for corn, natural gas, ethanol, soybean meal, soybean oil and other agricultural commodities. The financial impact of these activities depends on the price of the commodities involved and/or our ability to physically receive or deliver the commodities.

Hedging arrangements expose us to risk of financial loss when the counterparty defaults on its contract or, in the case of exchange-traded contracts, when the expected differential between the price of the underlying and physical commodity changes. Hedging activities can result in losses when a position is purchased in a declining market or sold in a rising market. Hedging losses may be offset by a decreased cash price for corn, and natural gas and an increased cash price for ethanol, distillers grains, Ultra-High Protein and renewable corn oil. We vary the amount of hedging and other risk mitigation strategies we undertake and sometimes choose not to engage in hedging transactions at all. We cannot provide assurance that our risk management and commodity trading strategies and decisions will be profitable or effectively offset commodity price volatility. If they are not, our results of operations and financial position may be adversely affected.

The use of derivative financial instruments frequently involves cash deposits with brokers, or margin calls. Sudden changes in commodity prices may require additional cash deposits immediately. Depending on our open derivative positions, we may need additional liquidity with little advance notice to cover margin calls. While we continuously monitor our exposure to margin calls, we cannot guarantee we will be able to maintain adequate liquidity to cover margin calls in the future.

In the past, we have had operating losses and could incur future operating losses.

In the last five years, we incurred operating losses during certain quarters and annually and could incur operating losses in the future that are substantial. Although we have had periods of sustained profitability, we may not be able to maintain or increase profitability on a quarterly or annual basis, which could impact the market price of our common stock and the value of your investment. In addition, periods of sustained losses create uncertainty as to whether some or all of our deferred tax assets will be realizable in the future.

If the United States were to withdraw from or materially modify certain international trade agreements, our business, financial condition and results of operations could be materially adversely affected.

Ethanol and other products that we produce are or have been exported to Canada, Mexico, Brazil, China and other countries. The previous administration expressed antipathy towards certain existing international trade agreements and significantly increased tariffs on goods imported into the United States, which in turn led to retaliatory actions on U.S. exports. The outcome of trade negotiations or lack thereof, has had and/or may continue to have a material effect on our business, financial condition and results of operations.

Our ability to access the partnership's terminals adjacent to our ethanol plants could cause disruptions in our operations and adversely affect our production levels, profitability and needed capital expenditures.

We are party to the storage and throughput agreement with our partnership, under which we access the storage and throughput services offered by the partnership. In the event of a default by either party under that agreement, our ability to throughput our ethanol may be disrupted, which in turn could adversely affect our production levels, operating expenses, profitability and our need for capital expenditures for alternative throughput arrangements.

Our debt exposes us to numerous risks that could have significant consequences to our shareholders.

Risks related to the level of debt we have include: (1) requiring a sizeable portion of cash to be dedicated for debt service, reducing the availability of cash flow for working capital, capital expenditures, and other general business activities and limiting our ability to invest in new growth opportunities; (2) limiting our ability to obtain additional financing for working capital, capital expenditures, acquisitions and other activities; (3) limiting our flexibility to plan for or react to changes in the businesses and industries in which we operate; (4) increasing our vulnerability to general and industry-specific adverse economic conditions; (5) being at a competitive disadvantage against less leveraged competitors; and (6) being vulnerable to increases in prevailing interest rates. A portion of our debt bears interest at variable rates, which creates exposure to interest rate risk. If interest rates increase, our debt service obligations at variable rates would increase even though the amount borrowed remained the same, decreasing net income.

Our ability to make scheduled payments on or to refinance our debt obligations and to fund our planned capital expenditures, acquisitions and other ongoing liquidity needs depends on our financial condition and operating performance, which are subject to prevailing economic and competitive conditions as well as certain financial, business and other factors which are beyond our control. There can be no assurance that we will maintain a level of cash flow from operating activities in an amount sufficient to permit us to pay the principal, premium, if any, and interest on our indebtedness. If our cash flow and capital resources are insufficient to fund our debt service obligations, we may be forced to reduce or delay investments and capital expenditures, or to seek additional capital or restructure our indebtedness. These alternative measures may not be successful and may not permit us to meet our scheduled debt service obligations. In the absence of such operating results and resources, we could face substantial liquidity problems and might be required to dispose of material assets or operations to meet our debt service and other obligations.

We are required to comply with a number of covenants under our existing loan agreements that could hinder our growth.

We are required to maintain specified financial ratios, including minimum cash flow coverage, working capital and tangible net worth under certain loan agreements. A breach of these covenants could result in default, and if such default is not cured or waived, our lenders could accelerate our debt and declare it immediately due and payable. If this occurs, we may not be able to repay or borrow sufficient funds to refinance the debt. Even if financing is available, it may not be on acceptable terms. No assurance can be given that our future operating results will be sufficient to comply with these covenants or remedy default.

In the event we are unable to comply with these covenants in the future, we cannot provide assurance that we will be able to obtain the necessary waivers or amend our loan agreements to prevent default. Under our convertible senior notes, default on any loan in excess of \$20.0 million could result in the notes being declared due and payable, which could have a material and adverse effect on our ability to operate.

We operate in a capital intensive business and rely on cash generated from operations and external financing, which could be limited.

Increased commodity prices could increase liquidity requirements. Our operating cash flow is dependent on overall commodity market conditions as well as our ability to operate profitably. In addition, we may need to raise additional financing to fund growth. In some market environments, we may have limited access to incremental financing, which could defer or cancel growth projects, reduce business activity or cause us to default on our existing debt agreements if we are unable to meet our payment schedules. These events could have an adverse effect on our operations and financial position.

Our ability to repay current and anticipated future debt will depend on our financial and operating performance and successful implementation of our business strategies. Our financial and operational performance will depend on numerous factors including prevailing economic conditions, commodity prices, and financial, business and other factors beyond our control. If we cannot repay, refinance or extend our current debt at scheduled maturity dates, we could be forced to reduce or delay capital expenditures, sell assets, restructure our debt or seek additional capital. If we are unable to restructure our debt or raise funds, our operations and growth plans could be harmed and the value of our stock could be significantly reduced.

Disruptions in the credit market could limit our access to capital.

We may need additional capital to fund our growth or other business activities in the future. The cost of capital under our existing or future financing arrangements could increase and affect our ability to trade with various commercial counterparties or cause our counterparties to require additional forms of credit support. If capital markets are disrupted, we

may not be able to access capital at all or capital may only be available under less favorable terms.

We are required to continue to make payments to the partnership to the minimum volume commitment regardless of our production levels.

We are party to the storage and throughput agreement with our partnership, under which we are obligated to pay a minimum volume commitment regardless of whether or not we operate. We may not run our plants at volumes sufficient enough to cover the MVC resulting in payments being made to the partnership. In times of sustained negative margins, our volumes may be insufficient to recover these MVC payments in the following four quarters as outlined in the partnership agreement.

Our ability to maintain the required regulatory permits or manage changes in environmental, safety and TTB regulations is essential to successfully operating our plants.

Our plants are subject to extensive air, water, environmental and TTB regulations. Our production facilities involve the emission of various airborne pollutants, including particulate, carbon dioxide, nitrogen oxides, hazardous air pollutants and volatile organic compounds, which requires numerous environmental permits to operate our plants. Governing state agencies could impose costly conditions or restrictions that are detrimental to our profitability and have a material adverse effect on our operations, cash flows and financial position.

Environmental laws and regulations at the federal and state level are subject to change. These changes can also be made retroactively. It is possible that more stringent federal or state environmental rules or regulations could be adopted, which could increase our operating costs and expenses. Consequently, even though we currently have the proper permits, we may be required to invest or spend considerable resources in order to comply with future environmental regulations. Furthermore, ongoing plant operations, which are governed by the Occupational Safety and Health Administration, may change in a way that increases the cost of plant operations. Any of these events could have a material adverse effect on our operations, cash flows and financial position.

Part of our business is regulated by environmental laws and regulations governing the labeling, use, storage, discharge and disposal of hazardous materials. Since we handle and use hazardous substances, changes in environmental requirements or an unanticipated significant adverse environmental event could have a negative impact on our business. While we strive to comply with all environmental requirements, we cannot provide assurance that we have been in compliance at all times or will not incur material costs or liabilities in connection with these requirements. Private parties, including current and former employees, could bring personal injury or other claims against us due to the presence of hazardous substances. We are also exposed to residual risk by our land and facilities which may have environmental liabilities from prior use. Changes in environmental regulations may require us to modify existing plant and processing facilities, which could significantly increase our cost of operations.

TTB regulations apply when producing our undenatured ethanol. These regulations carry substantial penalties for non-compliance and therefore any non-compliance may adversely affect our financial operations or adversely impact our ability to produce undenatured ethanol.

Any inability to generate or obtain RINs could adversely affect our operating margins.

Nearly all of our ethanol production is sold with RINs that are used by our customers to comply with the RFS. Should our production not meet the EPA's requirements for RIN generation in the future, we would need to purchase RINs in the open market or sell our ethanol at lower prices to compensate for the absence of RINs. The price of RINs depends on a variety of factors, including the availability of qualifying biofuels and RINs for purchase, production levels of transportation fuel and percentage mix of ethanol with other fuels, and cannot be predicted. Failure to obtain sufficient RINs or reliance on invalid RINs could subject us to fines and penalties imposed by the EPA which could adversely affect our results of operations, cash flows and financial condition.

As we trade ethanol acquired from third-parties, should it be discovered the RINs associated with the ethanol we purchased are invalid, albeit unknowingly, we could be subject to substantial penalties if we are assessed the maximum amount allowed by law. Based on EPA penalties assessed on RINS violations in the past few years, in the event of a violation, the EPA could assess penalties, which could have an adverse impact on our profitability.

Compliance with evolving environmental, health and safety laws and regulations, particularly those related to climate change, could be costly.

Our plants emit carbon dioxide as a by-product of ethanol production. While all eleven of our plants have grandfathered pathways allowing them to operate under their current authorized capacity under the RFS mandate, operating above these capacities requires an Efficient Producer Pathways and a 20% reduction in GHG emissions from a 2005 baseline. Four of our plants currently maintain Efficient Producer Pathways to operate at increased capacities. Separately, CARB began implementation of the California LCFS in 2011, which aims to decrease the CI of transportation fuel in the state. In 2018, CARB strengthened GHG benchmarks to 20% reductions vs 1990 levels by 2030. The most recent Scoping Plan from CARB in 2022 sets a target of 85% GHG reductions vs 1990 levels no later than 2045. An ILUC component is included in the GHG emission calculation, which may have an adverse impact on the market for corn-based ethanol in California.

To expand our production capacity, federal and state regulations may require us to obtain additional permits, achieve EPA's efficient producer status under the pathway petition program, install advanced technology or reduce drying distillers grains. Compliance with future laws or regulations to decrease carbon dioxide could be costly and may prevent us from operating our plants as profitably, which may have an adverse impact on our operations, cash flows and financial position.

We may fail to realize the anticipated benefits of mergers, acquisitions, joint ventures or partnerships.

We have increased the size and diversity of our operations through mergers, acquisitions and joint ventures or partnerships and intend to continue exploring potential growth opportunities. Acquisitions involve numerous risks that could harm our business, including: (1) difficulties integrating the operations, technologies, products, existing contracts, accounting processes and personnel and realizing anticipated synergies of the combined business; (2) risks relating to environmental hazards on purchased sites; (3) risks relating to developing the necessary infrastructure for facilities or acquired sites, including access to rail networks; (4) difficulties supporting and transitioning customers; (5) diversion of financial and management resources from existing operations; (6) the purchase price exceeding the value realized; (7) risks of entering new markets or areas outside of our core competencies; (8) potential loss of key employees, customers and strategic alliances from our existing or acquired business; (9) unanticipated problems or underlying liabilities; and (10) inability to generate sufficient revenue to offset acquisition and development costs. The anticipated benefits of these transactions may not be fully realized or could take longer to realize than expected.

We have also pursued growth through joint ventures or partnerships, which typically involve restrictions on actions that the partnership or joint venture may take without the approval of the partners. These provisions could limit our ability to manage the partnership or joint venture in a manner that serves our best interests.

Future acquisitions may involve issuing equity as payment or to finance the business or assets, which could dilute your ownership interest. Furthermore, additional debt may be necessary to complete these transactions, which could have a material adverse effect on our financial condition. Failure to adequately address the risks associated with acquisitions or joint ventures could have a material adverse effect on our business, results of operations and financial condition.

Future events could result in impairment of long-lived assets, which may result in charges that adversely affect our results of operations.

Long-lived assets, including property, plant and equipment, intangible assets, goodwill and equity method investments, are evaluated for impairment annually or whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Our impairment evaluations are subject to changes in key assumptions used in our analysis and may require use of financial estimates of future cash flows. Application of alternative assumptions could produce significantly different results. We may be required to recognize impairments of long-lived assets based on future economic factors such as unfavorable changes in estimated future undiscounted cash flows of an asset group.

Global competition could affect our profitability.

We compete with producers in the United States and abroad. Depending on feedstock, labor and other production costs, producers in other countries, such as Brazil, may be able to produce ethanol cheaper than we can. Under the RFS, certain parties are obligated to meet an advanced biofuel standard. While transportation costs, infrastructure constraints and demand may temper the impact of ethanol imports, foreign competition remains a risk to our business. Moreover, significant additional foreign ethanol production could create excess supply, which could result in lower ethanol prices throughout the world, including the United States. Any penetration of ethanol imports into the domestic market may have a material adverse

effect on our operations, cash flows and financial position.

International activities such as boycotts, embargoes, product rejection, trade policies and compliance matters, may have an adverse effect on our results of operations.

Government actions abroad can have a significant impact on our business. In 2022, we exported approximately 16% of our ethanol production. We have experienced trade policy disputes, tariffs, changing foreign laws as well as investigations in various foreign countries over the past ten years that have adversely impacted the international demand for U.S. ethanol. With these types of international activities, the value of our products may be affected, which could have a negative impact on our profitability. Additionally, tariffs on U.S. ethanol may lead to further industry over-supply and reduce our profitability. Moreover, the America First trade position has caused more countries to toughen their positions on U.S. imports.

The ability or willingness of OPEC and other oil exporting nations to set and maintain production levels has a significant impact on oil and natural gas commodity prices.

The Organization of Petroleum Exporting Countries and their allies (collectively, OPEC+), is an intergovernmental organization that seeks to manage the price and supply of oil on the global energy market. Actions taken by OPEC+ members, including those taken alongside other oil exporting nations, have a significant impact on global oil supply and pricing. There can be no assurance that OPEC+ members and other oil exporting nations will agree to future production cuts or other actions to support and stabilize oil prices, nor can there be any assurance that they will not further reduce oil prices or increase production. Uncertainty regarding future actions to be taken by OPEC+ members or other oil exporting countries could lead to increased volatility in the price of oil, which could adversely affect our business, future financial condition and results of operations.

Increased ethanol industry penetration by oil and other multinational companies could impact our margins.

We operate in a very competitive environment and compete with other domestic ethanol producers in a relatively fragmented industry. The top four producers account for approximately 41% of the domestic production capacity with production capacity ranging from 958 mmgy to 2,811 mmgy. The remaining ethanol producers consist of smaller entities engaged exclusively in ethanol production and large integrated grain companies that produce ethanol in addition to their base grain businesses. We compete for capital, labor, corn and other resources with these companies. Historically, oil companies, petrochemical refiners and gasoline retailers were not engaged in ethanol production even though they form the primary distribution network for ethanol blended with gasoline. As of this filing, oil refiners accounted for approximately 10% of domestic ethanol production. If these companies increase their ethanol plant ownership or additional companies commence production, the need to purchase ethanol from independent producers like us or at pricing that provides us an acceptable margin could diminish and adversely effect on our operations, cash flows and financial position.

Our agribusiness operations are subject to significant government regulations.

Our agribusiness operations are regulated by various government entities that can impose significant costs on our business. Failure to comply could result in additional expenditures, fines or criminal action. Our production levels, markets and grains we merchandise are affected by federal government programs. Government policies such as tariffs, duties, subsidies, import and export restrictions and embargos can also impact our business. Changes in government policies and producer support could impact the type and amount of grains planted, which could affect our ability to buy grain. Export restrictions or tariffs could limit sales opportunities outside of the United States.

Commodities futures trading is subject to extensive regulations.

The futures industry is subject to extensive regulation. Since we use exchange-traded futures contracts as part of our business, we are required to comply with a wide range of requirements imposed by the Commodity Futures Trading Commission, National Futures Association and the exchanges on which we trade. These regulatory bodies are responsible for safeguarding the integrity of the futures markets and protecting the interests of market participants. As a market participant, we are subject to regulation concerning trade practices, business conduct, reporting, position limits, record retention, the conduct of our officers and employees, and other matters.

Failure to comply with the laws, rules or regulations applicable to futures trading could have adverse consequences. Such claims could result in fines, settlements or suspended trading privileges, which could have a material adverse impact on our business, financial condition or operating results.

Our success depends on our ability to manage our growing and changing operations.

Since our formation in 2004, our business has grown significantly in size, products and complexity. This growth places substantial demands on our management, systems, internal controls, and financial and physical resources. If we acquire or develop additional operations, we may need to further develop our financial and managerial controls and reporting systems, and could incur expenses related to hiring additional qualified personnel and expanding our information technology infrastructure. Our ability to manage growth effectively could impact our results of operations, financial position and cash flows.

Replacement technologies could make corn-based ethanol or our process technology obsolete.

Ethanol is used primarily as an octane additive and oxygenate blended with gasoline. Critics of ethanol blends argue that it decreases fuel economy, causes corrosion and damages fuel pumps. Prior to federal restrictions and ethanol mandates, methyl tertiary-butyl ether, or MTBE, was the leading oxygenate. Other oxygenate products could enter the market and prove to be environmentally or economically superior to ethanol. Alternative biofuel alcohols, such as methanol and butanol, could evolve and replace ethanol.

Research is currently underway to develop products and processes that have advantages over ethanol, such as: lower vapor pressure, making it easier to add to gasoline; similar energy content as gasoline, reducing any decrease in fuel economy caused by blending with gasoline; ability to blend at higher concentration levels in standard vehicles; and reduced susceptibility to separation when water is present. Products offering a competitive advantage over ethanol could reduce our ability to generate revenue and profits from ethanol production.

New ethanol process technologies could emerge that require less energy per gallon to produce and result in lower production costs. Our process technologies could become less effective or competitive than competing technologies or obsolete and place us at a competitive disadvantage, which could have a material adverse effect on our operations, cash flows and financial position.

We may be required to provide remedies for ethanol, distillers grains, Ultra-High Protein or renewable corn oil that do not meet the specifications defined in our sales contracts.

If we produce or purchase ethanol, distillers grains, Ultra-High Protein or renewable corn oil that does not meet the specifications defined in our sales contracts, we may be subject to quality claims. We could be required to refund the purchase price of any non-conforming product or replace the non-conforming product at our expense. Ethanol, distillers grains, Ultra-High Protein or renewable corn oil that we purchase or market and subsequently sell to others could result in similar claims if the product does not meet applicable contract specifications, which could have an adverse impact on our profitability.

Business disruptions due to unforeseen operational failures or factors outside of our control could impact our ability to fulfill contractual obligations.

Natural disasters, pandemics, transportation issues, significant track damage resulting from a train derailment or strikes by our transportation providers could delay shipments of raw materials to our plants or deliveries of ethanol, distillers grains, Ultra-High Protein and renewable corn oil to our customers. If we are unable to meet customer demand or contract delivery requirements due to stalled operations caused by business disruptions, we could potentially lose customers.

Shifts in global markets, supply or demand changes, as well as adverse weather conditions, such as inadequate or excessive amounts of rain during the growing season, overly wet conditions, an early freeze or snowy weather during harvest could impact the supply of corn that is needed to produce ethanol. Corn stored in an open pile may be damaged by rain or warm weather before the corn is dried, shipped or moved into a storage structure.

Our business may be adversely impacted by the continued impact of the COVID-19 outbreak.

The outbreak of the coronavirus, or COVID-19, including resurgences and variants of the virus, has created risk on all aspects of our business, including its impact on our employees, customers, vendors, and business partners. There are uncertainties from COVID-19 that continue, and include but are not limited to (1) the health of our workforce, and our ability to meet staffing needs which are vital to our operations; (2) the duration of additional outbreaks; (3) the effect on customer demand resulting in a decline in the demand for our products; (4) impacts on our supply chain and potential limitations of

supply of our feedstocks, chemicals and other products utilized as well as supply chain impacts on construction equipment, supplies and/or labor; (5) interruptions of our rail and distribution systems and delays in the delivery of our product; and (6) volatility in the credit and financial markets. Specifically, we have experienced demand fluctuations for our products, and rail disruptions. Any of the foregoing may have an adverse impact our business, operations and/or profitability.

We continue to actively manage our response in collaboration with customers, government officials, and business partners and assess potential impacts to our future financial position and operating results, as well as adverse developments in our business. While many restrictions have been lifted, it is not possible for us to predict whether there will be additional government-mandated orders that could affect our business, or how any additional measures could impact our operations. We are unable to predict the overall impact these events will have on our future financial position and operations and it could have a material adverse impact on our business, operations and/or profitability.

Our ethanol-related assets may be at greater risk of terrorist attacks, threats of war or actual war, than other possible targets.

Terrorist attacks in the United States, including threats of war or actual war, may adversely affect our operations. A direct attack on our ethanol plants, or our partnership's storage facilities, fuel terminals and railcars could have a material adverse effect on our financial condition, results of operations and cash flows. Furthermore, a terrorist attack could have an adverse impact on ethanol prices. Disruption or significant increases in ethanol prices could result in government-imposed price controls.

Our network infrastructure, enterprise applications and internal technology systems could be damaged or otherwise fail and disrupt business activities.

Our network infrastructure, enterprise applications and internal technology systems are instrumental to the day-to-day operations of our business. Numerous factors outside of our control, including earthquakes, floods, lightning, tornados, fire, power loss, telecommunication failures, computer viruses, physical or electronic vandalism or similar disruptions could result in system failures, interruptions or loss of critical data and prevent us from fulfilling customer orders. We cannot provide assurance that our backup systems are sufficient to mitigate hardware or software failures, which could result in business disruptions that negatively impact our operating results and damage our reputation.

We could be adversely affected by cyber-attacks, data security breaches and significant information technology systems interruptions.

We rely on network infrastructure, enterprise applications, and internal and external technology systems for operational, marketing support and sales, and product development activities. The hardware and software systems related to such activities are subject to damage from earthquakes, floods, lightning, tornados, fire, power loss, telecommunication failures, cyber-attacks and other similar events. They are also subject to acts such as computer viruses, physical or electronic vandalism or other similar disruptions that could cause system interruptions and loss of critical data, and could prevent us from fulfilling customers' orders. We have experienced various cyber-attacks, with minimal consequences on our business to date. As examples, we have experienced attempts to gain access to systems, denial of service attacks, attempted malware infections, account takeovers, scanning activity and phishing emails. Attacks can originate from external criminals, terrorists, nation states or internal actors. We will continue to dedicate resources and incur expenses to maintain and update on an ongoing basis the systems and processes that are designed to mitigate the information security risks we face and protect the security of our computer systems, software, networks and other technology assets against attempts by unauthorized parties to obtain access to confidential information, disrupt or degrade service or cause other damage. Despite the implementation of numerous cybersecurity measures (including but not limited to, ongoing collaboration and engagement with the Department of Homeland Security, access controls, data encryption, internal and third-party vulnerability assessments, employee training, continuous protection and monitoring, and maintenance of backup and protective systems), our information technology systems may still be vulnerable to cybersecurity threats and other electronic security breaches. While we have taken reasonable efforts to protect ourselves, and to date, we have not experienced any material losses related to cyber-attacks, we cannot assure our shareholders that any of our security measures would be sufficient in the future. Any event that causes failures or interruption in such hardware or software systems could result in disruption of our business operations, have a negative impact on our operating results, and damage our reputation, which could negatively affect our financial condition, results of operation, cash flows.

We may not be able to hire and retain qualified personnel to operate our facilities.

Our success depends, in part, on our ability to attract and retain competent employees. Qualified employees, including but not limited to finance and accounting, managers, engineers, merchandisers, and other personnel must be hired for each of our locations and our corporate office. If we are unable to hire and retain productive, skilled personnel, we may not be able to maximize production, optimize plant operations or execute our business strategy.

Compliance with and changes in tax laws could adversely affect our performance.

We are subject to extensive tax liabilities imposed by multiple jurisdictions, including income taxes, indirect taxes (excise/duty, sales/use, gross receipts, and value-added taxes), payroll taxes, franchise taxes, withholding taxes, and ad valorem taxes. New tax laws and regulations and changes in existing tax laws and regulations are continuously being enacted or proposed that could result in increased expenditures for tax liabilities in the future. Many of these liabilities are subject to periodic audits by the respective taxing authority. Subsequent changes to our tax liabilities as a result of these audits may subject us to interest and penalties.

Federal, state and local jurisdictions may challenge our tax return positions.

The positions taken in our federal and state tax return filings require significant judgments, use of estimates and the interpretation and application of complex tax laws. Significant judgment is also required in assessing the timing and amounts of deductible and taxable items. Despite management's belief that our tax return positions are fully supportable, certain positions may be successfully challenged by federal, state and local jurisdictions.

Financial performance of our equity method investments are subject to risks beyond our control and can vary substantially from period to period.

The company invests in certain limited liability companies, which are accounted for using the equity method of accounting. This means that the company's share of net income or loss in the investee increases or decreases, as applicable, the carrying value of the investment. By operating a business through this arrangement, we do not have control over operating decisions as we would if we owned the business outright. Specifically, we cannot act on major business initiatives without the consent of the other investors.

The company recognizes these investments within other assets on the consolidated balance sheets and its proportionate share of earnings on a separate line item in the consolidated statements of operations. As a result, the amount of net investment income recognized from these investments can vary substantially from period to period. Any losses experienced by these entities could adversely impact our results of operations and the value of our investment.

We are exposed to credit risk that could result in losses or affect our ability to make payments should a counterparty fail to perform according to the terms of our agreement.

We are exposed to credit risk from a variety of customers, including major integrated oil companies, large independent refiners, petroleum wholesalers and other ethanol plants. We are also exposed to credit risk with major suppliers of petroleum products and agricultural inputs when we make payments for undelivered inventories. Our fixed-price forward contracts are subject to credit risk when prices change significantly prior to delivery. The inability by a third party to pay us for our sales, provide product that was paid for in advance or deliver on a fixed-price contract could result in a loss and adversely impact our liquidity and ability to make our own payments when due.

The interest rates under our credit facilities may be impacted by the phase-out of LIBOR and we have exposure to increases in interest rates.

LIBOR was historically the basic rate of interest widely used as a reference for setting the interest rates on loans globally. We have and continue to use LIBOR as a reference rate for some of our credit facilities. The United Kingdom's Financial Conduct Authority, which regulates LIBOR, ceased the publication of the one week and two month LIBOR settings immediately following the LIBOR publication on December 31, 2021, and will cease the remaining USD LIBOR settings immediately following the LIBOR publication on June 30, 2023. The U.S. Federal Reserve, in conjunction with the Alternative Reference Rates Committee, a steering committee comprised of large U.S. financial institutions, is considering replacing U.S. dollar LIBOR with a new reference rate, the SOFR, calculated using short-term repurchase agreements backed by Treasury securities. The potential effect of any such event on interest expense cannot yet be determined. Our financial

condition, results of operations and cash flows could be materially adversely affected by significant increases in interest rates.

We have limitations, as a holding company, in our ability to receive distributions from a small number of our subsidiaries.

We conduct most of our operations through our subsidiaries and rely on dividends or intercompany transfers of funds to generate free cash flow. Some of our subsidiaries are currently, or are expected to be, limited in their ability to pay dividends or make distributions under the terms of their financing agreements. Consequently, we cannot fully rely on the cash flow from one subsidiary to satisfy the loan obligations of another subsidiary. As a result, if a subsidiary is unable to satisfy its loan obligations, we may not be able to prevent default by providing additional cash to that subsidiary, even if sufficient cash exists elsewhere within our organization.

The ability of suppliers to deliver inputs, parts, components and equipment to our facilities, and our ability to construct our facilities without disruption, could affect our business performance.

We use a wide range of materials and components in the production of our products and our transformation construction, which come from numerous suppliers. Also, key parts may be available only from a single or a limited group of suppliers, and we are subject to supply and pricing risk. Our operations and those of our suppliers are subject to disruption for a variety of reasons, including supplier plant shutdowns or slowdowns, parts availability, transportation delays, work stoppages, labor relations, governmental regulatory and enforcement actions, disputes with suppliers, distributors or transportation providers, information technology failures, and natural hazards, including due to climate change. We may be impacted by supply chain issues, due to factors largely beyond our control, which could escalate in future quarters. Any of the foregoing factors may result in higher costs or operational disruptions, which could have an adverse impact on our business and financial statements. Such disruption has in the past and could in the future interrupt our ability to manufacture certain products. Any significant disruption could have a material adverse impact on our financial statements.

Inflation may impact the cost and/or availability of materials, inputs and labor, which could adversely affect our operating results.

We have experienced inflationary impacts on raw materials, labor costs, wages, components, equipment, other inputs and services across our business and inflation and its impact could escalate in future quarters, many of which are beyond our control. Moreover, we may not be able to pass those costs along in the products we sell. As such, inflationary pressures could have a material adverse effect on our performance and financial statements.

Climate change, environmental, social and corporate governance issues and uncertainty regarding regulation of such matters may increase our operating costs, impact our capital markets and potentially reduce the value of our products and assets.

The issue of global climate change continues to attract considerable public and scientific attention with widespread concern about the impacts of human activity, especially the emissions of GHG such as carbon dioxide and methane. With the current administration, climate change legislation in the U.S. is likely to receive increased focus and consideration over the next several years, with numerous proposals having been made and are likely to continue to be made at the international, national, regional and state levels of government that are intended to limit emissions of GHG and capture carbon. Several states have already adopted measures requiring reduction of GHG within state boundaries. Other states have elected to participate in voluntary regional cap-and-trade programs. While we have considered potential risks with transitioning to a low-carbon economy, and we believe our products are low carbon and result in a reduction of GHG emissions compared to alternatives, any significant legislative changes at the international, national, state or local levels could significantly affect our ability to produce and sell our products, could increase the cost of the production and sale of our products and could materially reduce the value of our products. Additionally, our industry receives adverse commentary related to food versus fuel and land use change/conversion debates. These debates could increase which could potentially result in increased costs and/or regulations. Moreover, costs to transition to lower emissions process technology related to our decarbonization strategy is a related risk that has the potential to result in increased research and development expenditures in new and alternative technologies and capital investments in technology development. Unsuccessful investment in new technologies could pose further risk. Transitioning to a low-carbon economy could also result in increased cost of raw materials, which could increase our overall production costs.

Apart from legislation and regulation, some banks based both domestically and internationally have announced that they have adopted environmental, social and corporate governance guidelines (ESG). There have also been efforts in recent years affecting the investment community promoting the divestment of fossil fuel equities, and encouraging the consideration of

ESG practices of companies. The impact of such efforts may adversely affect the demand for and price of securities issued by us, and impact our access to the capital and financial markets.

Further, it is believed that climate change itself may cause more extreme temperatures and weather conditions such as more intense hurricanes, thunderstorms, tornadoes, droughts, floods, snow or ice storms as well as rising sea levels and increased volatility in temperatures. Extreme weather conditions can interfere with our operations and cause damage resulting from extreme weather, which may not be fully insured. However, at this time, we are unable to determine the extent to which any potential climate change may lead to increased weather hazards affecting our operations.

Our insurance policies do not cover all losses, costs or liabilities that we may experience, and insurance companies that currently insure companies in the energy industry may cease to do so or substantially increase premiums.

We are insured under property, liability and business interruption policies, subject to the deductibles and limits under those policies. We have acquired insurance that we believe to be adequate to prevent loss from material foreseeable risks. However, events may occur for which no insurance is available or for which insurance is not available on terms that are acceptable. Loss from an event, such as, but not limited to war, riots, pandemics, terrorism or other risks, may not be insured and such a loss may have a material adverse effect on our operations, cash flows and financial position. Certain of our ethanol plants and our related storage tanks, as well as certain of our fuel terminal facilities are located within recognized seismic and flood zones. We believe that the design of these facilities have been modified to fortify them to meet structural requirements for those regions of the country. We have also obtained additional insurance coverage specific to earthquake and flood risks for the applicable plants and fuel terminals. However, there is no assurance that any such facility would remain in operation if a seismic or flood event were to occur.

Additionally, our ability to obtain and maintain adequate insurance may be adversely affected by conditions in the insurance market over which we have no control. In addition, if we experience insurable events, our annual premiums could increase further or insurance may not be available at all. If significant changes in the number or financial solvency of insurance underwriters for the ethanol industry occur, we may be unable to obtain and maintain adequate insurance at a reasonable cost. We cannot assure our shareholders that we will be able to renew our insurance coverage on acceptable terms, if at all, or that we will be able to arrange for adequate alternative coverage in the event of non-renewal. The occurrence of an event that is not fully covered by insurance, the failure by one or more insurers to honor its commitments for an insured event or the loss of insurance coverage could have a material adverse effect on our financial condition, results of operations, cash flows and ability of the partnership to make distributions to its unitholders.

Risks Related to the Partnership

We depend on the partnership to provide fuel storage and transportation services.

The partnership's operations are subject to all of the risks and hazards inherent in the storage and transportation of fuel, including: damages to storage facilities, railcars and surrounding properties caused by floods, fires, severe weather, explosions, embargoes, natural disasters or acts of terrorism; mechanical or structural failures at the partnership's facilities or at third-party facilities at which its operations are dependent; curtailments of operations relative to severe weather; and other hazards, resulting in severe damage or destruction of the partnership's assets or temporary or permanent shut-down of the partnership's facilities. If the partnership is unable to serve our storage and transportation needs, our ability to operate our business could be adversely impacted, which could adversely affect our financial condition and results of operations. The inability of the partnership to continue operations, for any reason, could also impact the value of our investment in the partnership and, because the partnership is a consolidated entity, our business, financial condition and results of operations.

The partnership's credit facility includes restrictions that may limit its ability to finance future operations, meet its capital needs or expand its business. If the partnership fails to comply with covenants in its credit facility, the partnership may be required to repay its indebtedness thereunder, which may have an adverse effect on the partnership's liquidity and its ability to operate and provide services to us.

The partnership is dependent upon the earnings and cash flow generated by its operations in order to meet its debt service obligations and to allow the partnership to pay cash distributions to its unitholders. The operating and financial restrictions and covenants in the partnership's credit facility or in any future financing agreements could restrict its ability to finance future operations or capital needs or to expand or pursue its business activities, which may, in turn, limit its ability to pay cash distributions to unitholders. For example, the partnership's credit facility restricts its ability to, among other things: (1) make certain cash distributions; (2) incur certain indebtedness; (3) create certain liens; (4) make certain investments; (5)

merge or sell certain of our assets; and (6) expand the nature of our business.

Furthermore, the partnership's credit facility contains covenants requiring it to maintain certain financial ratios.

A failure to comply with the provisions of the partnership's credit facility could result in an event of default that could enable the partnership's lenders, subject to the terms and conditions of the partnership's credit facility, to declare the outstanding principal of that debt, together with accrued interest, to be immediately due and payable and/or to proceed against the collateral granted to them to secure such debt. If there is a default or event of default, the payment of the partnership's debt is accelerated, defaults under its other debt instruments, if any, may be triggered, and its assets may be insufficient to repay such debt in full. Therefore, the holders of its units could experience a partial or total loss of their investment.

Increases in interest rates could adversely impact the partnership's unit price, ability to issue equity or incur debt, and pay cash distributions at intended levels.

The partnership's cash distributions and implied distribution yield affect its unit price. Distributions are often used by investors to compare and rank yield-oriented securities when making investment decisions. A rising interest rate environment could have an adverse impact on the partnership's unit price, ability to issue equity or incur debt or pay cash distributions at intended levels, which could adversely impact the value of our investment in the partnership.

The partnership may not have sufficient available cash to pay quarterly distributions on its units.

The amount of cash the partnership can distribute depends on how much cash is generated from operations, which can fluctuate from quarter to quarter based on ethanol and other fuel volumes, handling fees, payments associated with minimum volume commitments, timely payments by subsidiaries, and other third parties, and prevailing economic conditions. The amount of cash available for distribution also depends on the partnership's operating and general and administrative expenses, capital expenditures, acquisitions and organic growth projects, debt service requirements, working capital needs, ability to borrow funds and access capital markets, credit facility restrictions, cash reserves and other risks affecting cash levels. Increasing the partnership's borrowings or other debt to finance certain projects could increase interest expense, which could impact the amount of cash available for distributions. There are no limitations in the partnership agreement regarding its ability to issue additional units. Should the partnership issue additional units in connection with an acquisition or expansion, the distributions on the incremental units will increase the risk that the partnership will be unable to maintain or increase distributions on a per unit basis.

We may be required to pay taxes on our share of the partnership's income that are greater than the cash distributions we receive from the partnership.

The unitholders of the partnership generally include, for purposes of calculating their U.S. federal, state and local income taxes, their share of the partnership's taxable income, whether they have received cash distributions from the partnership. We ultimately may not receive cash distributions from the partnership equal to our share of taxable income or the taxes that are due with respect to that income, which could negatively impact our liquidity.

A majority of the executive officers and directors of the partnership are also officers of our company, which could result in conflicts of interest.

We indirectly own and control the partnership and appoint all of its officers and directors. A majority of the executive officers and directors of the partnership are also officers or directors of our company. Although our directors and officers have a fiduciary responsibility to manage the company in a manner that is beneficial to us, as directors and officers of the partnership, they also have certain duties to the partnership and its unitholders. Conflicts of interest may arise between us and our affiliates, and the partnership and its unitholders, and in resolving these conflicts, the partnership may favor its own interests over the company's interests. In certain circumstances, the partnership may refer conflicts of interest or potential conflicts of interest to its conflicts committee, which must consist entirely of independent directors, for resolution. The conflicts committee must act in the best interests of the public unitholders of the partnership. As a result, the partnership may manage its business in a manner that differs from the best interests of the company or our stockholders, which could adversely affect our profitability.

Cash available for distributions could be reduced and likely cause a substantial reduction in unit value if the partnership became subject to entity-level taxation for federal income tax purposes.

The present federal income tax treatment of publicly traded partnerships or investments in its units could be modified, at any time, by administrative, legislative or judicial changes and interpretations. From time to time, members of Congress propose and consider substantive changes to the existing federal income tax laws that affect publicly traded partnerships. Should any legislative proposal eliminate the qualifying income exception, all publicly traded partnerships would be treated as corporations for federal income tax purposes. The partnership would be required to pay federal income tax on its taxable income at the corporate tax rate and likely state and local income taxes at varying rates as well. Distributions to unitholders would be taxed as corporate distributions. The partnership's cash available for distributions and the value of the units would be substantially reduced.

Risks Related to our Common Stock

The price of our common stock may be highly volatile and subject to factors beyond our control.

Some of the many factors that can influence the price of our common stock include: (1) our results of operations and the performance of our competitors; (2) public's reaction to our press releases, public announcements and filings with the SEC; (3) changes in earnings estimates or recommendations by equity research analysts who follow us or other companies in our industry; (4) changes in general economic conditions; (5) changes in market prices for our products or raw materials and related substitutes; (6) sales of common stock by our directors, executive officers and significant shareholders; (7) actions by institutional investors trading in our stock; (8) disruptions in our operations; (9) changes in our management team; (10) other developments affecting us, our industry or our competitors; and (11) U.S. and international economic, legal and regulatory factors unrelated to our performance. The stock market may experience significant price and volume fluctuations, which are unrelated to the operating performance of any particular company. These broad market fluctuations could materially reduce the price of our common stock price based on factors that have little or nothing to do with our company or its performance.

Anti-takeover provisions could make it difficult for a third party to acquire us.

Our restated articles of incorporation, restated bylaws and Iowa's law contain anti-takeover provisions that could delay or prevent change in control of us or our management. These provisions discourage proxy contests, making it difficult for our shareholders to take other corporate actions without the consent of our board of directors, which include: (1) board members can only be removed for cause with an affirmative vote of no less than two-thirds of the outstanding shares; (2) shareholder action can only be taken at a special or annual meeting, not by written consent except where required by Iowa law; (3) shareholders are restricted from making proposals at shareholder meetings; and (4) the board of directors can issue authorized or unissued shares of stock. We are subject to the provisions of the Iowa Business Corporations Act, which prohibits combinations between an Iowa corporation whose stock is publicly traded or held by more than 2,000 shareholders and an interested shareholder for three years unless certain exemption requirements are met.

Provisions in the convertible notes could also make it more difficult or too expensive for a third party to acquire us. If a takeover constitutes a fundamental change, holders of the notes have the right to require us to repurchase their notes in cash. If a takeover constitutes a make-whole fundamental change, we may be required to increase the conversion rate for holders who convert their notes. In either case, the obligation under the notes could increase the acquisition cost and discourage a third party from acquiring us. These items discourage transactions that could otherwise command a premium over prevailing market prices and may limit the price investors are willing to pay for our stock.

Non-U.S. shareholders may be subject to U.S. income tax on gains related to the sale of their common stock.

If we are a U.S. real property holding corporation during the shorter of the five-year period before the stock was sold or the period the stock was held by a non-U.S. shareholder, the non-U.S. shareholder could be subject to U.S. federal income tax on gains related to the sale of their common stock. Whether we are a U.S. real property holding corporation depends on the fair market value of our U.S. real property interests relative to our other trade or business assets and non-U.S. real property interests. We cannot provide assurance that we are not a U.S. real property holding corporation or will not become one in the future.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

We believe the properties owned and leased at our locations are sufficient to accommodate our current needs, as well as potential expansion.

Corporate

We lease approximately 54,000 square feet of office space in Omaha, Nebraska for our corporate headquarters, which houses our corporate administrative functions and commodity trading operations.

Ethanol Production Segment

We own approximately 1,637 acres of land and lease approximately 78 acres of land at and around our ethanol production facilities. As detailed in our discussion of the ethanol production segment in *Item 1 – Business*, our ethanol plants have the capacity to produce approximately 958 million gallons of ethanol per year.

Agribusiness and Energy Services Segment

As detailed in our discussion in *Item 1 – Business*, our agribusiness and energy services segment facilities include grain storage capacity at our ethanol plants of approximately 25.3 million bushels.

We lease approximately 50,500 square feet of manufacturing space in Omaha, Nebraska for our Optimal Aquafeed LLC operations, where we manufacture and store fish food, feed ingredients and other related products.

Our marketing operations are conducted primarily at our corporate office, in Omaha, Nebraska.

Partnership Segment

Our partnership owns approximately five acres of land and leases approximately 29 acres of land at two locations in two states, as disclosed in *Item 1 – Business*, where its fuel terminals are located, and owns approximately 41 acres of land and leases approximately two acres of land where its storage facilities are located at our ethanol production facilities.

Item 3. Legal Proceedings.

We are currently involved in litigation that has occurred in the ordinary course of doing business. We do not believe this will have a material adverse effect on our financial position, results of operations or cash flows.

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Common Stock

Our common stock trades under the symbol “GPPE” on Nasdaq.

Holder of Record

We had 1,844 holders of record of our common stock, not including beneficial holders whose shares are held in names other than their own, on February 7, 2023. This figure does not include approximately 56.7 million shares held in depository trusts.

Dividend Policy

On June 18, 2019, the company’s board of directors suspended its future quarterly cash dividend following the June 14, 2019 dividend payment, in order to retain and redirect cash flow to the company’s operating expense equalization plan, the deployment of high-protein technology, its stock repurchase program and other corporate purposes.

Issuer Purchases of Equity Securities

Employees surrender shares when restricted stock grants are vested to satisfy statutory minimum required payroll tax withholding obligations. No restricted stock vested during the fourth quarter of 2022 and therefore no shares were surrendered.

Our board of directors authorized a share repurchase program of up to \$200.0 million of our common stock. Under this program, we may repurchase shares in open market transactions, privately negotiated transactions, accelerated buyback programs, tender offers or by other means. The timing and amount of the transactions are determined by management based on its evaluation of market conditions, share price, legal requirements and other factors. The program may be suspended, modified or discontinued at any time, without prior notice. We did not repurchase any shares during 2022. Since inception, the company has repurchased 7.4 million shares of common stock for approximately \$92.8 million under the program.

Recent Sales of Unregistered Securities

None.

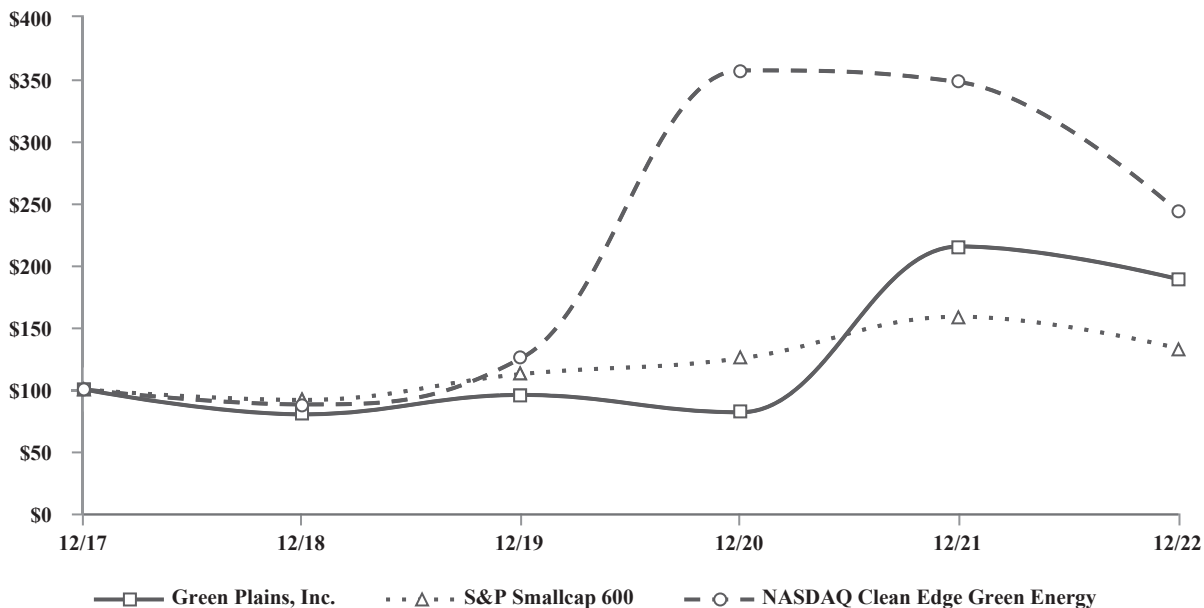
Equity Compensation Plans

Refer to *Item 12 – Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters* for information regarding shares authorized for issuance under equity compensation plans.

Performance Graph

The following graph compares our cumulative total return with the S&P SmallCap 600 Index and the Nasdaq Clean Edge Green Energy Index (CELS) for each of the five years ended December 31, 2022. The graph assumes a \$100 investment in our common stock and each index at December 31, 2017, and that all dividends were reinvested.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*
Among Green Plains, Inc., the S&P Smallcap 600 Index
and the NASDAQ Clean Edge Green Energy Index



*\$100 invested on 12/31/17 in stock or index, including reinvestment of dividends.
 Fiscal year ending December 31.

	12/17	12/18	12/19	12/20	12/21	12/22
Green Plains Inc.	\$ 100.00	\$ 79.88	\$ 95.54	\$ 81.54	\$ 215.22	\$ 188.84
S&P SmallCap 600	100.00	91.52	112.37	125.05	158.59	133.06
Nasdaq Clean Edge Green Energy	100.00	87.89	125.39	357.14	347.70	242.88

The information in the graph will not be considered solicitation material, nor will it be filed with the SEC or incorporated by reference into any future filing under the Securities Act or the Exchange Act, unless we specifically incorporate it by reference into our filing.

Item 6. Reserved.

Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations.

General

The following discussion and analysis includes information management believes is relevant to understand and assess our consolidated financial condition and results of operations. This section should be read in conjunction with our consolidated financial statements, accompanying notes and the risk factors contained in this report.

Overview

Green Plains is an Iowa corporation, founded in June 2004 as a producer of low carbon fuels and has grown to be a leading biorefining company maximizing the potential of existing resources through fermentation and agribusiness technologies. We continue the transition from a commodity-processing business to a value-added agricultural technology company creating sustainable, high-value ingredients from existing resources. To that end, we are currently executing on a number of initiatives to allow for product diversification, new market opportunities and production of additional value-added low-carbon ingredients, such as Ultra-High Protein, dextrose, renewable corn oil and more.

Our first FQT MSC™ Ultra-High Protein installation was completed at our Shenandoah plant during the first quarter of 2020. Our Wood River plant began MSC™ operations in October 2021. Commissioning on our MSC™ installation at our Central City plant began during the third quarter of 2022 while two additional locations began commissioning in the fourth quarter of 2022. Installation at additional biorefineries is expected over the course of the next few years. Through our value-added ingredients initiative, we expect to produce Ultra-High Protein, a feed ingredient with protein concentrations of 50% or greater and yeast concentrations of 25%, increase production of renewable corn oil and produce other higher value products, such as post-MSD distillers grains.

We began pilot scale batch operations at the CST™ production facility at our Innovation Center at York in the second quarter of 2021, which allows for the production of both food and industrial grade low-carbon glucose and dextrose to target applications in food production, renewable chemicals and synthetic biology. In September 2022, we broke ground at our biorefinery in Shenandoah, Iowa, as the first location to deploy FQT CST™ at commercial scale. We also anticipate modifying additional biorefineries to include FQT CST™ production capabilities to meet anticipated future customer demands.

In December 2020, we completed the purchase of a majority interest in FQT. The acquisition capitalizes on the core strengths of each company to develop and implement proven, agriculture, food and industrial biotechnology systems, rapidly expand installation and production across Green Plains facilities, and offer these technologies to the biofuels industry.

Additionally, we have taken advantage of opportunities to divest certain assets in recent years to reallocate capital toward our current growth initiatives. We are focused on generating stable and growing operating margins through our business segments and risk management strategy.

Our profitability is highly dependent on commodity prices, particularly for ethanol, distillers grains, renewable corn oil, soybean meal, corn, and natural gas. Since market price fluctuations of these commodities are not always correlated, our operations may be unprofitable at times. We use a variety of risk management tools and hedging strategies to monitor price risk exposure at our ethanol plants and lock in favorable margins or reduce production when margins are compressed. Our profitability could be significantly impacted by price movements of the aforementioned commodities.

More information about our business, properties and strategy can be found under *Item 1 – Business* and a description of our risk factors can be found under *Item 1A – Risk Factors*.

Industry Factors Affecting our Results of Operations

U.S. Ethanol Supply and Demand

According to the EIA, domestic ethanol production averaged 1.0 million barrels per day in 2022, which was 1% higher than the 0.99 million barrels per day in 2021. Refiner and blender input volume increased 1% to 884 thousand barrels per day for 2022, compared with 875 thousand barrels per day in 2021. Gasoline demand decreased 0.2 million barrels per day, or 3%, in 2022 compared to the prior year. U.S. domestic ethanol ending stocks increased by approximately 3.2 million barrels compared to the prior year, or 15%, to 24.6 million barrels as of December 31, 2022. As of this filing, according to Prime the

Pump, there were approximately 2,923 retail stations selling E15 in 31 states, up from 2,555 at the beginning of the year, and approximately 386 suppliers at 113 pipeline terminal locations now offering E15 to wholesale customers.

Global Ethanol Supply and Demand

According to the USDA Foreign Agriculture Service, domestic ethanol exports through November 30, 2022, were approximately 1,277 mmg, up 13% from 1,126 mmg for the same period of 2021. Canada was the largest export destination for U.S. ethanol accounting for 36% of domestic ethanol export volume, driven in part by their national clean fuel standard. South Korea, Netherlands, India and United Kingdom accounted for 12%, 8%, 7% and 5%, respectively, of U.S. ethanol exports. We currently estimate that net ethanol exports will range from 1.1 to 1.3 billion gallons in 2023, based on historical demand from a variety of countries and certain countries that seek to improve their air quality, reduce greenhouse gas emissions through low carbon fuel programs and eliminate MTBE from their own fuel supplies. The recent strengthening of the U.S. Dollar relative to other currencies has the potential to adversely impact the U.S. ethanol competitiveness in the global market, which could also impact domestic ethanol prices.

Legislation and Regulation

We are sensitive to government programs and policies that affect the supply and demand for ethanol and other fuels, which in turn may impact the volume of ethanol and other products we handle. Over the years, various bills and amendments have been proposed in the House and Senate, which would eliminate the RFS entirely, eliminate the corn based ethanol portion of the mandate, and make it more difficult to sell fuel blends with higher levels of ethanol. Bills have also been introduced to require higher levels of octane blending, and require car manufacturers to produce vehicles that can operate on higher ethanol blends. We believe it is unlikely that any of these bills will become law in the current Congress. In addition, the manner in which the EPA administers the RFS and related regulations can have a significant impact on the actual amount of ethanol and other biofuels blended into the domestic fuel supply.

Federal mandates and state-level clean fuel programs supporting the use of renewable fuels are a significant driver of ethanol demand in the U.S. Ethanol policies are influenced by concerns for the environment, diversifying the fuel supply, and reducing the country's dependence on foreign oil. Consumer acceptance of FFVs and higher ethanol blends in non-FFVs may be necessary before ethanol can achieve further growth in U.S. surface transportation fleet market share. In addition, expansion of clean fuel programs in other states and countries, or a national LCFS could increase the demand for ethanol, depending on how it is structured.

The Inflation Reduction Act of 2022, which was signed into law on August 16, 2022, is a sweeping policy that could have many potential impacts on our business which we are continuing to evaluate. The legislation (1) created a new Clean Fuel Production Credit, section 45Z of the Internal Revenue Code, which runs from 2025 to 2027 of \$1.00 per gallon, which could impact our fuel ethanol, depending on the level of GHG reduction for each gallon; (2) created a new tax credit for SAF of \$1.25 to \$1.75 per gallon, depending on the GHG reduction for each gallon, that could possibly involve some of our low carbon ethanol through an ATJ pathway, depending on the life cycle analysis model being used (this credit expires after 2024 and shifts to the 45Z Clean Fuel Production Credit, where it qualifies for \$1.75 per gallon); (3) expanded the carbon capture and sequestration credit, section 45Q of the Internal Revenue Code, to \$85 for each ton of carbon sequestered, which could impact our carbon capture partnership and other potential carbon capture investments, though it cannot be claimed in conjunction with the 45Z Clean Fuel Production Credit, which could prove to be more valuable; (4) extended the biodiesel tax credit, which could impact our renewable corn oil values, as this co-product serves as a low-carbon feedstock for renewable diesel and biomass based diesel production (this credit expires after 2024 and shifts to the 45Z Clean Fuel Production credit, where all non-SAF fuels qualify for up to \$1.00 per gallon); (5) funded biofuel refueling infrastructure by \$500 million, which could impact the availability of higher level ethanol blended fuel; (6) increased funding for working lands conservation programs for farmers by \$20 billion; and (7) provided credits for the production and purchase of electric vehicles, which could impact the amount of internal combustion engines built and sold longer term, and by extension impact the demand for liquid fuels including ethanol. There are numerous additional clean energy credits included in this law, including investment tax credits for construction of clean energy infrastructure, that could impact us and our overall competitiveness.

The RFS sets a floor for biofuels use in the United States. When the RFS was established in 2010, the required volume of conventional, or corn-based, ethanol to be blended with gasoline was to increase each year until it reached 15 billion gallons in 2015, which left the EPA to address existing limitations in both supply and demand.

As of December 31, 2022, the EPA has proposed RVOs for 2023, 2024 and 2025, setting the implied conventional

ethanol levels at 15.25 billion gallons for each year, inclusive of 250 million gallons of supplemental volume in 2023 to reflect a court-ordered remand of a previously lowered RVO. The EPA also proposed a modest increase in biomass based diesel volumes over the three years, with a large increase in advanced biofuels for 2024 and 2025, which they expect to be fulfilled by e-RINs for electric vehicles. The EPA has agreed to a consent decree from the U.S. District Court for D.C. to finalize an RVO for 2023 (and possibly 2024 and 2025) by June 14, 2023.

Under the RFS, RINs and SREs are important tools impacting supply and demand. The EPA assigns individual refiners, blenders, and importers the volume of renewable fuels they are obligated to use in each annual RVO based on their percentage of total production of domestic transportation fuel sales. Obligated parties use RINs to show compliance with the RFS mandated volumes. Ethanol producers assign RINs to each gallon of renewable fuel they produce and the RINs are detached when the renewable fuel is blended with transportation fuel domestically. Market participants can trade the detached RINs in the open market. The market price of detached RINs can affect the price of ethanol in certain markets and can influence purchasing decisions by obligated parties. Of note, the RIN mechanism for proposed e-RINs could vary from the traditional process.

As it relates to SREs, a small refinery is defined as one that processes fewer than 75,000 barrels of petroleum per day. Small refineries can petition the EPA for a SRE which, if approved, waives their portion of the annual RVO requirements. The EPA, through consultation with the DOE and the USDA can grant them a full or partial waiver, or deny it outright within 90 days of submittal. The EPA granted significantly more of these waivers for the 2016, 2017 and 2018 reporting years than they had in prior years, totaling 790 mmg of waived requirements for the 2016 compliance year, 1.82 billion gallons for 2017 and 1.43 billion gallons for 2018. In doing so, the EPA effectively reduced the RFS mandated volumes for those compliance years by those amounts respectively, and as a result, RIN values declined significantly. In the waning days of the previous administration, the EPA approved three additional SREs, reversing one denial from 2018 and granting two from 2019. A total of 88 SREs were granted under the previous administration, erasing a total 4.3 billion gallons of potential blending demand. The EPA, under the current administration, reversed the three SREs issued in the final weeks of the previous administration, and in conjunction with the RVO rulemaking for 2020, 2021, and 2022, denied all pending SREs, a stance they have reiterated in the proposed 2023, 2024 and 2025 RVO rulemaking. There are multiple on-going legal challenges to how the EPA has handled SREs and RFS rulemakings.

The One-Pound Waiver, which was extended in May 2019 to allow E15 to be sold year-round to all vehicles model year 2001 and newer, was challenged in an action filed in Federal District Court for the D.C. Circuit. On July 2, 2021, the Circuit Court vacated the EPA's rule so the future of summertime, defined as June 1 to September 15, sales of E15 is uncertain. The Supreme Court declined to hear a challenge to this ruling. On April 12, 2022, the President announced that he has directed the EPA to issue an emergency waiver to allow for the continued sale of E15 during the summer months, and that the temporary waiver should be extended as long as the gasoline supply emergency lasts. As of this filing, E15 is sold year-round at approximately 2,923 stations in 31 states.

In October 2019, the White House directed the USDA and EPA to move forward with rulemaking to expand access to higher blends of biofuels. This includes funding for infrastructure, labeling changes and allowing E15 to be sold through E10 infrastructure. The USDA rolled out the Higher Blend Infrastructure Incentive Program in the summer of 2020, providing competitive grants to fuel terminals and retailers for installing equipment for dispensing higher blends of ethanol and biodiesel. In December 2021, the USDA announced it would administer another infrastructure grant program. The Inflation Reduction Act, signed into law in 2022, provided for an additional \$500 million in USDA grants for biofuel infrastructure from 2022 to 2031, though all the funds could be awarded in the first few years of the program.

To respond to COVID-19 health crisis and attempt to offset the subsequent economic damage, Congress passed multiple relief measures, most notably the CARES Act in March 2020, which created and funded multiple programs that have impacted our industry. The CARES Act also allowed for certain net operating loss carrybacks, which has allowed us to receive certain tax refunds. In December 2020, Congress passed and then the President signed into law an annual spending package coupled with another COVID relief bill which included additional funds for the Secretary of Agriculture to distribute to those impacted by the pandemic. The language of the bill specifically included biofuels producers as eligible for some of this aid, and in May 2022, the USDA distributed funds to us in the amount of \$27.7 million pursuant to this bill.

Environmental and Other Regulation

Our operations are subject to environmental regulations, including those that govern the handling and release of ethanol, crude oil and other liquid hydrocarbon materials. Compliance with existing and anticipated environmental laws and regulations may increase our overall cost of doing business, including capital costs to construct, maintain, operate, and

upgrade equipment and facilities. Our business may also be impacted by government policies, such as tariffs, duties, subsidies, import and export restrictions and outright embargos. We employ maintenance and operations personnel at each of its facilities, which are regulated by the Occupational Safety and Health Administration.

The U.S. ethanol industry relies heavily on tank cars to deliver its product to market. In 2015, the DOT finalized the Enhanced Tank Car Standard and Operational Controls for High-Hazard and Flammable Trains, or DOT specification 117, which established a schedule to retrofit or replace older tank cars that carry crude oil and ethanol, braking standards intended to reduce the severity of accidents and new operational protocols. The deadline for compliance with DOT specification 117 is May 1, 2023. The rule may increase our lease costs for railcars over the long term, which will, in turn, result in an increase in fees the partnership charges for railcar capacity. Additionally, existing railcars may be out of service for a period of time while upgrades are made, tightening supply in an industry that is highly dependent on railcars to transport product. We are strategically managing our leased railcar fleet to comply with the new regulations and have commenced transition of our fleet to DOT 117 compliant railcars. As of December 31, 2022, approximately 87% of our railcar fleet was DOT 117 compliant. We anticipate that our entire railcar fleet will be DOT 117 compliant by the 2023 deadline.

Variability of Commodity Prices

Our business is highly sensitive to commodity price fluctuations, particularly for corn, ethanol, renewable corn oil, distillers grains, Ultra-High Protein, and natural gas, which are impacted by factors that are outside of our control, including weather conditions, corn yield, changes in domestic and global ethanol supply and demand, government programs and policies and the price of crude oil, gasoline and substitute fuels. We use various financial instruments to manage and reduce our exposure to price variability. For more information about our commodity price risk, refer to *Item 7A. - Qualitative and Quantitative Disclosures About Market Risk, Commodity Price Risk* in this report.

We maintained an average utilization rate of approximately 91% of capacity during 2022, compared with 77% of capacity for the prior year. Our operating strategy is to transform our company to a value-add agricultural technology company. Depending on the margin environment, we may exercise operational discretion that results in reductions in production volumes. It is possible that throughput volumes could be below our MVC made to the partnership in the future, depending on various factors that drive each biorefinery's variable contribution margin, including future driving and gasoline demand for the industry, demand for valuable coproducts we produce, and the supply and pricing of renewable feedstocks needed to operate our biorefineries. We are currently producing Ultra-High Protein at three locations, and began commissioning FQT's MSC™ technology at two additional locations in the fourth quarter of 2022. We also anticipate deploying FQT MSC™ technology at various locations across our platform to help meet growing global demand for protein feed ingredients and renewable corn oil.

Effects of Inflation

While inflation has increased relative to recent years, we do not expect it to have a material impact on our future results of operations. However, inflation has and may continue to impact the interest rate environment in which we operate, resulting in a higher cost of capital. Refer to *Item 7A. - Qualitative and Quantitative Disclosures About Market Risk, Commodity Price Risk* in this report for additional information related to interest rate risk.

Critical Accounting Policies and Estimates

The preparation of our consolidated financial statements requires that we use estimates that affect the reported assets, liabilities, revenue and expense and related disclosures for contingent assets and liabilities. We base our estimates on experience and assumptions we believe are proper and reasonable. While we regularly evaluate the appropriateness of these estimates, actual results could differ materially from our estimates. The following accounting policies, in particular, may be impacted by judgments, assumptions and estimates used in the preparation of our consolidated financial statements.

Derivative Financial Instruments

We use various derivative financial instruments, including exchange-traded futures and exchange-traded and over-the-counter options contracts, to attempt to minimize risk and the effect of commodity price changes, including but not limited to, corn, ethanol, natural gas, soybean meal, soybean oil and other agricultural and energy products. We monitor and manage this exposure as part of our overall risk management policy to reduce the adverse effect market volatility may have on our operating results. We may hedge these commodities as one way to mitigate risk; however, there may be situations when these hedging activities themselves result in losses.

By using derivatives to hedge exposures to changes in commodity prices, we are exposed to credit and market risk. Our exposure to credit risk includes the counterparty's failure to fulfill its performance obligations under the terms of the derivative contract. We minimize our credit risk by entering into transactions with high quality counterparties, limiting the amount of financial exposure it has with each counterparty and monitoring their financial condition. Market risk is the risk that the value of the financial instrument might be adversely affected by a change in commodity prices or interest rates. We manage market risk by incorporating parameters to monitor exposure within our risk management strategy, which limits the types of derivative instruments and strategies we can use and the degree of market risk we can take using derivative instruments.

Forward contracts are recorded at fair value unless the contracts qualify for, and we elect, normal purchase or sale exceptions. Changes in fair value are recorded in operating income unless the contracts qualify for, and we elect, cash flow hedge accounting treatment.

Certain qualifying derivatives related to ethanol production and agribusiness and energy services segments are designated as cash flow hedges. We evaluate the derivative instrument to ascertain its effectiveness prior to entering into cash flow hedges. Unrealized gains and losses are reflected in accumulated other comprehensive income or loss until the gain or loss from the underlying hedged transaction is realized and the physical transaction is completed. When it becomes probable a forecasted transaction will not occur, the cash flow hedge treatment is discontinued, which affects earnings. These derivative financial instruments are recognized in current assets or current liabilities at fair value.

At times, we hedge our exposure to changes in inventory values and designate qualifying derivatives as fair value hedges. The carrying amount of the hedged inventory is adjusted in the current period for changes in fair value. Estimated fair values carried at market are based on exchange-quoted prices, adjusted as appropriate for regional location basis values which represent differences in local markets including transportation as well as quality or grade differences. Basis values are generally determined using inputs from broker quotations or other market transactions. However, a portion of the value may be derived using unobservable inputs. Ineffectiveness of the hedges is recognized in the current period to the extent the change in fair value of the inventory is not offset by the change in fair value of the derivative.

Please refer to *Note 11 - Derivative Financial Instruments* to the consolidated financial statements for further details.

Accounting for Income Taxes

Income taxes are accounted for under the asset and liability method in accordance with GAAP. Deferred tax assets and liabilities are recognized for future tax consequences between existing assets and liabilities and their respective tax basis, and for net operating loss and tax credit carry-forwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to be applied to taxable income in years temporary differences are expected to be recovered or settled. The effect of a tax rate change is recognized in the period that includes the enactment date. The realization of deferred tax assets depends on the generation of future taxable income during the periods in which temporary differences become deductible. Management considers scheduled reversal of deferred tax liabilities, projected future taxable income and tax planning strategies to make this assessment. A valuation allowance is recorded by the company when it is more likely than not that some portion or all of a deferred tax asset will not be realized. In making such a determination, management considers the positive and negative evidence to support the need for, or reversal of, a valuation allowance. The weight given to the potential effects of positive and negative evidence is based on the extent it can be objectively verified.

To account for uncertainty in income taxes, we gauge the likelihood of a tax position based on the technical merits of the position, perform a subsequent measurement related to the maximum benefit and degree of likelihood, and determine the benefit to be recognized in the financial statements, if any.

Please refer to *Note 16 - Income Taxes* to the consolidated financial statements for further details.

Impairment of Goodwill

Our goodwill is related to certain acquisitions within our ethanol production and partnership segments. We review goodwill for impairment at least annually, as of October 1, or more frequently whenever events or changes in circumstances indicate that an impairment may have occurred.

Circumstances that may indicate impairment include a decline in future projected cash flows, a decision to suspend plant operations for an extended period of time, a sustained decline in our market capitalization, a sustained decline in market

prices for similar assets or businesses or a significant adverse change in legal or regulatory matters, or business climate. Significant management judgment is required to determine the fair value of our goodwill and measure impairment, including projected cash flows. Fair value is determined through various valuation techniques, including discounted cash flow models utilizing assumed margins, cost of capital, inflation and other inputs, sales of comparable properties and third-party independent appraisals. Changes in estimated fair value as a result of declining ethanol margins, loss of significant customers or other factors could result in an impairment of goodwill.

Please refer to *Note 10 – Goodwill and Intangible Assets* to the consolidated financial statements for further details.

Recently Issued Accounting Pronouncements

For information related to recent accounting pronouncements, see *Note 2 – Summary of Significant Accounting Policies* included as part of the notes to consolidated financial statements in this report.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements.

Components of Revenues and Expenses

Revenues. For our ethanol production segment, our revenues are derived primarily from the sale of ethanol, distillers grains, Ultra-High Protein and renewable corn oil. For our agribusiness and energy services segment, our primary sources of revenue include sales of ethanol, distillers grains and renewable corn oil that we market for our ethanol plants, in which we earn a marketing fee, sales of ethanol we market for a third-party and sales of grain and other commodities purchased in the open market. The vast majority of our revenues are from forward contracts accounted for as derivatives under ASC 815 as disclosed in the tables within *Note 4 - Revenue* and *Note 11 - Derivative Financial Instruments*. Revenues include net gains or losses from derivatives related to products sold. For our partnership segment, our revenues consist primarily of fees for receiving, storing, transferring and transporting ethanol and other fuels.

Cost of Goods Sold. For our ethanol production segment, cost of goods sold includes direct labor, materials and plant overhead costs. Direct labor includes compensation and related benefits of non-management personnel involved in ethanol plant operations. Plant overhead consists primarily of plant utilities and outbound freight charges. Corn is the most significant raw material cost followed by natural gas, which is used to power steam generation in the ethanol production process and dry distillers grains. Cost of goods sold also includes net gains or losses from derivatives related to commodities purchased.

For our agribusiness and energy services segment, purchases of ethanol, distillers grains, renewable corn oil and grain are the primary component of cost of goods sold. Grain inventories held for sale and forward purchase and sale contracts are valued at market prices when available or other market quotes adjusted for differences, such as transportation, between the exchange-traded market and local markets where the terms of the contracts are based. Changes in the market value of grain inventories, forward purchase and sale contracts, and exchange-traded futures and options contracts are recognized as a component of cost of goods sold.

Operations and Maintenance Expense. For our partnership segment, transportation expense is the primary component of operations and maintenance expense. Transportation expense includes rail car leases, shipping and freight and costs incurred for storing ethanol at destination terminals.

Loss (Gain) on Sale of Assets, Net. We completed the sale of the ethanol plant located in Ord, Nebraska in March 2021 and the sale of the ethanol plant located in Hereford, Texas during the fourth quarter of 2020. The sale of Ord resulted in a pretax gain of \$35.9 million recorded at the corporate level. The sale of Hereford resulted in a loss of \$18.5 million recorded at the corporate level, a loss of \$3.9 million recorded at the ethanol production level and the gain on the assignment of operating leases of \$2.7 million recorded at the partnership level.

Selling, General and Administrative Expense. Selling, general and administrative expenses are recognized at the operating segment and corporate level. These expenses consist of employee salaries, incentives and benefits; office expenses; director fees; and professional fees for accounting, legal, consulting and investor relations services. Personnel costs, which include employee salaries, incentives and benefits, as well as severance and separation costs, are the largest expenditure. Selling, general and administrative expenses that cannot be allocated to an operating segment are referred to as corporate activities.

Other Income (Expense). Other income (expense) includes interest earned, interest expense and other non-operating items, as well as a \$27.7 million grant received from the USDA related to the Biofuel Producer Program authorized as part of the CARES Act to offset market losses as a result of the COVID-19 pandemic for the year-ended December 31, 2022.

Income from Equity Method Investees, Net of Income Taxes. Income from equity method investees, net of income taxes, represents our proportional share of earnings from our equity method investees.

Results of Operations

Comparability

The following summarizes various events that affect the comparability of our operating results for the past three years:

- October 2020 Our remaining 50% membership interest in GPCC was sold.
- December 2020 Hereford, Texas ethanol plant was sold and certain storage assets of this plant were acquired from the partnership prior to being sold.
- December 2020 Acquired a majority interest in FQT.
- March 2021 Ord, Nebraska ethanol plant was sold and certain storage assets of this plant were acquired from the partnership prior to being sold.
- May 2022 Received a \$27.7 million grant from the USDA as part of the CARES Act.

The year ended December 31, 2020, includes approximately nine months of operations of the GPCC joint venture being accounted for using the equity method of accounting.

A discussion regarding our financial condition and results of operations for the year ended December 31, 2021, compared to the year ended December 31, 2020, can be found under Item 7 in our Annual Report on Form 10-K for the fiscal year ended December 31, 2021, filed with the SEC on February 18, 2022.

Segment Results

We report the financial and operating performance for the following three operating segments: (1) ethanol production, which includes the production of ethanol, distillers grains, Ultra-High Protein and renewable corn oil, (2) agribusiness and energy services, which includes grain handling and storage, commodity marketing and merchant trading for company-produced and third-party ethanol, distillers grains, renewable corn oil, natural gas and other commodities, and (3) partnership, which includes fuel storage and transportation services.

During the normal course of business, our operating segments do business with each other. For example, our agribusiness and energy services segment procures grain and natural gas and sells products, including ethanol, distillers grains and renewable corn oil of our ethanol production segment. Our partnership segment provides fuel storage and transportation services for our agribusiness and energy services segment. These intersegment activities are treated like third-party transactions with origination, marketing and storage fees charged at estimated market values. Consequently, these transactions affect segment performance; however, they do not impact our consolidated results since the revenues and corresponding costs are eliminated.

Corporate activities include selling, general and administrative expenses, consisting primarily of compensation, professional fees and overhead costs not directly related to a specific operating segment.

The selected operating segment financial information are as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Revenues:			
Ethanol production:			
Revenues from external customers	\$ 3,070,192	\$ 2,153,368	\$ 1,502,481
Intersegment revenues	—	—	100
Total segment revenues	<u>3,070,192</u>	<u>2,153,368</u>	<u>1,502,581</u>
Agribusiness and energy services:			
Revenues from external customers	588,654	669,526	416,403
Intersegment revenues	26,961	21,958	27,468
Total segment revenues	<u>615,615</u>	<u>691,484</u>	<u>443,871</u>
Partnership:			
Revenues from external customers	4,003	4,274	4,835
Intersegment revenues	75,764	74,178	78,510
Total segment revenues	<u>79,767</u>	<u>78,452</u>	<u>83,345</u>
Revenues including intersegment activity	3,765,574	2,923,304	2,029,797
Intersegment eliminations	<u>(102,725)</u>	<u>(96,136)</u>	<u>(106,078)</u>
	<u>\$ 3,662,849</u>	<u>\$ 2,827,168</u>	<u>\$ 1,923,719</u>

	Year Ended December 31,		
	2022	2021	2020
Cost of goods sold:			
Ethanol production	\$ 3,068,366	\$ 2,063,283	\$ 1,507,335
Agribusiness and energy services	562,950	657,375	409,407
Intersegment eliminations	<u>(106,305)</u>	<u>(95,549)</u>	<u>(104,579)</u>
	<u>\$ 3,525,011</u>	<u>\$ 2,625,109</u>	<u>\$ 1,812,163</u>

	Year Ended December 31,		
	2022	2021	2020
Gross margin:			
Ethanol production	\$ 1,826	\$ 90,085	\$ (4,754)
Agribusiness and energy services	52,665	34,109	34,464
Partnership	79,767	78,452	83,345
Intersegment eliminations	<u>3,580</u>	<u>(587)</u>	<u>(1,499)</u>
	<u>\$ 137,838</u>	<u>\$ 202,059</u>	<u>\$ 111,556</u>

	Year Ended December 31,		
	2022	2021	2020
Operating income (loss):			
Ethanol production ⁽¹⁾	\$ (117,764)	\$ (27,996)	\$ (129,618)
Agribusiness and energy services	36,415	17,458	15,773
Partnership	47,699	48,672	50,437
Intersegment eliminations	3,580	(587)	(1,400)
Corporate activities ⁽²⁾	(68,878)	(12,039)	(57,888)
	<u>\$ (98,948)</u>	<u>\$ 25,508</u>	<u>\$ (122,696)</u>

- (1) Operating loss for ethanol production includes an inventory lower of cost or net realizable value adjustment of \$12.3 million for the year-ended December 31, 2022, and a goodwill impairment charge of \$24.1 million and \$3.9 million loss on sale of assets from the sale of the Hereford, Texas ethanol plant for the year-ended December 31, 2020.
- (2) Corporate activities for the year-ended December 31, 2021 include a \$29.6 million net gain on sale of assets primarily from the sale of the Ord, Nebraska ethanol plant. Corporate activities for the year-ended December 31, 2020 include an \$18.5 million loss on sale of assets from the sale of the Hereford, Texas ethanol plant and a \$1.5 million net gain from the sale of GPCC.

	Year Ended December 31,		
	2022	2021	2020
Depreciation and amortization:			
Ethanol production	\$ 81,545	\$ 82,969	\$ 67,956
Agribusiness and energy services	3,466	2,535	2,512
Partnership	4,093	3,737	3,806
Corporate activities	3,594	2,711	3,970
	<u>\$ 92,698</u>	<u>\$ 91,952</u>	<u>\$ 78,244</u>

We use EBITDA, adjusted EBITDA, and segment EBITDA as measures of profitability to compare the financial performance of our reportable segments and manage those segments. EBITDA is defined as earnings before interest expense, income tax expense, including related tax expense of equity method investments, depreciation and amortization excluding the amortization of right-of-use assets and debt issuance costs. Adjusted EBITDA includes adjustments related to other income associated with the USDA COVID-19 relief grant, gains or losses on sale of assets, our proportional share of EBITDA adjustments of our equity method investees and noncash goodwill impairment. We believe EBITDA, adjusted EBITDA and segment EBITDA are useful measures to compare our performance against other companies. These measures should not be considered an alternative to, or more meaningful than, net income, which is prepared in accordance with GAAP. EBITDA, adjusted EBITDA, and segment EBITDA calculations may vary from company to company. Accordingly, our computation of EBITDA, adjusted EBITDA, and segment EBITDA may not be comparable with a similarly titled measure of other companies.

The following table reconciles net loss including noncontrolling interest to adjusted EBITDA (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Net loss	\$ (103,377)	\$ (44,146)	\$ (89,654)
Interest expense ⁽¹⁾	32,642	67,144	39,993
Income tax expense (benefit)	4,747	1,845	(43,879)
Depreciation and amortization ⁽²⁾	92,698	91,952	78,244
EBITDA	26,710	116,795	(15,296)
Other income ⁽³⁾	(27,712)	—	—
Loss (gain) on sale of assets, net	—	(29,601)	20,860
Proportional share of EBITDA adjustments to equity method investees	180	184	7,093
Noncash goodwill impairment	—	—	24,091
Adjusted EBITDA	<u>\$ (822)</u>	<u>\$ 87,378</u>	<u>\$ 36,748</u>

(1) Interest expense for the year ended December 31, 2021 includes a loss on extinguishment of convertible notes of \$22.1 million and a loss on settlement of convertible notes of \$9.5 million.

(2) Excludes the amortization of operating lease right-of-use assets and amortization of debt issuance costs.

(3) Other income for the year-ended December 31, 2022 includes a grant received from the USDA related to the Biofuel Producer Program of \$27.7 million.

The following table reconciles segment EBITDA to consolidated adjusted EBITDA (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Adjusted EBITDA:			
Ethanol production ⁽¹⁾	\$ (8,619)	\$ 55,056	\$ (60,868)
Agribusiness and energy services	39,798	19,716	18,430
Partnership	52,429	53,109	54,907
Intersegment eliminations	3,580	(587)	(1,400)
Corporate activities ⁽²⁾	(60,478)	(10,499)	(26,365)
EBITDA	26,710	116,795	(15,296)
Other income ⁽³⁾	(27,712)	—	—
Loss (gain) on sale of assets, net	—	(29,601)	20,860
Proportional share of EBITDA adjustments to equity method investees	180	184	7,093
Noncash goodwill impairment	—	—	24,091
Adjusted EBITDA	<u>\$ (822)</u>	<u>\$ 87,378</u>	<u>\$ 36,748</u>

(1) Operating loss for ethanol production includes an inventory lower of cost or net realizable value adjustment of \$12.3 million for the year-ended December 31, 2022, and a goodwill impairment charge of \$24.1 million and \$3.9 million loss on sale of assets from the sale of the Hereford, Texas ethanol plant for the year-ended December 31, 2020.

(2) Corporate activities for the year-ended December 31, 2021 include a \$29.6 million net gain on sale of assets primarily from the sale of the Ord, Nebraska ethanol plant. Corporate activities for the year-ended December 31, 2020 include an \$18.5 million loss on sale of assets from the sale of the Hereford, Texas ethanol plant and a \$1.5 million gain from sale of GPCC.

(3) Other income for the year-ended December 31, 2022 includes a grant received from the USDA related to the Biofuel Producer Program of \$27.7 million.

Total assets by segment are as follows (in thousands):

	<u>Year Ended December 31,</u>	
	<u>2022</u>	<u>2021</u>
Total assets ⁽¹⁾ :		
Ethanol production	\$ 1,157,791	\$ 1,101,151
Agribusiness and energy services	489,083	487,164
Partnership	108,680	100,349
Corporate assets	386,437	524,206
Intersegment eliminations	(18,860)	(53,115)
	<u>\$ 2,123,131</u>	<u>\$ 2,159,755</u>

(1) Asset balances by segment exclude intercompany balances.

Year Ended December 31, 2022 compared with the Year Ended December 31, 2021

Consolidated Results

Consolidated revenues increased \$835.7 million in 2022 compared with 2021 primarily due to higher average selling prices and higher volumes sold on ethanol, distillers grains and renewable corn oil within our ethanol production segment as described below, slightly offset by lower revenues within our agribusiness and energy services segment as a result of decreased trading volumes.

Net loss increased \$59.2 million and adjusted EBITDA decreased \$88.2 million in 2022 compared with 2021 primarily due to decreased margins within our ethanol production segment. Interest expense decreased \$34.5 million in 2022 compared with 2021 primarily due to the loss upon settlement of convertible notes of \$31.6 million recorded during 2021, as well as higher capitalized interest and decreased amortization of debt issuance costs, partially offset by increased interest as a result of higher rates and a higher average debt balance. Income tax expense was \$4.7 million in 2022 compared to an income tax expense of \$1.8 million in 2021 primarily due to an increase in the valuation allowance recorded against certain deferred tax assets.

The following discussion provides greater detail about our segment performance.

Ethanol Production Segment

Key operating data for our ethanol production segment is as follows:

	<u>Year Ended December 31,</u>	
	<u>2022</u>	<u>2021</u>
Ethanol sold		
(thousands of gallons)	872,133	750,648
Distillers grains sold		
(thousands of equivalent dried tons)	2,280	1,977
Renewable corn oil sold		
(thousands of pounds)	281,730	219,807
Corn consumed		
(thousands of bushels)	301,868	259,786

Revenues in our ethanol production segment increased \$916.8 million in 2022 compared with 2021 primarily due to higher ethanol, distillers grains and renewable corn oil volumes sold resulting in increased revenues of \$295.7 million, \$57.3 million and \$31.9 million, respectively, as well as higher weighted average selling prices on ethanol, distillers grains and renewable corn oil resulting in increased revenues of \$168.2 million, \$90.2 million and \$50.0 million, respectively. Revenues

also increased as a result of ethanol hedging activities by \$233.3 million.

Cost of goods sold in our ethanol production segment increased \$1,005.1 million for 2022 compared with 2021 due to higher weighted average corn prices, higher corn volumes processed and hedging activities, resulting in increased costs of \$400.2 million, \$248.3 million and \$151.3 million, respectively, as well as an increase of \$178.8 million driven by higher utilities, freight and chemical costs.

Operating loss in our ethanol production segment increased \$89.8 million in 2022 compared with 2021 primarily due to decreased margins as outlined above. Depreciation and amortization expense for the ethanol production segment was \$81.5 million for 2022 compared with \$83.0 million during 2021.

Agribusiness and Energy Services Segment

Revenues in our agribusiness and energy services segment decreased \$75.9 million while operating income increased \$19.0 million in 2022 compared with 2021. The decrease in revenues was primarily due to a decrease in ethanol, distillers grains and renewable corn oil trading volume. Operating income increased primarily as a result of higher trading margins.

Partnership Segment

Revenues generated by our partnership segment increased \$1.3 million in 2022 compared with 2021. Railcar transportation services revenue increased \$2.4 million primarily due to an increase in railcar volumetric capacity and associated fees. Storage and throughput services revenue decreased \$0.7 million primarily due to a reduction in contracted minimum volume commitments as a result of the sale of our parent's Ord ethanol plant in the first quarter of 2021. Trucking and other revenue decreased \$0.3 million primarily as a result of lower non-affiliate freight volume. Terminal services revenue remained consistent with the prior year. Operating income decreased \$1.0 million in 2022 compared with 2021 primarily due to higher railcar lease expenses.

Intersegment Eliminations

Intersegment eliminations of revenues increased by \$6.6 million for 2022 compared with 2021 due to increased intersegment marketing and commodity service fees within the agribusiness and energy services segment as a result of higher production volumes as well as increased storage and throughput fees paid to the partnership segment.

Corporate Activities

Operating loss was impacted by an increase in corporate activities of \$56.8 million for 2022 compared with 2021, primarily due to the net gain on sale of assets recorded during 2021 of \$29.6 million, as well as increased personnel costs, professional fees and travel costs during 2022.

Income Taxes

We recorded income tax expense of \$4.7 million for 2022 compared to an income tax expense of \$1.8 million in 2021. The increase in the amount of tax expense recorded for 2022 was primarily due to an increase in the valuation allowance recorded against certain deferred tax assets.

Liquidity and Capital Resources

Our principal sources of liquidity include cash generated from operating activities and bank credit facilities. We fund our operating expenses and service debt primarily with operating cash flows. Capital resources for maintenance and growth expenditures are funded by a variety of sources, including cash generated from operating activities, borrowings under bank credit facilities, or issuance of senior notes or equity. Our ability to access capital markets for debt under reasonable terms depends on our financial condition, credit ratings and market conditions. We believe that our ability to obtain financing at reasonable rates and our history of positive cash flow from operating activities, which have been positive for eight of the previous ten years, provide a solid foundation to meet our future liquidity and capital resource requirements.

On December 31, 2022, we had \$444.7 million in cash and cash equivalents and \$55.6 million in restricted cash. We also had \$235.0 million available under our committed revolving credit agreement, subject to restrictions or other lending conditions. Funds at certain subsidiaries are generally required for their ongoing operational needs and restricted from

distribution. At December 31, 2022, our subsidiaries had approximately \$117.1 million of net assets that were not available to use in the form of dividends, loans or advances due to restrictions contained in their credit facilities.

Net cash provided by operating activities was \$69.7 million in 2022 compared to \$4.2 million in 2021. Operating activities compared to the prior year were primarily affected by fluctuations in working capital, including cash provided by higher accounts payable and lower accounts receivable, offset by higher net loss when compared to the prior year. Net cash used in investing activities was \$105.3 million in 2022 compared to \$236.3 million in 2021 primarily due to the purchases of marketable securities in the prior year. Net cash used in financing activities was \$25.1 million in 2022 compared to net cash provided by financing activities of \$518.2 million in 2021 primarily due to proceeds from the issuance of common stock and debt offerings during 2021.

Additionally, Green Plains Finance Company, Green Plains Trade, Green Plains Grain and Green Plains Commodity Management use revolving credit facilities to finance working capital requirements. We frequently draw from and repay these facilities which results in significant cash movements reflected on a gross basis within financing activities as proceeds from and payments on short-term borrowings.

We incurred capital expenditures of \$212.4 million in 2022 primarily for Ultra-High Protein expansion projects at Central City, Mount Vernon and Obion and for various other capital projects, which were funded from our restricted cash accounts. The current projected estimate for capital spending for 2023 is approximately \$150 million to \$250 million, which is subject to review prior to the initiation of any project. The estimate includes additional expenditures to deploy FQT's MSC™ and CST™ technology, as well as expenditures for various other maintenance projects, which are expected to be financed with cash on hand and by cash provided by operating activities.

Our business is highly sensitive to the price of commodities, particularly for corn, ethanol, distillers grains, renewable corn oil and natural gas. We use derivative financial instruments to reduce the market risk associated with fluctuations in commodity prices. Sudden changes in commodity prices may require cash deposits with brokers for margin calls or significant liquidity with little advanced notice to meet margin calls, depending on our open derivative positions. We continuously monitor our exposure to margin calls and believe we will continue to maintain adequate liquidity to cover margin calls from our operating results and borrowings.

Available cash generally means all cash and cash equivalents on hand at the end of that quarter less cash reserves established by the general partner, including those for future capital expenditures, future acquisitions and anticipated future debt service requirements, plus all or any portion of the cash on hand resulting from working capital borrowings made subsequent to the end of that quarter.

Our board of directors authorized a share repurchase program of up to \$200.0 million of our common stock. Under the program, we may repurchase shares in open market transactions, privately negotiated transactions, accelerated share buyback programs, tender offers or by other means. The timing and amount of repurchase transactions are determined by our management based on market conditions, share price, legal requirements and other factors. The program may be suspended, modified or discontinued at any time without prior notice. We did not repurchase any common stock in 2022 and 2021. Since inception, we have repurchased 7.4 million shares of common stock for approximately \$92.8 million under the program.

We believe we have sufficient working capital for our existing operations. A continued sustained period of unprofitable operations, however, may strain our liquidity. We may sell additional assets or equity or borrow capital to improve or preserve our liquidity, expand our business or acquire businesses.

Debt

We were in compliance with our debt covenants at December 31, 2022. Based on our forecasts, we believe we will maintain compliance at each of our subsidiaries for the next twelve months or have sufficient liquidity available on a consolidated basis to resolve noncompliance. We cannot provide assurance that actual results will approximate our forecasts or that we will inject the necessary capital into a subsidiary to maintain compliance with its respective covenants. In the event a subsidiary is unable to comply with its debt covenants, the subsidiary's lenders may determine that an event of default has occurred, and following notice, the lenders may terminate the commitment and declare the unpaid balance due and payable.

As outlined in *Note 12 - Debt*, we use LIBOR as a reference rate for certain credit facilities. The administrator of LIBOR ceased the publication of the one week and two month LIBOR settings immediately following the LIBOR publication on December 31, 2021, and will cease the remaining USD LIBOR settings immediately following the LIBOR publication on

June 30, 2023. The U.S. Federal Reserve, in conjunction with the Alternative Reference Rates Committee, a steering committee comprised of large U.S. financial institutions, is considering replacing U.S. dollar LIBOR with a new reference rate, the SOFR, calculated using short-term repurchase agreements backed by Treasury securities. The potential effect of any such event on interest expense is not expected to be material.

Corporate Activities

In March 2021, we issued \$230.0 million of 2.25% convertible senior notes due in 2027, or the 2.25% notes. The 2.25% notes bear interest at a rate of 2.25% per year, payable on March 15 and September 15 of each year. The initial conversion rate is 31.6206 shares of the company's common stock per \$1,000 principal amount of 2.25% notes (equivalent to an initial conversion price of approximately \$31.62 per share of our common stock), representing an approximately 37.5% premium over the offering price of our common stock. The conversion rate is subject to adjustment upon the occurrence of certain events, including but not limited to; the event of a stock dividend or stock split; the issuance of additional rights, options and warrants; spinoffs; or a tender or exchange offering. In addition, we may be obligated to increase the conversion rate for any conversion that occurs in connection with certain corporate events, including our calling the 2.25% notes for redemption. We may settle the 2.25% notes in cash, common stock or a combination of cash and common stock. At December 31, 2022, the outstanding principal balance on the 2.25% notes was \$230.0 million.

In June 2019, we issued \$115.0 million of 4.00% convertible senior notes due in 2024, or the 4.00% notes. The 4.00% notes were senior, unsecured obligations, with interest payable on January 1 and July 1 of each year, beginning January 1, 2020, at a rate of 4.00% per annum. The initial conversion rate was 64.1540 shares of our common stock per \$1,000 principal amount of the 4.00% notes, which is equivalent to an initial conversion price of approximately \$15.59 per share of our common stock. We increased the final conversion rate to 66.4178 in connection with calling the 4.00% notes for redemption on May 25, 2022.

In May 2021, we entered into a privately negotiated agreement with certain noteholders of the company's 4.00% notes. Under this agreement, 3.6 million shares of our common stock were exchanged for \$51.0 million in aggregate principal amount of the 4.00% notes. Common stock held as treasury shares were exchanged for the 4.00% notes.

On May 25, 2022, we gave notice calling for the redemption of our outstanding 4.00% notes, totaling an aggregate principal amount of \$64.0 million. The conversion rate was 66.4178 shares of common stock per 1,000 of principal. From July 1, 2022 through July 8, 2022, the remaining \$64.0 million of the 4.00% notes were converted into approximately 4.3 million shares of common stock. Common stock held as treasury shares were exchanged for the 4.00% notes. Pursuant to the guidance within ASC 470, *Debt*, we recorded the exchanges as a conversion. The 4.00% notes were retired effective July 8, 2022.

In August 2016, we issued \$170.0 million of 4.125% convertible senior notes due in 2022, or 4.125% notes, which were senior, unsecured obligations with interest payable on March 1 and September 1 of each year. Prior to March 1, 2022, the 4.125% notes were not convertible unless certain conditions are satisfied. The initial conversion rate was 35.7143 shares of common stock per \$1,000 of principal, which was equal to a conversion price of approximately \$28.00 per share.

In March 2021, concurrent with the issuance of the 2.25% notes, we used approximately \$156.5 million of the net proceeds of the 2.25% notes to repurchase approximately \$135.7 million aggregate principal amount of its 4.125% notes due 2022, in privately negotiated transactions. Pursuant to the guidance within ASC 470, *Debt*, we recorded a loss upon extinguishment of \$22.1 million in interest expense. This charge included \$1.2 million of unamortized debt issuance costs related to the principal balance extinguished.

During August 2022, we entered into four privately negotiated exchange agreements with certain noteholders of the 4.125% notes to exchange approximately \$32.6 million aggregate principal amount for approximately 1.2 million shares of our common stock. Additionally, on September 1, 2022, approximately \$1.7 million aggregate principal amount of the 4.125% notes were settled through a combination of \$1.7 million in cash and approximately 15 thousand shares of our common stock, and the remaining \$23 thousand aggregate principal amount and accrued interest were settled in cash. The 4.125% notes were fully retired effective September 1, 2022.

Ethanol Production Segment

On February 9, 2021, Green Plains SPE LLC, a wholly-owned special purpose subsidiary and parent of Green Plains Obion and Green Plains Mount Vernon issued \$125.0 million of junior secured mezzanine notes due 2026 with BlackRock

for the purchase of all notes issued. At December 31, 2022, the outstanding principal balance was \$125.0 million on the loan and the interest rate was 11.75%.

Green Plains Wood River and Green Plains Shenandoah, wholly-owned subsidiaries of us, have a \$75.0 million delayed draw loan agreement, which matures on September 1, 2035. At December 31, 2022, the outstanding principal balance was \$74.6 million on the loan and the interest rate was 5.02%.

We also have small equipment financing loans, finance leases on equipment or facilities, and other forms of debt financing.

Agribusiness and Energy Services Segment

Green Plains Finance Company, Green Plains Grain and Green Plains Trade have total revolving commitments of \$350.0 million and an accordion feature whereby amounts available under the Facility may be increased by up to \$100.0 million of new lender commitments subject to certain conditions, due 2027. Each SOFR rate loan shall bear interest for each day at a rate per annum equal to the Term SOFR rate for the outstanding period plus a Term SOFR adjustment and an applicable margin of 2.25% to 2.50%, which is dependent on undrawn availability under the Facility. Each base rate loan shall bear interest at a rate per annum equal to the base rate plus the applicable margin of 1.25% to 1.50%, which is dependent on undrawn availability under the Facility. The unused portion of the Facility is also subject to a commitment fee of 0.275% to 0.375%, dependent on undrawn availability. At December 31, 2022, the outstanding principal balance was \$115.0 million on the facility and the interest rate was 8.02%.

Green Plains Commodity Management has an uncommitted \$40.0 million revolving credit facility to finance margins related to its hedging programs. We expect to refinance or extend this facility prior to maturity. Advances are subject to variable interest rates equal to SOFR plus 1.75%. At December 31, 2022, the outstanding principal balance was \$22.7 million on the facility and the interest rate was 6.05%.

Green Plains Grain has a short-term inventory financing agreement with a financial institution. The company has accounted for the agreements as short-term notes, rather than revenues, and has elected the fair value option to offset fluctuations in market prices of the inventory. This agreement is subject to negotiated variable interest rates. The company had no outstanding short-term notes payable related to the inventory financing agreement as of December 31, 2022.

Partnership Segment

Green Plains Partners, through a wholly owned subsidiary, has a term loan to fund working capital, capital expenditures and other general partnership purposes. On July 20, 2021, the partnership's prior credit facility was amended in the Amended and Restated Credit Agreement ("Amended Credit Facility") with BlackRock and TMI Trust Company as administrative agent. The Amended Credit Facility decreased the total amount available to \$60.0 million, extended the maturity from December 31, 2021 to July 20, 2026, and converted the balance to a term loan. The term loan does not require any principal payments; however, the partnership has the option to prepay \$1.5 million per quarter.

Under the terms of the Amended Credit Facility, BlackRock purchased the outstanding balance of the existing notes from the previous lenders. Interest on the term loan is based on 3-month LIBOR plus 8.00%, with a 0% LIBOR floor and is payable on the 15th day of each March, June, September and December, during the term, with the first interest payment being September 15, 2021. The Amended Credit Facility is secured by substantially all of the assets of the partnership.

During the year ended December 31, 2021, prior to the amendment, principal payments of \$50.0 million were made on the previous credit facility, including \$19.5 million of scheduled repayments, \$27.5 million related to the sale of the storage assets located adjacent to the Ord, Nebraska ethanol plant and a \$3.0 million prepayment made with excess cash.

On February 11, 2022, the Amended Credit Facility was modified to allow Green Plains Partners and its affiliates to repurchase outstanding notes. On the same day, the partnership purchased \$1.0 million of the outstanding notes from accounts and funds managed by BlackRock and subsequently retired the notes. As of December 31, 2022, the term loan had a balance of \$59.0 million and an interest rate of 12.77%.

Refer to *Note 12 – Debt* included as part of the notes to consolidated financial statements for more information about our debt.

Contractual Obligations and Commitments

In addition to debt, our material future obligations include certain lease agreements and contractual and purchase commitments related to commodities, storage and transportation. Aggregate minimum lease payments under the operating lease agreements for future fiscal years as of December 31, 2022 totaled \$85.6 million. As of December 31, 2022, we had contracted future purchases of ethanol, grain, natural gas, and distillers grains valued at approximately \$389.1 million and future commitments for storage and transportation valued at approximately \$23.6 million. Refer to *Note 17 – Commitments and Contingencies* included in the notes to consolidated financial statements for more information.

Item 7A. Qualitative and Quantitative Disclosures About Market Risk.

We use various financial instruments to manage and reduce our exposure to various market risks, including changes in commodity prices and interest rates. We conduct the majority of our business in U.S. dollars and are not currently exposed to material foreign currency risk.

Interest Rate Risk

We are exposed to interest rate risk through our loans which bear interest at variable rates. Interest rates on our variable-rate debt are based on the market rate for the lender's prime rate, SOFR or LIBOR. At December 31, 2022, we had \$634.8 million in debt, \$196.6 million of which had variable interest rates. A 10% increase in interest rates would affect our interest cost by approximately \$1.8 million per year.

Refer to *Note 12 – Debt* included as part of the notes to consolidated financial statements for more information about our debt.

Commodity Price Risk

Our business is highly sensitive to commodity price risk, particularly for ethanol, corn, distillers grains, Ultra-High Protein, renewable corn oil and natural gas. Ethanol prices are sensitive to world crude oil supply and demand, the price of crude oil, gasoline, corn, the price of substitute fuels, refining capacity and utilization, government regulation and consumer demand for alternative fuels. Corn prices are affected by weather conditions, yield, changes in domestic and global supply and demand, and government programs and policies. Distillers grains prices are impacted by livestock numbers on feed, prices for feed alternatives and supply, which is associated with ethanol plant production. Natural gas prices are influenced by severe weather in the summer and winter and hurricanes in the spring, summer and fall. Other factors include North American energy exploration and production, and the amount of natural gas in underground storage during injection and withdrawal seasons.

To reduce the risk associated with fluctuations in the price of ethanol, corn, distillers grains, Ultra-High Protein, renewable corn oil and natural gas, at times we use forward fixed-price physical contracts and derivative financial instruments, such as futures and options executed on the Chicago Board of Trade, the New York Mercantile Exchange and the Chicago Mercantile Exchange. We focus on locking in favorable operating margins, when available, using a model that continually monitors market prices for corn, natural gas and other inputs relative to the price for ethanol and distillers grains at each of our production facilities. We create offsetting positions using a combination of forward fixed-price purchases, sales contracts and derivative financial instruments. As a result, we frequently have gains on derivative financial instruments that are offset by losses on forward fixed-price physical contracts or inventories and vice versa. Our results are impacted by a mismatch of gains or losses associated with the derivative instrument during a reporting period when the physical commodity purchases or sale has not yet occurred. For the year ended December 31, 2022, revenues included net losses of \$1.6 million and cost of goods sold included net losses of \$66.2 million associated with derivative instruments.

Ethanol Production Segment

In the ethanol production segment, net gains and losses from settled derivative instruments are offset by physical commodity purchases or sales to achieve the intended operating margins. To reduce commodity price risk caused by market fluctuations, we enter into exchange-traded futures and options contracts that serve as economic hedges. Our results are impacted when there is a mismatch of gains or losses associated with the derivative instrument during a reporting period when the physical commodity purchases or sale has not yet occurred.

Our exposure to market risk, which includes the impact of our risk management activities resulting from our fixed-price

purchase and sale contracts and derivatives, is based on the estimated net income effect resulting from a hypothetical 10% change in price for the next 12 months starting on December 31, 2022, are as follows (in thousands):

Commodity	Estimated Total Volume Requirements for the Next 12 Months ⁽¹⁾	Unit of Measure	Net Income Effect of Approximate 10% Change in Price
Ethanol	958,000	Gallons	\$174,393
Corn	330,000	Bushels	\$162,336
Distillers grains	2,700	Tons ⁽²⁾	\$45,178
Renewable corn oil	310,000	Pounds	\$13,784
Natural gas	27,700	MmBTU	\$2,388

(1) Estimated volumes assume production at full capacity.

(2) Distillers grains quantities are stated on an equivalent dried ton basis.

Agribusiness and Energy Services Segment

In the agribusiness and energy services segment, our inventories, physical purchase and sale contracts and derivatives are marked to market. Our inventories are carried at the lower of cost or net realizable value, except fair-value hedged inventories. To reduce commodity price risk caused by market fluctuations for purchase and sale commitments of grain and grain held in inventory, we enter into exchange-traded futures and options contracts that serve as economic hedges.

The market value of exchange-traded futures and options used for hedging are highly correlated with the underlying market value of grain inventories and related purchase and sale contracts for grain. The less correlated portion of inventory and purchase and sale contract market values, known as basis, is much less volatile than the overall market value of exchange-traded futures and tends to follow historical patterns. We manage this less volatile risk by constantly monitoring our position relative to the price changes in the market. Inventory values are affected by the month-to-month spread in the futures markets. These spreads are also less volatile than overall market value of our inventory and tend to follow historical patterns, but cannot be mitigated directly. Our accounting policy for futures and options, as well as the underlying inventory held for sale and purchase and sale contracts, is to reflect their current market values and include gains and losses in the consolidated statement of operations.

Item 8. Financial Statements and Supplementary Data.

The required consolidated financial statements and accompanying notes are listed in Part IV, Item 15.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures designed to ensure information that must be disclosed in the reports we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to management, as appropriate, to allow timely decisions regarding required financial disclosure. In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. Management is required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Under the supervision of and participation of our chief executive officer and chief financial officer, management carried out an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of

December 31, 2022, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act and concluded that our disclosure controls and procedures were effective.

Management's Annual Report on Internal Control over Financial Reporting

Management is responsible for establishing and maintaining effective internal control over financial reporting as defined in Rule 13a-15(f) of the Exchange Act. Our internal control system is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements in accordance with GAAP.

Under the supervision and participation of our chief executive officer and chief financial officer, management assessed the design and operating effectiveness of our internal control over financial reporting as of December 31, 2022, based on the *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this assessment, management concluded that our internal control over financial reporting was effective as of December 31, 2022.

The effectiveness of the company's internal control over financial reporting as of December 31, 2022, has been audited by KPMG LLP, an independent registered public accounting firm, as stated in their report, which is included herein.

Changes in Internal Control over Financial Reporting

Management is responsible for establishing and maintaining effective internal control over financial reporting to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of our consolidated financial statements for external purposes in accordance with GAAP. We have not identified any changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2022, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
Green Plains Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited Green Plains Inc. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2022 and 2021, the related consolidated statements of operations, comprehensive loss, stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2022, and the related notes (collectively, the consolidated financial statements), and our report dated February 10, 2023 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ KPMG LLP

Omaha, Nebraska
February 10, 2023

Item 9B. Other Information.

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

Information in our Proxy Statement for the 2023 Annual Meeting of Stockholders (“Proxy Statement”) under “Corporate Governance,” “Proposal 1 – Election of Directors,” “Executive Officers,” and “Delinquent Section 16(a) Reports” is incorporated by reference.

We have adopted a code of ethics that applies to our chief executive officer, chief financial officer and all other senior financial officers. Our code of ethics is available on our website at www.gpreinc.com in the “Investors and Media – Governance” section. Amendments or waivers are disclosed within five business days following its adoption.

Item 11. Executive Compensation.

Information included in the Proxy Statement under “Corporate Governance - Compensation of Directors” and “Executive Compensation” is incorporated by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

Information in the Proxy Statement under “Security Ownership of Certain Beneficial Owners and Management” and “Executive Compensation” is incorporated by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

Information in the Proxy Statement under "Corporate Governance" and “Transactions with Related Persons, Promoters and Certain Control Persons” is incorporated by reference.

Item 14. Principal Accounting Fees and Services.

Information in the Proxy Statement under “Independence of Auditors” and "Auditors' Fees" is incorporated by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(1) *Financial Statements.* The following consolidated financial statements and notes are filed as part of this annual report on Form 10-K.

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Auditor Location: Omaha, NE	
Auditor Firm ID: 185	
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(2) *Financial Statement Schedules.* All schedules have been omitted because they are not applicable or the required information is included in the consolidated financial statements or notes thereto.

(3) *Exhibits.* The following exhibits are incorporated by reference, filed or furnished as part of this annual report on Form 10-K.

Exhibit Index

Exhibit No.	Description of Exhibit
2.1	Stock Purchase Agreement among Green Plains Inc., Green Plains II LLC and Kerry Holding Co. dated October 23, 2018. (The schedules to the Stock Purchase Agreement have been omitted. The Company will furnish such schedules to the SEC upon request.) (incorporated herein by reference to Exhibit 2.1 of the company's Current Report on Form 8-K filed October 25, 2018)
2.2	Securities Purchase Agreement, dated as of September 6, 2019, by and among Green Plains Inc., Green Plains Cattle Company LLC, TGAM Agribusiness Fund Holdings-B LP, and StepStone Atlantic Fund, L.P. (Certain schedules to the Securities Purchase Agreement have been omitted. The company will furnish such schedules to the SEC upon request.) (incorporated herein by reference to Exhibit 2.1 of the company's Current Report on Form 8-K filed September 9, 2019)
2.3	Second Amended and Restated Limited Liability Company Agreement of Green Plains Cattle Company LLC, dated September 6, 2019 (Certain schedules to the Second Amended and Restated Limited Liability Company Agreement have been omitted. The company will furnish such schedules to the SEC upon request.) (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed September 9, 2019)
2.4	Securities Purchase Agreement, dated as of October 9, 2020, by and among Green Plains Inc., Green Plains Cattle Company LLC, AGR Special Opportunities Fund I, LP, TGAM Agribusiness Fund LP, and StepStone Atlantic Fund, LP (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K filed on October 13, 2020) (Certain schedules to the Securities Purchase Agreement have been omitted. The company will furnish such schedules to the SEC upon request)
2.5(a)	Asset Purchase Agreement among Hereford Ethanol Partners, L.P. and Green Plains Hereford LLC, dated December 11, 2020. (The schedules to the Asset Purchase Agreement have been omitted. The Company will furnish such schedules to the SEC upon request.)

- 2.5(b) Asset Purchase Agreement, dated December 14, 2020, by and among Green Plains LP, Green Plains Holdings LLC, Green Plains Operating Company LLC, Green Plains Ethanol Storage LLC, Green Plains Logistics LLC, Green Plains Inc., Green Plains Trade Group LLC and Green Plains Hereford LLC. (incorporated herein by reference to Exhibit 2.2 to the company's Current Report on Form 8-K filed on December 15, 2020).
- 2.6 Asset Purchase Agreement, dated January 25, 2021, by and among Green Plains Partners LP, Green Plains Holdings LLC, Green Plains Operating Company LLC, Green Plains Ethanol Storage LLC, Green Plains Logistics LLC, Green Plains Inc., Green Plains Trade Group LLC and Green Plains Ord LLC. (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K filed on January 27, 2021)
- 3.1(a) Second Amended and Restated Articles of Incorporation of the company (incorporated herein by reference to Exhibit 3.1 of the company's Current Report on Form 8-K filed October 15, 2008)
- 3.1(b) Articles of Amendment to Second Amended and Restated Articles of Incorporation of Green Plains Renewable Energy, Inc. (incorporated herein by reference to Exhibit 3.1 of the company's Current Report on Form 8-K filed May 9, 2011)
- 3.1(c) Second Articles of Amendment to Second Amended and Restated Articles of Incorporation of Green Plains Renewable Energy, Inc. (incorporated herein by reference to Exhibit 3.1 to the company's Current Report on Form 8-K filed May 16, 2014)
- 3.1(d) Third Articles of Amendment to Second Amended and Restated Articles of Incorporation of Green Plains, Inc. (incorporated herein by reference to Exhibit 3.1 to the company's Current Report on Form 8-K filed on May 6, 2022)
- 3.2(a) Fourth Amended and Restated Bylaws of Green Plains Inc., dated September 27, 2021 (incorporated herein by reference to Exhibit 3.1 to the company's Current Report on Form 8-K filed on September 28, 2021)
- 3.2(b) First Amendment to Fourth Amended and Restated Bylaws of Green Plains, Inc. (incorporated herein by reference to Exhibit 3.2 to the company's Current Report on Form 8-K filed on May 6, 2022)
- 3.3 Fifth Amended and Restated Bylaws of Green Plains Inc., dated November 14, 2022 (incorporated herein by reference to Exhibit 3.1 to the company's Current Report on Form 8-K filed on November 16, 2022)
- 4.1(a) Shareholders' Agreement by and among Green Plains Renewable Energy, Inc., each of the investors listed on Schedule A, and each of the existing shareholders and affiliates identified on Schedule B, dated May 7, 2008 (incorporated herein by reference to Appendix F of the company's Registration Statement on Form S-4/A filed September 4, 2008)
- 4.1(b) Indenture, dated March 1, 2021, between Green Plains Inc. and Wilmington Trust, National Association, as trustee (incorporated herein by reference to Exhibit 4.1 to the company's Current Report on Form 8-K dated March 1, 2021)
- 4.2(a) Indenture relating to the 4.125% Convertible Senior Notes due 2022, dated as of August 15, 2016, between Green Plains Inc. and Wilmington Trust, National Association, including the form of Global Note attached as Exhibit A thereto (incorporated herein by reference to Exhibit 4.1 to the company's Current Report on Form 8-K filed August 15, 2016)
- 4.2(b) First Supplemental Indenture relating to the 2.25% Convertible Senior Notes due 2027, dated as of March 1, 2021, between Green Plains Inc. and Wilmington Trust, National Association, including the form of Global Note attached as Exhibit A thereto (incorporated herein by reference to Exhibit 4.2 to the company's Current Report on Form 8-K dated March 1, 2021)
- 4.3(a) Indenture relating to the 3.25% Convertible Senior Notes due 2019, dated as of August 14, 2018, between Green Plains Inc. and Wilmington Trust, National Association, as trustee (including therein Form of 3.25% Convertible Senior Notes Due 2019) (incorporated herein by reference to Exhibit 4.1 to the company's Current Report on Form 8-K filed August 14, 2018)
- 4.3(b) Form of Global Note representing 2.25% Convertible Senior Notes due 2027 (included as a part of Exhibit 4.2(b)).
- 4.4 Indenture relating to the 4.00% Convertible Senior Notes due 2024, dated as of June 21, 2019, between Green Plains Inc. and Wilmington Trust, National Association, including the form of Global Note attached as Exhibit A thereto (incorporated herein by reference to Exhibit 4.1 of the company's Current Report on Form 8-K filed on June 21, 2019)
- 4.5 Description of Securities Registered Under Section 12 of the Exchange Act (incorporated herein by reference to Exhibit 4.7 of the company's Annual Report on Form 10-K filed February 20, 2020)

*10.1	2007 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 27, 2007)
10.2	Form of Indemnification Agreement (incorporated herein by reference to Exhibit 10.53 of the company's Registration Statement on Form S-4/A filed August 1, 2008)
*10.3(a)	Employment Agreement by and between Green Plains Renewable Energy, Inc. and Todd Becker dated May 7, 2008 (incorporated herein by reference to Exhibit 10.54 of the company's Registration Statement on Form S-4/A filed August 1, 2008)
*10.3(b)	Amendment No. 1 to Employment Agreement by and between Green Plains Renewable Energy, Inc. and Todd Becker, dated December 18, 2009. (incorporated herein by reference to Exhibit 10.7(b) of the company's Annual Report on Form 10-K filed February 24, 2010)
*10.3(c)	Amendment No. 2 to Employment Agreement by and between Green Plains, Inc. and Todd Becker, dated March 27, 2018 (incorporated herein by reference to Exhibit 10.52 of the company's Quarterly Report on Form 10-Q filed on May 7, 2018)
*10.4(a)	2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K dated May 11, 2009)
*10.4(b)	Amendment No. 1 to the 2009 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 25, 2011)
*10.4(c)	Amendment No. 2 to the 2009 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 29, 2013)
*10.4(d)	Amended and Restated 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 99.1 of the company's Registration Statement on Form S-8 filed June 23, 2017)
*10.4(e)	Form of Stock Option Award Agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.19(b) of the company's Annual Report on Form 10-K filed February 24, 2010)
*10.4(f)	Form of Restricted Stock Award Agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.19(c) of the company's Annual Report on Form 10-K/A (Amendment No. 1) filed February 25, 2010)
*10.4(g)	Amended Form of Restricted Stock Award agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.53 of the company's Quarterly Report on Form 10-Q filed on May 7, 2018)
*10.4(h)	Form of Deferred Stock Unit Award Agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.19(d) of the company's Annual Report on Form 10-K filed February 24, 2010)
*10.4(i)	Form of Performance Share Unit Award agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.54 of the company's Quarterly Report on Form 10-Q filed on May 7, 2018)
*10.4(j)	2019 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 28, 2019)
*10.4(k)	Amendment No. 1 to the 2019 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 26, 2020)
10.5(a)	Second Amended and Restated Revolving Credit and Security Agreement dated April 26, 2013 by and among Green Plains Trade Group LLC and PNC Bank, National Association (as Lender and Agent) (incorporated herein by reference to Exhibit 10.2 of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
10.5(b)	Third Amended and Restated Revolving Credit and Security Agreement dated November 26, 2014 by and among Green Plains Trade Group LLC, the Lenders and PNC Bank, National Association (as Lender and Agent) (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed December 2, 2014)
10.5(c)	Fourth Amended and Restated Revolving Credit and Security Agreement dated July 28, 2017, among Green Plains Trade Group LLC, the Lenders and PNC Bank, National Association as Lender and Agent (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated July 31, 2017)
10.5(d)	First Amendment to Fourth Amended and Restated Revolving Credit and Security Agreement, dated as of August 29, 2017, among Green Plains Trade Group LLC and PNC Bank, National Association, as agent, and the lenders party to the Credit and Security Agreement (incorporated herein by reference to Exhibit 10.4(a) to the company's Current Report on Form 8-K dated August 29, 2017)

10.5(e)	Second Amendment to Fourth Amended and Restated Revolving Credit and Security Agreement, dated as of March 15, 2018, by and among Green Plains Trade Group LLC and PNC Bank, National Association (incorporated herein by reference to Exhibit 10.1 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
10.5(f)	Third Amendment to Fourth Amended and Restated Revolving Credit and Security Agreement, dated as of November 27, 2019, by and among Green Plains Trade Group LLC and PNC Bank, National Association (incorporated herein by reference to Exhibit 10.5(f) of the company's Annual Report on Form 10-K filed February 20, 2020)
10.5(g)	Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and Citibank, N.A. (incorporated herein by reference to Exhibit 10.2(b) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
10.5(h)	Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and BMO Harris Bank N.A. (incorporated herein by reference to Exhibit 10.2(c) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
10.5(i)	Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and Alostara Bank of Commerce (incorporated herein by reference to Exhibit 10.2(d) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
10.5(j)	Second Amended and Restated Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and PNC Bank, National Association (Incorporated by reference to Exhibit 10.2(a) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
10.5(k)	Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and Bank of America (incorporated here by reference to Exhibit 10.2(e) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
10.5(l)	ABL Intercreditor Agreement, dated as of August 29, 2017, among PNC Bank, National Association, as ABL Collateral Agent, and BNP Paribas, as Term Loan Collateral Agent, and acknowledged by Green Plains Trade Group LLC and the other ABL Grantors (incorporated herein by reference to Exhibit 10.4(b) to the company's Current Report on Form 8-K dated August 29, 2017)
10.5(m)	Guaranty, dated as of August 29, 2017, in favor of PNC Bank, National Association, as agent (incorporated herein by reference to Exhibit 10.4(c) to the company's Current Report on Form 8-K dated August 29, 2017)
*10.6	Umbrella Short-Term Incentive Plan (incorporated herein by reference to Appendix A of the company's Proxy Statement filed April 3, 2014)
*10.7	Director Compensation effective May 11, 2016 (incorporated herein by reference to Exhibit 10.4 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
*10.8	Director Compensation effective November 14, 2017 (incorporated herein by reference to Exhibit 10.9 of the company's Annual Report on Form 10-K filed February 15, 2018)
10.9(a)	Credit Agreement dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc., BNP Paribas Securities Corp. as Lead Arranger, Rabo Agrifinance, Inc. as Syndication Agent, ABN AMRO Capital USA LLC as Documentation Agent and BNP Paribas as Administrative Agent (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed November 3, 2011)
10.9(b)	Security Agreement dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and BNP Paribas (incorporated herein by reference to Exhibit 10.2 of the company's Current Report on Form 8-K filed November 3, 2011)
10.9(c)	Promissory Note dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and Bank of Oklahoma (incorporated herein by reference to Exhibit 10.3 of the company's Current Report on Form 8-K filed November 3, 2011)
10.9(d)	Promissory Note dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and U.S. Bank National Association (incorporated herein by reference to Exhibit 10.4 of the company's Current Report on Form 8-K filed November 3, 2011)
10.9(e)	Promissory Note dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and Farm Credit Bank of Texas (incorporated herein by reference to Exhibit 10.5 of the company's Current Report on Form 8-K filed November 3, 2011)

- 10.9(f) First Amendment to Credit Agreement dated January 6, 2012 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc., BNP Paribas and the Required Lenders (incorporated herein by reference to Exhibit 10.26(k) of the company's Annual Report on Form 10-K filed February 17, 2012)
- 10.9(g) Second Amendment to Credit Agreement, dated October 26, 2012, by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex, Inc., BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.5 of the company's Quarterly Report on Form 10-Q filed November 1, 2012)
- 10.9(h) Third Amendment to Credit Agreement, dated August 27, 2013, by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex, Inc., BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.3 of the company's Quarterly Report on Form 10-Q filed October 31, 2013)
- 10.9(i) Fourth Amendment to Credit Agreement, dated August 8, 2014, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.3 of the company's Quarterly Report on Form 10-Q filed October 30, 2014)
- 10.9(j) Fifth Amendment to Credit Agreement, dated June 1, 2015, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.5 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.9(k) Sixth Amendment to Credit Agreement, dated January 5, 2016, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.6 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.9(l) Seventh Amendment to Credit Agreement, dated July 27, 2016, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.7 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.9(m) Eighth Amendment to Credit Agreement, dated as of August 29, 2017, among Green Plains Grain Company and BNP Paribas, as Administrative Agent, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.3(a) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.9(n) Ninth Amendment to Credit Agreement, dated as of June 28, 2019, among Green Plains Grain Company LLC and BNP Paribas, as Administrative Agent, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed on July 1, 2019)
- 10.9(o) ABL Intercreditor Agreement, dated as of August 29, 2017, among BNP Paribas, as ABL Collateral Agent, and BNP Paribas, as Term Loan Collateral Agent, and acknowledged by Green Plains Grain Company LLC and the other ABL Grantors (incorporated herein by reference to Exhibit 10.3(b) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.9(p) Guaranty, dated as of August 29, 2017, in favor of BNP Paribas, as administrative agent (incorporated herein by reference to Exhibit 10.3(c) to the company's Current Report on Form 8-K dated August 29, 2017)
- *10.10 Employment Agreement by and between Green Plains Renewable Energy, Inc. and Patrich Simpkins dated April 1, 2012 (incorporated herein by reference to Exhibit 10.2 of the company's Quarterly Report on Form 10-Q filed May 1, 2014)
- *10.11 Employment Agreement by and between Green Plains Inc. and Michelle S. Mapes dated February 3, 2020 (incorporated herein by reference to Exhibit 10.12 of the company's Annual Report on Form 10-K filed February 20, 2020)

- 10.12 Amended and Restated Credit Agreement, dated as of August 28, 2019, by and among Green Plains Cattle Company LLC, Bank of the West and ING Capital LLC, as Joint Administrative Agents, and the lenders party to the Credit Agreement (Certain schedules to the Amended and Restated Credit Agreement have been omitted. The company will furnish such schedules to the SEC upon request.) (incorporated herein by reference to Exhibit 10.3 of the company's Current Report on Form 8-K filed September 9, 2019)
- 10.13 Contribution, Conveyance and Assumption Agreement, dated July 1, 2015, by and among Green Plains Inc., Green Plains Obion LLC, Green Plains Trucking LLC, Green Plains Holdings LLC, Green Plains Partners LP and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.14(a) Omnibus Agreement, dated July 1, 2015, by and among Green Plains Inc., Green Plains Holdings LLC, Green Plains Partners LP and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.14(b) First Amendment to the Omnibus Agreement, dated January 1, 2016, by and among Green Plains Inc., Green Plains Holdings LLC, Green Plains Partners LP and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.22(b) to the company's Annual Report on Form 10-K for the year ended December 31, 2015)
- 10.14(c) Second Amendment to the Omnibus Agreement, dated September 23, 2016, by and among Green Plains Inc., Green Plains Partners LP, Green Plains Holdings LLC and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated September 26, 2016)
- 10.14(d) Third Amendment to the Omnibus Agreement, dated November 15, 2018, by and among Green Plains Inc., Green Plains Partners LP, Green Plains Holdings LLC and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.18(d) to the company's Annual Report on Form 10-K for the year ended December 31, 2018)
- 10.15(a) Operational Services and Secondment Agreement, dated July 1, 2015, by and between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.15(b) Amendment No. 1 to the Operational Services and Secondment Agreement, dated January 1, 2016, by and between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.23(b) to the company's Annual Report on Form 10-K for the year ended December 31, 2015)
- 10.15(c) Amendment No. 2 to Operational Services and Secondment Agreement, dated September 23, 2016, between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated September 26, 2016)
- 10.15(d) Amendment No. 3 to Operational Services and Secondment Agreement, dated November 15, 2018, between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.19(d) to the company's Annual Report on Form 10-K for the year ended December 31, 2018)
- 10.15(e) Amendment No. 4 to Operational Services and Secondment Agreement, dated December 28, 2020, between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K filed December 28, 2020)
- 10.15(f) Amendment No. 5 to Operational Services and Secondment Agreement, dated March 22, 2021, between Green Plains Inc. and Green Plains Holdings LLC. (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K dated March 23, 2021)
- 10.16(a) Rail Transportation Services Agreement, dated July 1, 2015, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.4 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.16(b) Amendment No. 1 to Rail Transportation Services Agreement, dated September 1, 2015, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.1 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.16(c) Correction to Rail Transportation Services Agreement, dated May 12, 2016, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.3 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.16(d) Amendment No. 2 to Rail Transportation Services Agreement, dated November 30, 2016 (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated December 1, 2016)

- 10.16(e) Amendment No. 3 to Rail Transportation Services Agreement, dated November 15, 2018 (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated November 15, 2018)
- 10.16(f) Corrective Amendment to Rail Transportation Services Agreement, dated November 15, 2018, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.20(f) to the company's Annual Report on Form 10-K for the year ended December 31, 2018)
- 10.16(g) Amendment No. 4 to Rail Transportation Services Agreement, dated December 28, 2020 (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated December 28, 2020)
- 10.16(h) Amendment No. 5 to Rail Transportation Services Agreement, dated March 22, 2021, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed March 23, 2021)
- 10.16(i) Amendment No. 6 to Rail Transportation Services Agreement, dated August 16, 2022, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC. (incorporated herein by reference to exhibit 10.1 to the company's Quarterly Report on Form 10-Q filed November 3, 2022)
- 10.17(a) Ethanol Storage and Throughput Agreement, dated July 1, 2015, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.5 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.17(b) Amendment No. 1 to the Ethanol Storage and Throughput Agreement, dated January 1, 2016, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.25(b) to the company's Annual Report on Form 10-K for the year ended December 31, 2015)
- 10.17(c) Clarifying Amendment to Ethanol Storage and Throughput Agreement, dated January 4, 2016, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.2 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.17(d) Amendment No. 2 to Ethanol Storage and Throughput Agreement, dated September 23, 2016, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K dated September 26, 2016)
- 10.17(e) Amendment No. 3 to Ethanol Storage and Throughput Agreement, dated November 15, 2018, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated November 15, 2018) (The exhibits to Amendment No. 3 have been omitted. The company will furnish such schedules to the SEC upon request).
- 10.17(f) Amendment No. 4 to Ethanol Storage and Throughput Agreement, dated December 28, 2020, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated December 28, 2020)
- 10.17(g) Amendment No. 5 to Ethanol Storage and Throughput Agreement, dated March 22, 2021, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC. (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K filed March 23, 2021) (The exhibits to Amendment No. 5 have been omitted. The Company will furnish such schedules to the SEC upon request).
- 10.18(a) Credit Agreement, dated July 1, 2015, by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto (incorporated herein by reference to Exhibit 10.6 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.18(b) First Amendment to Credit Agreement, dated September 16, 2016 by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto (incorporated herein by reference to Exhibit 10.22(b) to the company's Annual Report on Form 10-K for the year ended December 31, 2018)
- 10.18(c) Incremental Joinder Agreement, dated October 27, 2017, among Green Plains Operating Company LLC and Bank of America, as Administrative (incorporated herein by reference to Exhibit 10.8 to the company's Quarterly Report on Form 10-Q dated November 2, 2017)
- 10.18(d) Second Amendment to Credit Agreement, dated February 16, 2018 by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto (incorporated herein by reference to Exhibit 10.22(d) to the company's Annual Report on Form 10-K for the year ended December 31, 2018)

- 10.18(e) Incremental Joinder Agreement, dated February 20, 2018, among Green Plains Operating Company LLC and Bank of America, as Administrative (incorporated herein by reference to Exhibit 10.22(e) to the company's Annual Report on Form 10-K for the year ended December 31, 2018)
- 10.18(f) Third Amendment to Credit Agreement, dated October 12, 2018 by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto (incorporated herein by reference to Exhibit 10.22(f) to the company's Annual Report on Form 10-K for the year ended December 31, 2018)
- 10.18(g) Consent to Credit Agreement, dated July 15, 2019, by and among Green Plains Operating Company LLC and Bank of America, as Administrative Agent (incorporated herein by reference to Exhibit 10.1 to the company's Quarterly Report on Form 10-Q dated August 6, 2019)
- 10.18(h) Fourth Amendment to Credit Agreement, dated June 4, 2020, by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A. and the other lenders party thereto (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on June 4, 2020)
- 10.18(i) Amended and Restated Credit Agreement, dated July 20, 2021, by and among Green Plains Operating Company LLC, as the Borrower, the guarantors identified therein, TMI Trust Company, as Administrative Agent and the other lenders party thereto (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on July 26, 2021)
- 10.18(j) Amended No. 1 to Amended and Restated Credit Agreement, dated February 11, 2022, by and among Green Plains Operating Company LLC, as the Borrower, the guarantors identified therein, TMI Trust Company, as Administrative Agent and the other lenders party thereto (incorporated herein by reference to Exhibit 10.26 to the company's Annual Report on Form 10-K for the year ended December 31, 2021).
- 10.19 Second Amendment to Term Loan Agreement, dated July 13, 2018, among Green Plains Inc. and BNP Paribas, as administrative agent and collateral agent (incorporated herein by reference to Exhibit 10.3 to the company's Quarterly Report on Form 10-Q dated August 2, 2018)
- 10.20 Partial Release of Security Interest, dated as of April 30, 2018, by and among Green Plains Inc., its subsidiaries and BNP Paribas, as collateral agent (incorporated herein by reference to Exhibit 10.3 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.21(a) Revolving Credit Facility, dated as of April 30, 2018, by and among Green Plains Commodity Management LLC and Macquarie Bank Limited (incorporated herein by reference to Exhibit 10.4 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.21(b) Amendment to Revolving Credit Facility, dated as of June 18, 2019, by and among Green Plains Commodity Management LLC and Macquarie Bank Limited (incorporated herein by reference to Exhibit 10.24(b) of the company's Annual Report on Form 10-K filed February 20, 2020)
- 10.22 Promissory Note between Green Plains Inc. and StepStone Atlantic Fund, L.P., dated September 6, 2019 (incorporated herein by reference to Exhibit 10.2 of the company's Current Report on Form 8-K filed September 9, 2019)
- 10.23(a) Loan Agreement dated September 3, 2020 by and among Green Plains Wood River LLC and Green Plains Shenandoah LLC, as the Borrowers, and MetLife Real Estate Lending LLC, as the Lender (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on September 8, 2020)
- 10.23(b) Delayed Draw Term Promissory Note dated September 3, 2020 by and among Green Plains Wood River LLC and Green Plains Shenandoah LLC, as the Borrowers, and MetLife Real Estate Lending LLC, as the Lender (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K filed on September 8, 2020)
- 10.23(c) Loan Guaranty Agreement dated September 3, 2020 by and among Green Plains Inc, as the Guarantor, and MetLife Real Estate Lending LLC, as the Lender (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K filed on September 8, 2020)
- 10.23(d) Deed of Trust, Security Agreement, Assignment of Leases and Rents and Fixture Filing dated September 3, 2020 by and among Green Plains Wood River LLC, as the Trustor, and MetLife Real Estate Lending LLC, as the Beneficiary (incorporated herein by reference to Exhibit 10.4 to the company's Current Report on Form 8-K filed on September 8, 2020)

10.23(e)	Mortgage, Security Agreement, Assignment of Leases and Rents and Fixture Filing dated September 3, 2020 by and among Green Plains Shenandoah LLC, as the Borrower, and MetLife Real Estate Lending LLC, as the Lender (incorporated herein by reference to Exhibit 10.5 to the company's Current Report on Form 8-K filed on September 8, 2020)
10.24(a)	Note Purchase Agreement dated February 9, 2021 by and among Green Plains SPE LLC, as the Issuer, Green Plains Inc., as Guarantor, and Purchasers signatory thereto. (The schedules to the Note Purchase Agreement have been omitted. The Company will furnish such schedules to the SEC upon request.) (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on February 12, 2021)
10.24(b)	Pledge and Security Agreement dated February 9, 2021 by and among Green Plains SPE LLC, as the Pledgor, in favor of Wilmington Trust, National Association, as Trustee. (The schedules to the Pledge and Security Agreement have been omitted. The Company will furnish such schedules to the SEC upon request.) (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K filed on February 12, 2021)
10.24(c)	Indenture dated February 9, 2021 by Green Plains SPE LLC, as Issuer, Green Plains Inc., as Guarantor and Wilmington Trust, National Association, as Trustee. (The schedules to the Indenture have been omitted. The Company will furnish such schedules to the SEC upon request.) (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K filed on February 12, 2021)
10.24(d)	First Priority Mortgage, Assignment of Leases and Rents, Security Agreement and Financing Statement from Green Plains Mount Vernon LLC, as Mortgagor and Wilmington Trust, National Association, as Mortgagee. (incorporated herein by reference to Exhibit 10.4 to the company's Current Report on Form 8-K filed on February 12, 2021)
10.24(e)	First Priority Deed of Trust, Assignment of Leases and Rents, Security Agreement and Financing Statement from Green Plains Obion LLC, as Mortgagor and Wilmington Trust, National Association, as Mortgagee. (incorporated herein by reference to Exhibit 10.5 to the company's Current Report on Form 8-K filed on February 12, 2021)
*10.25	Employment Agreement by and between Green Plains Inc. and Leslie van der Meulen dated December 2, 2021 (incorporated herein by reference to Exhibit 10.25 to the company's Annual Report on Form 10-K for the year ended December 31, 2021).
10.26	Loan and Security Agreement, dated March 25, 2022, by and among Green Plains Inc., as Guarantor, Green Plains Finance Company LLC, Green Plains Grain Company LLC and Green Plains Trade Group LLC as the Borrowers, ING Capital LLC, as Agent and the other financial institutions party thereto. (The exhibits and schedules to the Loan and Security Agreement have been omitted. The Company will furnish such schedules to the SEC upon request). (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on March 28, 2022).
*10.27	Employment Agreement by and between Green Plains Inc. and Paul Kolomaya dated December 2, 2021 (incorporated herein by reference to Exhibit 10.3 to the company's Quarterly Report on Form 10-Q filed on May 3, 2022).
10.28(a)	Exchange Agreement, dated August 3, 2022, by and between Green Plains Inc and the applicable Noteholders (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on August 4, 2022)
10.28(b)	Exchange Agreement, dated August 4, 2022, by and between Green Plains Inc and the applicable Noteholders (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on August 5, 2022)
10.28(c)	Exchange Agreement, dated August 4, 2022, by and between Green Plains Inc and the applicable Noteholders (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K filed on August 5, 2022)
10.28(d)	Exchange Agreement, dated August 24, 2022, by and between Green Plains Inc and the applicable Noteholders (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K filed on August 25, 2022)
21.1	Schedule of Subsidiaries
23.1	Consent of KPMG LLP
31.1	Certification of Chief Executive Officer pursuant to Rule 13a-14(a) and Section 302 of the Sarbanes-Oxley Act of 2002

- 31.2 Certification of Chief Financial Officer pursuant to Rule 13a-14(a) and Section 302 of the Sarbanes-Oxley Act of 2002
- 32.1 Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
- 32.2 Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
- 101 The following information from Green Plains Inc.'s Annual Report on Form 10-K for the annual period ended December 31, 2022, formatted in Inline Extensible Business Reporting Language (iXBRL): (i) the Consolidated Balance Sheets, (ii) the Consolidated Statements of Operations, (iii) the Consolidated Statements of Comprehensive Income (iv) the Consolidated Statements of Stockholders' Equity (v) the Consolidated Statements of Cash Flows and (vi) the Notes to Consolidated Financial Statements and Financial Statement Schedule.
- 104 The cover page from Green Plains Inc. Annual Report on Form 10-K for the year ended December 31, 2022, formatted in iXBRL

* Represents management compensatory contracts

Item 16. Form 10-K Summary.

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

GREEN PLAINS INC

(Registrant)

Date: February 10, 2023

By: /s/ Todd A. Becker

Todd A. Becker

President and Chief Executive Officer

(Principal Executive Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Todd A. Becker</u> Todd A. Becker	President and Chief Executive Officer (Principal Executive Officer) and Director	February 10, 2023
<u>/s/ James E. Stark</u> James E. Stark	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	February 10, 2023
<u>/s/ Wayne B. Hoovestol</u> Wayne B. Hoovestol	Chairman of the Board	February 10, 2023
<u>/s/ Jim Anderson</u> Jim Anderson	Director	February 10, 2023
<u>/s/ Farha Aslam</u> Farha Aslam	Director	February 10, 2023
<u>/s/ Ejnar A. Knudsen III</u> Ejnar A. Knudsen III	Director	February 10, 2023
<u>/s/ Brian D. Peterson</u> Brian D. Peterson	Director	February 10, 2023
<u>/s/ Martin Salinas Jr.</u> Martin Salinas Jr.	Director	February 10, 2023
<u>/s/ Alain Treuer</u> Alain Treuer	Director	February 10, 2023
<u>/s/ Kimberly Wagner</u> Kimberly Wagner	Director	February 10, 2023

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
Green Plains Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Green Plains Inc. and subsidiaries (the Company) as of December 31, 2022 and 2021, the related consolidated statements of operations, comprehensive loss, stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2022, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2022, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 10, 2023 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for convertible debt instruments as of January 1, 2021 due to the adoption of Accounting Standards Update (ASU) 2020-06, *Debt - Debt with Conversion and Other Options and Derivatives and Hedging - Contracts in Entity's Own Equity*.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of a critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Fair value of forward contracts

As discussed in Note 2 to the consolidated financial statements, the Company records forward contracts at fair value unless the contract qualifies for and the Company elects normal purchase or sale exceptions. The Company estimates a fair value based on exchange-quoted prices, adjusted as appropriate for regional location basis values, which represent differences in local markets including transportation as well as quality or grade differences. Basis values are generally determined using inputs from broker quotations or market transactions. As of December 31, 2022, the recorded balances of the Company's derivative assets and liabilities associated with forward contracts were \$16.4 million and \$44.7 million, respectively, and are classified as Level 2 assets and liabilities within Note 6 and 11.

We identified the assessment of the valuation of forward contracts as a critical audit matter. Specifically, evaluating the valuation of forward contracts, which includes assumptions related to exchange-quoted prices, and adjustments for regional location basis values, involved complex auditor judgment due to the subjectivity involved in determining the fair value.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls related to the valuation of forward contracts. To assess the valuation of forward contracts, for a sample of contracts, we tested the Company's exchange-quoted prices by comparing the amounts used to observable market transactions and evaluated the Company's adjustments for regional location basis values by comparing inputs used by the Company to third-party information, including broker quotations or market transactions.

/s/ KPMG LLP

We have served as the Company's auditor since 2009.

Omaha, Nebraska
February 10, 2023

GREEN PLAINS INC.
CONSOLIDATED BALANCE SHEETS
(in thousands, except share amounts)

	December 31,	
	2022	2021
ASSETS		
Current assets		
Cash and cash equivalents	\$ 444,661	\$ 426,220
Restricted cash	55,615	134,739
Marketable securities	—	124,859
Accounts receivable, net of allowances of \$429 and \$682, respectively	108,610	119,961
Income taxes receivable	1,286	911
Inventories	278,950	267,838
Prepaid expenses and other	19,837	16,483
Derivative financial instruments	19,791	26,738
Total current assets	928,750	1,117,749
Property and equipment, net	1,029,327	893,517
Operating lease right-of-use assets	73,244	64,042
Other assets	91,810	84,447
Total assets	<u>\$ 2,123,131</u>	<u>\$ 2,159,755</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities		
Accounts payable	\$ 234,301	\$ 146,063
Accrued and other liabilities	44,443	56,980
Derivative financial instruments	47,941	43,244
Operating lease current liabilities	20,721	16,814
Short-term notes payable and other borrowings	137,678	173,418
Current maturities of long-term debt	1,838	35,285
Total current liabilities	486,922	471,804
Long-term debt	495,243	514,006
Operating lease long-term liabilities	55,515	49,795
Other liabilities	24,385	22,131
Total liabilities	<u>1,062,065</u>	<u>1,057,736</u>
Commitments and contingencies (Note 17)		
Stockholders' equity		
Common stock, \$0.001 par value; 150,000,000 and 75,000,000 shares authorized; 62,100,555 and 61,840,434 shares issued, and 59,295,496 and 53,595,978 shares outstanding, respectively	62	62
Additional paid-in capital	1,110,151	1,069,573
Retained deficit	(142,417)	(15,199)
Accumulated other comprehensive loss	(26,591)	(12,310)
Treasury stock, 2,805,059 and 8,244,456 shares, respectively	(31,174)	(91,626)
Total Green Plains stockholders' equity	910,031	950,500
Noncontrolling interests	151,035	151,519
Total stockholders' equity	<u>1,061,066</u>	<u>1,102,019</u>
Total liabilities and stockholders' equity	<u>\$ 2,123,131</u>	<u>\$ 2,159,755</u>

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except per share amounts)

	Year Ended December 31,		
	2022	2021	2020
Revenues	\$ 3,662,849	\$ 2,827,168	\$ 1,923,719
Costs and expenses			
Cost of goods sold (excluding depreciation and amortization expenses reflected below)	3,525,011	2,625,109	1,812,163
Operations and maintenance expenses	25,158	23,061	26,125
Selling, general and administrative expenses	118,930	91,139	84,932
Loss (gain) on sale of assets, net	—	(29,601)	20,860
Goodwill impairment	—	—	24,091
Depreciation and amortization expenses	92,698	91,952	78,244
Total costs and expenses	<u>3,761,797</u>	<u>2,801,660</u>	<u>2,046,415</u>
Operating income (loss)	<u>(98,948)</u>	<u>25,508</u>	<u>(122,696)</u>
Other income (expense)			
Interest income	5,277	575	659
Interest expense	(32,642)	(67,144)	(39,993)
Other, net	27,612	(1,940)	900
Total other income (expense)	<u>247</u>	<u>(68,509)</u>	<u>(38,434)</u>
Loss before income taxes and income from equity method investees	<u>(98,701)</u>	<u>(43,001)</u>	<u>(161,130)</u>
Income tax benefit (expense)	(4,747)	(1,845)	50,383
Income from equity method investees, net of income taxes	<u>71</u>	<u>700</u>	<u>21,093</u>
Net loss	<u>(103,377)</u>	<u>(44,146)</u>	<u>(89,654)</u>
Net income attributable to noncontrolling interests	23,841	21,846	19,121
Net loss attributable to Green Plains	<u>\$ (127,218)</u>	<u>\$ (65,992)</u>	<u>\$ (108,775)</u>
Earnings per share			
Net loss attributable to Green Plains - basic and diluted	<u>\$ (2.29)</u>	<u>\$ (1.41)</u>	<u>\$ (3.14)</u>
Weighted average shares outstanding:			
Basic and diluted	<u>55,541</u>	<u>46,652</u>	<u>34,631</u>

See accompanying notes to the consolidated financial statements

GREEN PLAINS INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(in thousands)

	Year Ended December 31,		
	2022	2021	2020
Net loss	\$ (103,377)	\$ (44,146)	\$ (89,654)
Other comprehensive income (loss), net of tax:			
Unrealized losses on derivatives arising during the period, net of tax benefit of \$5,092, \$7,806 and \$257, respectively	(16,109)	(24,230)	(768)
Reclassification of realized losses (gains) on derivatives, net of tax expense (benefit) of (\$578), (\$4,540) and \$857, respectively	1,828	14,092	(2,566)
Other comprehensive loss, net of tax	(14,281)	(10,138)	(3,334)
Share of equity method investees other comprehensive gain arising during the period, net of tax expense of \$0, \$0 and (\$3,929), respectively	—	—	12,226
Total other comprehensive income (loss), net of tax	(14,281)	(10,138)	8,892
Comprehensive loss	(117,658)	(54,284)	(80,762)
Comprehensive income attributable to noncontrolling interests	23,841	21,846	19,121
Comprehensive loss attributable to Green Plains	<u>\$ (141,499)</u>	<u>\$ (76,130)</u>	<u>\$ (99,883)</u>

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands)

	Common Stock		Additional Paid-in Capital	Retained Earnings (Deficit)	Accumulated Other Comprehensive Loss	Treasury Stock		Total Green Plains Stockholders' Equity	Non-Controlling Interests	Total Stockholders' Equity
	Shares	Amount				Shares	Amount			
Balance, December 31, 2019	46,964	\$ 47	\$ 734,580	\$ 148,150	\$ (11,064)	10,932	\$ (119,808)	\$ 751,905	\$ 113,381	\$ 865,286
Net income (loss)	—	—	—	(108,775)	—	—	—	(108,775)	19,121	(89,654)
Cash dividends and distributions declared	—	—	—	—	—	—	—	—	(9,675)	(9,675)
Other comprehensive loss before reclassification	—	—	—	—	(768)	—	—	(768)	—	(768)
Amounts reclassified from accumulated other comprehensive loss	—	—	—	—	(2,566)	—	—	(2,566)	—	(2,566)
Other comprehensive loss, net of tax	—	—	—	—	(3,334)	—	—	(3,334)	—	(3,334)
Share of equity method investees other comprehensive loss arising during the period, net of tax	—	—	—	—	12,226	—	—	12,226	—	12,226
Acquisition of subsidiary	—	—	—	—	—	—	—	—	6,667	6,667
Repurchase of common stock	—	—	—	—	—	881	(11,479)	(11,479)	—	(11,479)
Stock-based compensation	507	—	6,309	—	—	—	—	6,309	318	6,627
Balance, December 31, 2020	47,471	47	740,889	39,375	(2,172)	11,813	(131,287)	646,852	129,812	776,664
Impact of ASC 470-20 adoption	—	—	(49,496)	11,418	—	—	—	(38,078)	—	(38,078)
Balance, January 1, 2021	47,471	47	691,393	50,793	(2,172)	11,813	(131,287)	608,774	129,812	738,586
Net income (loss)	—	—	—	(65,992)	—	—	—	(65,992)	21,846	(44,146)
Cash dividends and distributions declared	—	—	—	—	—	—	—	—	(9,251)	(9,251)
Other comprehensive loss before reclassification	—	—	—	—	(24,230)	—	—	(24,230)	—	(24,230)
Amounts reclassified from accumulated other comprehensive loss	—	—	—	—	14,092	—	—	14,092	—	14,092
Other comprehensive loss, net of tax	—	—	—	—	(10,138)	—	—	(10,138)	—	(10,138)
Issuance of common stock, net of fees	14,214	15	355,963	—	—	—	—	355,978	—	355,978
Exchange of 4.00% convertible notes due 2024	—	—	17,683	—	—	(3,569)	39,661	57,344	—	57,344
Investment in subsidiaries	—	—	—	—	—	—	—	—	12,264	12,264
Issuance of warrants	—	—	3,431	—	—	—	—	3,431	(3,431)	—
Stock-based compensation	155	—	1,103	—	—	—	—	1,103	279	1,382
Balance, December 31, 2021	61,840	62	1,069,573	(15,199)	(12,310)	8,244	(91,626)	950,500	151,519	1,102,019
Net income (loss)	—	—	—	(127,218)	—	—	—	(127,218)	23,841	(103,377)
Cash dividends and distributions declared	—	—	—	—	—	—	—	—	(25,240)	(25,240)
Other comprehensive loss before reclassification	—	—	—	—	(16,109)	—	—	(16,109)	—	(16,109)
Amounts reclassified from accumulated other comprehensive loss	—	—	—	—	1,828	—	—	1,828	—	1,828
Other comprehensive loss, net of tax	—	—	—	—	(14,281)	—	—	(14,281)	—	(14,281)
Exchange of 4.125% convertible notes due 2022	—	—	19,756	—	—	(1,188)	13,211	32,967	—	32,967
Redemption of 4.00% convertible notes due 2024	—	—	15,797	—	—	(4,251)	47,241	63,038	—	63,038
Investment in subsidiaries	—	—	—	—	—	—	—	—	675	675
Stock-based compensation	261	—	5,025	—	—	—	—	5,025	240	5,265
Balance, December 31, 2022	62,101	\$ 62	\$ 1,110,151	\$ (142,417)	\$ (26,591)	2,805	\$ (31,174)	\$ 910,031	\$ 151,035	\$ 1,061,066

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Year Ended December 31,		
	2022	2021	2020
Cash flows from operating activities:			
Net loss	\$ (103,377)	\$ (44,146)	\$ (89,654)
Adjustments to reconcile net loss to net cash provided by operating activities:			
Depreciation and amortization	92,698	91,952	78,244
Amortization of debt issuance costs and non-cash interest expense	3,894	8,402	22,500
Loss (gain) on the sale of assets, net	—	(29,601)	21,464
Inventory lower of cost or net realizable value adjustment	12,323	—	—
Loss on extinguishment of debt	419	32,645	—
Goodwill impairment	—	—	24,091
Deferred income taxes	4,515	1,233	(13,336)
Stock-based compensation	9,071	6,058	7,915
Income from equity method investees, net of income taxes	(71)	(700)	(21,093)
Distribution from equity method investees, net of income taxes	637	1,500	27,910
Other	(786)	1,590	—
Changes in operating assets and liabilities before effects of business combinations and dispositions:			
Accounts receivable	8,519	(64,095)	57,060
Inventories	(23,435)	(20,543)	(21,632)
Derivative financial instruments	(7,145)	6,808	1,274
Prepaid expenses and other assets	(3,354)	(578)	(2,105)
Accounts payable and accrued liabilities	75,311	17,189	(22,772)
Current income taxes	841	(699)	30,073
Other	(351)	(2,769)	(1,044)
Net cash provided by operating activities	<u>69,709</u>	<u>4,246</u>	<u>98,895</u>
Cash flows from investing activities:			
Purchases of property and equipment, net	(212,366)	(187,195)	(110,579)
Purchases of marketable securities	—	(124,859)	—
Proceeds from the sale of marketable securities	124,523	—	—
Proceeds from the sale of assets, net	—	87,217	39,952
Disposition of equity method investees	—	(2,948)	80,500
Acquisition of businesses, net of cash acquired	—	—	(21,325)
Investment in equity method investees, net	(17,156)	—	—
Other investing activities	(253)	(8,500)	—
Net cash used in investing activities	<u>(105,252)</u>	<u>(236,285)</u>	<u>(11,452)</u>
Cash flows from financing activities:			
Proceeds from the issuance of long-term debt	45,000	367,701	33,000
Payments of principal on long-term debt	(1,751)	(188,700)	(12,987)
Proceeds from short-term borrowings	1,863,315	3,473,541	2,392,258
Payments on short-term borrowings	(1,898,414)	(3,445,634)	(2,468,485)
Payments on extinguishment of convertible debt	(1,766)	(20,861)	—
Payments for repurchase of common stock	—	—	(11,479)
Payments of cash dividends and distributions	(22,555)	(9,251)	(9,675)
Proceeds from issuance of common stock, net	—	355,978	—
Payments of loan fees	(2,522)	(9,195)	(3,873)
Payments related to tax withholdings for stock-based compensation	(3,806)	(4,671)	(1,288)
Other financing activities	(2,641)	(720)	—
Net cash provided by (used in) financing activities	<u>(25,140)</u>	<u>518,188</u>	<u>(82,529)</u>
Net change in cash, cash equivalents and restricted cash	(60,683)	286,149	4,914
Cash, cash equivalents and restricted cash, beginning of period	560,959	274,810	269,896
Cash, cash equivalents and restricted cash, end of period	<u>\$ 500,276</u>	<u>\$ 560,959</u>	<u>\$ 274,810</u>

Continued on the following page

GREEN PLAINS INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

Continued from the previous page

	Year Ended December 31,		
	2022	2021	2020
Reconciliation of total cash, cash equivalents and restricted cash:			
Cash and cash equivalents	\$ 444,661	\$ 426,220	\$ 233,860
Restricted cash	55,615	134,739	40,950
Total cash, cash equivalents and restricted cash	<u>\$ 500,276</u>	<u>\$ 560,959</u>	<u>\$ 274,810</u>
Non-cash financing activity:			
Exchange of 4.00% convertible notes due 2024 for shares of common stock held in treasury stock	<u>\$ 64,000</u>	<u>\$ 51,000</u>	<u>\$ —</u>
Exchange of 4.125% convertible notes due 2022 for shares of common stock held in treasury stock	<u>\$ 32,550</u>	<u>\$ —</u>	<u>\$ —</u>
Supplemental investing activities:			
Assets acquired in acquisitions, net of cash	\$ —	\$ 9,000	\$ 42,443
Less: liabilities assumed	—	—	(14,451)
Less: noncontrolling interests assumed	—	(4,500)	(6,667)
Net assets acquired	<u>\$ —</u>	<u>\$ 4,500</u>	<u>\$ 21,325</u>
Assets disposed of in sale	\$ —	\$ 54,626	\$ 67,711
Less: liabilities relinquished	—	(3,706)	(6,234)
Net assets disposed	<u>\$ —</u>	<u>\$ 50,920</u>	<u>\$ 61,477</u>
Supplemental disclosures of cash flow:			
Cash paid (refunded) for income taxes, net	<u>\$ 583</u>	<u>\$ 1,479</u>	<u>\$ (60,587)</u>
Cash paid for interest	<u>\$ 30,889</u>	<u>\$ 29,369</u>	<u>\$ 23,300</u>
Capital expenditures in accounts payable	<u>\$ 17,140</u>	<u>\$ 11,948</u>	<u>\$ 4,494</u>
Cash premium paid for extinguishment of convertible notes	<u>\$ —</u>	<u>\$ 20,861</u>	<u>\$ —</u>

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. BASIS OF PRESENTATION AND DESCRIPTION OF BUSINESS

References to the Company

References to “Green Plains” or the “company” in the consolidated financial statements and in these notes to the consolidated financial statements refer to Green Plains Inc., an Iowa corporation, and its subsidiaries.

Consolidated Financial Statements

The consolidated financial statements include the company’s accounts and all significant intercompany balances and transactions are eliminated. Unconsolidated entities are included in the financial statements on an equity basis. As of December 31, 2022, the company owns a 48.8% limited partner interest and a 2.0% general partner interest in Green Plains Partners LP. Public investors own the remaining 49.2% limited partner interest in the partnership. The company determined that the limited partners in the partnership with equity at risk lack the power, through voting rights or similar rights, to direct the activities that most significantly impact partnership’s economic performance; therefore, the partnership is considered a variable interest entity. The company, through its ownership of the general partner interest in the partnership, has the power to direct the activities that most significantly affect economic performance and is obligated to absorb losses and has the right to receive benefits that could be significant to the partnership. Therefore, the company is considered the primary beneficiary and consolidates the partnership in the company’s financial statements. The assets of the partnership cannot be used by the company for general corporate purposes. The partnership’s consolidated total assets as of December 31, 2022 and 2021, excluding intercompany balances, are \$108.7 million and \$100.3 million, respectively, and primarily consist of cash and cash equivalents, property and equipment, operating lease right-of-use assets and goodwill. The partnership’s consolidated total liabilities as of December 31, 2022 and 2021, excluding intercompany balances, are \$119.5 million and \$111.4 million, respectively, which primarily consist of long-term debt as discussed in *Note 12 – Debt* and operating lease liabilities. The liabilities recognized as a result of consolidating the partnership do not represent additional claims on our general assets.

On October 1, 2020, the company sold its remaining 50% joint venture interest in GPCC, which resulted in a reduction in investment in equity method investees of \$69.7 million as a result of removal of the equity method investment in GPCC, and a reduction in accumulated other comprehensive income (loss) of \$10.7 million as a result of the removal of the company’s share of equity method investees accumulated other comprehensive loss. See *Note 5 - Acquisitions and Dispositions* and *Note 20 – Equity Method Investments* for further details.

The company also owns a majority interest in FQT, with their results being consolidated in our consolidated financial statements.

Use of Estimates in the Preparation of Consolidated Financial Statements

The preparation of consolidated financial statements in conformity with GAAP requires management to make certain estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the consolidated financial statements, and the reported amounts of revenues and expenses during the reporting period. The company bases its estimates on historical experience and assumptions it believes are proper and reasonable under the circumstances and regularly evaluates the appropriateness of its estimates and assumptions. Actual results could differ from those estimates. Certain accounting policies, including but not limited to those relating to impairment of goodwill, derivative financial instruments, accounting for income taxes, are impacted significantly by judgments, assumptions and estimates used in the preparation of the consolidated financial statements.

Description of Business

The company operates within three operating segments: (1) ethanol production, which includes the production of ethanol, distillers grains, and renewable corn oil, (2) agribusiness and energy services, which includes grain handling and storage, commodity marketing and merchant trading for company-produced and third-party ethanol, distillers grains, renewable corn oil, natural gas and other commodities and (3) partnership, which includes fuel storage and transportation services.

Ethanol Production Segment. The company is one of the largest ethanol producers in North America. The company operates eleven ethanol plants in six states through separate wholly owned operating subsidiaries. The company's ethanol plants use a dry mill process to produce ethanol and co-products such as wet, modified wet or dried distillers grains and renewable corn oil. At capacity, the company expects to process approximately 330 million bushels of corn and produce approximately 958 million gallons of ethanol, 2.7 million tons of distillers grains and 310 million pounds of renewable corn oil annually.

Agribusiness and Energy Services Segment. The company owns and operates grain handling and storage assets through its agribusiness and energy services segment, which has grain storage capacity of approximately 25.3 million bushels at the company's ethanol plants. The company's agribusiness operations provide synergies with the ethanol production segment as it supplies a portion of the feedstock needed to produce ethanol. The company has an in-house marketing business that is responsible for the sale, marketing and distribution of all ethanol, distillers grains, and renewable corn oil produced at its ethanol plants. The company also purchases and sells ethanol, distillers grains, renewable corn oil, grain, natural gas and other commodities and participates in other merchant trading activities in various markets.

Partnership Segment. The company's partnership segment provides fuel storage and transportation services by owning, operating, developing and acquiring ethanol and fuel storage tanks, terminals, transportation assets and other related assets and businesses. As of December 31, 2022, the partnership owns (i) 27 ethanol storage facilities located at or near the company's eleven ethanol plants, which have the ability to efficiently and effectively store and load railcars and tanker trucks with all of the ethanol produced at the company's ethanol plants, (ii) two fuel terminal facilities, located near major rail lines, which enable the partnership to receive, store and deliver fuels from and to markets that seek access to renewable fuels, and (iii) transportation assets, including a leased railcar fleet of approximately 2,500 railcars which is utilized to transport ethanol from the company's ethanol plants to refineries throughout the United States and international export terminals.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Cash and Cash Equivalents

Cash and cash equivalents includes bank deposits as well as short-term, highly liquid investments with original maturities of three months or less.

Restricted Cash

The company has restricted cash, which can only be used for funding letters of credit, for payment towards a credit agreement, or for capital expenditures as specified in certain credit facility agreements. Restricted cash also includes cash margins and securities pledged to commodity exchange clearinghouses and at times, funds in escrow related to acquisition and disposition activities. To the degree these segregated balances are cash and cash equivalents, they are considered restricted cash on the consolidated balance sheets.

Marketable Securities

Marketable securities include highly liquid, fixed maturity investments with original maturities ranging from three to twelve months and are carried at amortized cost, reflecting the ability and intent to hold the securities to maturity.

Revenue Recognition

The company recognizes revenue when obligations under the terms of a contract with a customer are satisfied. Generally this occurs with the transfer of control of products or services. Revenue is measured as the amount of consideration expected to be received in exchange for transferring goods or providing services. Sales, value add, and other taxes the company collects concurrent with revenue-producing activities are excluded from revenue.

Sales of ethanol, distillers grains, renewable corn oil, natural gas and other commodities by the company's marketing business are recognized when obligations under the terms of a contract with a customer are satisfied. Generally, this occurs with the transfer of control of products or services. Revenues related to marketing for third parties are presented on a gross basis as the company controls the product prior to the sale to the end customer, takes title of the product and has inventory risk. Unearned revenue is recorded for goods in transit when the company has received payment but control has not yet been transferred to the customer. Revenues for receiving, storing, transferring and transporting ethanol and other fuels are recognized when the product is delivered to the customer.

The company routinely enters into physical-delivery energy commodity purchase and sale agreements. At times, the company settles these transactions by transferring its obligations to other counterparties rather than delivering the physical commodity. Revenues include net gains or losses from derivatives related to products sold while cost of goods sold includes net gains or losses from derivatives related to commodities purchased. Revenues also include realized gains and losses on related derivative financial instruments and reclassifications of realized gains and losses on cash flow hedges from accumulated other comprehensive income or loss.

Sales of products, including agricultural commodities, are recognized when control of the product is transferred to the customer, which depends on the agreed upon shipment or delivery terms. Revenues related to grain merchandising are presented gross and include shipping and handling, which is also a component of cost of goods sold. Revenues from grain storage are recognized over time as the services are rendered.

A substantial portion of the partnership revenues are derived from fixed-fee commercial agreements for storage, terminal or transportation services. The partnership recognizes revenue upon transfer of control of product from its storage tanks and fuel terminals, when railcar volumetric capacity is provided, and as truck transportation services are performed. To the extent shortfalls associated with minimum volume commitments in the previous four quarters continue to exist, volumes in excess of the minimum volume commitment are applied to those shortfalls. Remaining excess volumes generating operating lease revenue are recognized as incurred.

Shipping and Handling Costs

The company accounts for shipping and handling activities related to contracts with customers as costs to fulfill its promise to transfer the associated products. Accordingly, the company records customer payments associated with shipping and handling costs as a component of revenue, and classifies such costs as a component of cost of goods sold.

Cost of Goods Sold

Cost of goods sold includes materials, direct labor, shipping and plant overhead costs. Materials include the cost of corn feedstock, denaturant, and process chemicals. Corn feedstock costs include gains and losses on related derivative financial instruments not designated as cash flow hedges, inbound freight charges, inspection costs and transfer costs, as well as reclassifications of gains and losses on cash flow hedges from accumulated other comprehensive income or loss. Direct labor includes all compensation and related benefits of non-management personnel involved in ethanol production. Shipping costs incurred by the company, including railcar costs, are also reflected in cost of goods sold. Plant overhead consists primarily of plant utilities, repairs and maintenance and outbound freight charges.

The company uses exchange-traded futures and options contracts and forward purchase and sale contracts to attempt to minimize the effect of price changes on ethanol, grain and natural gas. Exchange-traded futures and options contracts are valued at quoted market prices and settled predominantly in cash. The company is exposed to loss when counterparties default on forward purchase and sale contracts. Grain inventories held for sale and forward purchase and sale contracts are valued at market prices when available or other market quotes adjusted for basis differences, primarily in transportation, between the exchange-traded market and local market where the terms of the contract is based. Changes in forward purchase contracts and exchange-traded futures and options contracts are recognized as a component of cost of goods sold.

Operations and Maintenance Expenses

In the partnership segment, transportation expenses represent the primary component of operations and maintenance expenses. Transportation expenses include railcar leases, freight and shipping of the company's ethanol and co-products, as well as costs incurred storing ethanol at destination terminals.

Derivative Financial Instruments

The company uses various derivative financial instruments, including exchange-traded futures and exchange-traded and over-the-counter options contracts, to attempt to minimize risk and the effect of commodity price changes including but not limited to, corn, ethanol, natural gas and other agricultural and energy products. The company monitors and manages this exposure as part of its overall risk management policy to reduce the adverse effect market volatility may have on its operating results. The company may hedge these commodities as one way to mitigate risk; however, there may be situations when these hedging activities themselves result in losses.

By using derivatives to hedge exposures to changes in commodity prices, the company is exposed to credit and market risk. The company's exposure to credit risk includes the counterparty's failure to fulfill its performance obligations under the terms of the derivative contract. The company minimizes its credit risk by entering into transactions with high quality counterparties, limiting the amount of financial exposure it has with each counterparty and monitoring their financial condition. Market risk is the risk that the value of the financial instrument might be adversely affected by a change in commodity prices or interest rates. The company manages market risk by incorporating parameters to monitor exposure within its risk management strategy, which limits the types of derivative instruments and strategies the company can use and the degree of market risk it can take using derivative instruments.

Forward contracts are recorded at fair value unless the contracts qualify for, and the company elects, normal purchase or sale exceptions. Changes in fair value are recorded in operating income unless the contracts qualify for, and the company elects, cash flow hedge accounting treatment.

Certain qualifying derivatives related to ethanol production and agribusiness and energy services are designated as cash flow hedges. The company evaluates the derivative instrument to ascertain its effectiveness prior to entering into cash flow hedges. Unrealized gains and losses are reflected in accumulated other comprehensive income or loss until the gain or loss from the underlying hedged transaction is realized and the physical transaction is completed. When it becomes probable a forecasted transaction will not occur, the cash flow hedge treatment is discontinued, which affects earnings. These derivative financial instruments are recognized in current assets or current liabilities at fair value.

At times, the company hedges its exposure to changes in inventory values and designates qualifying derivatives as fair value hedges. The carrying amount of the hedged inventory is adjusted in the current period for changes in fair value. Estimated fair values carried at market are based on exchange-quoted prices, adjusted as appropriate for regional location basis values which represent differences in local markets including transportation as well as quality or grade differences. Basis values are generally determined using inputs from broker quotations or other market transactions. However, a portion of the value may be derived using unobservable inputs. Ineffectiveness of the hedges is recognized in the current period to the extent the change in fair value of the inventory is not offset by the change in fair value of the derivative.

Concentrations of Credit Risk

The company is exposed to credit risk resulting from the possibility that another party may fail to perform according to the terms of the company's contract. The company sells ethanol, renewable corn oil and distillers grains and markets products for third parties, which can result in concentrations of credit risk from a variety of customers, including major integrated oil companies, large independent refiners, petroleum wholesalers and other marketers. The company also sells grain to large commercial buyers, including other ethanol plants. Although payments are typically received within fifteen days of the sale, the company continually monitors its exposure. The company is also exposed to credit risk on prepayments of undelivered inventories with a few major suppliers of petroleum products and agricultural inputs.

The company has master netting arrangements with various counterparties. On the consolidated balance sheets, the associated net amount for each counterparty is reflected as either an accounts receivable or accounts payable. If the amount for each counterparty were reflected on a gross basis, the company's accounts receivable and accounts payable would increase by \$12.7 million and \$7.8 million at December 31, 2022 and 2021, respectively.

Inventories

Corn held for ethanol production, ethanol, renewable corn oil, Ultra-High Protein and distillers grains inventories are recorded at the lower of average cost or net realizable value, except grain held for sale and fair-value hedged inventories.

Other grain inventories include readily marketable grain, forward contracts to buy and sell grain, and exchange traded futures and option contracts, which are all stated at market value. All grain inventories held for sale are marked to market. Changes are reflected in cost of goods sold. The forward contracts require performance in future periods. Contracts to purchase grain generally relate to current or future crop years for delivery periods quoted by regulated commodity exchanges. Contracts for the sale of grain to processors or other consumers generally do not extend beyond one year. The terms of the purchase and sale agreements for grain are consistent with industry standards. Raw materials and finished goods inventories are valued at the lower of average cost or net realizable value.

Property and Equipment

Property and equipment are stated at cost less accumulated depreciation. Depreciation is generally calculated using the straight-line method over the following estimated useful life of the assets:

	Years
Buildings and improvements	10-40
Plant equipment	15-40
Other machinery and equipment	5-7
Land improvements	20-30
Railroad track and equipment	20-30
Computer hardware and software	3-5
Office furniture and equipment	5-7

Property and equipment is capitalized at cost. Land improvements, interest incurred during construction and other property improvements are capitalized and depreciated. Betterment of property assets are those that extend the useful life, increase the capacity or improve the operating efficiency or improve the safety of our operations. Costs of repairs and normal maintenance are charged to expense when incurred. The company periodically evaluates whether events and circumstances have occurred that warrant a revision of the estimated useful life of its fixed assets.

Intangible Assets

Our intangible assets consist primarily of customer relationships, intellectual property, research and development technology and licenses. These intangible assets were capitalized at fair market value and are being amortized over their estimated useful lives.

Impairment of Long-Lived Assets

The company reviews its long-lived assets, currently consisting of property and equipment, operating lease right-of-use assets, intangible assets and equity method investments, for impairment whenever events or changes in circumstances indicate the carrying amount of the asset may not be recoverable. Recoverability of assets to be held and used is measured by comparison of the carrying amount of an asset to estimated undiscounted future cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated future cash flows, an impairment charge is recognized in the amount by which the carrying amount of the asset exceeds the fair value of the asset. Significant management judgment is required to determine the fair value of our long-lived assets and measure impairment, which includes projected cash flows. Fair value is determined by using various valuation techniques, including discounted cash flow models, sales of comparable properties and third-party independent appraisals. Changes in estimated fair value could result in an impairment of the asset. There were no material impairment charges recorded for the periods reported.

Goodwill

Goodwill is an asset representing the future economic benefits arising from other assets acquired in a business combination that are not individually identified and separately recognized. The determination of goodwill takes into consideration the fair value of net tangible and intangible assets. The company's goodwill is related to certain acquisitions within our ethanol production and partnership segments.

The company is required to perform impairment tests related to goodwill annually, which it performs as of October 1, or if an indicator of impairment occurs. Circumstances that may indicate impairment include a decline in the company's future projected cash flows, a decision to suspend plant operations for an extended period of time, sustained decline in the company's market capitalization or market prices for similar assets or businesses, or a significant adverse change in legal or regulatory matters or business climate. Significant management judgment is required to determine the fair value of goodwill and measure impairment, which include, but are not limited to, market capitalization, prospective financial information, growth rates, discount rates, inflationary factors, and cost of capital. Fair value is determined by using various valuation techniques, including discounted cash flow models, sales of comparable properties and third-party independent appraisals. Changes in estimated fair value could result in a write-down of the asset.

For additional information, please refer to *Note 10 – Goodwill and Intangible Assets*.

Leases

The company leases certain facilities, parcels of land, and equipment. These leases are accounted for as operating leases, with lease expense recognized on a straight-line basis over the lease term. The term of the lease may include options to extend or terminate the lease when it is reasonably certain that such options will be exercised. For leases with initial terms greater than 12 months, the company records operating lease right-of-use assets and corresponding operating lease liabilities. Leases with an initial term of 12 months or less are not recorded on the consolidated balance sheet. The company did not incur any material short-term lease expense for the years ended December 31, 2022, 2021 or 2020.

Operating lease right-of-use assets represent the right to control an underlying asset for the lease term and operating lease liabilities represent the obligation to make lease payments arising from the lease. These assets and liabilities are recognized at the commencement date based on the present value of lease payments over the lease term. As the company's leases do not provide an implicit rate, the incremental borrowing rate is used based on information available at commencement date to determine the present value of future payments.

The company elected to utilize a portfolio approach for lease classification, which allows for an entity to group together leases with similar characteristics provided that its application does not create a material difference when compared to accounting for the leases at a contract level. For railcar leases, the company elected to combine the railcars within each rider and account for each rider as an individual lease.

From a lessee perspective, the company combines both the lease and non-lease components and accounts for them as one lease. Certain of the company's railcar agreements provide for maintenance costs to be the responsibility of the company as incurred or charged by the lessor. This maintenance cost is a non-lease component that the company combines with the monthly rental payment and accounts for the total cost as operating lease expense. In addition, the company has a land lease that contains a non-lease component for the handling and unloading services the landlord provides. The company combines the cost of services with the land lease cost and accounts for the total as operating lease expense.

The partnership segment records the majority of its operating lease revenue from its storage and throughput services, rail transportation services and certain terminal services agreements with Green Plains Trade. In addition, the partnership may sublease certain of its railcars to third parties on a short-term basis. These subleases are classified as operating leases, with the associated sublease revenue recognized on a straight-line basis over the lease term.

Please refer to *Note 17 – Commitments and Contingencies* to the consolidated financial statements for further details on operating lease expense and revenue.

Investments in Equity Method Investees

The company accounts for investments in which the company exercises significant influence using the equity method so long as the company (i) does not control the investee and (ii) is not the primary beneficiary of the entity. The company recognizes these investments as a separate line item in the consolidated balance sheets and its proportionate share of earnings on a separate line item in the consolidated statements of operations. The company's share of equity method investees other comprehensive income arising during the period is included in accumulated other comprehensive loss in the consolidated balance sheet.

The company recognizes losses in the value of equity method investments when there is evidence of an other-than-temporary decrease in value. Evidence of a loss might include, but would not necessarily be limited to, the inability to recover the carrying amount of the investment or the inability of the equity method investee to sustain an earnings capacity that justifies the carrying amount of the investment. The current fair value of an investment that is less than its carrying amount may indicate a loss in value of the investment. The company evaluates equity method investments for impairment if there is evidence an investment may be impaired. Distributions paid to the company from unconsolidated affiliates are classified as operating activities in the consolidated statements of cash flows until the cumulative distributions exceed the company's proportionate share of income from the unconsolidated affiliate since the date of initial investment. The amount of cumulative distributions paid to the company that exceeds the cumulative proportionate share of income in each period represents a return of investment, which is classified as an investing activity in the consolidated statements of cash flows.

Financing Costs

Fees and costs related to securing debt are recorded as financing costs. Debt issuance costs are stated at cost and are amortized using the effective interest method for term loans and the straight-line basis over the life of the agreements for revolving credit arrangements and convertible notes.

Selling, General and Administrative Expenses

Selling, general and administrative expenses consist of various expenses including employee salaries, incentives and benefits; office expenses; director compensation; professional fees for accounting, legal, consulting, and investor relations activities.

Stock-Based Compensation

The company recognizes compensation cost using a fair value based method whereby compensation cost is measured at the grant date based on the value of the award and is recognized over the service period, which is usually the vesting period. The company uses the Black-Scholes pricing model to calculate the fair value of options and warrants issued to both employees and non-employees. Stock issued for compensation is valued using the market price of the stock on the date of the related agreement.

Income Taxes

The provision for income taxes is computed using the asset and liability method, under which deferred tax assets and liabilities are recognized for the expected future tax consequences attributable to temporary differences between the financial reporting carrying amount of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in operating results in the period of enactment. Deferred tax assets are reduced by a valuation allowance when it is more likely than not that some portion or all of the deferred tax assets will not be realized.

The company recognizes uncertainties in income taxes within the financial statements under a process by which the likelihood of a tax position is gauged based upon the technical merits of the position, and then a subsequent measurement relates the maximum benefit and the degree of likelihood to determine the amount of benefit recognized in the financial statements.

Recent Accounting Pronouncements

On January 1, 2021, the company adopted the amended guidance in ASC 470-20, *Debt - Debt with Conversion and Other Options* and ASC 815-40, *Derivatives and Hedging - Contracts in Entity's Own Equity - Accounting for Convertible Instruments and Contracts in an Equity's Own Equity*. The adoption of this guidance resulted in a \$49.5 million decrease in additional paid-in capital, an \$11.4 million increase in retained earnings and a \$38.1 million increase in long-term debt, which included a \$39.4 million increase in debt principal offset by a \$1.3 million increase in debt issuance costs, resulting from amounts previously bifurcated to equity being reclassified to debt. See *Note 15 – Stockholders' Equity* for further details.

In March 2020, the FASB issued amended guidance in ASC 848, *Reference Rate Reform*, and a subsequent update in January 2021 and October 2022, which provides optional expedients and exceptions to U.S. GAAP guidance on contract modifications and hedge accounting to ease the financial reporting burden related to the expected market transition from the LIBOR and other interbank offered rates to alternative reference rates. The expedients and exceptions provided by the amended guidance do not apply to contract modifications made and hedging relationships entered into or evaluated after December 31, 2024, except for hedging relationships existing as of December 31, 2024, that an entity has elected certain optional expedients for and that are retained through the end of the hedging relationship. The guidance is effective upon issuance and to be applied prospectively from any date beginning March 12, 2020 through December 31, 2024. The company does not expect the amended guidance to have a material impact on its hedging relationships nor a material impact on the company's consolidated financial statements.

In December 2019, the FASB issued amended guidance in ASC 740, *Income Taxes - Simplifying the Accounting for Income Taxes*, which simplifies the accounting for income taxes by removing certain exceptions to the general principles in ASC 740. The amendments also improve consistent application of and simplify U.S. GAAP for other areas of ASC 740 by

clarifying and amending existing guidance. The amendments are effective for fiscal years beginning after December 15, 2021, and interim periods within fiscal years beginning after December 15, 2022. The company adopted the amended guidance for the fiscal year-ended December 31, 2022, which had no material impact on its hedging relationships nor a material impact on the company's consolidated financial statements.

3. GREEN PLAINS PARTNERS LP

The partnership is a fee-based master limited partnership formed by Green Plains to provide fuel storage and transportation services by owning, operating, developing and acquiring ethanol and fuel storage tanks, terminals, transportation assets and other related assets and businesses. The partnership's assets currently include (i) 27 ethanol storage facilities, located at or near the company's eleven ethanol plants, which have the ability to efficiently and effectively store and load railcars and tanker trucks with all of the ethanol produced at the company's ethanol plants, (ii) two fuel terminal facilities, located near major rail lines, which enable the partnership to receive, store and deliver fuels from and to markets that seek access to renewable fuels, and (iii) transportation assets, including a leased railcar fleet of approximately 2,500 railcars, which are contracted to transport ethanol from the company's ethanol plants to refineries throughout the United States and international export terminals. The partnership is the company's primary downstream logistics provider to support its approximately 958 mmgy ethanol marketing and distribution business since the partnership's assets are the principal method of storing and delivering the ethanol the company produces.

As of December 31, 2022, the company owns a 48.8% limited partner interest, consisting of 11,586,548 common units, and a 2.0% general partner interest in the partnership. The public owns the remaining 49.2% limited partner interest in the partnership. The partnership is consolidated in the company's financial statements.

A substantial portion of the partnership's revenues are derived from long-term, fee-based commercial agreements with Green Plains Trade, a subsidiary of the company. The partnership's agreements with Green Plains Trade include the following:

- Storage and throughput agreement, expiring on June 30, 2029;
- Rail transportation services agreement, expiring on June 30, 2029;
- Trucking transportation agreement, expiring on May 31, 2023, which is expected to auto-renew;
- Terminal services agreement for the Birmingham, Alabama unit train terminal, expiring December 31, 2023; and
- Terminal services agreement for the Collins, Mississippi terminal, expiring on December 31, 2023.

The partnership's storage and throughput agreement, and certain terminal services agreements, including the terminal services agreement for the Birmingham facility, are supported by minimum volume commitments. The partnership's rail transportation services agreement is supported by minimum take-or-pay capacity commitments. The company also has agreements which establish fees for general and administrative, and operational and maintenance services it provides. These transactions are eliminated when the company consolidates its financial results.

The company consolidates the financial results of the partnership and records a noncontrolling interest in the partnership held by public common unitholders. Noncontrolling interest on the consolidated statements of operations includes the portion of net income attributable to the economic interest held by the partnership's public common unitholders. Noncontrolling interest on the consolidated balance sheets includes the portion of net assets attributable to the partnership's public common unitholders.

4. REVENUE

Revenue Recognition

Revenue is recognized when obligations under the terms of a contract with a customer are satisfied. Generally this occurs with the transfer of control of products or services. Revenue is measured as the amount of consideration expected to be received in exchange for transferring goods or providing services. Sales, value add, and other taxes the company collects concurrent with revenue-producing activities are excluded from revenue.

Revenue by Source

The following tables disaggregate revenue by major source (in thousands):

Twelve Months Ended December 31, 2022					
	Ethanol Production	Agribusiness & Energy Services	Partnership	Eliminations	Total
Revenues:					
Revenues from contracts with customers under ASC 606:					
Ethanol	\$ —	\$ —	\$ —	\$ —	\$ —
Distillers grains	28,634	—	—	—	28,634
Renewable corn oil	—	—	—	—	—
Other	38,132	7,787	4,003	—	49,922
Intersegment revenues	—	229	7,950	(8,179)	—
Total revenues from contracts with customers	66,766	8,016	11,953	(8,179)	78,556
Revenues from contracts accounted for as derivatives under ASC 815 ⁽¹⁾ :					
Ethanol	2,286,886	481,392	—	—	2,768,278
Distillers grains	493,605	45,766	—	—	539,371
Renewable corn oil	195,114	3,954	—	—	199,068
Other	27,821	49,755	—	—	77,576
Intersegment revenues	—	26,732	—	(26,732)	—
Total revenues from contracts accounted for as derivatives	3,003,426	607,599	—	(26,732)	3,584,293
Leasing revenues under ASC 842 ⁽²⁾	—	—	67,814	(67,814)	—
Total Revenues	\$ 3,070,192	\$ 615,615	\$ 79,767	\$ (102,725)	\$ 3,662,849

Twelve Months Ended December 31, 2021					
	Ethanol Production	Agribusiness & Energy Services	Partnership	Eliminations	Total
Revenues:					
Revenues from contracts with customers under ASC 606:					
Ethanol	\$ —	\$ —	\$ —	\$ —	\$ —
Distillers grains	19,535	—	—	—	19,535
Renewable corn oil	—	—	—	—	—
Other	48,361	14,090	4,191	—	66,642
Intersegment revenues	—	—	8,028	(8,028)	—
Total revenues from contracts with customers	67,896	14,090	12,219	(8,028)	86,177
Revenues from contracts accounted for as derivatives under ASC 815 ⁽¹⁾ :					
Ethanol	1,589,649	498,367	—	—	2,088,016
Distillers grains	355,230	40,763	—	—	395,993
Renewable corn oil	113,249	32,528	—	—	145,777
Other	27,344	83,778	—	—	111,122
Intersegment revenues	—	21,958	—	(21,958)	—
Total revenues from contracts accounted for as derivatives	2,085,472	677,394	—	(21,958)	2,740,908
Leasing revenues under ASC 842 ⁽²⁾	—	—	66,233	(66,150)	83
Total Revenues	\$ 2,153,368	\$ 691,484	\$ 78,452	\$ (96,136)	\$ 2,827,168

Twelve Months Ended December 31, 2020

	Ethanol Production	Agribusiness & Energy Services	Partnership	Eliminations	Total
Revenues:					
Revenues from contracts with customers under ASC 606:					
Ethanol	\$ —	\$ —	\$ —	\$ —	\$ —
Distillers grains	32,032	—	—	—	32,032
Renewable corn oil	—	2,938	—	—	2,938
Other	4,306	6,423	4,434	—	15,163
Intersegment revenues	100	4,463	8,411	(12,974)	—
Total revenues from contracts with customers	36,438	13,824	12,845	(12,974)	50,133
Revenues from contracts accounted for as derivatives under ASC 815 ⁽¹⁾ :					
Ethanol	1,150,018	287,261	—	—	1,437,279
Distillers grains	261,554	41,184	—	—	302,738
Renewable corn oil	49,666	33,563	—	—	83,229
Other	4,905	45,034	—	—	49,939
Intersegment revenues	—	23,005	—	(23,005)	—
Total revenues from contracts accounted for as derivatives	1,466,143	430,047	—	(23,005)	1,873,185
Leasing revenues under ASC 842 ⁽²⁾	—	—	70,500	(70,099)	401
Total Revenues	\$ 1,502,581	\$ 443,871	\$ 83,345	\$ (106,078)	\$ 1,923,719

(1) Revenues from contracts accounted for as derivatives represent physically settled derivative sales that are outside the scope of ASC 606.

(2) Leasing revenues do not represent revenues recognized from contracts with customers under ASC 606, and are accounted for under ASC 842, *Leases*.

Major Customer

Revenues from Customer A represented 13% of total revenues for the year ended December 31, 2022, which are recorded within the ethanol production segment. There were no customers that accounted for more than 10% of total revenues for the year ended December 31, 2021. Revenues from Customer B represented 16% of total revenues for the year ended December 31, 2020, which are recorded within the ethanol production segment.

Payment Terms

The company has standard payment terms, which vary depending upon the nature of the services provided, with the majority falling within 10 to 30 days after transfer of control or completion of services. In instances where the timing of revenue recognition differs from the timing of invoicing, the company has determined that contracts generally do not include a significant financing component.

Contract Liabilities

The company records unearned revenue when consideration is received, or such consideration is unconditionally due, from a customer prior to transferring goods or services to the customer under the terms of service and lease agreements. Unearned revenue from service agreements, which represents a contract liability, is recorded for fees that have been charged to the customer prior to the completion of performance obligations. Unearned revenue is generally recognized in the subsequent quarter and is not material to the company. The company expects to recognize all of the unearned revenue associated with service agreements as of December 31, 2022, in the subsequent quarter when the inventory is withdrawn from the partnership's tank storage.

5. ACQUISITIONS AND DISPOSITIONS

ACQUISITIONS

Acquisition of a Majority Interest in FQT

On December 9, 2020, the company acquired a majority interest in FQT. The acquisition capitalized on the core strengths of each company to develop and implement proven, value-added agriculture, food and industrial biotechnology systems and rapidly expand installation of MSCTM technology across the company's facilities, as well as offer these technologies to partnering biofuel facilities.

DISPOSITIONS

Disposition of Ord Ethanol Plant

On March 22, 2021, the company completed the sale of the plant located in Ord, Nebraska and certain related assets, to GreenAmerica Biofuels Ord LLC (the "Ord Transaction") for a sale price of \$64.0 million, plus working capital of \$9.8 million. Correspondingly, the company entered into a separate asset purchase agreement with the Partnership to acquire the storage assets and assign the rail transportation assets to be disposed of in the Ord Transaction for \$27.5 million, which was used to pay down a portion of the partnership's credit facility. The divested assets were reported within the company's ethanol production, agribusiness and energy services and partnership segments. The company recorded a pretax gain on the sale of the Ord plant of \$35.9 million within corporate activities.

The asset and liabilities of the Ord ethanol plant at closing on March 22, 2021 were as follows: (in thousands):

Amounts of Identifiable Assets Disposed and Liabilities Relinquished

Inventory	\$	10,400
Prepaid expenses and other		632
Property and equipment		24,285
Operating lease right-of-use assets		1,811
Accrued and other liabilities		(156)
Operating lease current liabilities		(1,021)
Operating lease long-term liabilities		(790)
Total identifiable net assets disposed	\$	<u>35,161</u>

Disposition of Hereford Ethanol Plant

On December 28, 2020, the company completed the sale of the ethanol plant located in Hereford, Texas, and certain related assets, to Hereford Ethanol Partners, L.P. for the sale price of \$39.0 million, plus working capital. Correspondingly, the partnership's ethanol storage assets located adjacent to such plants were sold to the company for \$10.0 million, and certain railcar operating leases were assigned to Hereford Ethanol Partners, L.P. The divested assets were reported within the company's ethanol production, agribusiness and energy and partnership segments. The company recorded a pretax loss on the sale of the ethanol plant of \$22.4 million, of which a loss of \$18.5 million was recorded within corporate activities and a loss of \$3.9 million was recorded within the ethanol production segment. Transaction fees related to the disposal were not material. The agreement contains certain earn-out provisions to be received from the buyers if certain provisions are met. The company will record any contingent amounts in the consolidated financial statements when the amount is reasonably determinable or the consideration is realized.

The asset and liabilities of the Hereford ethanol plant at closing on December 28, 2020 were as follows: (in thousands):

Amounts of Identifiable Assets Disposed and Liabilities Relinquished

Inventory	\$	8,140
Prepaid expenses and other		196
Property and equipment		54,279
Operating lease right-of-use-assets		5,096
Accrued and other liabilities		(870)
Operating lease current liabilities		(977)
Operating lease long-term liabilities		(4,201)
Long-term liabilities		(186)
Total identifiable net assets disposed	\$	<u>61,477</u>

Disposition of Equity Interest in Green Plains Cattle Company LLC

On October 1, 2020, pursuant to the Securities Purchase Agreement, the company sold its remaining 50% joint venture interest in GPCC to AGR, TGAM Agribusiness Fund LP and StepStone (the “Buyers”) for \$80.5 million in cash, plus closing adjustments. The transaction resulted in a reduction in other assets of \$69.7 million as a result of the removal of the equity method investment in GPCC, and a reduction in accumulated other comprehensive loss of \$10.7 million as a result of the removal of the company’s share of equity method investees accumulated other comprehensive loss. Transaction fees related to the disposal were not material. The Securities Purchase Agreement contained certain earn-out provisions of up to \$4.0 million to be paid to the Buyers if certain EBITDA thresholds are met. During the year ended December 31, 2021, the company recorded a loss of \$2.9 million associated with the earn-out provision.

6. FAIR VALUE DISCLOSURES

The following methods, assumptions and valuation techniques were used in estimating the fair value of the company’s financial instruments:

Level 1 – unadjusted quoted prices in active markets for identical assets or liabilities the company can access at the measurement date.

Level 2 – directly or indirectly observable inputs such as quoted prices for similar assets or liabilities in active markets other than quoted prices included within Level 1, quoted prices for identical or similar assets in markets that are not active, and other inputs that are observable or can be substantially corroborated by observable market data through correlation or other means. Grain inventories held for sale in the agribusiness and energy services segment as well as forward commodity purchase and sale contracts are valued at nearby futures values, plus or minus nearby basis values, which represent differences in local markets including transportation or commodity quality or grade differences.

Level 3 – unobservable inputs that are supported by little or no market activity and comprise a significant component of the fair value of the assets or liabilities. The company currently does not have any recurring Level 3 financial instruments.

Derivative contracts include exchange-traded commodity futures and options contracts and forward commodity purchase and sale contracts. Exchange-traded futures and options contracts are valued based on unadjusted quoted prices in active markets and are classified in Level 1. The majority of the company’s exchange-traded futures and options contracts are cash-settled on a daily basis.

There have been no changes in valuation techniques and inputs used in measuring fair value. The company's assets and liabilities by level are as follows (in thousands):

Fair Value Measurements at December 31, 2022			
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Total
Assets:			
Cash and cash equivalents	\$ 444,661	\$ —	\$ 444,661
Restricted cash	55,615	—	55,615
Inventories carried at market	—	61,885	61,885
Derivative financial instruments - assets	—	16,420	16,420
Other assets	110	1	111
Total assets measured at fair value	<u>\$ 500,386</u>	<u>\$ 78,306</u>	<u>\$ 578,692</u>
Liabilities:			
Accounts payable ⁽¹⁾	\$ —	\$ 31,925	\$ 31,925
Accrued and other liabilities ⁽²⁾	—	1,909	1,909
Derivative financial instruments - liabilities	—	44,686	44,686
Other liabilities ⁽²⁾	—	6,640	6,640
Total liabilities measured at fair value	<u>\$ —</u>	<u>\$ 85,160</u>	<u>\$ 85,160</u>

Fair Value Measurements at December 31, 2021			
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Total
Assets:			
Cash and cash equivalents	\$ 426,220	\$ —	\$ 426,220
Restricted cash	134,739	—	134,739
Inventories carried at market	—	72,320	72,320
Derivative financial instruments - assets	—	26,738	26,738
Other assets	111	8	119
Total assets measured at fair value	<u>\$ 561,070</u>	<u>\$ 99,066</u>	<u>\$ 660,136</u>
Liabilities:			
Accounts payable ⁽¹⁾	\$ —	\$ 12,617	\$ 12,617
Accrued and other liabilities ⁽²⁾	—	3,260	3,260
Derivative financial instruments - liabilities	—	26,117	26,117
Other liabilities ⁽²⁾	—	7,788	7,788
Total liabilities measured at fair value	<u>\$ —</u>	<u>\$ 49,782</u>	<u>\$ 49,782</u>

- (1) Accounts payable is generally stated at historical amounts with the exception of \$31.9 million and \$12.6 million at December 31, 2022 and 2021, respectively, related to certain delivered inventory for which the payable fluctuates based on changes in commodity prices. These payables are hybrid financial instruments for which the company has elected the fair value option.
- (2) As of December 31, 2022 and 2021, respectively, accrued and other liabilities includes \$1.9 million and \$3.3 million and other liabilities includes \$6.6 million and \$7.6 million of consideration related to potential earn-out payments recorded at fair value.

The fair value of the company's debt was approximately \$654.5 million compared with a book value of \$634.8 million at December 31, 2022. The fair value of the company's debt was approximately \$891.1 million compared with a book value of \$722.7 million at December 31, 2021. The company estimated the fair value of its outstanding debt using Level 2 inputs. The company believes the fair value of its marketable securities approximated book value, which was \$124.9 million at December 31, 2021. The company believes the fair value of its accounts receivable approximated book value, which was \$108.6 million and \$120.0 million, respectively, at December 31, 2022 and 2021.

Although the company currently does not have any recurring Level 3 financial measurements, the fair values of tangible assets and goodwill acquired represent Level 3 measurements which were derived using a combination of the income approach, market approach and cost approach for the specific assets or liabilities being valued.

7. SEGMENT INFORMATION

The company reports the financial and operating performance for the following three operating segments: (1) ethanol production, which includes the production of ethanol, distillers grains, Ultra-High Protein and renewable corn oil, (2) agribusiness and energy services, which includes grain handling and storage, commodity marketing and merchant trading for company-produced and third-party ethanol, distillers grains, renewable corn oil, natural gas and other commodities, and (3) partnership, which includes fuel storage and transportation services.

Corporate activities include selling, general and administrative expenses, consisting primarily of compensation, professional fees and overhead costs not directly related to a specific operating segment.

During the normal course of business, the operating segments conduct business with each other. For example, the agribusiness and energy services segment procures grain and natural gas and sells products, including ethanol, distillers grains, Ultra-High Protein and renewable corn oil for the ethanol production segment. The partnership segment provides fuel storage and transportation services for the ethanol production segment. These intersegment activities are treated like third-party transactions with origination, marketing and storage fees charged at estimated market values. Consequently, these transactions affect segment performance; however, they do not impact the company's consolidated results since the revenues and corresponding costs are eliminated.

The following tables set forth certain financial data for the company's operating segments (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Revenues:			
Ethanol production:			
Revenues from external customers	\$ 3,070,192	\$ 2,153,368	\$ 1,502,481
Intersegment revenues	—	—	100
Total segment revenues	<u>3,070,192</u>	<u>2,153,368</u>	<u>1,502,581</u>
Agribusiness and energy services:			
Revenues from external customers	588,654	669,526	416,403
Intersegment revenues	26,961	21,958	27,468
Total segment revenues	<u>615,615</u>	<u>691,484</u>	<u>443,871</u>
Partnership:			
Revenues from external customers	4,003	4,274	4,835
Intersegment revenues	75,764	74,178	78,510
Total segment revenues	<u>79,767</u>	<u>78,452</u>	<u>83,345</u>
Revenues including intersegment activity	3,765,574	2,923,304	2,029,797
Intersegment eliminations	<u>(102,725)</u>	<u>(96,136)</u>	<u>(106,078)</u>
	<u>\$ 3,662,849</u>	<u>\$ 2,827,168</u>	<u>\$ 1,923,719</u>

Refer to *Note 4 – Revenue*, for further disaggregation of revenue by operating segment.

	Year Ended December 31,		
	2022	2021	2020
Cost of goods sold:			
Ethanol production	\$ 3,068,366	\$ 2,063,283	\$ 1,507,335
Agribusiness and energy services	562,950	657,375	409,407
Intersegment eliminations	(106,305)	(95,549)	(104,579)
	<u>\$ 3,525,011</u>	<u>\$ 2,625,109</u>	<u>\$ 1,812,163</u>

	Year Ended December 31,		
	2022	2021	2020
Gross margin:			
Ethanol production	\$ 1,826	\$ 90,085	\$ (4,754)
Agribusiness and energy services	52,665	34,109	34,464
Partnership	79,767	78,452	83,345
Intersegment eliminations	3,580	(587)	(1,499)
	<u>\$ 137,838</u>	<u>\$ 202,059</u>	<u>\$ 111,556</u>

	Year Ended December 31,		
	2022	2021	2020
Operating income (loss):			
Ethanol production ⁽¹⁾	\$ (117,764)	\$ (27,996)	\$ (129,618)
Agribusiness and energy services	36,415	17,458	15,773
Partnership	47,699	48,672	50,437
Intersegment eliminations	3,580	(587)	(1,400)
Corporate activities ⁽²⁾	(68,878)	(12,039)	(57,888)
	<u>\$ (98,948)</u>	<u>\$ 25,508</u>	<u>\$ (122,696)</u>

- (1) Operating loss for ethanol production includes an inventory lower of cost or net realizable value adjustment of \$12.3 million for the year-ended December 31, 2022, and a goodwill impairment charge of \$24.1 million and \$3.9 million loss on sale of assets from the sale of the Hereford, Texas ethanol plant for the year-ended December 31, 2020.
- (2) Corporate activities for the year-ended December 31, 2021 include a \$29.6 million net gain on sale of assets primarily from the sale of the Ord, Nebraska ethanol plant. Corporate activities for the year-ended December 31, 2020 include an \$18.5 million loss on sale of assets from the sale of the Hereford, Texas ethanol plant and a \$1.5 million net gain from sale of GPCC.

	Year Ended December 31,		
	2022	2021	2020
Depreciation and amortization:			
Ethanol production	\$ 81,545	\$ 82,969	\$ 67,956
Agribusiness and energy services	3,466	2,535	2,512
Partnership	4,093	3,737	3,806
Corporate activities	3,594	2,711	3,970
	<u>\$ 92,698</u>	<u>\$ 91,952</u>	<u>\$ 78,244</u>

	Year Ended December 31,		
	2022	2021	2020
Capital expenditures:			
Ethanol production	\$ 210,256	\$ 181,731	\$ 109,970
Agribusiness and energy services	1,647	2,896	1,195
Partnership	641	668	162
Corporate activities	75	1,976	472
	<u>\$ 212,619</u>	<u>\$ 187,271</u>	<u>\$ 111,799</u>

The following table sets forth total assets by operating segment (in thousands):

	Year Ended December 31,	
	2022	2021
Total assets ⁽¹⁾ :		
Ethanol production	\$ 1,157,791	\$ 1,101,151
Agribusiness and energy services	489,083	487,164
Partnership	108,680	100,349
Corporate assets	386,437	524,206
Intersegment eliminations	(18,860)	(53,115)
	<u>\$ 2,123,131</u>	<u>\$ 2,159,755</u>

(1) Asset balances by segment exclude intercompany balances.

8. INVENTORIES

Inventories are carried at the lower of cost or net realizable value, except fair-value hedged inventories. As of December 31, 2022, the company recorded a \$12.3 million lower of cost or net realizable value inventory adjustment associated with finished goods in cost of goods within the ethanol production segment. There was no lower of cost or net realizable value inventory adjustment as of December 31, 2021.

The components of inventories are as follows (in thousands):

	December 31,	
	2022	2021
Finished goods	\$ 97,719	\$ 91,448
Commodities held for sale	61,885	72,320
Raw materials	55,983	50,604
Work-in-process	18,499	19,783
Supplies and parts	44,864	33,683
	<u>\$ 278,950</u>	<u>\$ 267,838</u>

9. PROPERTY AND EQUIPMENT

The components of property and equipment are as follows (in thousands):

	December 31,	
	2022	2021
Plant equipment	\$ 1,089,890	\$ 1,000,820
Buildings and improvements	186,391	180,713
Land and improvements	90,944	83,403
Railroad track and equipment	33,136	32,971
Construction-in-progress	207,366	111,745
Computer hardware and software	21,312	19,927
Office furniture and equipment	3,512	3,356
Leasehold improvements and other	29,074	27,609
Total property and equipment	1,661,625	1,460,544
Less: accumulated depreciation and amortization	(632,298)	(567,027)
Property and equipment, net	<u>\$ 1,029,327</u>	<u>\$ 893,517</u>

Interest capitalized during the years ended December 31, 2022, 2021 and 2020 totaled \$11.3 million, \$7.3 million and \$1.8 million, respectively.

10. GOODWILL AND INTANGIBLE ASSETS

Goodwill

The company has two reporting units, to which goodwill was assigned. We are required to perform impairment tests related to our goodwill annually, which we perform as of October 1, or if an indicator of impairment occurs. The company and the partnership performed their annual goodwill assessments as of October 1, 2022 and 2021 using qualitative assessments, which resulted in no indication of goodwill impairment.

During 2020, as a result of the COVID-19 outbreak and the subsequent decline in the company's stock price causing a decline in market capitalization, the company determined a triggering event had occurred that required an impairment assessment for its ethanol production reporting unit. Based on the company's quantitative evaluation, it determined that the fair value of the ethanol production reporting unit did not exceed its carrying value. As a result, the company concluded that the goodwill assigned to the ethanol production reporting unit was impaired and recorded a non-cash impairment charge of \$24.1 million.

Changes in the carrying amount of goodwill attributable to each business segment during the years ended December 31, 2022 and 2021 were as follows (in thousands):

	Ethanol Production	Partnership	Total
Balance, December 31, 2020	\$ —	\$ 10,598	\$ 10,598
FQT acquisition	18,534	—	18,534
Balance, December 31, 2021 ⁽¹⁾	<u>18,534</u>	<u>10,598</u>	<u>29,132</u>
Balance, December 31, 2022 ⁽¹⁾	<u>\$ 18,534</u>	<u>\$ 10,598</u>	<u>\$ 29,132</u>

(1) The company records goodwill within other assets on the consolidated balance sheets.

Intangible Assets

The company recognized certain intangible assets in connection with the FQT acquisition during the fourth quarter of 2020. The components of the FQT intangible assets are as follows (in thousands):

	December 31,	
	2022	2021
Customer relationships and backlog	\$ 17,628	\$ 17,628
Intellectual property	9,700	9,700
Trade name	1,300	1,300
Total	28,628	28,628
Accumulated amortization	(10,640)	(5,877)
Total FQT intangible assets, net	<u>\$ 17,988</u>	<u>\$ 22,751</u>
Weighted average remaining amortization period	11.0 years	11.5 years

The company recognized \$4.8 million, \$5.7 million, and \$0.2 million of amortization expense associated with these intangible assets during the years ended December 31, 2022, 2021, 2020, respectively. The company expects estimated amortization expense of \$2.8 million, \$2.5 million, \$2.2 million, \$2.0 million and \$0.8 million, respectively, for the years ended December 31, 2023, 2024, 2025, 2026 and 2027, as well as \$7.7 million thereafter. The company's intangible assets are recorded within other assets on the consolidated balance sheets.

11. DERIVATIVE FINANCIAL INSTRUMENTS

At December 31, 2022, the company's consolidated balance sheet reflected unrealized losses of \$26.6 million, net of tax, in accumulated other comprehensive loss. The company expects these items will be reclassified as operating income (loss) over the next 12 months as a result of hedged transactions that are forecasted to occur. The amount realized in operating income will differ as commodity prices change.

Fair Values of Derivative Instruments

The fair values of the company's derivative financial instruments and the line items on the consolidated balance sheets where they are reported are as follows (in thousands):

	Asset Derivatives'		Liability Derivatives'	
	Fair Value at December 31,		Fair Value at December 31,	
	2022	2021	2022	2021
Derivative financial instruments - forwards	\$ 16,420 ⁽¹⁾	\$ 26,738	\$ 44,686 ⁽²⁾	\$ 26,117 ⁽³⁾
Other assets	1	8	—	—
Other liabilities	—	—	—	196
Total	<u>\$ 16,421</u>	<u>\$ 26,746</u>	<u>\$ 44,686</u>	<u>\$ 26,313</u>

- (1) At December 31, 2022, derivative financial instruments, as reflected on the balance sheet, includes net unrealized gains on exchange traded futures and options contracts of \$3.4 million, which include \$9.0 million of unrealized gains on derivative financial instruments designated as fair value hedging instruments, offset by \$2.0 million of net unrealized losses on derivative financial instruments designated as cash flow hedging instruments, and the balance representing economic hedges.
- (2) At December 31, 2022, derivative financial instruments, as reflected on the balance sheet, includes net unrealized losses on exchange traded futures and options contracts of \$3.3 million, which included \$0.6 million of net unrealized losses on derivative financial instruments designated as fair value hedging instruments and the balance representing economic hedges.
- (3) At December 31, 2021, derivative financial instruments, as reflected on the balance sheet, includes net unrealized losses on exchange traded futures and options contracts of \$17.1 million, which include \$1.3 million of net unrealized losses on derivative financial instruments designated as cash flow hedging instruments, \$0.5 million of unrealized losses on derivative financial instruments designated as fair value hedging instruments, and the balance representing economic hedges.

Refer to *Note 6 - Fair Value Disclosures*, which contains fair value information related to derivative financial instruments.

Effect of Derivative Instruments on Consolidated Balance Sheets, Consolidated Statements of Operations and Consolidated Statements of Comprehensive Income

The gains or losses recognized in income and other comprehensive income related to the company's derivative financial instruments and the line items on the consolidated financial statements where they are reported are as follows (in thousands):

Location of Gain (Loss) Reclassified from Accumulated Other Comprehensive Income into Income	Amount of Gain (Loss) Reclassified from Accumulated Other Comprehensive Income into Income		
	Year Ended December 31,		
	2022	2021	2020
Revenues	\$ 3,347	\$ (60,261)	\$ 5,538
Cost of goods sold	(5,753)	41,629	(2,115)
Net gain (loss) recognized in loss before income taxes	<u>\$ (2,406)</u>	<u>\$ (18,632)</u>	<u>\$ 3,423</u>

Gain (Loss) Recognized in Other Comprehensive Income on Derivatives	Amount of Gain (Loss) Recognized in Other Comprehensive Income on Derivatives		
	Year Ended December 31,		
	2022	2021	2020
Commodity Contracts	<u>\$ (21,201)</u>	<u>\$ (32,036)</u>	<u>\$ (1,025)</u>

A portion of the company's derivative instruments are considered economic hedges and as such are not designated as hedging instruments. The company uses exchange-traded futures and options contracts to manage its net position of product inventories and forward cash purchase and sales contracts to reduce price risk caused by market fluctuations. Derivatives, including exchange traded contracts and forward commodity purchase or sale contracts, and inventories of certain agricultural products, which include amounts acquired under deferred pricing contracts, are stated at fair value. Fair value estimates are based on exchange-quoted prices, adjusted as appropriate for regional location basis value, which represent differences in local markets including transportation as well as quality or grade differences. Inventories are not considered a derivative, rather they are carried at the lower of cost or net realizable value. As such, changes in the fair value of inventories are not included in the table below.

Derivatives Not Designated as Hedging Instruments	Location of Gain (Loss) Recognized in Income on Derivatives	Amount of Gain (Loss) Recognized in Income on Derivatives		
		Year Ended December 31,		
		2022	2021	2020
Exchange traded futures and options	Revenues	\$ 2,470	\$ (201,249)	\$ (6,302)
Forwards	Revenues	(7,404)	7,106	(4,511)
Exchange traded futures and options	Costs of goods sold	(59,697)	12,879	17,137
Forwards	Costs of goods sold	(6,381)	(6,381)	15,777
Net loss recognized in loss before income taxes		<u>\$ (71,012)</u>	<u>\$ (187,645)</u>	<u>\$ 22,101</u>

The following amounts were recorded on the consolidated balance sheets related to cumulative basis adjustments for the fair value hedged items (in thousands):

Line Item in the Consolidated Balance Sheet in Which the Hedged Item is Included	December 31, 2022		December 31, 2021	
	Carrying Amount of the Hedged Assets	Cumulative Amount of Fair Value Hedging Adjustment Included in the Carrying Amount of the Hedged Assets	Carrying Amount of the Hedged Assets	Cumulative Amount of Fair Value Hedging Adjustment Included in the Carrying Amount of the Hedged Assets
Inventories	\$ 61,885	\$ (13,776)	\$ 72,320	\$ 6,291

Effect of Cash Flow and Fair Value Hedge Accounting on the Statements of Operations

	Location and Amount of Gain (Loss) Recognized in Income on Cash Flow and Fair Value Hedging Relationships for the Year Ended December 31, 2022	
	Revenue	Cost of Goods Sold
Gain (loss) on cash flow hedging relationships:		
Commodity contracts:		
Amount of gain (loss) on exchange traded futures reclassified from accumulated other comprehensive income into income	\$ 3,347	\$ (5,753)
Gain (loss) on fair value hedging relationships:		
Commodity contracts:		
Fair-value hedged inventories	—	735
Exchange traded futures designated as hedging instruments	—	5,677
Total amounts of income and expense line items presented in the consolidated statement of operations in which the effects of cash flow or fair value hedges are recorded	\$ 3,347	\$ 659

**Location and Amount of Gain (Loss)
Recognized in Income on Cash Flow and
Fair Value Hedging Relationships for the
Year Ended December 31, 2021**

	Revenue	Cost of Goods Sold
Gain (loss) on cash flow hedging relationships:		
Commodity contracts:		
Amount of gain (loss) on exchange traded futures reclassified from accumulated other comprehensive income into income	\$ (60,261)	\$ 41,629
Gain (loss) on fair value hedging relationships:		
Commodity contracts:		
Fair value hedged inventories	—	20,567
Exchange traded futures designated as hedging instruments	—	(14,695)
Total amounts of income and expense line items presented in the consolidated statement of operations in which the effects of cash flow or fair value hedges are recorded	<u>\$ (60,261)</u>	<u>\$ 47,501</u>

**Location and Amount of Gain (Loss)
Recognized in Income on Cash Flow and
Fair Value Hedging Relationships for the
Year Ended December 31, 2020**

	Revenue	Cost of Goods Sold
Gain (loss) on cash flow hedging relationships:		
Commodity contracts:		
Amount of gain (loss) on exchange traded futures reclassified from accumulated other comprehensive income into income	\$ 5,538	\$ (2,115)
Gain (loss) on fair value hedging relationships:		
Commodity contracts:		
Fair-value hedged inventories	—	5,098
Exchange traded futures designated as hedging instruments	—	(3,752)
Total amounts of income and expense line items presented in the consolidated statement of operations in which the effects of cash flow or fair value hedges are recorded	<u>\$ 5,538</u>	<u>\$ (769)</u>

There were no gains or losses from discontinuing cash flow or fair value hedge treatment during the years ended December 31, 2022, 2021 and 2020.

The notional volume of open commodity derivative positions as of December 31, 2022 are as follows (in thousands):

Derivative Instruments	Exchange Traded ⁽¹⁾	Non-Exchange Traded ⁽²⁾		Unit of Measure	Commodity
	Net Long & (Short)	Long	(Short)		
Futures	(30,815)			Bushels	Corn
Futures	(5,155) ⁽⁴⁾			Bushels	Corn
Futures	(2,856)			Gallons	Ethanol
Futures	(12,395)			mmBTU	Natural Gas
Futures	2,140 ⁽³⁾			mmBTU	Natural Gas
Futures	(4,755) ⁽⁴⁾			mmBTU	Natural Gas
Futures	6,720 ⁽³⁾			Gallons	Natural Gasoline
Options	(2,173)			Bushels	Corn
Options	(459)			mmBTU	Natural Gas
Forwards		33,919	—	Bushels	Corn
Forwards		5,256	(245,555)	Gallons	Ethanol
Forwards		66	(250)	Tons	Distillers Grains
Forwards		—	(29,591)	Pounds	Renewable Corn Oil
Forwards		21,933	(2,244)	mmBTU	Natural Gas

- (1) Notional volume of exchange traded futures and options are presented on a net long and (short) position basis. Options are presented on a delta-adjusted basis.
- (2) Notional volume of non-exchange traded forward physical contracts are presented on a gross long and (short) position basis, including both fixed-price and basis contracts, for which only the basis portion of the contract price is fixed.
- (3) Notional volume of exchange traded futures used for cash flow hedges.
- (4) Notional volume of exchange traded futures used for fair value hedges.

Energy trading contracts that do not involve physical delivery are presented net in revenues on the consolidated statements of operations. Included in revenues are net gains of \$4.0 million, \$1.1 million, and \$3.0 million for the years ended December 31, 2022, 2021, and 2020, respectively, on energy trading contracts.

12. DEBT

The components of long-term debt are as follows (in thousands):

	December 31,	
	2022	2021
Corporate:		
2.25% convertible notes due 2027 ⁽¹⁾	\$ 230,000	\$ 230,000
4.00% convertible notes due 2024 ⁽²⁾	—	64,000
4.125% convertible notes due 2022 ⁽³⁾	—	34,316
Green Plains SPE LLC:		
\$125.0 million junior secured mezzanine notes due 2026 ⁽⁴⁾	125,000	125,000
Green Plains Wood River and Green Plains Shenandoah:		
\$75.0 million delayed draw loan agreement ⁽⁵⁾	74,625	30,000
Green Plains Partners:		
\$60.0 million term loan ⁽⁶⁾⁽⁷⁾	58,969	60,000
Other	15,097	15,531
Total book value of long-term debt	503,691	558,847
Unamortized debt issuance costs	(6,610)	(9,556)
Less: current maturities of long-term debt	(1,838)	(35,285)
Total long-term debt	<u>\$ 495,243</u>	<u>\$ 514,006</u>

- (1) Includes \$5.2 million and \$6.5 million of unamortized debt issuance costs as of December 31, 2022 and 2021, respectively.
- (2) The 2024 notes were converted into shares of common stock of the company and were retired effective July 8, 2022. Includes \$1.2 million of unamortized debt issuance costs as of December 31, 2021.
- (3) The 2022 notes were converted into shares of common stock of the company and settled in cash, and were retired upon maturity effective September 1, 2022. Includes \$0.1 million of unamortized debt issuance costs as of December 31, 2021.
- (4) Includes \$0.7 million and \$0.9 million of unamortized debt issuance costs as of December 31, 2022 and 2021, respectively.
- (5) Includes \$0.3 million of unamortized debt issuance costs as of both December 31, 2022 and 2021.
- (6) Includes \$0.4 million and \$0.5 million of unamortized debt issuance costs as of December 31, 2022 and 2021, respectively.
- (7) On February 11, 2022, the term loan was amended to allow Green Plains Partners and its affiliates to repurchase outstanding notes. On the same day, the partnership purchased \$1.0 million of the outstanding notes from accounts and funds managed by BlackRock and subsequently retired the notes.

Scheduled long-term debt repayments excluding the effects of debt issuance costs, are as follows (in thousands):

Year Ending December 31,	Amount
2023	\$ 1,927
2024	1,922
2025	1,918
2026	185,886
2027	231,910
Thereafter	80,128
Total	<u>\$ 503,691</u>

The components of short-term notes payable and other borrowings are as follows (in thousands):

	December 31,	
	2022	2021
Green Plains Finance Company, Green Plains Grain and Green Plains Trade:		
\$350.0 million revolver	\$ 115,000	\$ —
Green Plains Commodity Management:		
\$40.0 million hedge line	22,678	16,210
Green Plains Trade:		
\$300.0 million revolver	—	137,208
Green Plains Grain:		
\$100.0 million revolver	—	20,000
	\$ 137,678	\$ 173,418

Corporate Activities

In March 2021, the company issued an aggregate \$230.0 million of 2.25% convertible senior notes due in 2027, or the 2.25% notes. The 2.25% notes bear interest at a rate of 2.25% per year, payable on March 15 and September 15 of each year, beginning September 15, 2021, and mature on March 15, 2027. The 2.25% notes are senior, unsecured obligations of the company. The 2.25% notes are convertible, at the option of the holders, into consideration consisting of, at the company's election, cash, shares of the company's common stock, or a combination of cash and stock (and cash in lieu of fractional shares). However, before September 15, 2026, the 2.25% notes will not be convertible unless certain conditions are satisfied. The initial conversion rate is 31.6206 shares of the company's common stock per \$1,000 principal amount of 2.25% notes (equivalent to an initial conversion price of approximately \$31.62 per share of the company's common stock), representing an approximately 37.5% premium over the offering price of the company's common stock. The conversion rate is subject to adjustment upon the occurrence of certain events, including but not limited to; the event of a stock dividend or stock split; the issuance of additional rights, options and warrants; spinoffs; or a tender or exchange offering. In addition, the company may be obligated to increase the conversion rate for any conversion that occurs in connection with certain corporate events, including the company's calling the 2.25% notes for redemption.

On and after March 15, 2024, and prior to the maturity date, the company may redeem, for cash, all, but not less than all, of the 2.25% notes if the last reported sale price of the company's common stock equals or exceeds 140% of the applicable conversion price on (i) at least 20 trading days during a 30 consecutive trading day period ending on the trading day immediately prior to the date the company delivers notice of the redemption; and (ii) the trading day immediately before the date of the redemption notice. The redemption price will equal 100% of the principal amount of the 2.25% notes to be redeemed, plus any accrued and unpaid interest to, but excluding, the redemption date. In addition, upon the occurrence of a "fundamental change" (as defined in the indenture for the 2.25% notes), holders of the 2.25% notes will have the right, at their option, to require the company to repurchase their 2.25% notes for cash at a price equal to 100% of the principal amount of the 2.25% notes to be repurchased, plus accrued and unpaid interest to, but excluding, the fundamental change repurchase date.

During June 2019, the company issued an aggregate \$115.0 million of 4.00% convertible senior notes due in 2024, or the 4.00% notes. The 4.00% notes were senior, unsecured obligations of the company, with interest payable on January 1 and July 1 of each year, beginning January 1, 2020, at a rate of 4.00% per annum. The 4.00% notes were convertible, at the option of the holders, into consideration consisting of, at the company's election, cash, shares of the company's common stock, or a combination of cash and shares of the company's common stock until the close of business on the scheduled trading day immediately preceding the maturity date. The initial conversion rate was 64.1540 shares of common stock per \$1,000 of principal, which was equal to a conversion price of approximately \$15.59 per share. The company increased the final conversion rate to 66.4178 in connection with the company's calling the 4.00% notes for redemption on May 25, 2022.

During May 2021, the company entered into a privately negotiated agreement with certain noteholders of the company's 4.00% notes. Under this agreement, 3.6 million shares of the company's common stock were exchanged for \$51.0 million in aggregate principal amount of the 4.00% notes. Common stock held as treasury shares were exchanged for the 4.00% notes. Pursuant to the guidance within ASC 470, *Debt*, the company recorded a loss of \$9.5 million which was recorded as a charge to interest expense in the consolidated financial statements during the year ended December 31, 2021, of which \$1.2 million

was related to unamortized debt issuance costs.

On May 25, 2022, the company gave notice calling for the redemption of its outstanding 4.00% notes, totaling an aggregate principal amount of \$64.0 million. The conversion rate was 66.4178 shares of common stock per 1,000 of principal. From July 1, 2022 through July 8, 2022, the remaining \$64.0 million of the 4.00% notes were converted into approximately 4.3 million shares of common stock. Common stock held as treasury shares were exchanged for the 4.00% notes. Pursuant to the guidance within ASC 470, *Debt*, the company recorded the exchanges as a conversion. The 4.00% notes were retired effective July 8, 2022.

In August 2016, the company issued \$170.0 million of 4.125% convertible senior notes due in 2022, or the 4.125% notes. The 4.125% notes were senior, unsecured obligations of the company, with interest payable on March 1 and September 1 of each year. The notes were convertible at the Holder's option. The initial conversion rate was 35.7143 shares of common stock per \$1,000 of principal, which was equal to a conversion price of approximately \$28.00 per share. The conversion rate was subject to adjustment upon the occurrence of certain events, including but not limited to; the event of a stock dividend or stock split; the issuance of additional rights, options and warrants; spinoffs; the event of a cash dividend or distribution; or a tender or exchange offering.

In March 2021, concurrent with the issuance of the 2.25% notes, the company used approximately \$156.5 million of the net proceeds of the 2.25% notes to repurchase approximately \$135.7 million aggregate principal amount of the 4.125% notes, in privately negotiated transactions. Pursuant to the guidance within ASC 470, *Debt*, the company recorded a loss upon extinguishment of \$22.1 million in interest expense. This charge included \$1.2 million of unamortized debt issuance costs related to the principal balance extinguished.

During August 2022, the company entered into four privately negotiated exchange agreements with certain noteholders of the 4.125% notes to exchange approximately \$32.6 million aggregate principal amount for approximately 1.2 million shares of the company's common stock. Pursuant to the guidance within ASC 470, *Debt*, the company recorded the exchanges as a conversion and recorded a loss of \$419 thousand, which was recorded as a charge to interest expense in the consolidated financial statements during the year ended December 31, 2022. Additionally, on September 1, 2022, approximately \$1.7 million aggregate principal amount of the 4.125% notes were settled through a combination of \$1.7 million in cash and approximately 15 thousand shares of the company's common stock. The remaining \$23 thousand aggregate principal amount and accrued interest were settled in cash. The 4.125% notes were fully retired effective September 1, 2022.

Ethanol Production Segment

On February 9, 2021, Green Plains SPE LLC, a wholly-owned special purpose subsidiary and parent of Green Plains Obion and Green Plains Mount Vernon, issued \$125.0 million of junior secured mezzanine notes due 2026 (the "Junior Notes") with BlackRock, a holder of a portion of the company's common stock, for the purchase of all notes issued.

The Junior Notes will mature on February 9, 2026 and are secured by a pledge of the membership interests in and the real property owned by Green Plains Obion and Green Plains Mount Vernon. The proceeds of the Junior Notes will be used to construct high protein processing systems at the Green Plains Obion and Green Plains Mount Vernon facilities. The Junior Notes accrue interest at an annual rate of 11.75%. However, subject to the satisfaction of certain conditions, the Green Plains SPE LLC may elect to pay an amount in cash equal to interest accruing at a rate of 6.00% per annum plus an amount equal to interest accruing at a rate of 6.75% per annum to be paid in kind. The entire outstanding principal balance, plus any accrued and unpaid interest is due upon maturity. Green Plains SPE LLC is required to comply with certain financial covenants regarding minimum liquidity at Green Plains and a maximum aggregate loan to value. The Junior Notes can be retired or refinanced after 42 months with no prepayment premium. The Junior Notes have an unsecured parent guarantee from the company and have certain limitations on distributions, dividends or loans to the company unless there will not exist any event of default. Funds associated with the Junior Notes are administered by a trustee and a portion are included in the balance of restricted cash as of December 31, 2022. At December 31, 2022, the interest rate on the loan was 11.75%.

On September 3, 2020, Green Plains Wood River and Green Plains Shenandoah, wholly-owned subsidiaries of the company, entered into a delayed draw loan agreement with MetLife Real Estate Lending LLC. The \$75.0 million delayed draw loan matures on September 1, 2035 and is secured by substantially all of the assets of the Wood River and Shenandoah facilities. The proceeds from the loan were used to add MSCTM technology at the Wood River and Shenandoah facilities as well as other capital expenditures.

The delayed draw loan bears interest at a fixed rate of 5.02%, plus an interest rate premium of 1.5% until the loan is fully drawn. The remaining availability was drawn in the first quarter of 2022. Beginning in the second quarter of 2022, the interest rate premium may be adjusted quarterly from 0.00% to 1.50% based on the leverage ratio of total funded debt to EBITDA of Wood River and Shenandoah. Principal payments of \$1.5 million per year begin 24 months from the closing date. Prepayments are prohibited until September 2024. Financial covenants of the delayed draw loan agreement include a minimum loan to value ratio of 50%, a minimum fixed charge coverage ratio of 1.25x, a total debt service reserve of six months of future principal and interest payments and a minimum working capital requirement at Green Plains of not less than \$0.10 per gallon of nameplate capacity or \$95.8 million. The loan is guaranteed by the company and has certain limitations on distributions, dividends or loans to Green Plains by Wood River and Shenandoah unless immediately after giving effect to such action, there will not exist any event of default. At December 31, 2022, the interest rate on the loan was 5.02%.

The company also has small equipment financing loans, finance leases on equipment or facilities, and other forms of debt financing.

Agribusiness and Energy Services Segment

On March 25, 2022, Green Plains Finance Company, Green Plains Grain and Green Plains Trade (collectively, the “Borrowers”), all wholly owned subsidiaries of the company, together with the company, as guarantor, entered into a five-year, \$350.0 million senior secured sustainability-linked revolving Loan and Security Agreement (the “Facility”) with a group of financial institutions. This transaction refinanced the separate credit facilities previously held by Green Plains Grain and Green Plains Trade. The Facility matures on March 25, 2027.

The Facility includes revolving commitments totaling \$350.0 million and an accordion feature whereby amounts available under the Facility may be increased by up to \$100.0 million of new lender commitments subject to certain conditions. Each SOFR rate loan shall bear interest for each day at a rate per annum equal to the Term SOFR rate for the outstanding period plus a Term SOFR adjustment and an applicable margin of 2.25% to 2.50%, which is dependent on undrawn availability under the Facility. Each base rate loan shall bear interest at a rate per annum equal to the base rate plus the applicable margin of 1.25% to 1.50%, which is dependent on undrawn availability under the Facility. The unused portion of the Facility is also subject to a commitment fee of 0.275% to 0.375%, dependent on undrawn availability. Additionally, the applicable margin and commitment fee are subject to certain increases or decreases of up to 0.10% and 0.025%, respectively, tied to the company’s achievement of certain sustainability criteria, including the reduction of GHG emissions, recordable incident rate reduction, increased renewable corn oil production and the implementation of technology to produce sustainable ingredients.

The Facility contains customary affirmative and negative covenants, as well as the following financial covenants to be calculated as of the last day of any month: the current ratio of the Borrowers shall not be less than 1.00 to 1.00; the collateral coverage ratio of the Borrowers shall not be less than 1.20 to 1.00; and the debt to capitalization ratio of the company shall not be greater than 0.60 to 1.00.

The Facility also includes customary events of default, including without limitation, failure to make required payments of principal or interest, material incorrect representations and warranties, breach of covenants, events of bankruptcy and other certain matters. The Facility is secured by the working capital assets of the Borrowers and is guaranteed by the company. At December 31, 2022, the interest rate on the facility was 8.02%.

Green Plains Commodity Management has an uncommitted \$40.0 million revolving credit facility which matures April 2023, to finance margins related to its hedging programs. Advances are subject to variable interest rates equal to SOFR plus 1.75%. At December 31, 2022, the interest rate on the facility was 6.05%.

Green Plains Grain has a short-term inventory financing agreement with a financial institution. The company has accounted for the agreements as short-term notes, rather than revenues, and has elected the fair value option to offset fluctuations in market prices of the inventory. This agreement is subject to negotiated variable interest rates. The company had no outstanding short-term notes payable related to the inventory financing agreement as of December 31, 2022.

Partnership Segment

Green Plains Partners has a term loan to fund working capital, capital expenditures and other general partnership purposes. On July 20, 2021, the prior credit facility was amended decreasing the total amount available to \$60.0 million, extending the maturity to July 20, 2026, and converting the credit facility to a term loan. Under the terms of the amended agreement, BlackRock purchased the outstanding balance of the prior credit facility from the previous lenders. Interest on the

amended term loan is based on 3-month LIBOR plus 8.00%, with a 0% LIBOR floor. Interest is payable on the 15th day of each March, June, September and December during the term with the first interest payment being September 15, 2021. The amended term loan does not require any principal payments; however, the partnership has the option to prepay \$1.5 million per quarter beginning twelve months after the closing date. On February 11, 2022, the amended loan was modified to allow Green Plains Partners and its affiliates to repurchase outstanding notes. On the same day, the partnership purchased \$1.0 million of the outstanding notes from accounts and funds managed by BlackRock and subsequently retired the notes.

The partnership's obligations under the term loan are secured by a first priority lien on (i) the equity interests of the partnership's present and future subsidiaries, (ii) all of the partnership's present and future personal property, such as investment property, general intangibles and contract rights, including rights under any agreements with Green Plains Trade, (iii) all proceeds and products of the equity interests of the partnership's present and future subsidiaries and its personal property and (iv) substantially all of the partnership's real property and material leases of real property. The terms impose affirmative and negative covenants, including restrictions on the partnership's ability to incur additional debt, acquire and sell assets, create liens, invest capital, pay distributions and materially amend the partnership's commercial agreements with Green Plains Trade. The term loan also requires the partnership to maintain a maximum consolidated leverage ratio and a minimum consolidated debt service coverage ratio, each of which is calculated on a pro forma basis with respect to acquisitions and divestitures occurring during the applicable period. The maximum consolidated leverage ratio required, as of the end of any fiscal quarter, is no more than 2.50x. The minimum debt service coverage ratio required, as of the end of any fiscal quarter, is no less 1.10x. The consolidated leverage ratio is calculated by dividing total funded indebtedness by the sum of the four preceding fiscal quarters' consolidated EBITDA. The consolidated debt service coverage ratio is calculated by taking the sum of the four preceding fiscal quarters' consolidated EBITDA minus income taxes and consolidated capital expenditures for such period divided by the sum of the four preceding fiscal quarters' consolidated interest charges plus consolidated scheduled funded debt payments for such period.

Under the amended terms of the loan, the partnership has no restrictions on the amount of quarterly distribution payments, so long as (i) no default has occurred and is continuing, or would result from payment of the distribution, and (ii) the partnership and its subsidiaries are in compliance with its financial covenants and remain in compliance after payment of the distribution. The term loan is not guaranteed by the company. At December 31, 2022, the interest rate on the term loan was 12.77%.

Covenant Compliance

The company was in compliance with its debt covenants as of December 31, 2022.

Restricted Net Assets

At December 31, 2022, there were approximately \$117.1 million of net assets at the company's subsidiaries that could not be transferred to the parent company in the form of dividends, loans or advances due to restrictions contained in the credit facilities of these subsidiaries.

13. STOCK-BASED COMPENSATION

On May 6, 2020, the shareholders of the company approved the 2019 Equity Incentive Plan which granted an additional 1.6 million shares of common stock for stock-based compensation. All shares remaining under the 2009 Equity Incentive Plan rolled into the 2019 Equity Incentive Plan effective May 6, 2020. The 2019 Equity Incentive Plan reserves 5.7 million shares of common stock for issuance to its directors and employees. The plan provides for shares, including options to purchase shares of common stock, stock appreciation rights tied to the value of common stock, restricted stock, performance share awards, and restricted and deferred stock unit awards, to be granted to eligible employees, non-employee directors and consultants. The company measures stock-based compensation at fair value on the grant date, with no adjustments for estimated forfeitures. The company records noncash compensation expense related to equity awards in its consolidated financial statements over the requisite period on a straight-line basis.

Grants under the equity incentive plans may include stock options, stock awards, performance share awards or deferred stock units:

- Restricted Stock Awards – Restricted stock awards may be granted to directors and employees that vest immediately or over a period of time as determined by the compensation committee. Stock awards granted to date vested immediately and over a period of time, and included sale restrictions. Compensation expense is recognized on the

grant date if fully vested or over the requisite vesting period.

- **Deferred Stock Units** – Deferred stock units may be granted to directors and employees that vest immediately or over a period of time as determined by the compensation committee. Deferred stock units granted to date vest over a period of time with underlying shares of common stock that are issuable after the vesting date. Compensation expense is recognized on the grant date if fully vested, or over the requisite vesting period.
- **Performance Share Awards** – Performance share awards may be granted to directors and employees that cliff-vest after a period of time as determined by the compensation committee. Performance share awards granted to date cliff-vest after a period of time, and included sale restrictions. Compensation expense is recognized over the requisite vesting period.
- **Stock Options** – Stock options may be granted that can be exercised immediately in installments or at a fixed future date. Certain options are exercisable regardless of employment status while others expire following termination. Options issued to date could have been exercised immediately or at future vesting dates, and expired five years to eight years after the grant date. Compensation expense for stock options that vest over time is recognized on a straight-line basis over the requisite service period.

Restricted Stock Awards and Deferred Stock Units

The non-vested restricted stock award and deferred stock unit activity for the year ended December 31, 2022 are as follows:

	Non-Vested Shares and Deferred Stock Units	Weighted- Average Grant- Date Fair Value	Weighted- Average Remaining Vesting Term (in years)
Non-Vested at December 31, 2021	793,337	\$ 14.64	
Granted	303,099	30.13	
Forfeited	(6,547)	20.23	
Vested	(276,856)	15.79	
Non-Vested at December 31, 2022	813,033	\$ 19.98	1.8

Performance Share Awards

On March 14, 2022, February 18, 2021 and March 18, 2020, the board of directors granted performance shares to be awarded in the form of common stock to certain participants of the plan. These performance shares vest based on the level of achievement of certain performance goals, including the incremental value achieved from the company's high-protein initiatives, annual production levels and return on investment (ROI). Performance shares granted in 2022, 2021 and 2020 do not contain market-based factors requiring a Monte Carlo valuation model. The performance shares were granted at a target of 100%, but each performance share will reduce or increase depending on results for the performance period. If the company achieves the maximum performance goals, the maximum amount of shares available to be issued pursuant to the 2022, 2021 and 2020 awards are 1,210,935 performance shares which represents approximately 251% of the 482,811 performance shares which remain outstanding. The actual number of performance shares that will ultimately vest is based on the actual performance targets achieved at the end of the performance period.

On February 19, 2019, the board of directors granted performance shares to be awarded in the form of common stock to certain participants of the plan. The performance shares were granted at a target of 100%, but each performance share was reduced or increased depending on results for the performance period for the company's average return on net assets, and the company's total shareholder return relative to that of the company's performance peer group. On February 19, 2022, based on the criteria discussed above, the 74,967 2019 performance shares vested at 150%, which resulted in the issuance of 112,450 shares of common stock.

The non-vested performance share award activity for the year ended December 31, 2022 is as follows:

	Performance Shares	Weighted- Average Grant- Date Fair Value	Weighted- Average Remaining Vesting Term (in years)
Non-Vested at December 31, 2021	486,155	\$ 13.93	
Granted	146,589	29.47	
Forfeited	(74,966)	15.34	
Vested	(74,967)	15.28	
Non-Vested at December 31, 2022	482,811	\$ 18.22	1.9

Stock Options

The fair value of the stock options is estimated on the date of the grant using the Black-Scholes option-pricing model, a pricing model acceptable under GAAP. The expected life of the options is the period of time the options are expected to be outstanding. The company did not grant any stock option awards during the years ended December 31, 2022, 2021 and 2020.

Green Plains Partners

Green Plains Partners has a long-term incentive plan (LTIP) intended to promote the interests of the partnership, its general partner and affiliates by providing unit-based incentive compensation awards to employees, consultants and directors to encourage superior performance. The LTIP reserves 2,500,000 common limited partner units for issuance in the form of options, restricted units, phantom units, distribution equivalent rights, substitute awards, unit appreciation rights, unit awards, profit interest units or other unit-based awards. The partnership measures unit-based compensation related to equity awards in its consolidated financial statements over the requisite service period on a straight-line basis.

The non-vested unit-based awards activity for the year ended December 31, 2022, are as follows:

	Non-Vested Units	Weighted- Average Grant-Date Fair Value	Weighted- Average Remaining Vesting Term (in years)
Non-Vested at December 31, 2021	19,482	\$ 12.32	
Granted	19,707	12.18	
Vested	(19,482)	12.32	
Non-Vested at December 31, 2022	19,707	\$ 12.18	0.5

Stock-Based and Unit-Based Compensation Expense

Compensation costs for stock-based and unit-based payment plans during the years ended December 31, 2022, 2021 and 2020, were approximately \$9.1 million, \$6.1 million and \$7.9 million, respectively. At December 31, 2022, there was \$13.7 million of unrecognized compensation costs from stock-based and unit-based compensation related to non-vested awards. This compensation is expected to be recognized over a weighted-average period of approximately 1.8 years. The potential tax benefit related to stock-based payment is approximately 20.0% of these expenses.

14. EARNINGS PER SHARE

Basic earnings per share, or EPS, is calculated by dividing net income available to common stockholders by the weighted average number of common shares outstanding during the period.

The company computes diluted EPS by dividing net income on an if-converted basis, adjusted to add back net interest expense related to the convertible debt instruments, by the weighted average number of common shares outstanding during the period, adjusted to include the shares that would be issued if the convertible debt instruments were converted to common shares and the effect of any outstanding dilutive securities.

The basic and diluted EPS are calculated as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
EPS - basic and diluted			
Net loss attributable to Green Plains	\$ (127,218)	\$ (65,992)	\$ (108,775)
Weighted average shares outstanding - basic and diluted	55,541	46,652	34,631
EPS - basic and diluted	\$ (2.29)	\$ (1.41)	\$ (3.14)
Anti-dilutive weighted-average convertible debt and stock-based compensation ⁽¹⁾	8,556	12,952	14,089

- (1) The effect related to the company's convertible debt, warrants and certain stock-based compensation award has been excluded from diluted EPS for the periods presented as the inclusion of these shares would have been antidilutive.

15. STOCKHOLDERS' EQUITY

Adoption of ASC 470-20

On January 1, 2021, the company adopted the amended guidance in ASC 470-20, using the modified retrospective method of transition. The adoption of this guidance resulted in a \$49.5 million decrease in additional paid-in capital, an \$11.4 million increase in retained earnings and a \$38.1 million increase in long-term debt, which included a \$39.4 million increase in debt principal offset by a \$1.3 million increase in debt issuance costs, resulting from amounts previously bifurcated to equity being reclassified to debt.

Upon adoption of amended guidance in ASC 470-20, the company reversed the remaining deferred tax liability of \$9.2 million associated to the equity portion of previously issued convertible debt. As the company had recorded a full valuation allowance against its deferred tax assets, the reversal of the \$9.2 million deferred tax liability would require an increase to the existing valuation allowance by the same amount, which would normally be recorded through current income tax expense. However, because the change in the deferred tax liability is directly linked to the adoption of ASC 470-20, which is accounted for as a cumulative effect adjustment, the required increase to the valuation allowance was recorded as part of the cumulative adjustment to stockholders' equity and had no effect on the income statement.

Public Offerings of Common Stock

On March 1, 2021, the company completed an offering of 8,751,500 shares of our common stock, par value \$0.001 per share, in a public offering at a price of \$23.00 per share (the "March Common Stock Offering"). The March Common Stock Offering resulted in net proceeds of \$191.1 million, after deducting underwriting discounts and commissions and the company's offering expenses.

On August 9, 2021, the company completed an offering of 5,462,500 shares of our common stock, par value \$0.001 per share, in a public offering at a price of \$32.00 per share (the "August Common Stock Offering"). The August Common Stock Offering resulted in net proceeds of \$164.9 million, after deducting underwriting discounts and commissions and the company's offering expenses.

Warrants

During the three months ended March 31, 2021, in connection with certain agreements, the company issued warrants to purchase shares of its common stock. The company measures the fair value of the warrants using the Black-Scholes option pricing model as of the issuance date. Exercisable warrants are equity based and recorded as a reduction in additional paid-in capital.

The company has reserved 2,550,000 shares of common stock for the exercise of warrants to non-employees, of which 2,275,000 are exercisable, treated as equity based awards and recorded as a reduction in additional paid-in capital. The remaining 275,000 warrants, of which 111,111 are exercisable as a result of achieving certain earn-out provisions and 163,889 are contingent upon certain earn-out provisions, are treated as liability based awards, and valued quarterly using the company's stock price. These warrants could potentially dilute basic earnings per share in future periods. The exercise price of the warrants is \$22.00 and expiration dates are December 8, 2025 for 275,000 warrants, February 9, 2026 for 275,000 warrants and April 28, 2026 for 2,000,000 warrants.

Convertible Note Exchange

On May 18, 2021, the company closed on a privately negotiated exchange agreement with certain noteholders of the company's 4.00% notes, pursuant to which the noteholders agreed to exchange \$51.0 million in aggregate principal for 3.6 million shares of the company's common stock at an implied price of \$26.80.

On May 25, 2022, the company gave notice calling for the redemption of all its outstanding 4.00% Convertible Senior Notes due 2024, totaling an aggregate principal amount of \$64.0 million. The conversion rate was 66.4178 shares of common stock per \$1,000 of principal. From July 1, 2022 through July 8, 2022, all \$64.0 million of the 4.00% convertible notes were converted into approximately 4.3 million shares of common stock.

During August 2022, the company entered into four privately negotiated exchange agreements with certain noteholders of the 4.125% Convertible Senior Notes due 2022 to exchange approximately \$32.6 million aggregate principal amount for approximately 1.2 million shares of the company's common stock. Additionally, on September 1, 2022, approximately \$1.7 million aggregate principal amount was settled through a combination of \$1.7 million in cash and approximately 15 thousand shares of the company's common stock.

Treasury Stock

The company holds 2.8 million shares of its common stock at a cost of \$31.2 million. Treasury stock is recorded at cost and reduces stockholders' equity in the consolidated balance sheets. When shares are reissued, the company will use the weighted average cost method for determining the cost basis. The difference between the cost and the issuance price is added or deducted from additional paid-in capital.

Share Repurchase Program

The company's board of directors authorized a share repurchase program of up to \$200.0 million. Under the program, the company may repurchase shares in open market transactions, privately negotiated transactions, accelerated share buyback programs, tender offers or by other means. The timing and amount of repurchase transactions are determined by its management based on market conditions, share price, legal requirements and other factors. The program may be suspended, modified or discontinued at any time without prior notice. The company did not repurchase any shares of common stock during 2022 or 2021. The company repurchased 0.9 million shares of common stock for approximately \$11.5 million during 2020. Since inception, the company has repurchased 7.4 million shares of common stock for approximately \$92.8 million under the program.

Dividends and Distributions

On June 18, 2019, the company's board of directors suspended its future quarterly cash dividend following the June 14, 2019 dividend payment, in order to retain and redirect cash flow to the company's operating expense equalization plan, the deployment of high-protein technology, its stock repurchase program and for other corporate purposes.

For each calendar quarter commencing with the quarter ended September 30, 2015, the partnership agreement provides for a quarterly distribution to be paid within 45 days after the end of the quarter, provided the partnership has sufficient available cash. Available cash generally means, all cash and cash equivalents on hand at the end of that quarter less cash

reserves established by the general partner of the partnership plus all or any portion of the cash on hand resulting from working capital borrowings made subsequent to the end of that quarter. On January 19, 2023, the board of directors of the general partner of the partnership declared a cash distribution of \$0.455 per unit on outstanding common units. The distribution is payable on February 10, 2023 to unitholders of record at the close of business on February 3, 2023.

Accumulated Other Comprehensive Income (Loss)

Changes in accumulated other comprehensive income (loss) are associated primarily with gains and losses on derivative financial instruments. Amounts reclassified from accumulated other comprehensive income (loss) are as follows (in thousands):

	Year Ended December 31,			Statements of Operations Classification
	2022	2021	2020	
Gains (losses) on cash flow hedges:				
Commodity derivatives	\$ 3,347	\$ (60,261)	\$ 5,538	(1)
Commodity derivatives	(5,753)	41,629	(2,115)	(2)
Total gains (losses) on cash flow hedges	(2,406)	(18,632)	3,423	(3)
Income tax expense (benefit)	(578)	(4,540)	857	(4)
Amounts reclassified from accumulated other comprehensive income (loss)	\$ (1,828)	\$ (14,092)	\$ 2,566	

- (1) Revenues
- (2) Costs of goods sold
- (3) Loss before income taxes and income from equity method investees
- (4) Income tax benefit (expense)

At December 31, 2022 and 2021, the company's consolidated balance sheets reflected unrealized losses of \$26.6 million and \$12.3 million, net of tax, in accumulated other comprehensive loss, respectively.

16. INCOME TAXES

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the carrying amounts of existing assets and liabilities and their respective tax bases, and net operating loss and tax credit carry-forwards. Deferred tax assets and liabilities are measured using enacted rates expected to be applicable to taxable income in the years those temporary differences are recovered or settled. The effect on deferred tax assets and liabilities from a change in tax rates is recognized in income during the period that includes the enactment date. A valuation allowance is recorded by the company when it is more likely than not that some portion or all of a deferred tax asset will not be realized.

Green Plains Partners is a limited partnership, which is treated as a flow-through entity for federal income tax purposes and is not subject to federal income taxes. As a result, the consolidated financial statements do not reflect such income taxes on pretax income or loss attributable to the noncontrolling interest in the partnership.

Upon adoption of amended guidance in ASC 470-20, during the first quarter of 2021 as discussed in *Note 15 - Stockholders' Equity*, the company reversed the remaining deferred tax liability of \$9.2 million associated to the equity portion of previously issued convertible debt. As the company had recorded a full valuation allowance against its deferred tax assets, the reversal of the \$9.2 million deferred tax liability would require an increase to the existing valuation allowance by the same amount which would normally be recorded through current income tax expense. However, as the change in the deferred tax liability is directly linked to the adoption of ASC 470-20, which is accounted for as a cumulative effect adjustment, the required increase to the valuation allowance is recorded as part of the cumulative adjustment to stockholders' equity and has no effect on the consolidated statements of operations.

The CARES Act was signed into law on March 27, 2020. The CARES Act includes several significant business tax provisions including elimination of the taxable limit for certain net operating losses (NOL), allowing businesses to carry back NOLs arising in 2018, 2019 and 2020 to the five prior tax years, accelerating refunds of previously generated corporate AMT credits, and loosening the business interest limitation under §163(j) from 30% to 50%. For 2021, the business interest

limitation under §163(j) reverts back to 30%. The CARES Act also contains an employee retention credit to encourage employers to maintain headcounts even if employees cannot report to work because of issues related to COVID-19. For the year ended December 31, 2020, the company recorded an income tax benefit of \$41.6 million related to the CARES Act including adjustments to certain valuation allowances. No additional tax benefit was recorded related to the CARES Act during the year ended December 31, 2022.

The Inflation Reduction Act (IRA), was signed into law on August 16, 2022. The IRA includes significant law changes relating to tax, climate change, energy and health care. The IRA significantly expands clean energy incentives by providing an estimated \$370 billion of new energy related tax credits over the next ten years. It also permits more flexibility for taxpayers to use the credits with direct-pay and transferable credit options. In addition, the IRA includes key revenue-raising provisions which include a 15% book-income alternative minimum tax on corporations with adjusted financial statement income over \$1 billion, a 1% excise tax on the value of certain net stock repurchases by publicly traded companies, and the reinstatement of Superfund excise taxes. The company expects it will benefit from certain energy related tax credits in future years and not be negatively impacted by the revenue raising provisions; however, the company does not have enough information to provide a reasonable estimate of future tax benefits at this time.

Income tax expense (benefit) consists of the following (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Current	\$ 232	\$ 612	\$ (37,047)
Deferred	4,515	1,233	(13,336)
Total income tax expense (benefit)	<u>\$ 4,747</u>	<u>\$ 1,845</u>	<u>\$ (50,383)</u>

Differences between income tax expense (benefit) at the statutory federal income tax rate and as presented on the consolidated statements of operations are summarized as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Tax expense at federal statutory rate	\$ (21,222)	\$ (8,883)	\$ (33,698)
State income tax expense (benefit), net of federal benefit	746	516	(802)
Nondeductible compensation	1,221	1,037	421
Noncontrolling interests	(5,245)	(4,587)	(4,015)
Unrecognized tax benefits	—	(170)	(28)
Increase in valuation allowance	27,778	15,301	6,279
Stock compensation	1,105	(1,954)	721
Amended return adjustments	—	—	(19,786)
Other	364	585	525
Income tax expense (benefit)	<u>\$ 4,747</u>	<u>\$ 1,845</u>	<u>\$ (50,383)</u>

Significant components of deferred tax assets and liabilities are as follows (in thousands):

	December 31,	
	2022	2021
Deferred tax assets:		
Net operating loss carryforwards - Federal	\$ 12,098	\$ 14,857
Net operating loss carryforwards - State	13,862	12,147
Tax credit carryforwards - Federal	63,857	64,081
Tax credit carryforwards - State	5,906	7,281
Derivative financial instruments	7,160	4,728
Section 174 capitalized expenses	42,115	—
Interest expense carryforward	15,300	12,063
Investment in partnerships	45,445	43,244
Inventory valuation	3,491	1,259
Stock-based compensation	—	1,312
Accrued expenses	4,770	4,511
Leases	8,820	8,885
Organizational and start-up costs	473	746
Other	810	912
Total	224,107	176,026
Valuation allowance	(101,118)	(69,834)
Total deferred tax assets	122,989	106,192
Deferred tax liabilities:		
Fixed assets	(116,781)	(100,166)
Right-of-use assets	(6,035)	(6,026)
Stock-based compensation	(173)	—
Total deferred tax liabilities	(122,989)	(106,192)
Deferred income taxes	\$ —	\$ —

At December 31, 2022, the company has federal R&D credits of \$63.9 million which will begin to expire in 2033. The company also has \$5.9 million of state credits which will expire, subject to taxable income, beginning in 2023. The company has federal net operating losses of \$12.1 million which do not have an expiration date.

The company increased the valuation allowance associated with its net deferred tax assets due to uncertainty that it will realize these assets in the future. The valuation allowance on deferred tax assets was recognized as a result of negative evidence, including cumulative losses in recent years, outweighing the more subjective positive evidence. Management considers whether it is more likely than not that some or all of the deferred tax assets will be realized, which is dependent on the generation of future taxable income and other tax attributes during the periods those temporary differences become deductible. Scheduled reversals of deferred tax liabilities, projected future taxable income, and tax planning strategies are considered to make this assessment. The company will continue to regularly assess the realizability of deferred tax assets. Changes in earnings performance and future earnings projections, among other factors, may cause the company to adjust its valuation allowance on deferred tax assets, which would impact the company's results of operations in the period it is determined that these factors have changed.

The company's federal income tax returns for the tax years ended December 31, 2014 through 2018 are currently under audit. The company's federal income tax returns for the tax years ended December 31, 2019 through 2021 are still subject to audit.

Unrecognized tax benefits were \$51.4 million as of both December 31, 2022 and 2021. Recognition of these tax benefits would favorably impact the company's effective tax rate. Unrecognized tax benefits were recorded as a reduction of the

deferred asset associated with the federal tax credit carryforwards. Interest and penalties associated with uncertain tax positions are accrued as part of income taxes payable. Approximately \$51.4 million in unrecognized tax benefits related to R&D credits are currently under audit. In addition, the results of the current audit may cause the company to significantly increase or decrease the unrecognized tax benefits associated with R&D credits for periods not under audit. At this time, the company does not have enough information to be able to estimate the potential adjustment.

17. COMMITMENTS AND CONTINGENCIES

Lease Expense

The company leases certain facilities, parcels of land, and equipment, with remaining terms ranging from less than one year to 14.9 years. The land and facility leases include renewal options. The renewal options are included in the lease term only for those sites or locations in which they are reasonably certain to be renewed. Equipment renewals are not considered reasonably certain to be exercised as they typically renew with significantly different underlying terms.

The company may sublease certain of its railcars to third parties on a short-term basis. The subleases are classified as operating leases, with the associated sublease income being recognized on a straight-line basis over the lease term.

The components of lease expense are as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Lease expense			
Operating lease expense	\$ 22,116	\$ 19,587	\$ 20,771
Variable lease expense ⁽¹⁾	1,394	1,225	1,681
Total lease expense	<u>\$ 23,510</u>	<u>\$ 20,812</u>	<u>\$ 22,452</u>

- (1) Represents amounts incurred in excess of the minimum payments required for a certain building lease and for the handling and unloading of railcars for a certain land lease, offset by railcar lease abatements provided by the lessor when railcars are out of service during periods of maintenance or upgrade.

Supplemental cash flow information related to operating leases is as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Cash paid for amounts included in the measurement of lease liabilities:			
Operating cash flows from operating leases	\$ 21,459	\$ 19,579	\$ 20,864
Right-of-use assets obtained in exchange for lease obligations:			
Operating leases	28,565	20,291	32,713
Right-of-use assets and lease obligations derecognized due to lease modifications:			
Operating leases	—	1,889	5,176

Supplemental balance sheet information related to operating leases is as follows:

	2022	2021
Weighted average remaining lease term	4.9 years	5.5 years
Weighted average discount rate	4.32%	4.16%

Aggregate minimum lease payments under the operating lease agreements for future fiscal years as of December 31, 2022 are as follows (in thousands):

Year Ending December 31,	Amount
2023	\$ 23,227
2024	20,728
2025	16,194
2026	8,920
2027	5,361
Thereafter	11,171
Total	85,601
Less: Present value discount	(9,365)
Lease liabilities	<u>\$ 76,236</u>

Lease Revenue

As described in *Note 4 – Revenue*, the majority of the partnership’s segment revenue is generated through their storage and throughput services and rail transportation services agreements with Green Plains Trade and are accounted for as lease revenue. Leasing revenues do not represent revenues recognized from contracts with customers under ASC 606, and are accounted for under ASC 842, *Leases*. Lease revenue associated with agreements with Green Plains Trade are eliminated upon consolidation. The remaining lease revenue is not material to the company. Refer to *Note 4 – Revenue* for further discussion on lease revenue.

Commodities, Storage and Transportation

As of December 31, 2022, the company had contracted future purchases of ethanol, grain, natural gas, and distillers grains, valued at approximately \$389.1 million and future commitments for storage and transportation, valued at approximately \$23.6 million.

Government Assistance

During the year ended December 31, 2022, the company received a relief grant from the USDA related to the Biofuel Producer Program authorized as part of the CARES Act to offset market losses as a result of the COVID-19 pandemic. The total cash grant received of \$27.7 million was recorded as other income and the company has no further reporting or other obligations related to the receipt of this grant.

Legal

The company is currently involved in litigation that has arisen in the ordinary course of business, but does not believe any pending litigation will have a material adverse effect on its financial position, results of operations or cash flows.

18. EMPLOYEE BENEFIT PLANS

The company offers eligible employees a comprehensive employee benefits plan that includes health, dental, vision, life and accidental death, short-term disability and long-term disability insurance, and flexible spending accounts. The company also offers a 401(k) plan enabling eligible employees to save for retirement on a tax-deferred basis up to the limits allowed under the Internal Revenue Code. During 2022, the company increased the employer match from 4% to 6% of eligible employee contributions for employees with less than 5 years of service, and up to 8% of eligible employee contributions after 5 years of service. Employee and employer contributions are 100% vested immediately. Employer contributions to the 401(k) plan for the years ended December 31, 2022, 2021 and 2020 were \$3.5 million, \$1.9 million and \$1.5 million, respectively.

The company contributes to a defined benefit pension plan. Since January 2009, the benefits under the plan were frozen; however, the company remains obligated to ensure the plan is funded according to its requirements. As of December 31, 2022, the plan’s assets were \$4.5 million and liabilities were \$5.8 million. At December 31, 2022 and 2021, net liabilities of \$1.3 million and \$0.7 million, respectively, were included in other liabilities on the consolidated balance sheets.

19. RELATED PARTY TRANSACTIONS

Green Plains Cattle Company LLC

The company engaged in certain related party transactions with GPCC, which was considered a related party until the fourth quarter of 2020 at which time the company's remaining 50% interest was sold. The company provided a variety of shared services to GPCC, including accounting and finance, payroll and human resources, information technology, legal, communications and treasury activities. The company reduced selling, general and administrative expenses by \$1.2 million related to shared services provided for the year ended December 31, 2020.

Green Plains Trade Group, a subsidiary of the company, enters into certain sale contracts with GPCC during the normal course of business. Related party revenues associated with GPCC were \$8.2 million for the year ended December 31, 2020.

At the time of the sale of GPCC, Mr. Ejnar Knudsen, a member of the company's board of directors, had an indirect ownership interest in GPCC of 0.0736% by reason of his ownership in TGAM Agribusiness Fund LP. Based on the purchase price, the value of that ownership interest is approximately \$0.1 million. Mr. Knudsen also is the CEO and partial owner of AGR Partners LLC (AGR) which provides investment advisory services to TGAM Agribusiness Fund LP pursuant to a sub-advisory agreement between AGR Partners LLC and Nuveen Alternative Advisors LLC, which is the investment manager for TGAM Agribusiness Fund LP.

20. EQUITY METHOD INVESTMENTS

Green Plains Cattle Company LLC

On September 1, 2019, the company formed a joint venture with TGAM and StepStone. Such parties entered into the Second Amended and Restated Limited Liability Company Agreement of GPCC effective as of September 1, 2019. GPCC was previously a wholly owned subsidiary of Green Plains. Green Plains also entered into a Securities Purchase Agreement with TGAM and StepStone, whereby TGAM and StepStone purchased an aggregate of 50% of the membership interests of GPCC from Green Plains. After closing, GPCC was no longer consolidated in the company's consolidated financial statements and the GPCC investment was accounted for using the equity method of accounting.

GPCC conducted the business of the joint venture, including (i) owning and operating the cattle feeding operations (as defined below), and (ii) any other activities approved by GPCC's board of managers. The company did not consolidate any part of the assets or liabilities or operating results of its equity method investee. The company's share of net income or loss in the investee increased or decreased, as applicable, the carrying value of the investment. With respect to GPCC, the company determined that this entity did not represent a variable interest entity and consolidation was not required. In addition, although the company had the ability to exercise significant influence over the joint venture through board representation and voting rights, all significant decisions required the consent of the other investors without regard to economic interest.

On October 1, 2020, the company sold its remaining 50% joint venture interest in GPCC to AGR, TGAM Agribusiness Fund LP and StepStone for \$80.5 million in cash, plus closing adjustments. The transaction resulted in a reduction in other assets of \$69.7 million as a result of removal of the equity method investment in GPCC, and a reduction in accumulated other comprehensive income (loss) of \$10.7 million as a result of the removal of the company's share of equity method investees accumulated other comprehensive loss.

Summarized Financial Information

Our equity method investments totaled \$17.3 million and \$7.2 million at December 31, 2022 and 2021, respectively and are reflected in other assets on the consolidated balance sheets.

Earnings from equity method investments, net of income taxes, were as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Green Plains Cattle Company LLC ⁽¹⁾	\$ —	\$ —	\$ 20,531
All others	71	700	562
Total income from equity method investments, net of income taxes	<u>\$ 71</u>	<u>\$ 700</u>	<u>\$ 21,093</u>
Distributions from equity method investments	<u>\$ 1,150</u>	<u>\$ 1,500</u>	<u>\$ 27,910</u>
Earnings (loss) from equity method investments, net of distributions	<u>\$ (1,079)</u>	<u>\$ (800)</u>	<u>\$ (6,817)</u>

(1) Pretax equity method earnings of GPCC were \$27.0 million for the year ended December 31, 2020.

The company reports its proportional share of equity method investment income in the consolidated statements of operations.

The following table present summarized information of GPCC.

	December 31, 2020 ⁽¹⁾
Total revenues	\$ 747,824
Total operating expenses	693,753
Net income	<u>\$ 54,071</u>

(1) GPCC equity method treatment began on September 1, 2019 and ended on October 1, 2020. As such, fiscal year 2020 includes nine months of GPCC operations.

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Corporate Information

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Owner and President
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Lead Independent Director
Chief Executive Officer Moly-Cop

FARHA ASLAM⁽²⁾
Managing Partner
Crescent House Capital

TODD BECKER
President and Chief Executive Officer
Green Plains Inc. | Green Plains Holdings LLC

EJNAR KNUDSEN
Founder and Chief Executive Officer
AGR Partners

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Whiskey Creek Enterprises

MARTIN SALINAS JR.^{(1),(3)}
Former Chief Financial Officer
Energy Transfer Partners, LP

ALAIN TREUER⁽³⁾
Chairman and Chief Executive Officer
Tellac Reuert Partners SA

KIMBERLY WAGNER^{(1),(3)}
Founder and Managing Partner
TBGD Partners

Member of: (1) Audit Committee, (2) Compensation Committee and/or (3) Nominating and Governance Committee

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JIM STARK
Chief Financial Officer

JAMIE HERBERT
Chief Human Resources Officer

PAUL KOLOMAYA
Chief Accounting Officer

MICHELLE MAPES
Chief Legal & Administration Officer and
Corporate Secretary

PATRICH SIMPKINS
Chief Transformation Officer

GRANT KADAVY
Executive Vice President,
Commercial Operations

CHRIS OSOWSKI
Executive Vice President, Operations
& Technology

LESLIE VAN DER MEULEN
Executive Vice President, Product
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